

# Automated Red-Light Photo Enforcement Engineering Audit



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Submitted to:



Sacramento County Sheriff's  
Department

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## 1.0 INTRODUCTION

Iteris performed an engineering audit of the Sacramento Sheriff’s Department Red Light Photo Enforcement Program the week of April 6, 2015. System data and field measurements were collected and evaluated for accuracy and compliance with the latest California Manual on Uniform Traffic Devices (California MUTCD) and the California Vehicle Code (CVC).



### 1.1 Background

In order to provide 24-hour enforcement of red light violations, Automated Red Light Enforcement systems (ARLE systems) were installed at locations within the City and County of Sacramento.

The system was installed not only to provide automated red light running enforcement at select locations, but also to increase safety at non-enforced locations by reminding drivers that such enforcements exist in the area.

At the time this audit was conducted, there were 24 intersections with a total of 26 approaches equipped with red light running (RLR) enforcement cameras with one approach that was not operational. The ARLE systems are part of the Red Light Photo Enforcement Program, a partnership between the Sacramento County Sheriff’s Department, California Highway Patrol (CHP), County of Sacramento, and City of Sacramento. **Table 1**, below, provides a list of the intersections, the approaches equipped with red light enforcement cameras, and their owning agency.

**Table 1: Existing Automated Red Light Enforcement Systems Locations**

NO	OWNING AGENCY	INTERSECTION NAME	APPROACH OF ENFORCEMENT
1	County	Watt Avenue at Fair Oaks Boulevard	<ul style="list-style-type: none"> <li>• NB Watt Ave</li> <li>• WB Fair Oaks Blvd</li> </ul>
2	County	Watt Avenue at Arden Way	<ul style="list-style-type: none"> <li>• EB Arden Way</li> </ul>
3	County	Howe Avenue at Hurley Way	<ul style="list-style-type: none"> <li>• NB Howe Ave</li> </ul>
4	County	Martin Luther King Boulevard at 47 <sup>th</sup> Avenue	<ul style="list-style-type: none"> <li>• WB 47<sup>th</sup> St*</li> </ul>
5	County	Madison Avenue at Sunrise Boulevard	<ul style="list-style-type: none"> <li>• EB Madison Ave</li> </ul>
6	County	Madison Avenue at Date Avenue	<ul style="list-style-type: none"> <li>• WB Madison Ave</li> </ul>
7	County	Florin Road at East Parkway	<ul style="list-style-type: none"> <li>• EB Florin Rd^</li> </ul>
8	County	Florin Road at Franklin Boulevard	<ul style="list-style-type: none"> <li>• WB Florin Rd</li> </ul>

<b>NO</b>	<b>OWNING AGENCY</b>	<b>INTERSECTION NAME</b>	<b>APPROACH OF ENFORCEMENT</b>
9	County	Manzanita Avenue at Cypress Avenue	• SB Manzanita Ave <sup>^</sup>
10	County	El Camino Avenue at Eastern Avenue	• EB El Camino Ave
11	County	Florin Road at Lindale Drive	• EB Florin Rd
12	County	Elkhorn Boulevard at Don Julio Drive	• EB Elkhorn Blvd
13	County	Hwy 99 NB Off-Ramp at Calvine Road	• EB Calvine Rd
14	County	Auburn Avenue at Garfield Avenue (Not Operational)	• WB Auburn Ave
15	City	Mack Road at Center Parkway	• EB Mack Rd
16	City	Mack Road at Valley High Drive / La Mancha Way	• WB Mack Rd
17	City	21 <sup>st</sup> Street at Broadway	• WB Broadway
18	City	Alhambra Street at J Street	• EB J St
19	City	El Camino Avenue at Evergreen Street	• EB El Camino Ave
20	City	Howe Avenue at Fair Oaks Boulevard	• EB Fair Oaks Blvd • SB Howe Ave*
21	City	Folsom Boulevard at Power Inn Road / Howe Avenue	• SB Howe Ave*
22	City	5 <sup>th</sup> Street at I Street	• WB I St
23	City	Arden Way at Challenge Way	• EB Arden Way
24	City	16 <sup>th</sup> Street at W Street	• NB 16 <sup>th</sup> St

