

# Transportation Monitoring Program - 2010



## Final Report

Prepared for:  
Tulare County Association of  
Governments

Prepared By:

**TRANSPORTATION MONITORING  
PROGRAM – 2010**

**FINAL REPORT**

**Prepared For:  
Tulare County Association of  
Governments (TCAG)**

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## **INTRODUCTION**

Since 1997 the Tulare County Association of Governments (TCAG) has monitored a minimum of 50 intersections per year throughout Tulare County. The monitoring program has assisted local agencies in identifying signalized and stop-controlled intersections that operate at unacceptable levels of service and recommending mitigation measures – such as installing traffic signals, adding lanes, optimizing signal timing/phasing, and identifying stop controlled intersections that meet traffic signal warrants, etc. – to improve operating conditions. In addition, the monitoring program has assisted local agencies that have limited staff and resources to conduct important peak hour intersection turning movement counts and to gather data related to lane geometrics and control and signal timing and phasing.

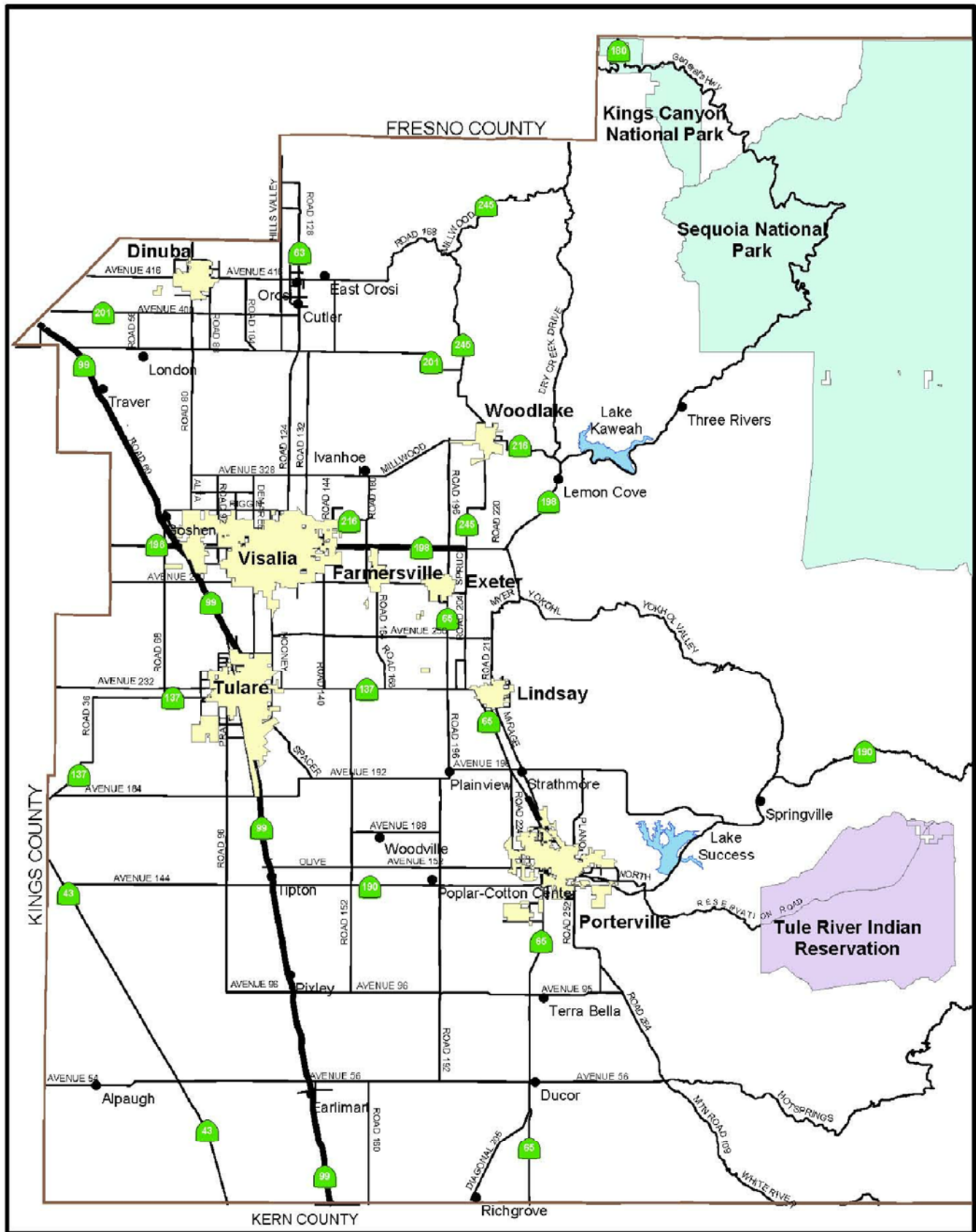
Traffic counts from two-way stop-controlled, all-way stop-controlled and signalized intersections were collected during the PM peak hour and are presented in this report. Typically, the PM peak hour is defined as the one-hour period of peak traffic flow counted between 4:00 and 6:00 PM. Intersection counts include the total number of turning movements, by direction, during the peak 1-hour period. Existing weekday (Tuesday through Thursday) PM peak-hour traffic count locations were identified by various agencies throughout the County as provided in Figure 1.

## **LEVEL OF SERVICE METHODOLOGY – HIGHWAY CAPACITY MANUAL 2000**

Traffic operations have been quantified through determination of “Level of Service” (LOS). LOS is a qualitative measure of traffic operating conditions, whereby a letter grade “A” through “F” is assigned to an intersection or roadway segment representing progressively worsening traffic conditions. LOS is calculated for different intersection control types using the methods documented in the *Highway Capacity Manual 2000*. LOS definitions for different types of intersection controls are outlined in Table 1.

LOS standards vary throughout the County and its eight incorporated cities. The *1995 Tulare County Congestion Management Program (CMP)*, prepared by TCAG, identified that the “minimum” LOS standard within the County shall be no lower than LOS “E” for urban areas and LOS “D” for rural areas. However, each local agency that owns and operates transportation facilities may select a LOS standard more stringent than the minimum LOS standards identified in the CMP. For purposes of this report, a peak-hour LOS of “D” is taken as the threshold for acceptable traffic operations at all study intersections.

Although Caltrans has not designated a LOS standard, Caltrans’ *Guide for the Preparation of Traffic Impact Studies* (December 2002) indicates that Caltrans endeavors to maintain a target LOS at the transition between LOS “C” and LOS “D” on state highway facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than the appropriate target LOS, the existing measures of effectiveness (MOE) should be maintained.



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Figure 1

Vicinity Map



**TABLE 1  
LEVEL-OF-SERVICE CRITERIA  
FOR INTERSECTIONS**

LEVEL OF SERVICE	TYPE OF FLOW	DELAY	MANEUVERABILITY	STOPPED DELAY/VEHICLE (SEC)		
				SIGNALIZED	UNSIGNALIZED	ALL-WAY STOP
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	≤ 10.0	≤ 10.0	≤ 10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10 and ≤ 20.0	>10 and ≤ 15.0	>10 and ≤ 15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted.	>20 and ≤ 35.0	>15 and ≤ 25.0	>15 and ≤ 25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35 and ≤ 55.0	>25 and ≤ 35.0	>25 and ≤ 35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55 and ≤ 80.0	>35 and ≤ 50.0	>35 and ≤ 50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	> 80.0	> 50.0	> 50.0

References: *Highway Capacity Manual 2000, Transportation Research Board*

To determine whether “significance” should be associated with unsignalized intersection LOS, a supplemental traffic signal warrant analysis was also performed. The signal warrant criteria employed for this study are presented in the *Manual on Uniform Traffic Control Devices* (MUTCD). Specifically, this study utilized the Peak-Hour-Volume Warrant 3. Though utilization of this warrant may indicate that signalization would be required, the final decision to provide this improvement should be based on further studies utilizing additional warrants presented in the MUTCD.

## **EXISTING TRAFFIC OPERATIONS**

“Existing” peak-hour intersection traffic operations were quantified applying existing traffic volumes and existing intersection lane geometrics and control. Existing traffic volumes and lane geometrics and control are shown alphabetically by jurisdiction in Figures 2-13.

Table 2 presents the “Existing” peak hour intersection LOS. In this study, a general Peak Hour Factor (PHF) of 0.92 has been applied to the analysis of all study intersections. For all non-state highway intersection locations, a heavy-duty vehicle factor of 3% was utilized. Actual truck percentages for state highway intersections were obtained from the 2009 Caltrans traffic data. As shown in Table 2, five intersections are currently operating at LOS “E” or worse conditions during the PM peak hour period and the intersections at Bardsley Avenue/State Route 99 SB Ramps and Millcreek Drive/Demaree Street meet the MUTCD Peak-Hour Volume Warrant. However, mitigation measures are not recommended at Millcreek Drive/Demaree Street since it operates at an acceptable LOS.

All mitigation measures are discussed in a subsequent section of this report.

**TABLE 2  
EXISTING PM PEAK HOUR CONDITIONS:  
INTERSECTION LEVELS-OF-SERVICE**

No	Intersection	Jurisdiction	Control Type	PM Peak Hour		
				Delay (sec/veh)	LOS	Warrant Met?
1	Nebraska Avenue/Alta Avenue	Dinuba	Signal	21.7	C	--
2	El Monte Way/Road 64	Dinuba	OWSC	22.1	C	No
3	El Monte Way/Road 72	Dinuba	Signal	16.7	B	--
4	El Monte Way/Perry Avenue/Tulare Avenue	Dinuba	Signal	19.6	B	--
5	El Monte Way/Crawford Avenue	Dinuba	Signal	31.2	C	--
6	Kamm Avenue/Alta Avenue	Dinuba	Signal	20.8	C	--
7	Noble Avenue/Farmersville Boulevard	Farmersville	OWSC	12.5	B	No
8	Walnut Avenue/Farmersville Boulevard	Farmersville	Signal	29.8	C	--
9	Visalia Road/Farmersville Boulevard	Farmersville	Signal	29.1	C	--
10	State Route 65/Tulare Road	Lindsay	OWSC	25.3	D	No
11	Hermosa Street/State Route 65	Lindsay	Signal	23.9	C	--
12	Hermosa Street/Westwood Avenue	Lindsay	TWSC	19.1	C	No
<b>13</b>	<b>Lindmore Street/State Route 65</b>	<b>Lindsay</b>	<b>TWSC</b>	<b>43.7</b>	<b>E</b>	<b>No</b>
14	Lindmore Street/Lindsay Boulevard	Lindsay	TWSC	10.3	B	No
15	Lindmore Street/Mirage Avenue	Lindsay	TWSC	12.6	B	No
16	Lindmore Street/Harvard Avenue	Lindsay	TWSC	10.5	B	No
17	Olive Avenue/Porter Road	Porterville	Signal	10.1	B	--
18	Cartmill Avenue/Hillman Street	Tulare	Signal	41.9	D	--
<b>19</b>	<b>Tulare Avenue/State Route 99 SB Ramps</b>	<b>Tulare</b>	<b>OWSC</b>	<b>49.0</b>	<b>E</b>	<b>No</b>
<b>20</b>	<b>Tulare Avenue/State Route 99 NB Ramps</b>	<b>Tulare</b>	<b>TWSC</b>	<b>OVRFL</b>	<b>F</b>	<b>No</b>

*Legend:*

*TWSC = Two-Way-Stop Control.*

*OWSC = One-Way-Stop Control.*

*AWSC = All-Way-Stop Control.*

*Average Delay = Average Intersection Delay for Signalized and AWSC Intersections.*

*Average Delay = Worst-Case Intersection Movement Delay for TWSC Intersections.*

*LOS = Average Intersection Level-of-Service for Signalized and AWSC Intersections.*

*LOS = Worst-Case Movement's Level-of-Service for TWSC Intersections.*

*Warrant = MUTCD Peak-Hour Warrant-3.*

**TABLE 2 (CONTINUED)  
EXISTING PM PEAK HOUR CONDITIONS:  
INTERSECTION LEVELS-OF-SERVICE**

No	Intersection	Jurisdiction	Control Type	PM Peak Hour		
				Delay (sec/veh)	LOS	Warrant Met?
21	Tulare Avenue/Oakmore Street	Tulare	TWSC	21.8	C	No
<b>22</b>	<b>Bardsley Avenue/State Route 99 SB Ramps</b>	<b>Tulare</b>	<b>OWSC</b>	<b>53.6</b>	<b>F</b>	<b>Yes</b>
<b>23</b>	<b>Bardsley Avenue/State Route 99 NB Ramps</b>	<b>Tulare</b>	<b>OWSC</b>	<b>48.3</b>	<b>E</b>	<b>No</b>
24	Bardsley Avenue/Oakmore Street	Tulare	OWSC	9.5	A	No
25	Avenue 416/Road 144	County	TWSC	9.2	A	No
26	Avenue 288/Road 180	County	AWSC	10.5	B	No
27	Avenue 256/Road 164	County	AWSC	8.4	A	No
28	Avenue 232/Road 68	County	TWSC	12.7	B	No
29	Avenue 228/Road 124	County	OWSC	9.0	A	No
30	Avenue 192/Road 152	County	AWSC	8.5	A	No
31	Avenue 192/Road 196	County	TWSC	11.7	B	No
32	Avenue 144/Road 152	County	TWSC	10.9	B	No
33	Avenue 128/Road 208	County	TWSC	9.9	A	No
34	Avenue 96/Road 208	County	TWSC	9.7	A	No
35	County Line Road/Road 152	County	AWSC	11.4	B	No
36	Riggin Avenue/County Center Drive	Visalia	TWSC	25.2	D	No
37	Houston Avenue/County Center Drive	Visalia	TWSC	16.6	C	No
38	Houston Avenue/Divisadero Street	Visalia	Signal	27.6	C	--
39	Houston Avenue/Giddings Street	Visalia	Signal	29.3	C	--
40	Houston Avenue/Jacob Street	Visalia	TWSC	22.3	C	No

*Legend:*

TWSC = Two-Way-Stop Control.