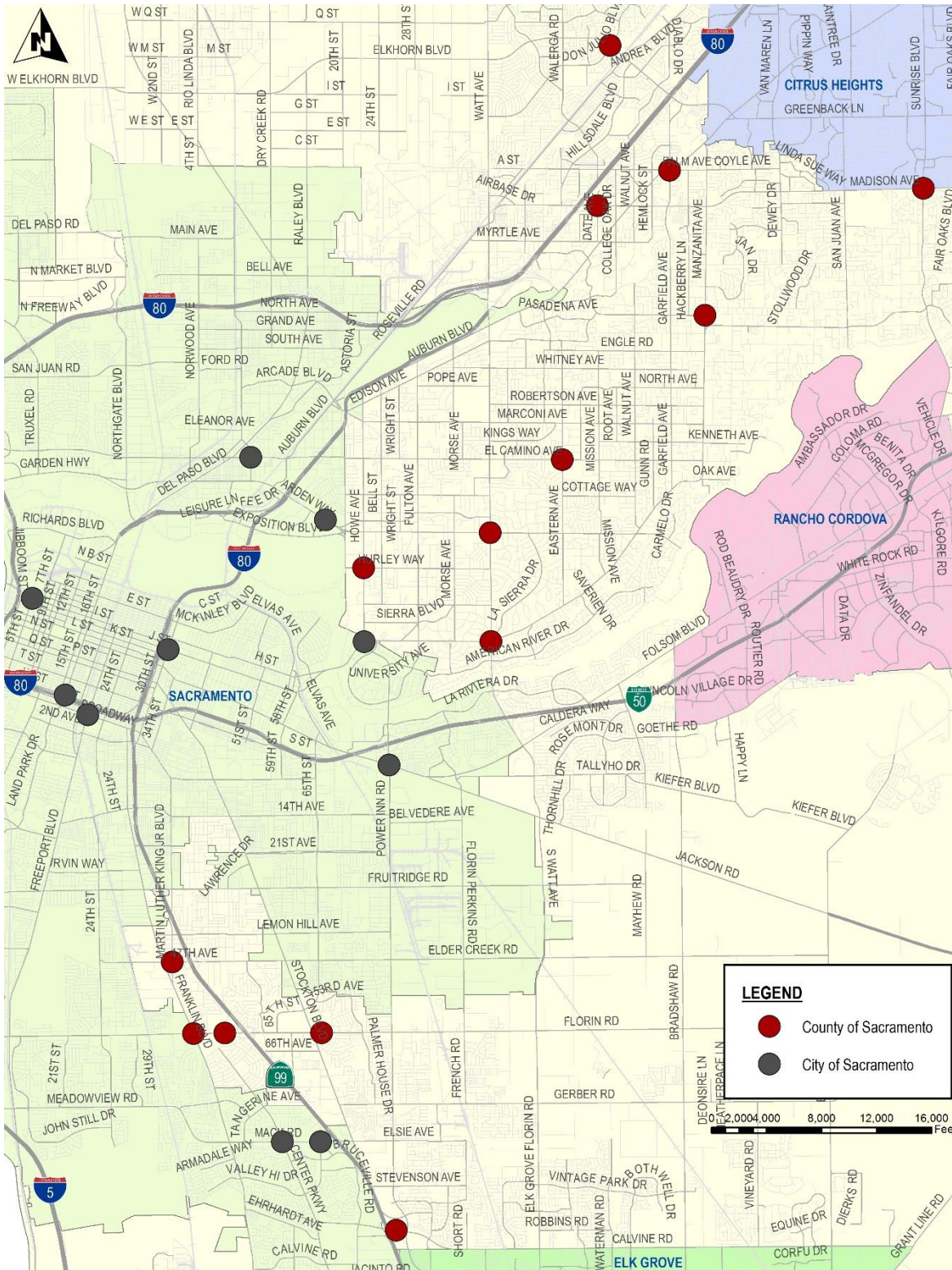
\* Right-turn lane not equipped for red light running enforcement

<sup>^</sup> Left-turn lane not equipped for red light running enforcement

Intersections listed above in **Table 1** are also represented below in **Figure 1**.



Figure 1: Existing Automated Red Light Enforcement Systems Locations



The City of Sacramento began its program in 1999, and the County's was started in 2001. In July 2003, the Sheriff's Department began managing the program for both the City and the County. Currently, officers (CHP/Sacramento County Sheriff) alternate working at the Sheriff's Department to operate and control the program.

The Sheriff's Department has an agreement with Redflex Traffic Systems (Redflex) to install and to regularly maintain the RLR cameras. Redflex is paid a fixed amount for any installation and any fees collected, per CVC section 21455.5, are not based on the number of citations or percentage of revenue generated. Staff from the Sheriff's department also visit the Redflex facilities in Arizona annually to ensure that the facilities, staff, and equipment continue to meet their standards.

As part of the CVC section 21455.5 requirements, a governmental agency must establish guidelines for the selection of a location. It is stated that, "Prior to installing an automated traffic enforcement system after January 1, 2013, the governmental agency shall make and adopt a finding of fact establishing that the system is needed at a specific location for reasons related to safety."



Installation of new RLR locations for the program are based on the following:

- Collision Data retrieved from Statewide Integrated Traffic Records System (SWITERS)
- Video survey
- Police and community input
- Sacramento Sheriff's Department approval with all program stakeholders

Stakeholders of the Red Light Enforcement Program are as follows:

- Sacramento Sheriff's Department
- Sacramento County Department of Transportation (DOT)
- City of Sacramento DOT
- California Highway Patrol (CHP)

Once a particular intersection is raised as a major concern, SWITERS data is analyzed to determine what the primary collision factor is and which direction/approach accidents happen most frequently at. If CVC 21453 (Red Light Violation) is the primary collision factor, consideration for the intersection begins the review process.

If an approach is identified as problematic, having high RLR accident factors, a 12-hour video survey will be conducted by Redflex. The video survey will assist in determining the number of red light violations for that approach, adding valuable information for consideration of placement of an ARLE system.

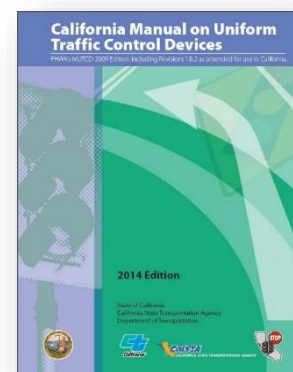
Before placement of an ARLE system, the Sacramento City or County Department of Transportation are contacted to determine if other possible countermeasures or improvements have been implemented to improve traffic safety and reduce the number of red light related accidents. For example, the City of Sacramento maintains their own list of candidate locations for future red light running cameras based on engineering and field evaluation of intersections with the highest number of red light running crashes. These intersections would have already been evaluated, implemented, and monitored for the effectiveness of any countermeasures to reduce red light running collisions. These cautious considerations by the City or County can eliminate the need of RLR cameras. However, once all the above steps are considered and completed and it is then determined that the approach is in fact a candidate for an ARLE system, Redflex is deployed to evaluate the approach. Only after all above criteria are met and placement of an ARLE system is needed and feasible, would the stakeholders of the program make a final decision to install an ARLE system.

## 1.2 Enabling Legislation

ARLE systems are permitted by the CVC section 21455.5. An additional CVC section (21455.7) became effective on January 1, 2002, requiring intersections with automated RLR cameras to meet or exceed the California Department of Transportation's (Caltrans) standards for yellow change intervals. The policies of the City and County of Sacramento are that at intersections equipped with automated RLR cameras, all approaches shall exceed Caltrans guidelines.