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AWSC = All-Way-Stop Control.

Average Delay = Average Intersection Delay for Signalized and AWSC Intersections.

Average Delay = Worst-Case Intersection Movement Delay for TWSC Intersections.

LOS = Average Intersection Level-of-Service for Signalized and AWSC Intersections.

LOS = Worst-Case Movement's Level-of-Service for TWSC Intersections.

Warrant = MUTCD Peak-Hour Warrant-3.

**TABLE 2 (CONTINUED)  
EXISTING PM PEAK HOUR CONDITIONS:  
INTERSECTION LEVELS-OF-SERVICE**

No	Intersection	Jurisdiction	Control Type	PM Peak Hour		
				Delay (sec/veh)	LOS	Warrant Met?
41	Goshen Avenue/Chinowith Street	Visalia	OWSC	17.7	C	No
42	Goshen Avenue/Demaree Street	Visalia	Signal	33.9	C	--
43	Hurley Avenue/Shirk Road	Visalia	AWSC	19.9	C	No
44	Millcreek Drive/Demaree Street	Visalia	AWSC	24.4	C	<b>Yes</b>
45	Walnut Avenue/Chinowith Street	Visalia	Signal	17.7	B	--
46	Walnut Avenue/Demaree Street	Visalia	Signal	30.9	C	--
47	Walnut Avenue/McAuliff Street	Visalia	TWSC	15.9	C	No
48	Caldwell Avenue/Court Street	Visalia	Signal	33.4	C	--
49	Caldwell Avenue/Lovers Lane	Visalia	Signal	31.1	C	--
50	Whitney Avenue/State Route 245	Woodlake	TWSC	13.5	B	No

*Legend:*

*TWSC = Two-Way-Stop Control.*

*OWSC = One-Way-Stop Control.*

*AWSC = All-Way-Stop Control.*

*Average Delay = Average Intersection Delay for Signalized and AWSC Intersections.*

*Average Delay = Worst-Case Intersection Movement Delay for TWSC Intersections.*

*LOS = Average Intersection Level-of-Service for Signalized and AWSC Intersections.*

*LOS = Worst-Case Movement's Level-of-Service for TWSC Intersections.*

*Warrant = MUTCD Peak-Hour Warrant-3.*

## RECOMMENDED MITIGATION MEASURES

This section presents a list of recommended mitigation measures at the study intersections based on the results of the analysis presented in this report. As presented in Table 3, all study intersections will operate at acceptable LOS conditions with implementation of the recommended mitigation measures identified below.

It should be noted the mitigation suggested in this report recommends the installation of traffic signals in various locations; although the installation of a traffic signal may improve the overall delay of an intersection, other factors such as spacing from adjacent intersections may need to be considered before implementation. The construction of a roundabout at these locations may also relieve congestion. For closely spaced intersections, signal coordination projects should be considered.

*Lindmore Street/State Route 65* intersection: Based on the recorded volumes the minor approach volumes of the intersection (Lindmore Street) are being delayed because the critical gap is limited on State Route 65 due to the high traffic volumes. Installation of a traffic signal with permitted phasing on the eastbound and westbound approaches would correct the delay on Lindmore Street but worsen the delay on State Route 65. Therefore, a traffic signal is not recommended on this expressway under current conditions.

*State Route 137 (Tulare Avenue)/State Route 99 SB Ramps* intersection: Install a traffic signal. The installation of a traffic signal would further improve the intersection based upon delay and queuing. This intersection currently operates at LOS “E” conditions during the PM peak hour. Implementation of a traffic signal would result in LOS “B” operating conditions.

*State Route 137 (Tulare Avenue)/State Route 99 NB Ramps* intersection: Install a traffic signal with permitted phasing on the northbound and southbound approaches. This intersection currently operates at LOS “F” conditions during the PM peak hour. Implementation of the recommended mitigation measure will result in LOS “B” operating conditions with improved traffic flow.

*Bardsley Avenue/State Route 99 SB Ramps* intersection: Based of the traffic data collected, vehicles exiting southbound State Route 99 are restricted with a shared left-thru-right lane. Addition of a dedicated right turn lane would improve traffic to a LOS “D” for that intersection. Installation of a traffic signal would further improve the intersection. This intersection currently operates at LOS “E” conditions during the PM peak hour. Implementation of a traffic signal would result in LOS “B” operating conditions.

*Bardsley Avenue/State Route 99 NB Ramps* intersection: Install a traffic signal. This intersection currently operates at LOS “E” conditions during the PM peak hour. If the traffic signal is installed, consideration should be given to widening the approaches to accommodate additional lanes based upon traffic volumes. Implementation of the recommended mitigation measure will result in LOS “B” operating conditions.

**TABLE 3  
MITIGATION MEASURES:  
INTERSECTION LEVELS-OF-SERVICE**

No	Intersection	Jurisdiction	Control Type	PM Peak Hour		
				Delay (sec/veh)	LOS	Warrant Met?
19	Tulare Avenue/State Route 99 SB Ramps	Tulare	Signal	10.4	B	--
20	Tulare Avenue/State Route 99 NB Ramps	Tulare	Signal	12.2	B	--
22	Bardsley Avenue/State Route 99 SB Ramps	Tulare	Signal	15.1	B	--
23	Bardsley Avenue/State Route 99 NB Ramps	Tulare	Signal	14.2	B	--

*Legend:*

*TWSC = Two-Way-Stop Control.*

*OWSC = One-Way-Stop Control.*

*AWSC = All-Way-Stop Control.*

*Average Delay = Average Intersection Delay for Signalized and AWSC Intersections.*

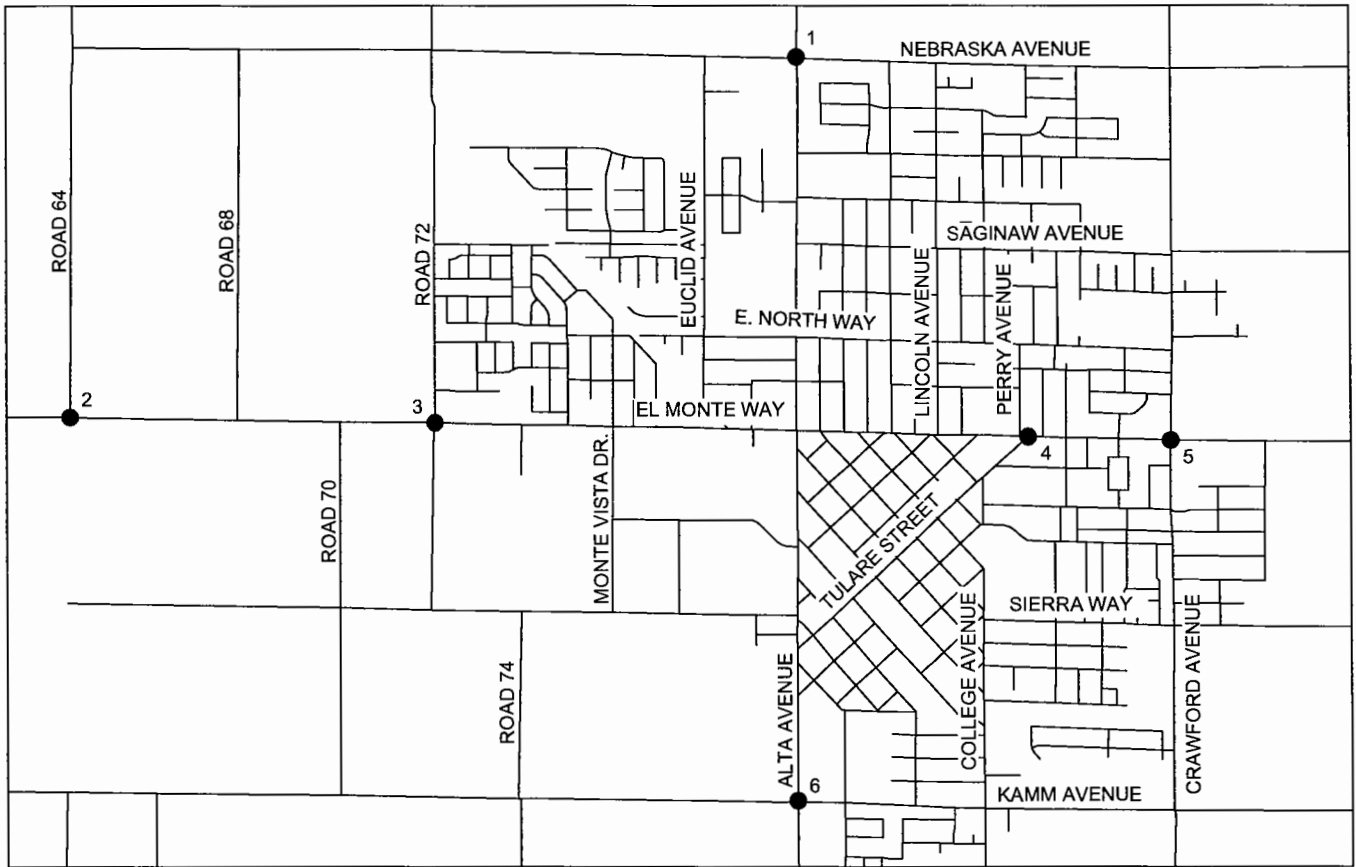
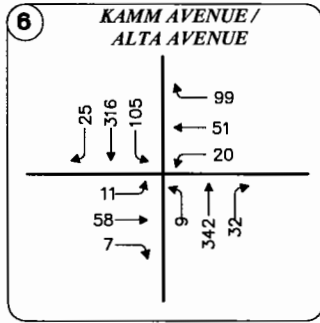
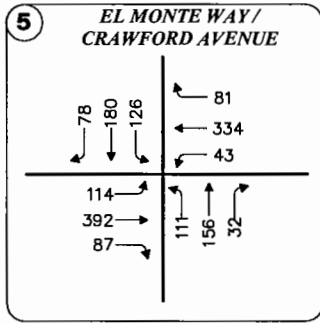
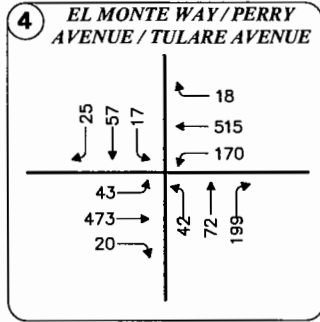
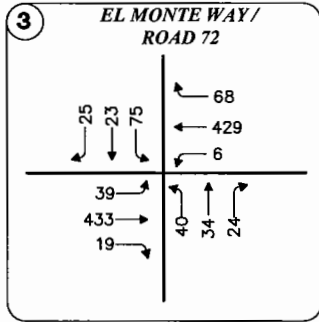
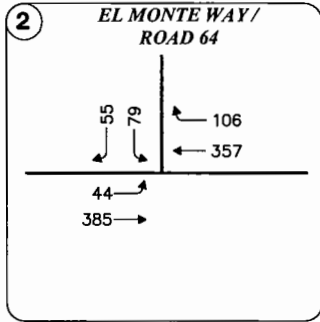
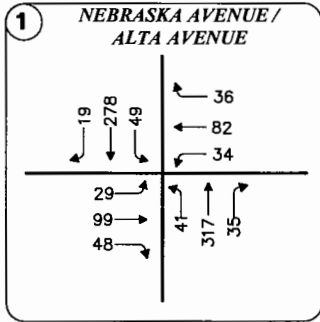
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*LOS = Worst-Case Movement's Level-of-Service for TWSC Intersections.*

*Warrant = MUTCD Peak-Hour Warrant-3.*

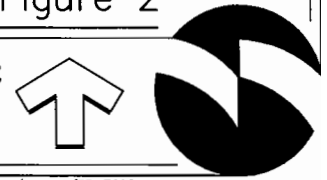
As indicated in Table 3, all of the study intersections are projected to operate at LOS “B” or better conditions with implementation of the recommended mitigation measures.