The California MUTCD, shown to the right, is the standard for all official traffic control devices, under Section 11340.9(h) of California Government Code and Section 21400 of the CVC.

As of November 7, 2014 Caltrans adopted the California MUTCD 2014 edition to provide for uniform standards and specifications for all official traffic control devices in California. The 2014 edition includes the Federal Highway Administration's MUTCD 2009 edition dated December 19, 2009, including Revisions 1 and 2, as amended for use in California. The California MUTCD 2014 also includes all policies on traffic control devices issued by Caltrans since January 13, 2012, and other corrections and format changes that were necessary to update the previous documents. A notable difference between the 2012 and 2014 versions is the determination of the minimum required yellow time for all signalized intersections.



Agencies have until August 1, 2015 to ensure the red-light running approaches meet the latest requirements in the 2014 California MUTCD edition and until 2017 for all other approaches (non-red-light enforced) to meet these guidelines. It should be noted that the differences in required yellow times between the 2012 and 2014 edition is only applicable if 85<sup>th</sup> percentile speed surveys are not available for the approach in which the yellow time is being calculated. Because these speed surveys are available for all the approaches reviewed in this audit, the guideline used for this review remains the same whether using the 2012 or 2014 calculations.

## 2.0 DATA COLLECTION AND VERIFICATION

Field visits were conducted at the 26 ARLE system locations the week of April 6, 2015 to observe and verify field conditions, loops, signage, and yellow change intervals. The data collection also included visiting with the Sheriff's department facility and staff, as well as the City and County Traffic Management Center (TMC) to gather all necessary information.

### 2.1 Field Conditions and Loops

At all operational locations, it was verified that the RLR cameras and loops were in proper working condition and are being maintained on a regular basis. No field review was conducted at the non-operational location of Auburn Avenue and Garfield Avenue, which currently has radar detection. Loop locations were not measured during this audit; however, field observations revealed that there were new installed loops for the movements equipped for RLR enforcement, as shown in the design plans provided by Redflex. **Figure 2** is an example of new Redflex loops installed in between the existing stop-bar loop detectors whereas **Figure 3** is an example of new Redflex loops installed at a location that did not have existing loop detection. Loops were verified to make sure they are still in place with no visual signs of damage. All loop and camera locations were confirmed per the as-built plans provided for each location.

**Figure 2: New RLR Loops with Existing Loops**



**Figure 3: New RLR loops**





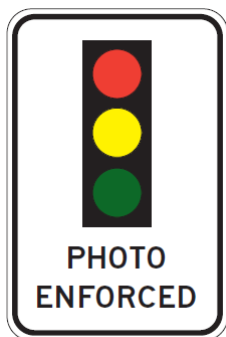
**2.2 Signage**

As part of the CVC section 21455.5, effective as of January 1, 2013, the use of automated enforcement systems is allowed if the system is identified by: "... signs posted within 200 feet of an intersection where a system is operating that clearly indicate the system’s presence and are visible to traffic approaching from all directions in which the automated traffic enforcement system is being utilized to issue citations."

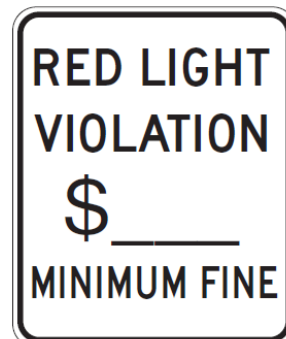
It is also important to note, from CVC 21455.5: "A governmental agency utilizing such a system does not need to post signs visible to traffic approaching the intersection from directions not subject to the automated traffic enforcement system."

Each ARLE system location was observed to verify the signs were clearly visible, legible, and met the requirements outlined in CVC section 21455.5. The notes taken at each location along with the measurements collected for each sign are available in **Appendix A**.

There are two primary types of signs used in conjunction with the automated enforcement programs in the City and the County of Sacramento, SR-56 and SR-58. **Figure 4** and **Figure 5**, below, illustrate the appearance of the enforcement signs. The sign in **Figure 4** (SR-56) has a white background with black letters and a multicolor traffic signal logo. Unlike SR-56, the sign in **Figure 5** (SR-58) is not mandatory, but was also observed at select locations throughout the City and County and clearly states the minimum fine of a red light violation.



**Figure 4: SR-56 (CA)**



**Figure 5: SR-58 (CA)**

Though signs are only required for the enforced approaches, as stated in the CVC, Sacramento has provided additional signs within City/County limits as well as various non-enforced approaches to remind drivers that the area is photo enforced.

## 2.3 Yellow Clearance Intervals

As mandated in CVC section 21455.7, subdivision (a), "...the minimum yellow light change interval shall be established in accordance with the Traffic Manual of the Department of Transportation" and a "yellow light change interval may exceed the minimum interval established pursuant to subdivision (a)".

In order to calculate the yellow clearance intervals and to ensure they are in compliance with the California MUTCD, posted speed limit data was collected and verified in the field. Also, specific to each agency's guidelines, the County and the City provided speed survey data containing necessary 85<sup>th</sup> percentile speeds.

Existing yellow clearance intervals, as they are currently programmed in the field were also collected. If a traffic signal controller was connected and communicating to the City or County's central system at their respective TMC, the yellow time was uploaded directly from the controllers; otherwise, field visits were required to obtain the yellow change interval for each RLR approach directly from the traffic signal controllers. The yellow time taken for each approach is available as part of **Appendix A**. Note that the values presented in the appendix also reflect any modifications made after the initial field visit, so that the values included are the most concurrent (as of June 17, 2015).



Because the ARLE system collects the yellow output rather than from the programmed time in the traffic signal controller, a review of the yellow interval to determine if there are any discrepancies between what is programmed and what is being outputted was also performed. Redflex provided output files for each RLR approach for a 24-hour period (April 7, 2015) to compare with the programmed yellow times. A summary of the Redflex yellow output compared to the programmed yellow times collected is available in **Appendix B**. As shown in the summary, the average for all locations were either equal to or higher than the programmed time.

## 2.4 Additional Field Observations

Additional factors were observed in the field to determine whether or not there may be other conditions which might cause a driver to inadvertently enter the intersection on a red phase. Although specific measurements were not made, the following conditions were also checked in the field:

- Sight distance
- Traffic volumes
- Traffic speeds and regulatory signs
- Traffic signal display conditions – visibility, number of heads, placement
- Quality of pavement markings – Stop lines
- Geometric features – horizontal and vertical curves, land widths, etc.

### 3.0 ANALYSIS

This section summarizes all the analysis conducted to ensure that the existing RLR enforcement program and equipment meets or exceed the California standards.

#### 3.1 System Operation

A loop system is in place at RLR camera locations to trigger the ARLE system once an incident occurs. When the system is triggered, digital photographs for the appropriate approach are taken at the RLR camera location and immediately processed. Four still images along with a 12-second video is collected for each red light running incident. The photographs are only taken if all the following conditions are met:

- The signal is red, and has been red for a pre-determined amount of time (e.g. 0.1 seconds)
- The calculated speed of the vehicle is over a certain threshold pre-determined (e.g. 10 mph)
- The vehicle is moving in the indicated direction (whichever approach the RLR camera is set to enforce)

Regardless of how the photograph/video was triggered, as long as the evidence demonstrates that the vehicle was behind the stop line at the onset of red, and proceeded across the stop line during the red, a violation has occurred. Once processed in the Redflex’s Arizona office, digital copies are made available in the Redflex application, which is accessible by the Sheriff’s Department staff. Officers (CHP/Sacramento County Sheriff) then review the photos and videos and make the final decision, as describe below, whether a ticket should be issued and to whom, which is printed and mailed from Redflex’s facilities in Phoenix, Arizona.

Process officers take to issue citation:

- Receive case information
- Confirm violation by analyzing pictures and reviewing video
- Confirm amber time outputted on the still image matches or exceeds the programmed yellow time for that particular location
- Determine to whom to issue a RLR citation
- Issue citation that is verified and in pursuant to CVC 21453

Every citation issued provides the photographs as well the following information recorded at the time the photographs were taken:

- Time and date
- Speed
- Length of yellow just prior to photograph capture
- Duration of red at the time of the photograph capture



A website address is also available on the citation, which allows the party receiving the citation to view the photos and video. The link is password protected and is only available for viewing by the party who received the citation. In addition to staff, a kiosk (pictured on previous page) is located at the Sheriff's Department and is available during business hours for the public to view and print as desired.

### 3.2 Maintenance

As part of the program, maintenance of all ARLE systems is conducted monthly as well as on an as-needed basis by Redflex field technicians. Below are some, but not all, the items that are verified by the field technicians:

- Proper operation and detection of loops
- All field enforcement equipment functioning properly
- Communication from Redflex servers to cameras in field
- Picture and video quality

After each maintenance visit, a log is written and the original is delivered and stored at the Sacramento Sheriff's Department for records with a copy provided to Redflex. In addition to the Redflex field technician's regular visits, the officers who typically issue citations, will also conduct some sight visits to ensure proper upkeep of the systems is maintained.

The Sheriff's Department also has direct access to each camera in the field for which to view, in real-time, the video feed. This capability provides additional monitoring and provides a proactive approach to ensure the field equipment are working properly without having wait to do be in the field.

### 3.3 Yellow Light Change Interval

The yellow light change interval provides drivers with sufficient time to stop before entering an intersection or to clear an intersection for an upcoming red phase. According to the CA MUTCD; "...the yellow change interval is to warn traffic approaching a traffic signal that the related green movement is ending or that a steady red indication will be exhibited immediately thereafter and traffic will be required to stop when the red signal is exhibited." CVC 21455.7, which became effective on January 1, 2002, mandates that intersections with RLR cameras should meet or exceed Caltrans guidelines.

As noted previously, Caltrans adopted the latest edition of the California MUTCD in November 2014. The yellow change interval values for through moving vehicles is defined in **Table 2**, below.



Table 2: California MUTCD Minimum Yellow Intervals

CA MUTCD Table 4D-102 (a)		CA MUTCD Table 4D-102 (b)	
SPEED* (mph)	MIN YELLOW TIME (sec)	SPEED* (mph)	MIN YELLOW TIME (sec)
< 25	3.0	15	3.0
30	3.2	20	3.2
35	3.6	25	3.6
40	3.9	30	3.7
45	4.3	35	4.1
50	4.7	40	4.4
55	5.0	45	4.8
60	5.4	50	5.2
65	5.8	55	5.5
		60 or higher	5.9

\*Speed: 85<sup>th</sup> percentile rounded up to the nearest 5 mph

\*Speed: Posted Speed Limit or Prima Facie Speed

The 2014 California MUTCD Table 4D-102(a) has not changed from the 2012 edition requirements; however, it can only be used to determine the minimum required yellow time if 85<sup>th</sup> percentile speeds are available. The difference between the 2012 and 2014 edition is the addition of Table 4D-102(b), which is only applicable in situations where only posted or prima facie speeds are available.

It’s important to note that the speed values are not the posted speeds, but the 85<sup>th</sup> percentile, which are typically higher than the posted. To ensure the appropriate speed is being used, the higher of the 85<sup>th</sup> and posted should be used to determine the minimum yellow time. **Appendix C** provides a comparison between the existing (programmed in the field) yellow change intervals versus the California MUTCD minimum required using the radar studies provided. Both the City and the County provide the Sheriff’s Department with updated yellow times programmed so that all officers ensure that the citations are issued only when the yellow outputs indicated on the citation either meet or exceed this value. The City of Sacramento has established a policy to submit updated yellow and/or all red times to the Sheriff’s Department within one business day of any update.