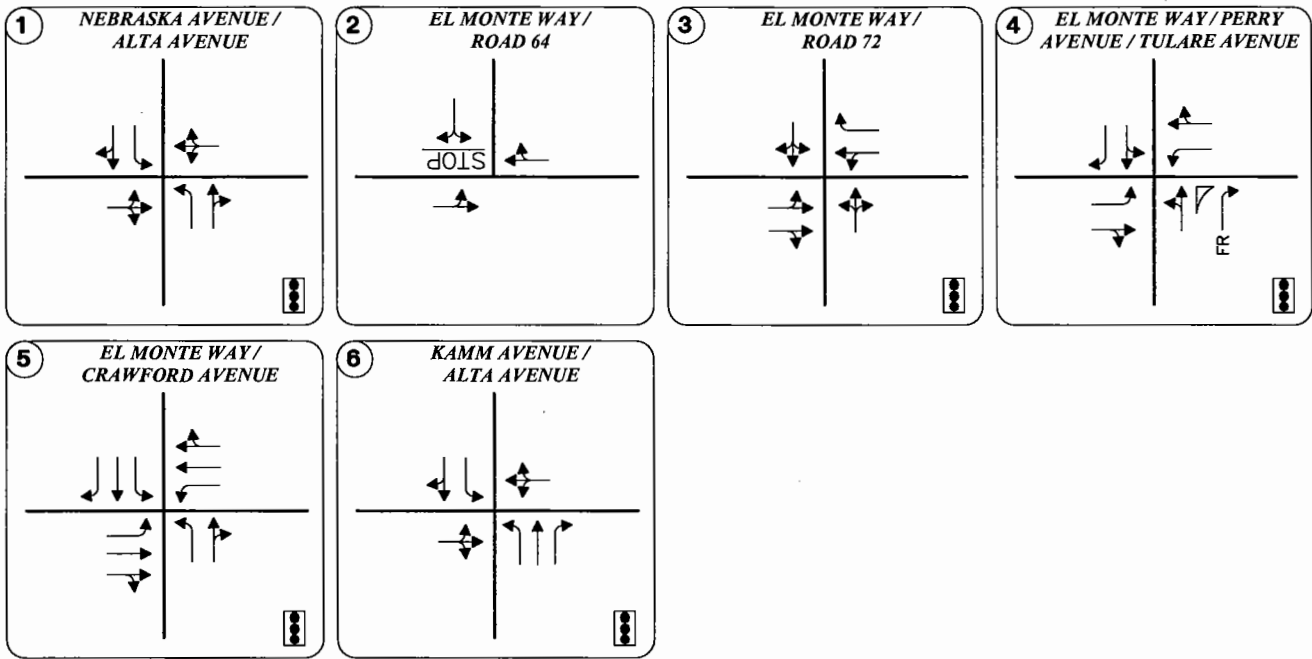


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Figure 2

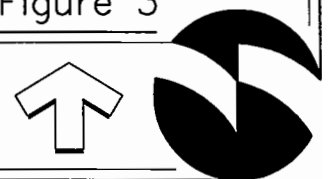
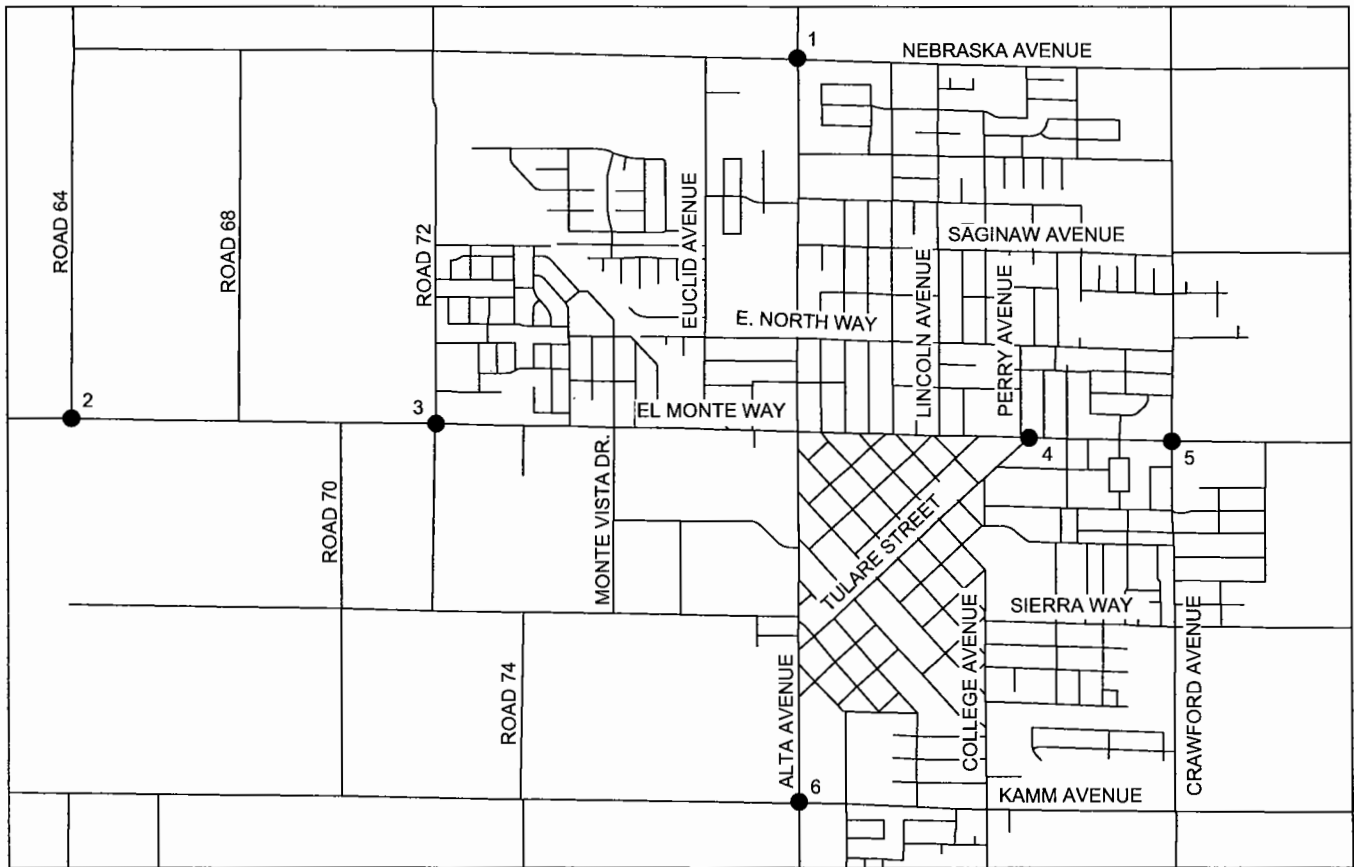
**City of Dinuba - PM Peak Hour Traffic Volumes**

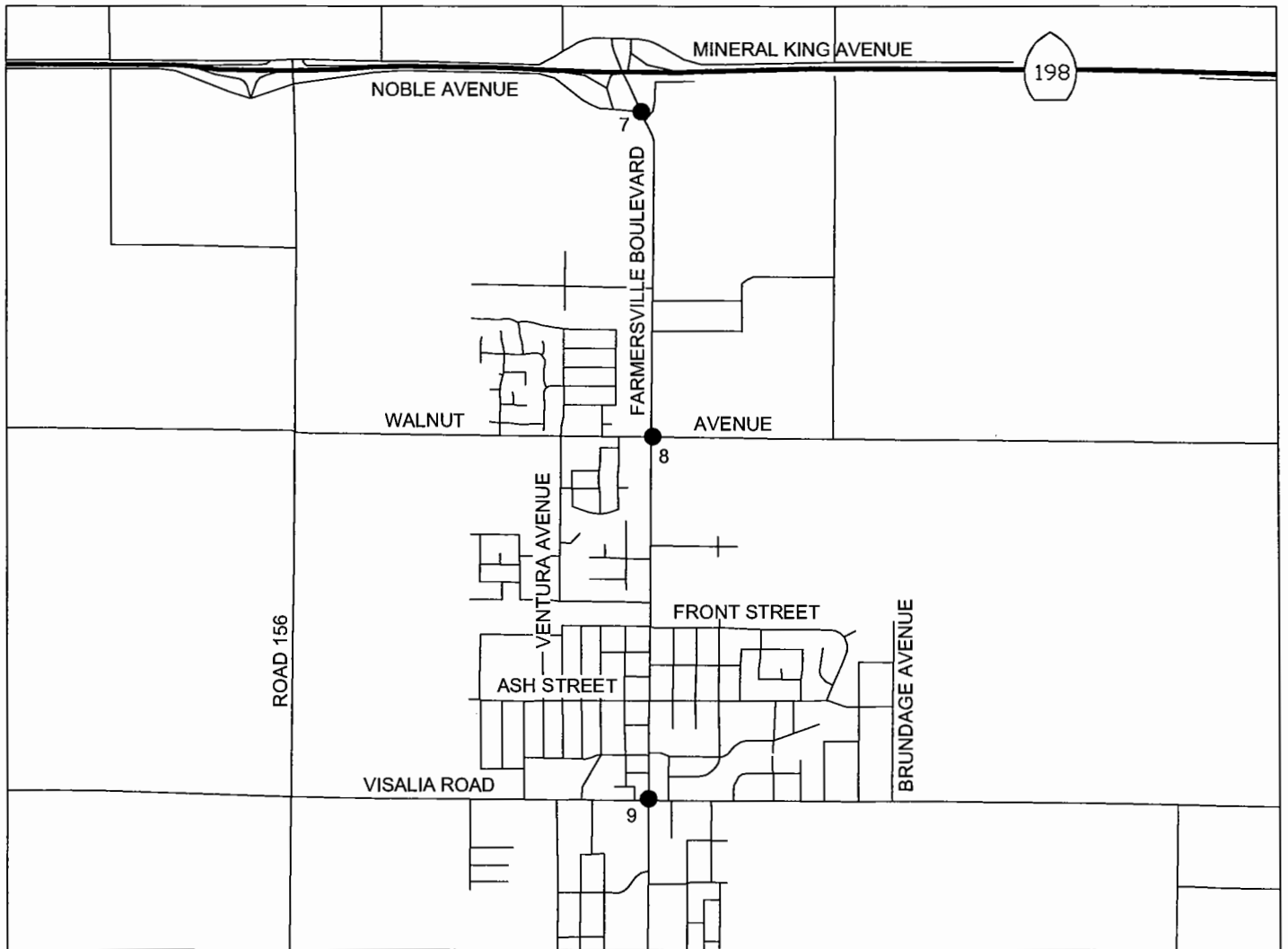
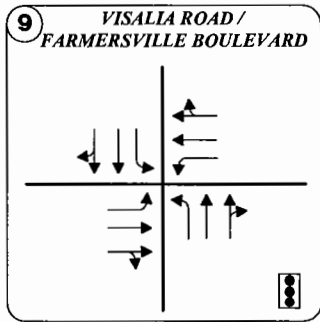
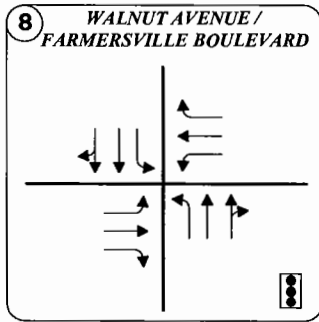
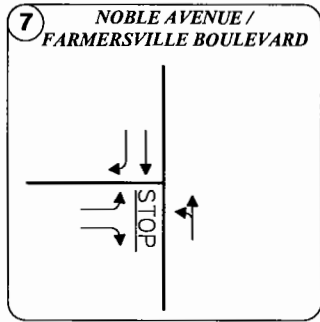
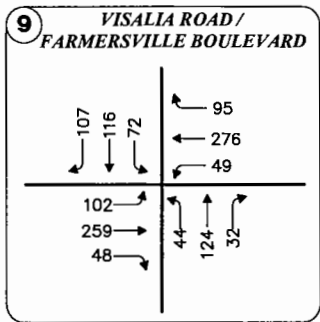
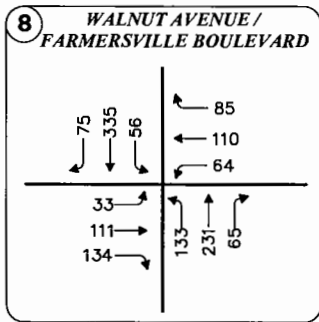
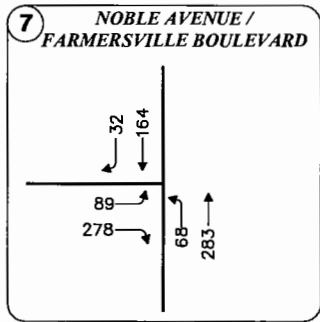




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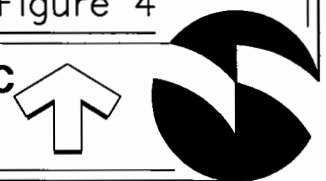