As shown in **Appendix C**, the City and County of Sacramento currently calculates for typically larger clearance intervals that exceed the California MUTCD minimums. For example, the California MUTCD requires a minimum yellow change interval of 3.0 seconds whereas the City and County both prefer a minimum value of 3.5 seconds. Similar to the California MUTCD, the City of Sacramento uses the 85<sup>th</sup> percentile to determine the minimum yellow times; however, for approach speeds at 35mph or lower, the City prefers slightly longer yellow times than those provided in the California MUTCD. The County of Sacramento prefers to use the 90<sup>th</sup> percentile speeds, which is more conservative and typically higher than the 85<sup>th</sup> percentile. Therefore, though two separate entities, there is a common goal to meet or exceed the minimum yellow time required to clear an intersection set forth by the California MUTCD.



### 3.4 Other Intersection Factors

In addition to the yellow interval, a review of the all-red times for each approach phase was also conducted, which is available as part of **Appendix C**. Unlike the yellow interval, no actual calculations were conducted for the all-red times. Per the California MUTCD, an all-red interval is not required. Although no all-red clearance interval is required, this review was conducted to ensure that movements with an all-red clearance interval were within the California MUTCD guidance, which is not to exceed a 6-second maximum all red clearance interval.

All RLR intersections were observed to experience high volume of traffic, especially those near the freeways; however, there were no additional factors, whether geometrical or operational, noted during the field observation that would affect a driver's ability to stop on red.

## 4.0 CONCLUSION AND RECOMMENDATIONS

During the engineering audit, there were no equipment, signage, and/or geometric flaws found in the current operation of the automated red-light running program for either the City or County of Sacramento locations.

In order to preserve the integrity of the existing program, and to ensure that citations are only given when the law has been clearly violated, additional recommendations are presented below. Please note that the recommendations below are given in no particular order.

- Yellow light change intervals should continue to be reviewed and/or updated based on the most current posted speed limits or speed survey data conducted. It is important that a review be conducted every time a speed survey is collected along a study corridor.
- Both City and County should periodically obtain yellow outputs from Redflex to ensure that the actual outputs continue to be equal to or exceed the programmed yellow time.
- Operation of the program and maintenance of each system should continue to be reviewed periodically.

# APPENDIX A

## FIELD REVIEW SUMMARY

# Mack Road at Center Parkway


**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



<b>Enforcement Direction:</b>	<b>Eastbound Mack Road</b>	<b>Speed Limit:</b>	<b>45 mph</b>				
<b>Lanes Enforced:</b>	<b>All Eastbound lanes</b>						
<b>Programmed Clearance Time:</b>	<b>Yellow</b>		<b>All-Red</b>				
	<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>4.7 sec</b>	<b>EBL</b>	<b>0.1 sec</b>	<b>EBT</b>
<b>Sign Distance to Intersection:</b>	<b>195 feet to Eastbound Limit Line</b>						
<b>Comments:</b>	<b>SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5.</b>						
							



# Mack Road at Valley High/La Mancha Way

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Westbound Mack Road**

**Speed Limit:**

**45 mph**

**Lanes Enforced:**

**All Westbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

**WBL**

**3.5 sec**

**WBT**

**4.7 sec**

**WBL**

**1.3 sec**

**WBT**

**1.0 sec**

**Sign Distance to Intersection:**

**155 feet to Westbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violations sign) are clearly visible to Westbound traffic and are in compliance with CVC 21455.5.**

# 21<sup>st</sup> Street at Broadway

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Westbound Broadway**

**Speed Limit:**

**25 mph**

**Lanes Enforced:**

**All Westbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>WBL</b>	<b>3.6 sec</b>	<b>WBT</b>	<b>3.6 sec</b>	<b>WBL</b>	<b>0 sec</b>	<b>WBT</b>	<b>0 sec</b>
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**Sign Distance to Intersection:**

**130 feet to Westbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Westbound traffic and is in compliance with CVC 21455.5.**

# Alhambra Street at J Street

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



<b>Enforcement Direction:</b>	<b>Eastbound J Street</b>	<b>Speed Limit:</b>	<b>30 mph</b>
<b>Lanes Enforced:</b>	<b>All Eastbound lanes</b>		
<b>Programmed Clearance Time:</b>	<b>Yellow</b>	<b>All-Red</b>	
	<b>3.7 sec</b>	<b>0 sec</b>	
<b>Sign Distance to Intersection:</b>	<b>120 feet to Eastbound Limit Line</b>		
<b>Comments:</b>	<p><b>SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5. Proper landscaping may be needed to increase visibility of signs.</b></p> <p style="text-align: right;"><b>ITERIS</b> Innovation for better mobility</p>		

# El Camino Avenue at Evergreen Street

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound El Camino Avenue**

**Speed Limit:**

**35 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>3.9 sec</b>	<b>EBL</b>	<b>0 sec</b>	<b>EBT</b>	<b>0.5 sec</b>
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**Sign Distance to Intersection:**

**Sign on Signal Standard Pole**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5.**

# Howe Avenue at Fair Oaks Boulevard

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Southbound Howe Avenue**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Southbound lanes with exception to the channelized right-turn pocket**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

**SBL**

**3.5 sec**

**SBT**

**4.3 sec**

**SBL**

**1.0 sec**

**SBT**

**1.0 sec**

**Sign Distance to Intersection:**

**75 feet to Southbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Southbound traffic and is in compliance with CVC 21455.5.**

# Howe Avenue at Fair Oaks Boulevard

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound Fair Oaks Boulevard**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>4.3 sec</b>	<b>EBL</b>	<b>2.0 sec</b>	<b>EBT</b>	<b>1.0 sec</b>
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**Sign Distance to Intersection:**

**90 feet to Eastbound Limit Line. Sign also present on signal standard pole.**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5.**