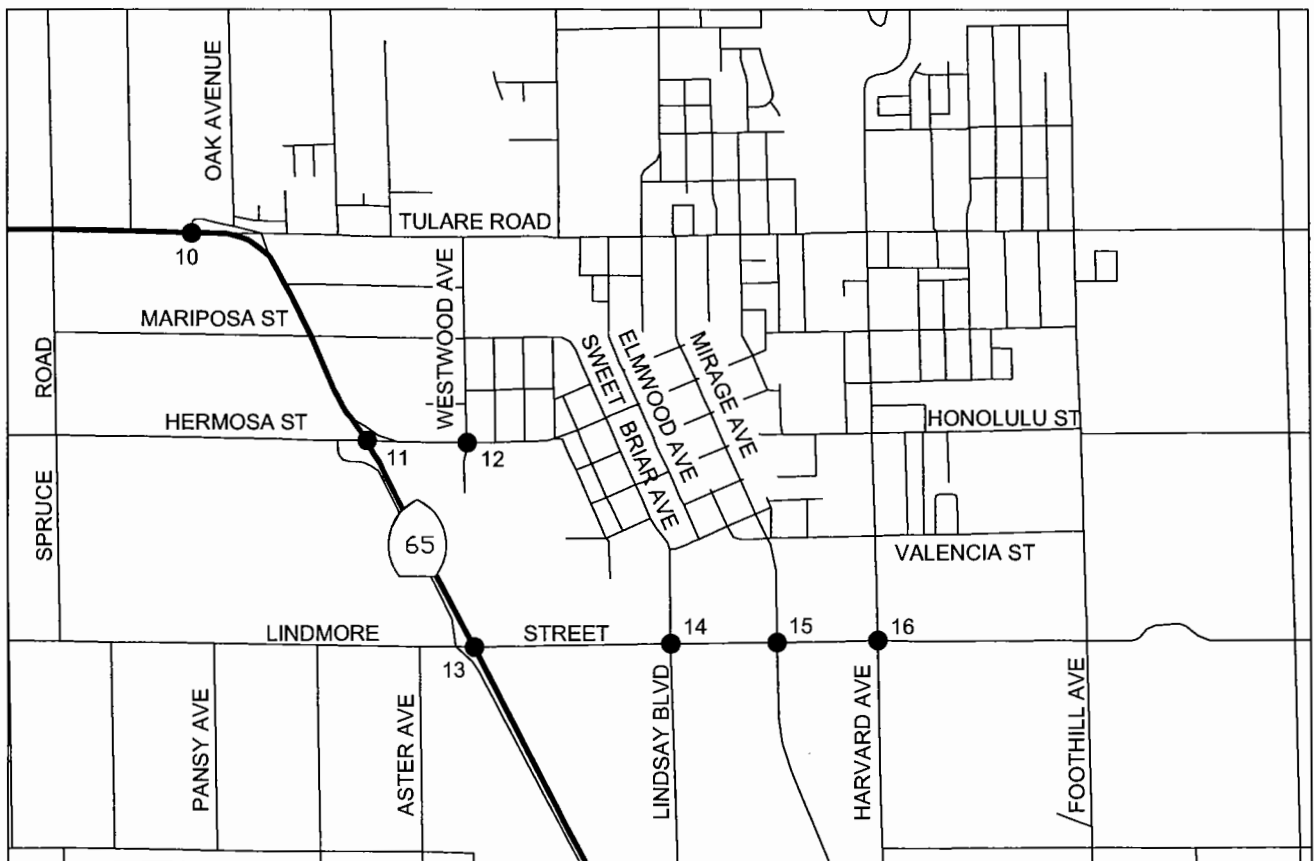
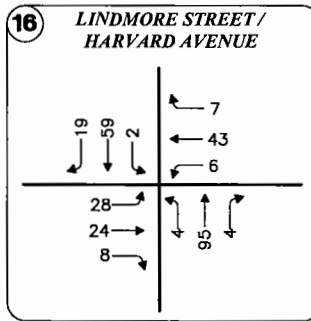
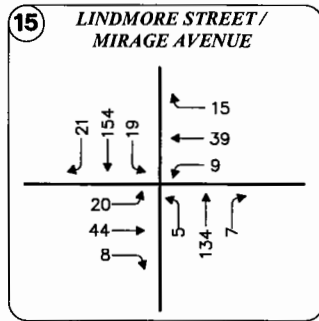
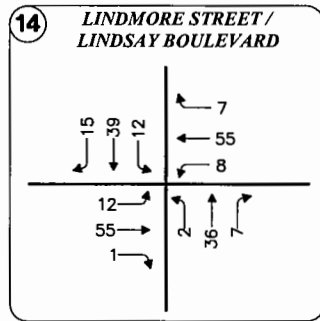
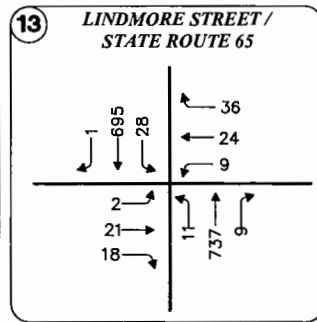
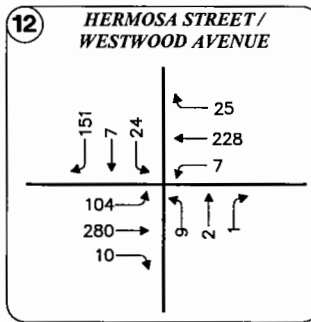
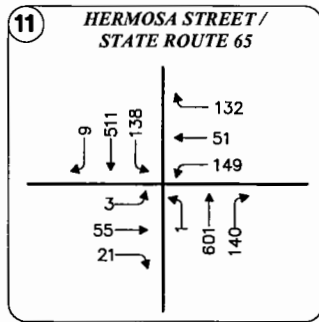
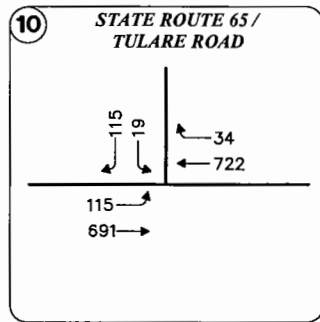


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Figure 4

**City of Farmersville - PM Peak Hour Traffic Volumes, Lane Geometrics and Control**



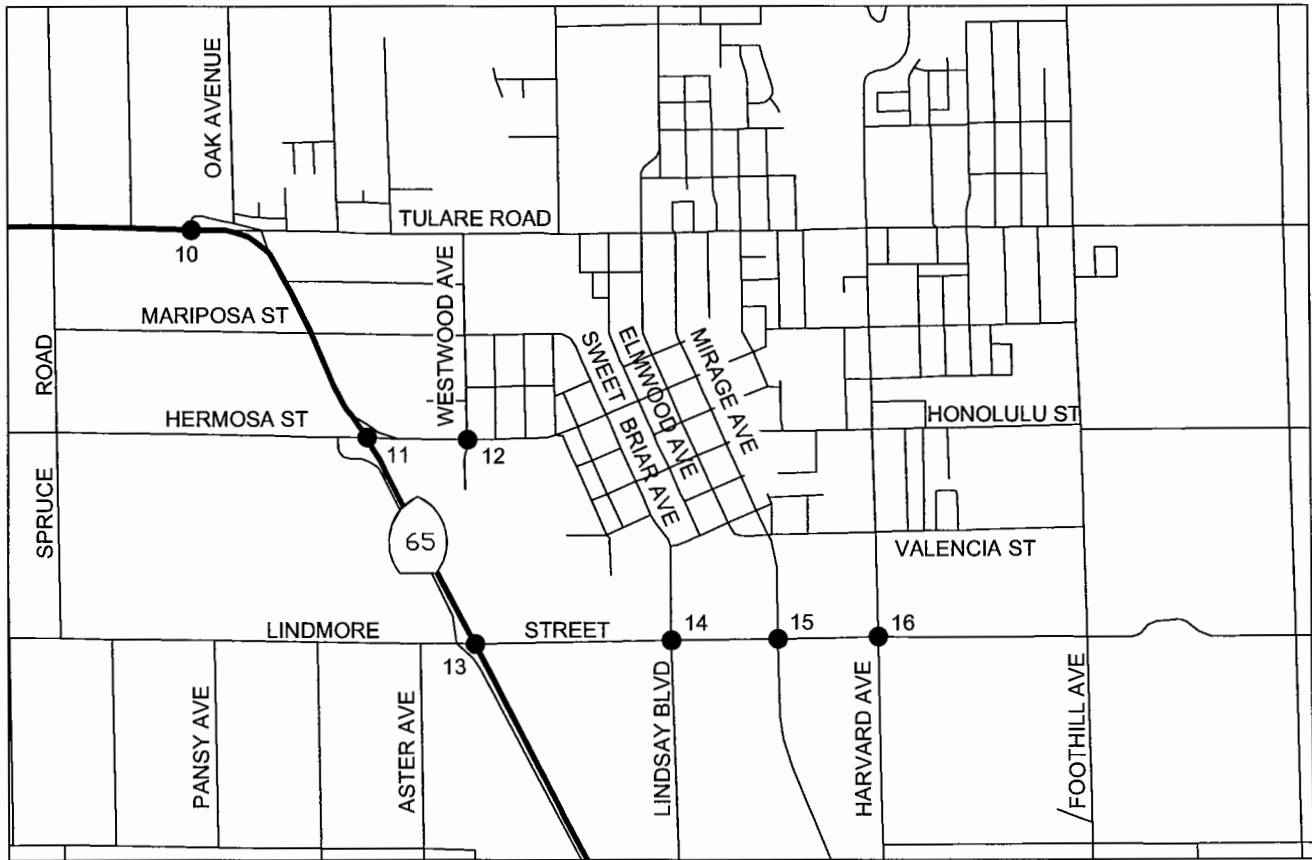
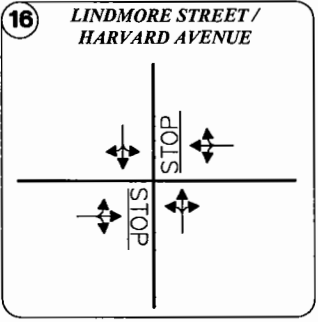
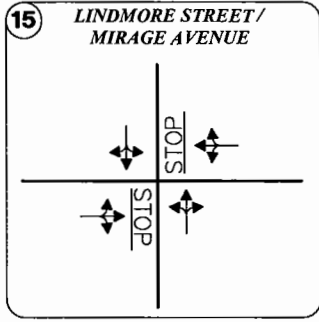
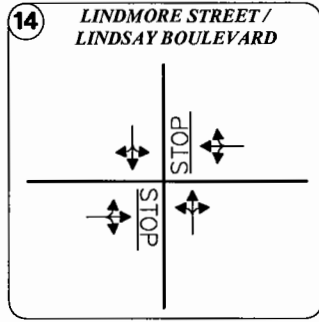
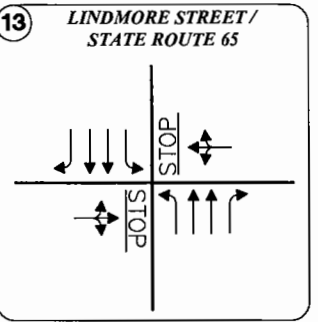
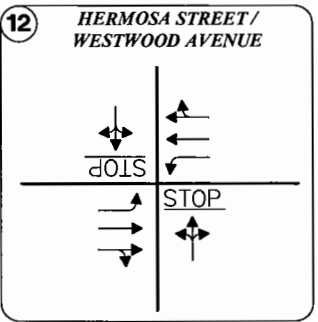
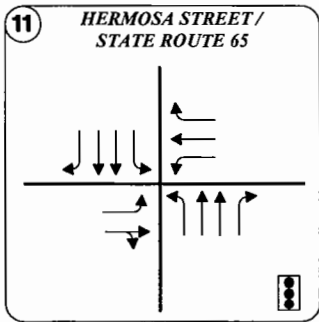
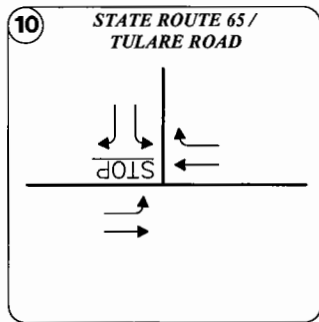


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Figure 5

**City of Lindsay - PM Peak Hour Traffic Volumes**



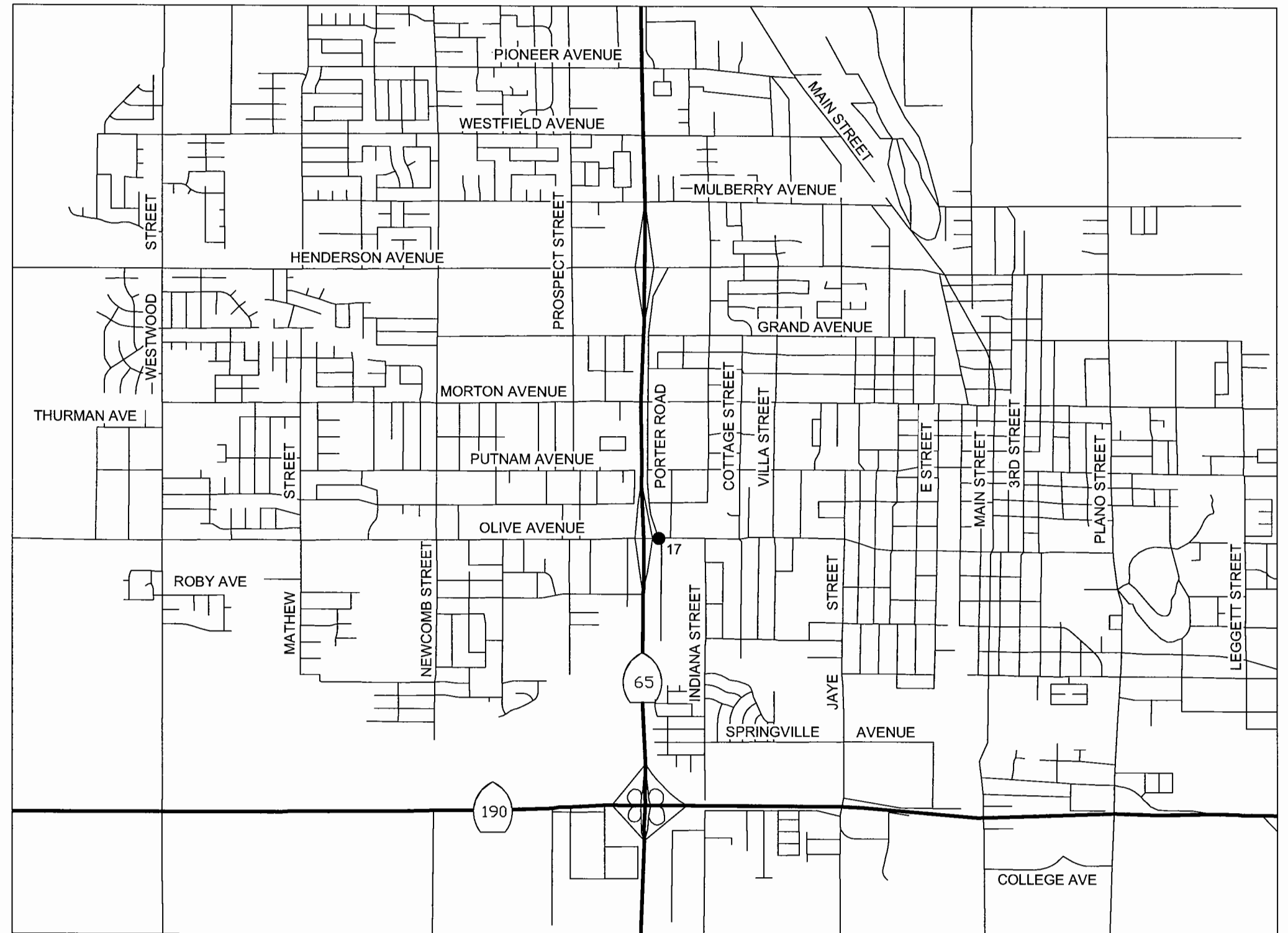
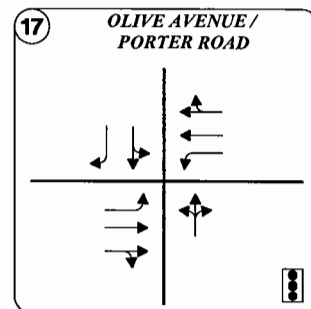
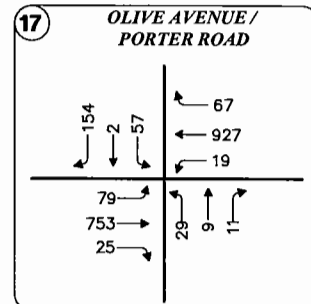


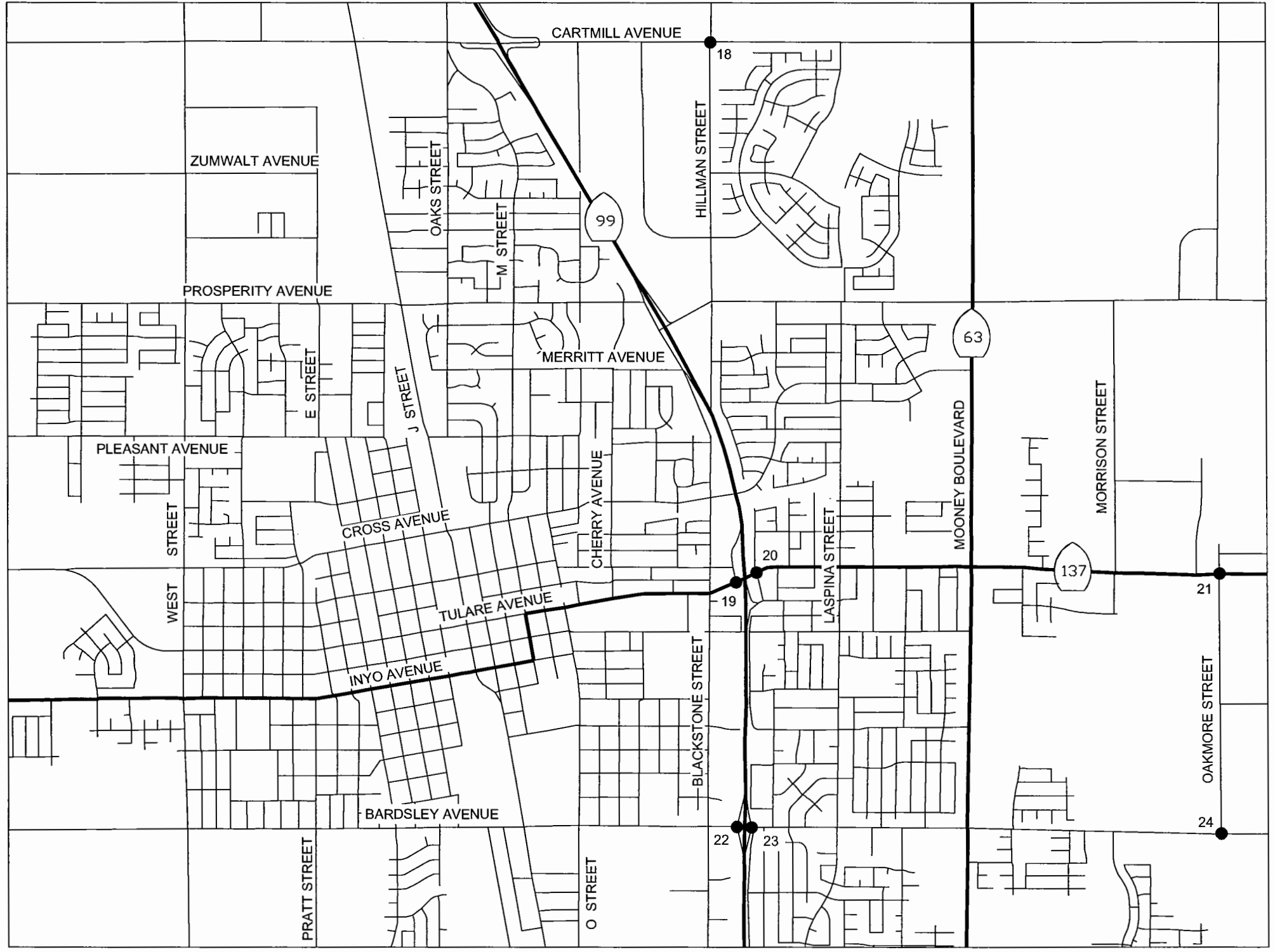
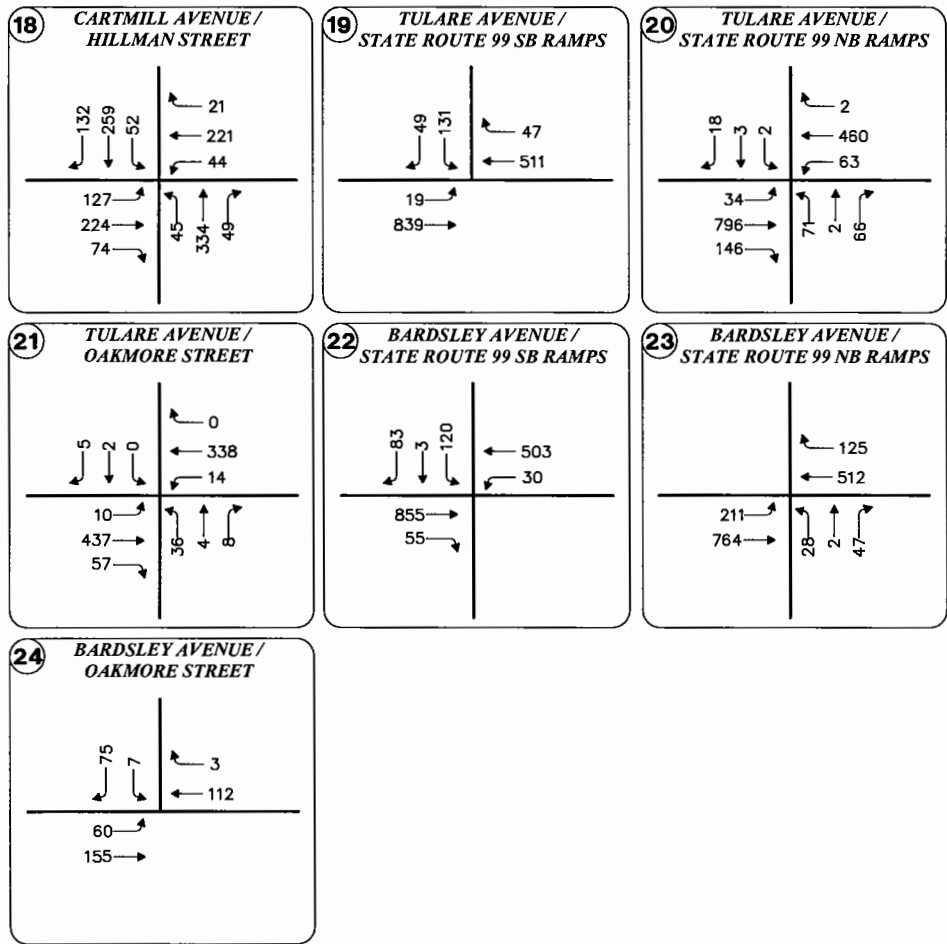
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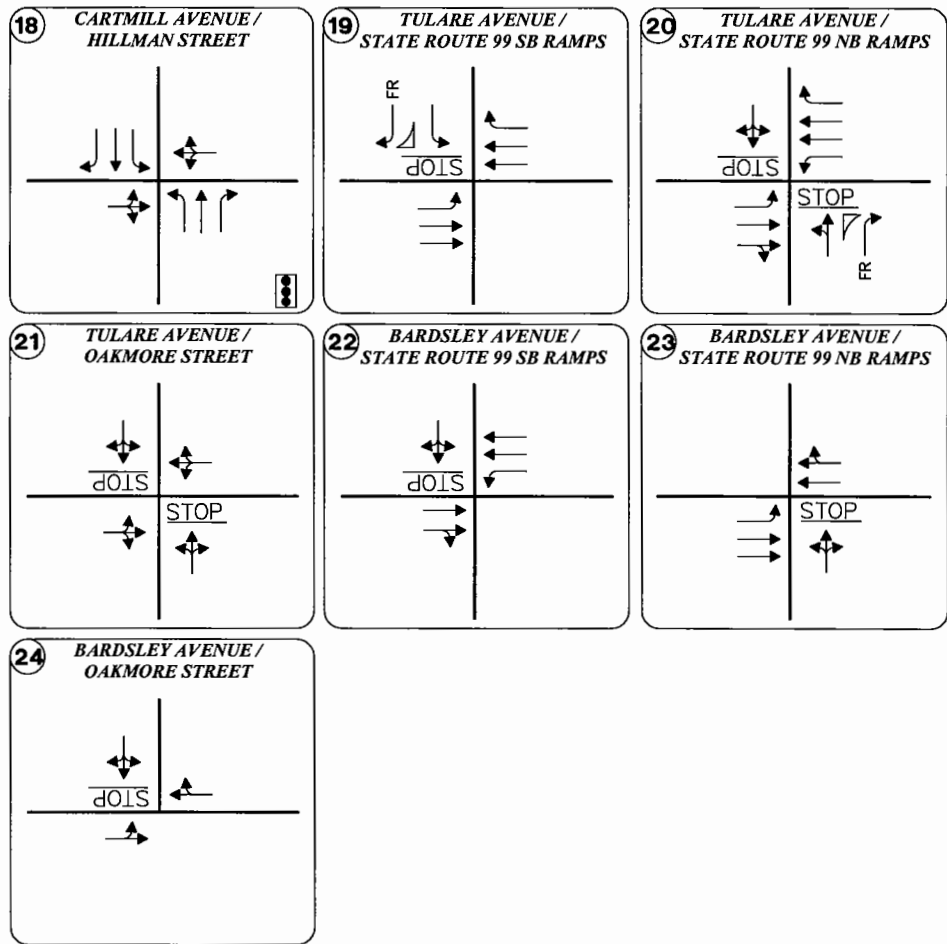
Figure 6