# Folsom Boulevard at Power Inn Road/Howe Avenue

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



Photo Updated: 06/03/15

<b>Enforcement Direction:</b>	<b>Southbound Howe Avenue</b>	<b>Speed Limit:</b>	<b>45 mph</b>				
<b>Lanes Enforced:</b>	<b>All Southbound lanes with exception to channelized right turn pocket</b>						
<b>Programmed Clearance Time:</b>	<b>Yellow</b>		<b>All-Red</b>				
	<b>SBL</b>	<b>3.5 sec</b>	<b>SBT</b>	<b>4.7 sec</b>	<b>SBL</b>	<b>1.9 sec</b>	<b>SBT</b>
<b>Sign Distance to Intersection:</b>	<b>100 feet from Southbound Limit Line</b>						
<b>Comments:</b>	<p style="text-align: center;"><b>SR-56 (Photo Enforced Sign) is clearly visible to Southbound traffic and is in compliance with CVC 21455.5.</b></p> <div style="text-align: right;"> </div>						

# 5<sup>th</sup> Street at I Street

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Westbound I Street**

**Speed Limit:**

**25 mph**

**Lanes Enforced:**

**All Westbound lanes (One-way Street )**

**Programmed Clearance Time:**

**Yellow  
3.5 sec**

**All-Red  
2.0 sec**

**Sign Distance to Intersection:**

**Sign on Signal Standard Pole**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Westbound traffic and is in compliance with CVC 21455.5.**



# Arden Way at Challenge Way

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound Arden Way**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>4.3 sec</b>	<b>EBL</b>	<b>1.2 sec</b>	<b>EBT</b>	<b>0.4 sec</b>
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**Sign Distance to Intersection:**

**125 feet to Eastbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5.**

# 16 Street and W Street

**Agency:**

**City of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Northbound 16<sup>th</sup> Street**

**Speed Limit:**

**30 mph**

**Lanes Enforced:**

**All Northbound lanes (One-way Street)**

**Programmed Clearance Time:**

**Yellow  
3.9 sec**

**All-Red  
0 sec**

**Sign Distance to Intersection:**

**35 feet to Northbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Northbound traffic and is in compliance with CVC 21455.5.**

# Watt Avenue at Fair Oaks Boulevard

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Northbound Watt Avenue**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Northbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

**NBL**

**3.5 sec**

**NBT**

**5.4 sec**

**NBL**

**2.0 sec**

**NBT**

**1.1 sec**

**Sign Distance to Intersection:**

**130 feet to Northbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Northbound traffic and are in compliance with CVC 21455.5.**

# Watt Avenue at Fair Oaks Boulevard

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Westbound Fair Oaks Boulevard**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Westbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>WBL</b>	<b>3.5 sec</b>	<b>WBT</b>	<b>5.0 sec</b>	<b>WBL</b>	<b>2.0 sec</b>	<b>WBT</b>	<b>1.0 sec</b>
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**Sign Distance to Intersection:**

**125 feet to Westbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Westbound traffic and are in compliance with CVC 21455.5.**

# Watt Avenue at Arden Way

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound Arden Way**

**Speed Limit:**

**35 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>4.8 sec</b>	<b>EBL</b>	<b>2.0 sec</b>	<b>EBT</b>	<b>0.9 sec</b>
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**Sign Distance to Intersection:**

**70 feet to Eastbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Eastbound traffic and are in compliance with CVC 21455.5.**



# Howe Avenue at Hurley Way

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Northbound Howe Avenue**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Northbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>NBL</b>	<b>3.5 sec</b>	<b>NBT</b>	<b>4.8 sec</b>	<b>NBL</b>	<b>2.0 sec</b>	<b>NBT</b>	<b>0.5 sec</b>
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**Sign Distance to Intersection:**

**165 feet from Northbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Northbound traffic and is in compliance with CVC 21455.5.**

# Martin Luther King Boulevard at 47<sup>th</sup> Avenue

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement  
Direction:**

**Westbound 47<sup>th</sup> Avenue**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Westbound lanes with exception to channelized right-turn lane**

**Programmed  
Clearance Time:**

**Yellow**

**All-Red**

**WBL**

**3.5 sec**

**WBT**

**5.0 sec**

**WBL**

**1.9 sec**

**WBT**

**0.2 sec**

**Sign Distance to  
Intersection:**

**185 feet from Westbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Westbound traffic and are in compliance with CVC 21455.5.**

# Madison Avenue at Sunrise Boulevard

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound Madison Avenue**

**Speed Limit:**

**45 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>5.0 sec</b>	<b>EBL</b>	<b>2.0 sec</b>	<b>EBT</b>	<b>1.1 sec</b>
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**Sign Distance to Intersection:**

**160 feet from Eastbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Eastbound traffic and are in compliance with CVC 21455.5.**



# Madison Avenue at Date Avenue

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Westbound Madison Avenue**

**Speed Limit:**

**45 mph**

**Lanes Enforced:**

**All Westbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

**WBL**

**3.5 sec**

**WBT**

**4.8 sec**

**WBL**

**0.8 sec**

**WBT**

**0 sec**

**Sign Distance to Intersection:**

**165 feet from Westbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Westbound traffic and is in compliance with CVC 21455.5.**

# Florin Road at East Parkway

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound Florin Road**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Eastbound lanes with exception to left-turn lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

**4.3 sec**

**0 sec**

**Sign Distance to Intersection:**

**100 feet from Eastbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5.**

# Florin Road at Franklin Boulevard

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Westbound Florin Road**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Westbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>WBL</b>	<b>3.5 sec</b>	<b>WBT</b>	<b>3.6 sec</b>	<b>WBL</b>	<b>1.6 sec</b>	<b>WBT</b>	<b>0.6 sec</b>
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**Sign Distance to Intersection:**

**155 feet to Westbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Westbound traffic and are in compliance with CVC 21455.5.**

# Manzanita Avenue at Cypress Avenue

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Southbound Manzanita Avenue**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Southbound lanes with exception to left-turn lanes**