City of Lindsay - Lane Geometrics and Control





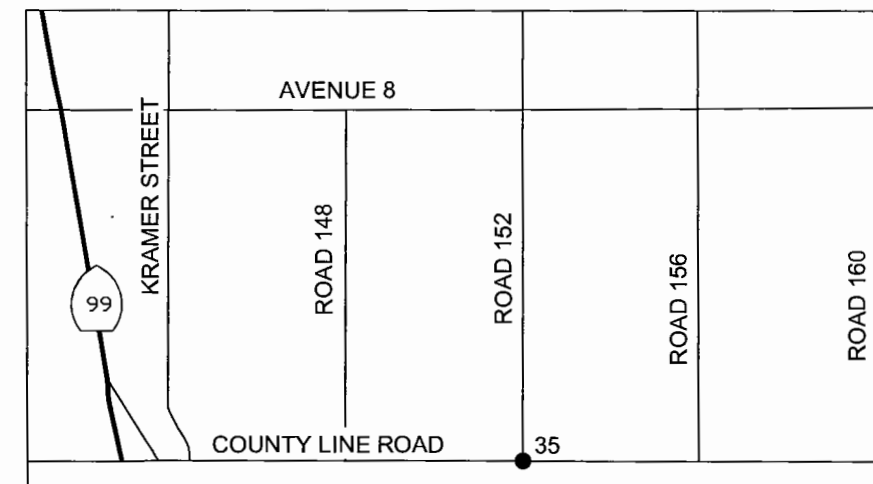
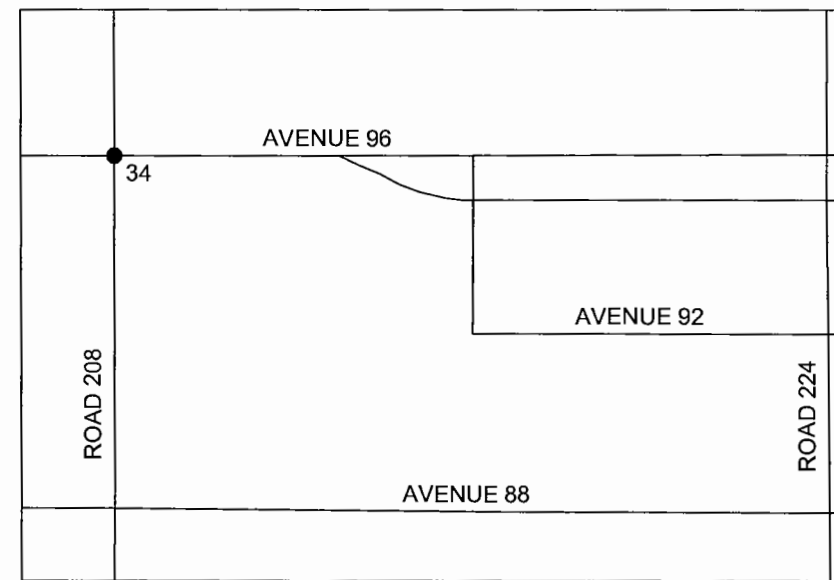
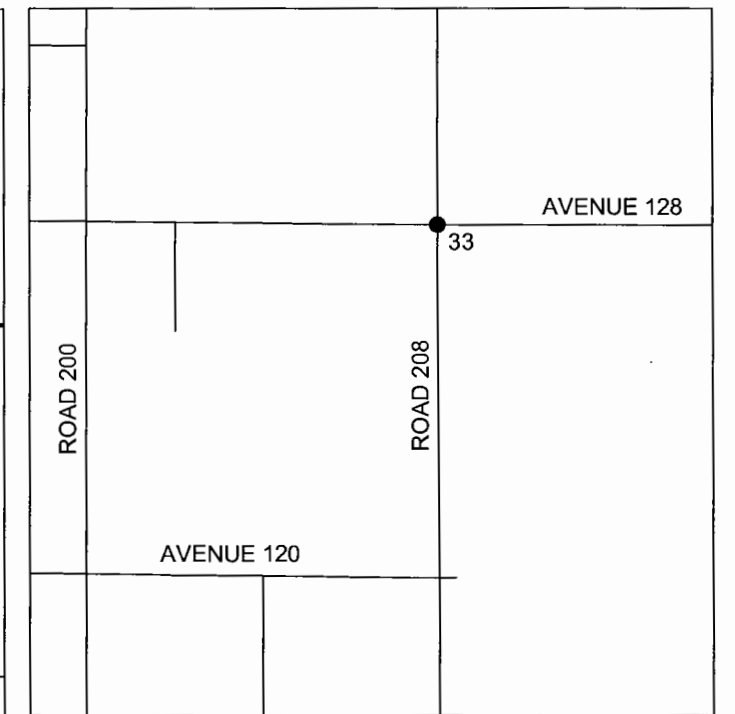
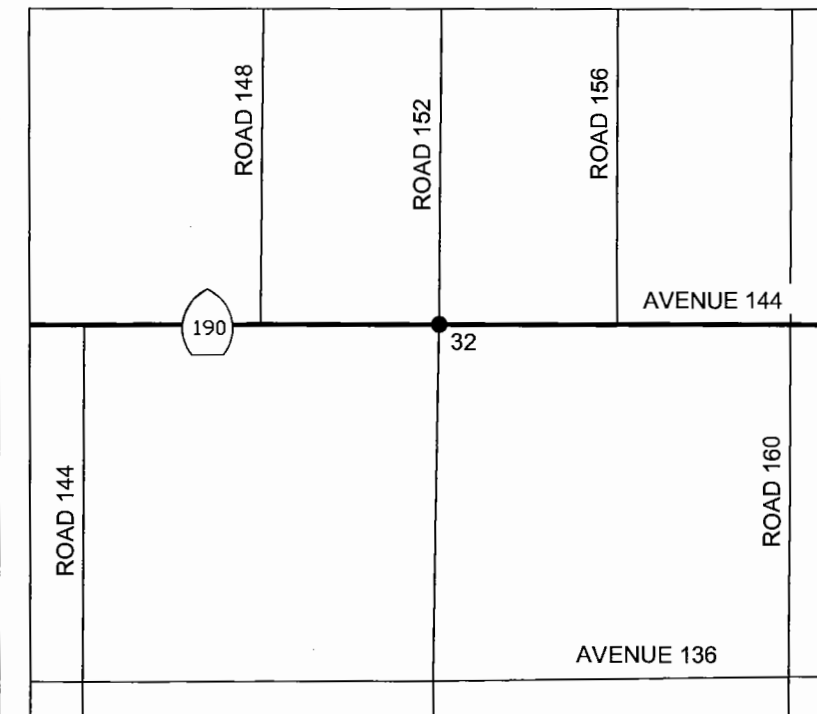
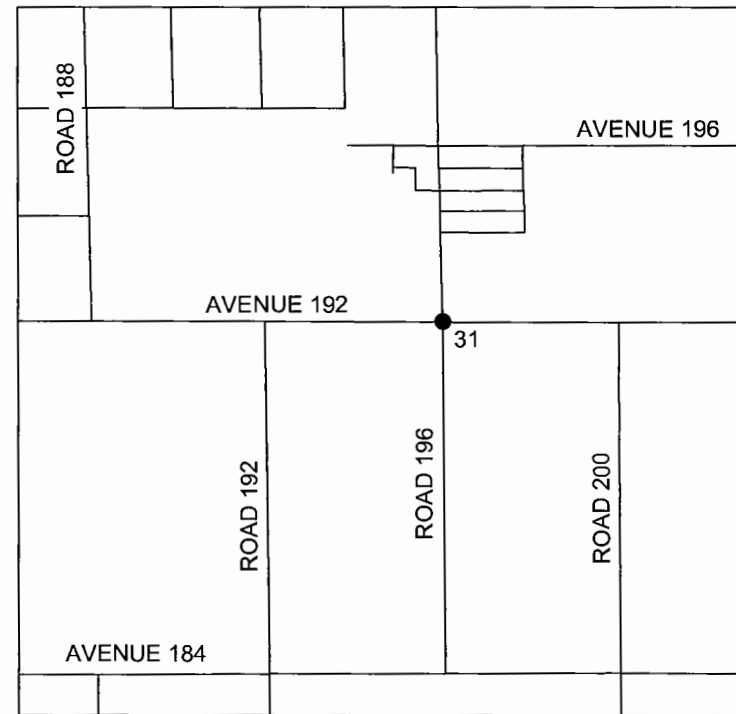
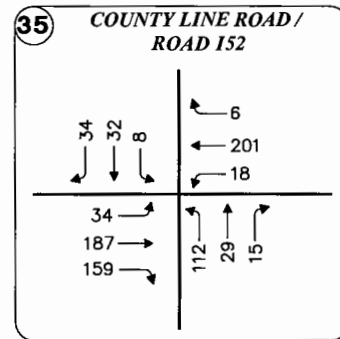
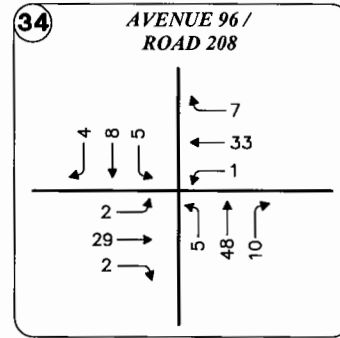
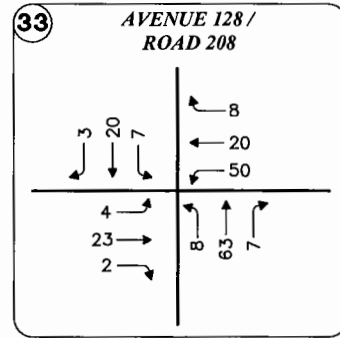
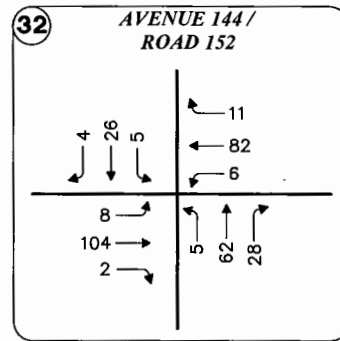
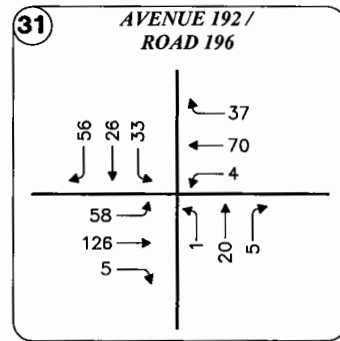




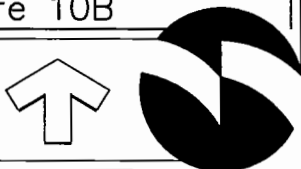
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FR - FREE RIGHT