**Programmed Clearance Time:**

**Yellow  
4.8 sec**

**All-Red  
0 sec**

**Sign Distance to Intersection:**

**50 feet from Southbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Southbound traffic and are in compliance with CVC 21455.5. Proper landscaping may be needed to increase visibility of signs.**

# El Camino Avenue at Eastern Avenue

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound El Camino Avenue**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>4.8 sec</b>	<b>EBL</b>	<b>1.6 sec</b>	<b>EBT</b>	<b>0.3 sec</b>
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**Sign Distance to Intersection:**

**85 feet from the Eastbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5.**

# Florin Road at Lindale Drive

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound Florin Road**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>4.8 sec</b>	<b>EBL</b>	<b>1.0 sec</b>	<b>EBT</b>	<b>0 sec</b>
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**Sign Distance to Intersection:**

**Enforcement sign on Signal Standard Pole**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5.**

# Elkhorn Boulevard at Don Julio Drive

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound Elkhorn Boulevard**

**Speed Limit:**

**45 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow**

**All-Red**

<b>EBL</b>	<b>3.5 sec</b>	<b>EBT</b>	<b>5.0 sec</b>	<b>EBL</b>	<b>2.0 sec</b>	<b>EBT</b>	<b>0.2 sec</b>
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**Sign Distance to Intersection:**

**170 feet from Eastbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Eastbound traffic and are in compliance with CVC 21455.5. Proper landscaping may be needed to increase visibility of signs.**



# Hwy 99 NB Off-Ramp at Calvine Boulevard

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Eastbound Calvine Road**

**Speed Limit:**

**45 mph**

**Lanes Enforced:**

**All Eastbound lanes**

**Programmed Clearance Time:**

**Yellow  
4.7 sec**

**All-Red  
1.3 sec**

**Sign Distance to Intersection:**

**Sign on signal mast arm**

**Comments:**

**SR-56 (Photo Enforced Sign) is clearly visible to Eastbound traffic and is in compliance with CVC 21455.5.**



# Auburn Avenue at Garfield Avenue

**Agency:**

**County of Sacramento**

**Date:**

**Monday, April 6, 2015**



**Enforcement Direction:**

**Westbound Auburn Avenue**

**Speed Limit:**

**40 mph**

**Lanes Enforced:**

**All Westbound lanes with exception to channelized right-turn lane**

**Sign Distance to Intersection:**

**50 feet from Westbound Limit Line**

**Comments:**

**SR-56 (Photo Enforced Sign) and SR-58 (Red Light Violation Sign) are clearly visible to Westbound traffic and are in compliance with CVC 21455.5. Enforcement system is not currently operational.**

# APPENDIX B

## YELLOW OUTPUT COMPARISON



# COUNTY OF SACRAMENTO SHERIFF'S DEPARTMENT

## Yellow Output Comparison County and City of Sacramento

Intersection No.	Agency	Intersection	Approach	Direction	Phase	Yellow Time	Yellow Output from Redflex	
							AVG	STDV
1	County	Watt Avenue at Fair Oaks Boulevard	NB	NBL	1	3.5	3.527	0.008
				NBT*	6	5.4	-	-
			WB	WBL	7	3.5	3.518	0.008
				WBT*	4	5.0	-	-
2	County	Watt Avenue at Arden Way	EB	EBL	3	3.5	3.536	0.029
				EBT	8	4.8	4.856	0.006
3	County	Howe Avenue at Hurley Way	NB	NBL	1	3.5	3.519	0.008
				NBT	6	4.8	4.820	0.009
4	County	Martin Luther King Boulevard at 47th Avenue	WB	WBL	5	3.5	3.524	0.001
				WBT	2	5.0	5.031	0.006
5	County	Madison Avenue at Sunrise Boulevard	EB	EBL	3	3.5	3.533	0.006
				EBT	8	5.0	5.036	0.003
6	County	Madison Avenue at Date Avenue	WB	WBL	5	3.5	3.525	0.007
				WBT	2	4.8	4.838	0.009
7	County	Florin Road at East Parkway	EB	EBT	6	4.3	4.355	0.009
8	County	Florin Road at Franklin Boulevard	WB	WBL	5	3.5	3.529	0.007
				WBT	2	4.6	4.639	0.007
9	County	Manzanita Avenue at Cypress Avenue	SB	SBT	2	4.8	4.854	0.040
10	County	El Camino Avenue at Eastern Avenue	EB	EBL	1	3.5	3.516	0.008
				EBT	6	4.8	4.822	0.010
11	County	Florin Road at Lindale Drive	EB	EBL	1	3.5	3.520	0.008
				EBT	6	4.8	4.820	0.012
12	County	Elkhorn Boulevard at Don Julio Drive	EB	EBL	1	3.5	3.520	0.005
				EBT*	6	5.0	-	-
13	County	Hwy 99 NB Off-Ramp at Calvine Road	EB	EBT	6	4.7	4.722	0.058
14	City	Mack Road at Center Parkway	EB	EBL	5	3.5	3.555	0.003
				EBT	2	4.7	4.755	0.003
15	City	Mack Road at Valley High Drive / La Mancha Way	WB	WBL	5	3.5	3.556	0.003
				WBT	2	4.7	4.755	0.003
16	City	21st Street at Broadway	WB	WBL	5	3.6	3.755	0.006
				WBT	2	3.6	3.731	0.022
17	City	Alhambra Street and J Street	EB	EBT	1	3.7	3.730	0.001
18	City	El Camino Avenue at Evergreen Street	EB	EBL	1	3.5	3.556	0.002
				EBT	5	3.9	3.953	0.004
19	City	Howe Avenue at Fair Oaks Boulevard	EB	EBL	1	3.5	3.558	0.005
				EBT	6	4.3	4.358	0.004
			SB	SBL	7	3.5	3.558	0.004
				SBT	4	4.3	4.357	0.004
20	City	Folsom Boulevard at Power Inn Road/Howe Avenue	SB	SBL	3	3.5	3.528	0.005
				SBT	8	4.7	4.713	0.004
21	City	5th Street at I Street	WB	WBT	4	3.5	3.530	0.001
22	City	Arden Way at Challenge Way	EB	EBL	2	3.5	3.504	0.023
				EBT	6	4.3	4.317	0.008
23	City	16th Street at W Street	NB	NBT	4	3.9	3.930	0.008

AVG = Average

STDV = Standard Deviation

Note that yellow times for locations indicated by "\*" represent final value implemented after the initial field work; therefore, no output comparisons were performed for these movements.

# APPENDIX C

## CLEARANCE INTERVAL REVIEW



# COUNTY OF SACRAMENTO SHERIFF'S DEPARTMENT

## Timing Evaluation

County and City of Sacramento

Intersection No.	Agency	Intersection	Approach	Speed Limit (MPH)			Enforcement Movement(s)				
				Posted	85th	90th	Dir	Phase	Yellow (sec)		Red
									EX	CA	EX
1	County	Watt Avenue at Fair Oaks Boulevard	NB	40	55	60	NBL	1	3.5	3.0	2.0
							NBT	6	5.4	5.0	1.1
			WB	40	55	55	WBL	7	3.5	3.0	2.0
							WBT	4	5.0	5.0	1.0
2	County	Watt Avenue at Arden Way	EB	40	50	50	EBL	3	3.5	3.0	2.0
							EBT	8	4.8	4.7	0.9
3	County	Howe Avenue at Hurley Way	NB	40	50	50	NBL	1	3.5	3.0	2.0
							NBT	6	4.8	4.7	0.5
4	County	Martin Luther King Boulevard at 47th Avenue	WB	40	50	55	WBL	5	3.5	3.0	1.9
							WBT	2	5.0	4.7	0.2
5	County	Madison Avenue at Sunrise Boulevard	EB	45	55	55	EBL	3	3.5	3.0	2.0
							EBT	8	5.0	5.0	1.1
6	County	Madison Avenue at Date Avenue	WB	45	50	50	WBL	5	3.5	3.0	0.8
							WBT	2	4.8	4.7	0.0
7	County	Florin Road at East Parkway	EB	40	45	50	EBT	6	4.3	4.3	0.0
8	County	Florin Road at Franklin Boulevard	WB	40	45	45	WBL	5	3.5	3.0	1.6
							WBT	2	4.6	4.3	0.6
9	County	Manzanita Avenue at Cypress Avenue	SB	40	50	55	SBT	2	4.8	4.7	0.0
10	County	El Camino Avenue at Eastern Avenue	EB	40	50	50	EBL	1	3.5	3.0	1.6
							EBT	6	4.8	4.7	0.3
11	County	Florin Road at Lindale Drive	EB	40	50	55	EBL	1	3.5	3.0	1.0
							EBT	6	4.8	4.7	0.0
12	County	Elkhorn Boulevard at Don Julio Drive	EB	45	55	55	EBL	1	3.5	3.0	2.0
							EBT	6	5.0	5.0	0.2
13	County	Hwy 99 NB Off-Ramp at Calvine Road	EB	45	50	50	EBT	6	4.7	4.7	1.3
Intersection No.	Agency	Intersection	Approach	Speed Limit (MPH)		Enforcement Movement(s)					
				Posted	85th	Dir	Phase	Yellow (sec)		Red	
								EX	CA	EX	
14	City	Mack Road at Center Parkway	EB	45	50	EBL	5	3.5	3.0	0.1	
						EBT	2	4.7	4.7	0.5	
15	City	Mack Road at Valley High Drive / La Mancha Way	WB	45	50	WBL	5	3.5	3.0	1.3	
						WBT	2	4.7	4.7	1.0	
16	City	21st Street at Broadway	WB	25	35	WBL	5	3.6	3.0	0.0	
						WBT	2	3.6	3.6	0.0	
17	City	Alhambra Street and J Street	EB	30	35	EBT	1	3.7	3.6	0.0	
18	City	El Camino Avenue at Evergreen Street	EB	35	35	EBL	1	3.5	3.0	0.0	
						EBT	5	3.9	3.6	0.5	
19	City	Howe Avenue at Fair Oaks Boulevard	EB	40	45	EBL	1	3.5	3.0	2.0	
						EBT	6	4.3	4.3	1.0	
			SB	40	45	SBL	7	3.5	3.0	1.0	
						SBT	4	4.3	4.3	1.0	
20	City	Folsom Boulevard at Power Inn Road/Howe Avenue	SB	45	50	SBL	3	3.5	3.0	1.9	
						SBT	8	4.7	4.7	1.8	
21	City	5th Street at I Street	WB	25	30	WBT	4	3.5	3.2	2.0	
22	City	Arden Way at Challenge Way	EB	40	45	EBL	2	3.5	3.0	1.2	
						EBT	6	4.3	4.3	0.4	
23	City	16th Street at W Street	NB	30	40	NBT	4	3.9	3.9	0.0	

**NOTES/ LEGEND:**  
 N Northbound phase S Southbound phase E Eastbound phase W Westbound phase  
 T Thru Movement L Left turn R Right turn PD Pedestrian phase

EX: Existing Value - Source: Timing Sheet uploaded from TMC or directly taken from the field (controller)  
 CA: Proposed Value based on the latest California MUTCD (2014)

\* CA required minimum values:  
 Yellow:  
 - All left turn phases = 3.0 seconds  
 - All thru phases = using 85th percentile speeds, rounded up to the nearest 5 mph

All Red:  
 - Not Required, but if used typically ranges from 0.1 to 2 seconds (should not exceed 6 seconds)

SPEED (mph)	CA MUTCD MIN YELLOW (sec)
< 25	3.0
30	3.2
35	3.6
40	3.9
45	4.3
50	4.7
55	5.0
60	5.4
65	5.8