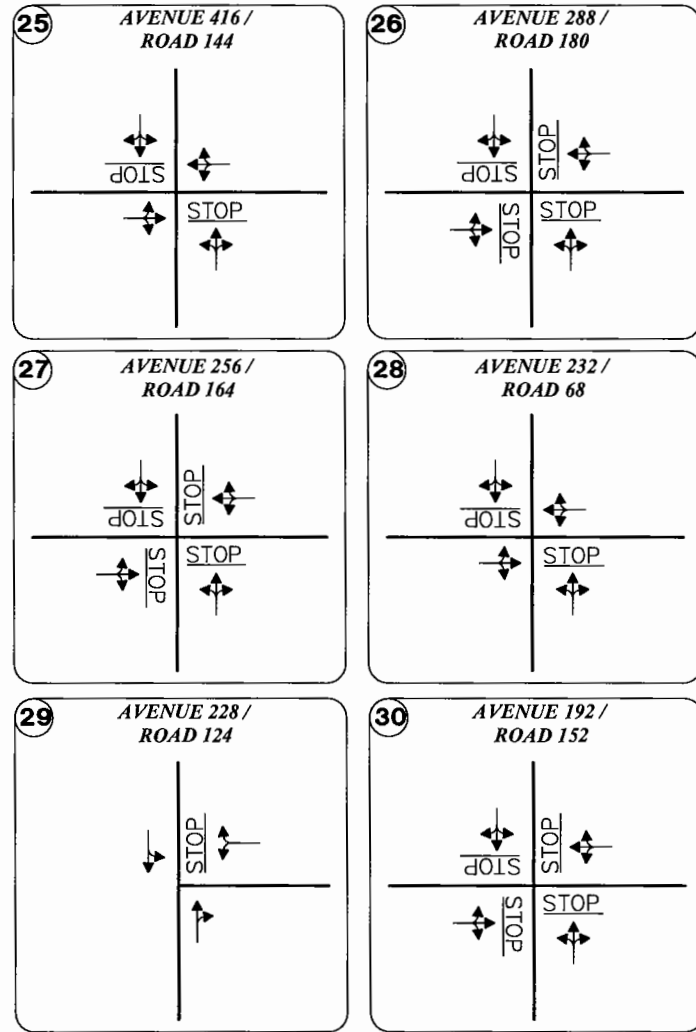


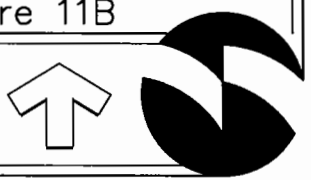
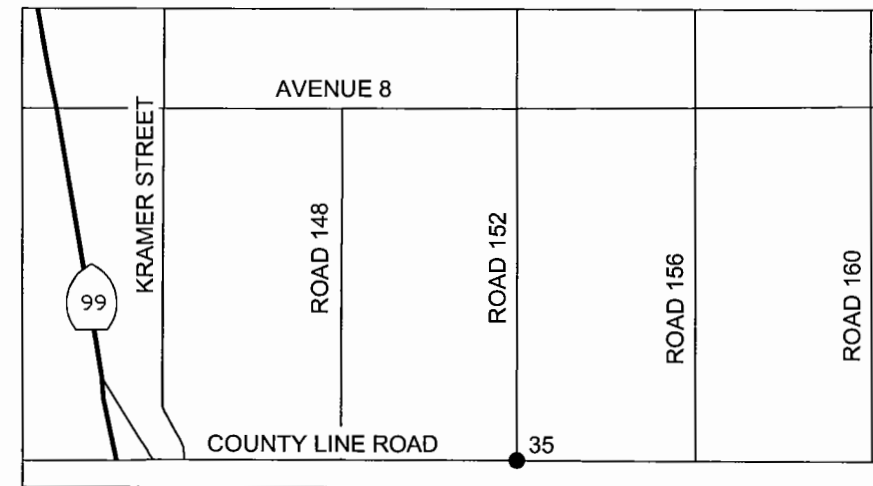
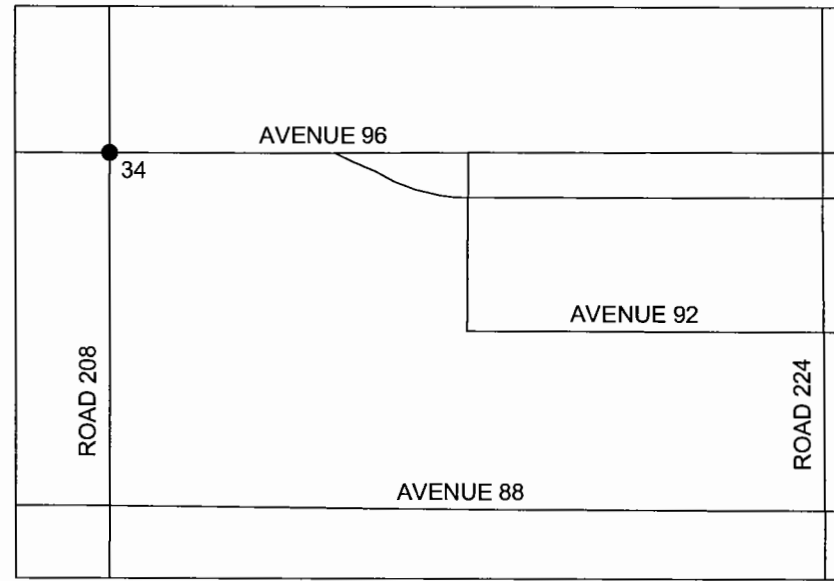
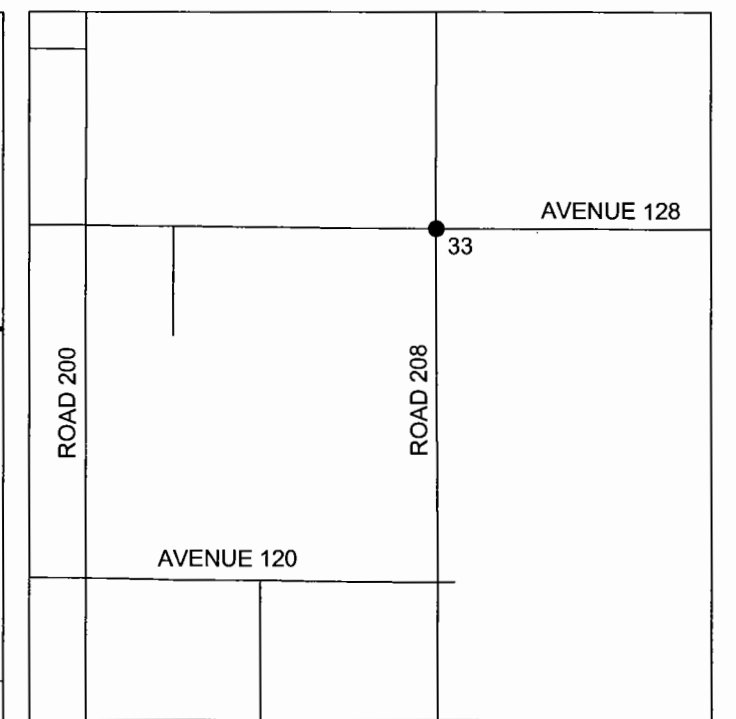
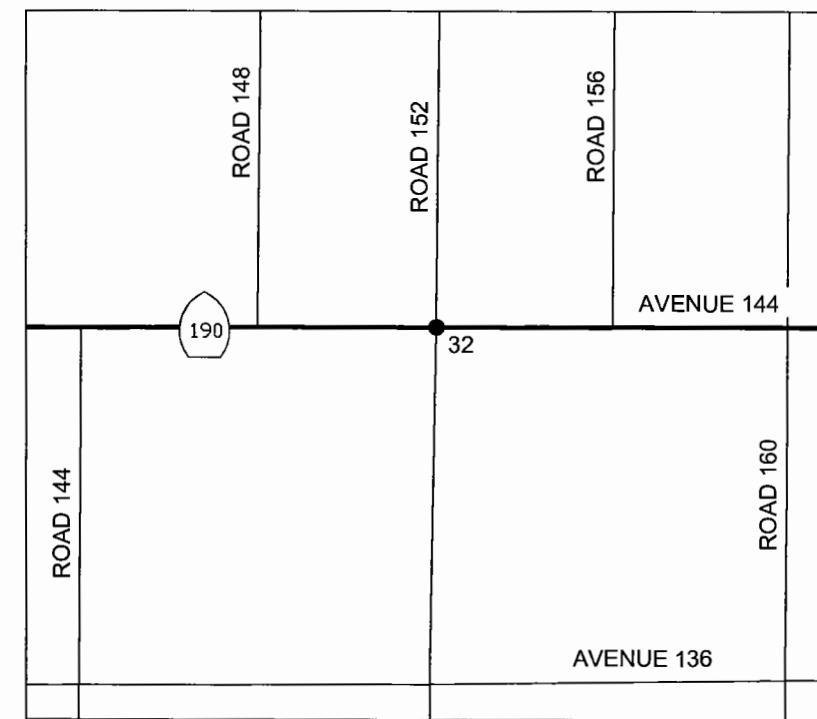
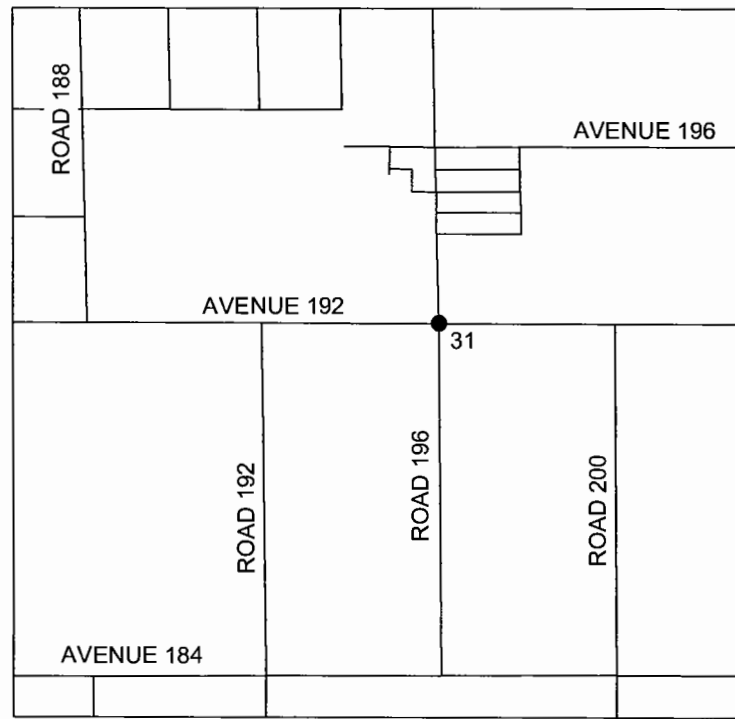
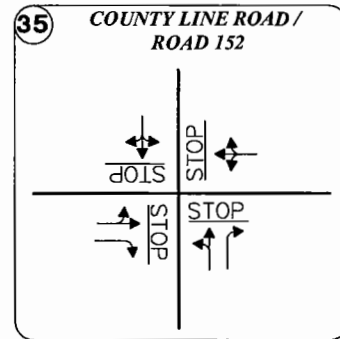
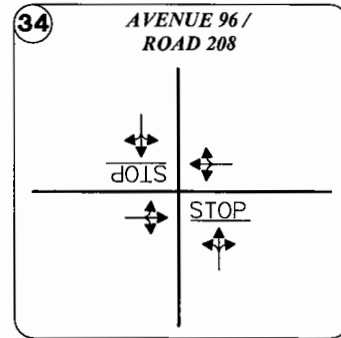
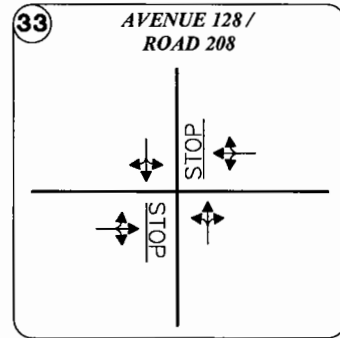
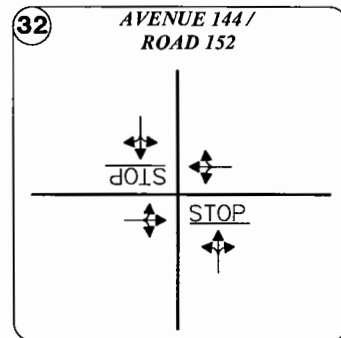
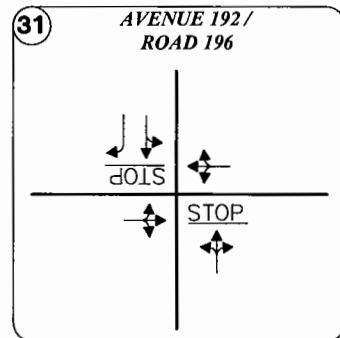


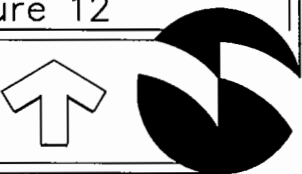
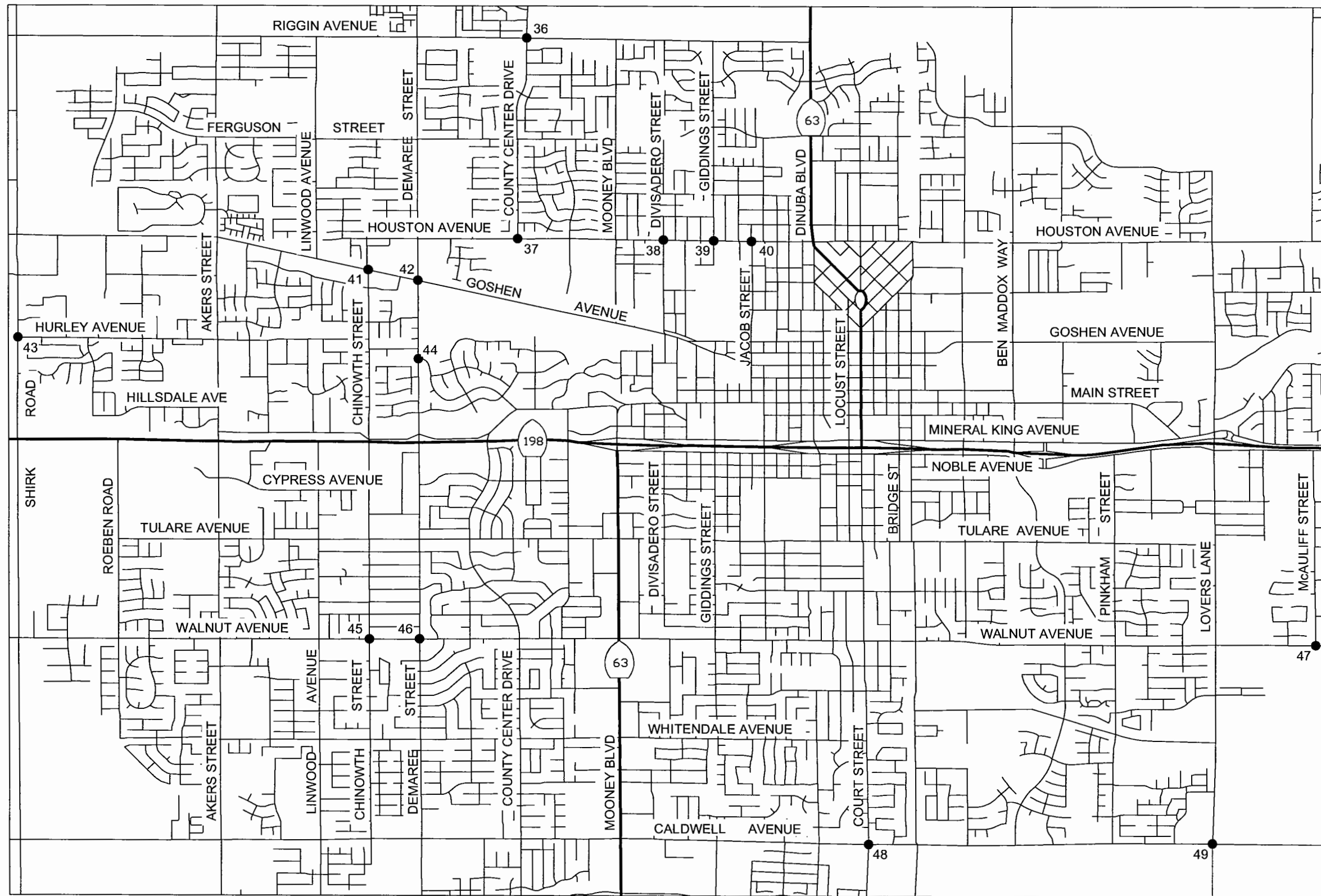
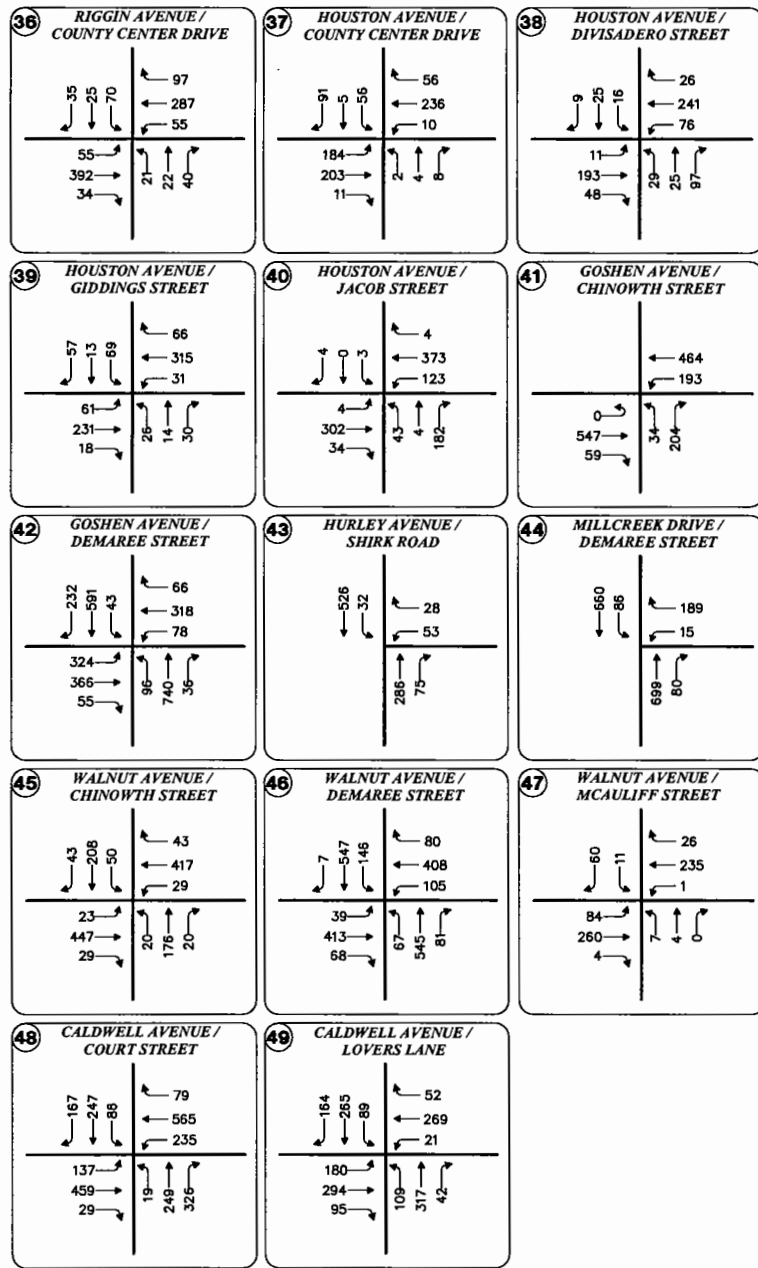


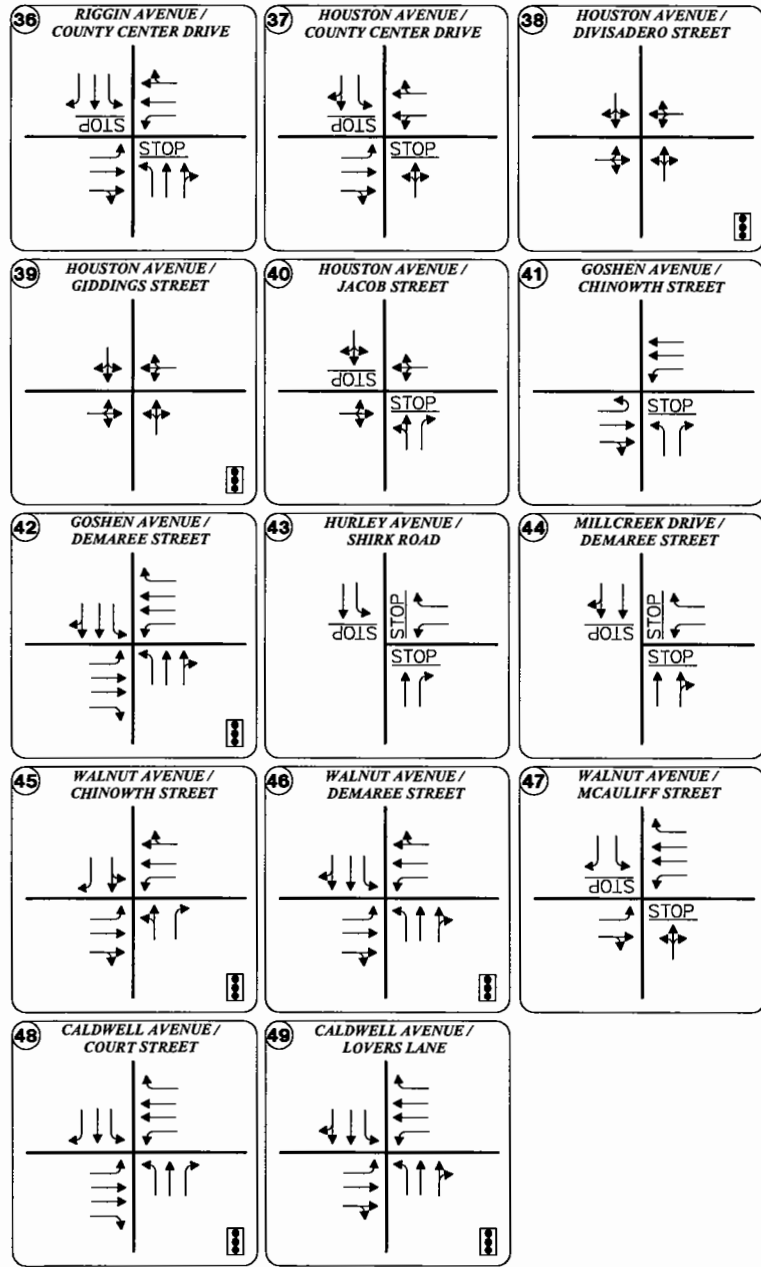
County of Tulare - PM Peak Hour Traffic Volumes (31-35)



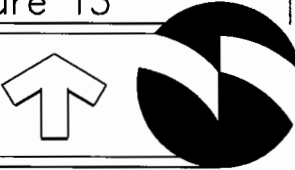
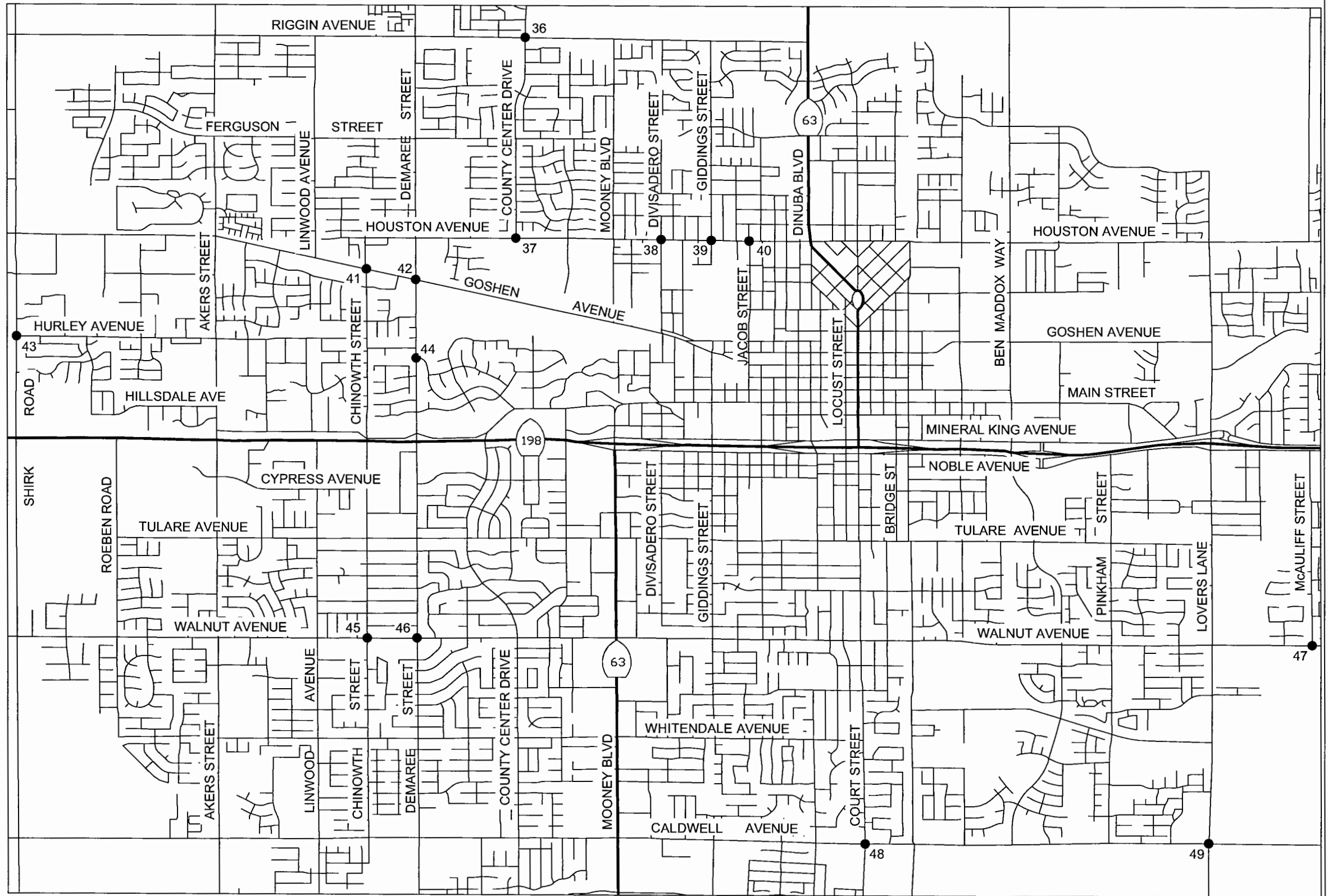


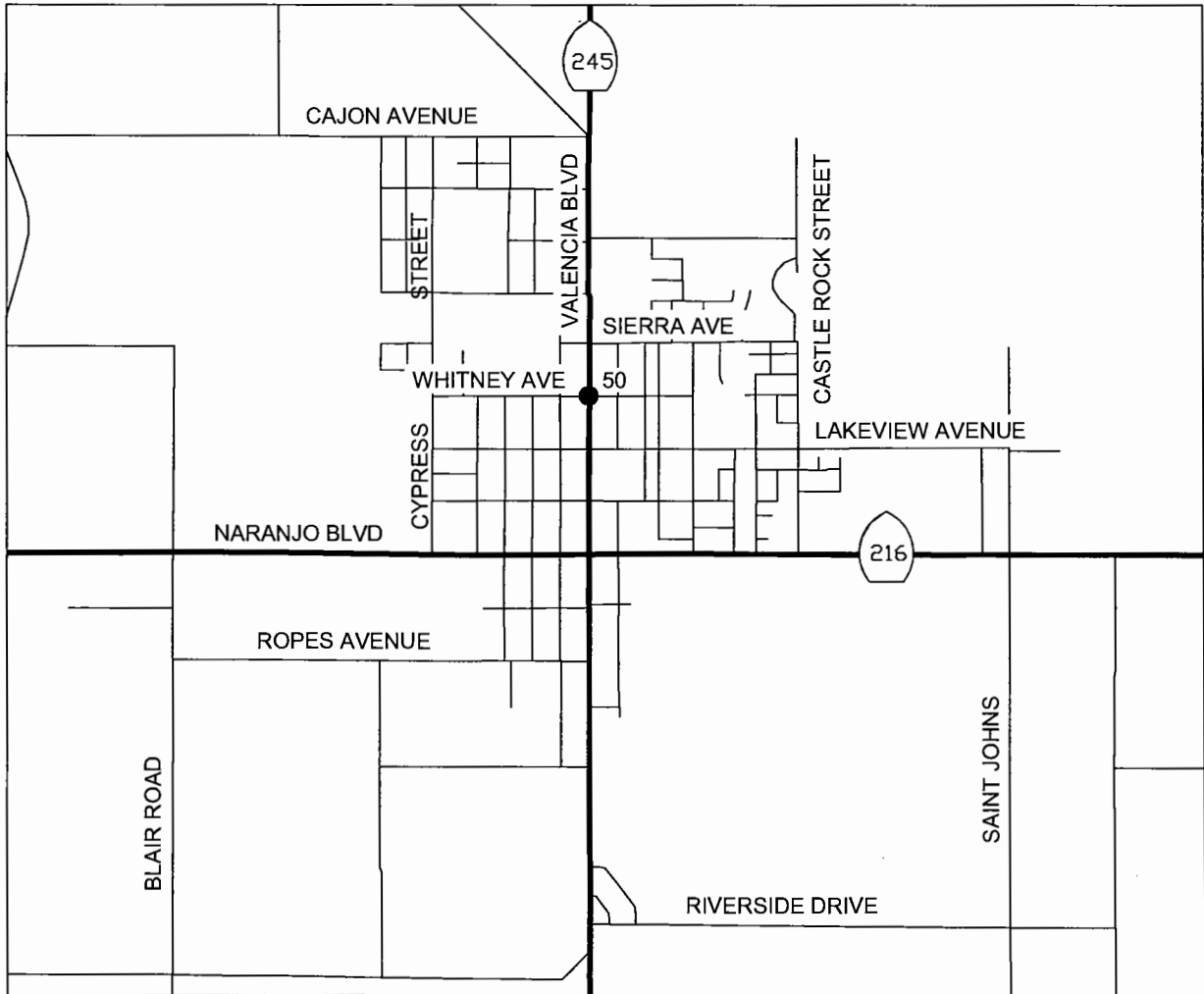
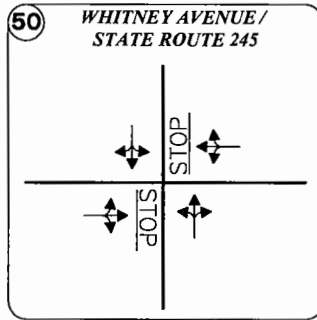
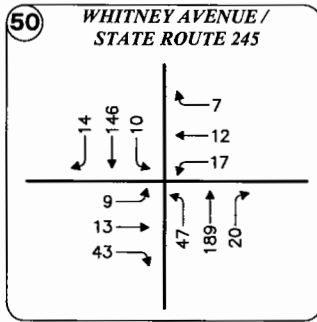






**LEGEND**  
 OVRLP - OVERLAPPING RIGHT TURNS





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Figure 14

City of Woodlake - PM Peak Hour Traffic Volumes, Lane Geometrics and Control

