

# **Analysis of RLR Collisions at RLC Intersections in Encinitas, CA**

**By Jay Beeber, Safer Streets L.A., Member ITE**

## **Background**

Safer Streets L.A. is a grassroots organization dedicated to furthering the interests of the motoring public through the adoption of scientifically sound and sensible transportation and traffic laws. We believe that accurate information and critical thinking are crucial to implementing sound public policy. Towards that end, we strive to provide the public and elected representatives with well researched and verifiable data. Our goal is to counter long-held misconceptions and misinformation with solid facts in order to promote scientifically based solutions to motorist and pedestrian safety issues. Safer Streets L.A. provides this information on a voluntary basis and is not paid to interact with elected officials.

Our goal in forwarding you the following information is to provide you with an alternative viewpoint on the use of photo enforcement. We hope that this information proves useful in your deliberations as to whether or not to continue the red light camera program in Encinitas.

## **Introduction**

The following is an analysis of Red Light Related (RLR) collisions at the two Red Light Camera (RLC) equipped intersections in the city of Encinitas, California as well as a short discussion of the economic impacts of photo enforcement along with a discussion of potential engineering alternatives. Accident statistics were compiled from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS) database. The SWITRS database serves as a means to collect and process data gathered from collision scenes by multiple police agencies throughout the state. The most recent complete year for which data is available is 2011. No relevant data is yet available through this database for 2012, although local police agencies may have more up-to-date information. However, the data can provide relevant information as to collision trends over an eleven year period.

We have also reviewed the Agenda Report for the City Council meeting of June 26, 2013 and have determined that a number of errors may have been made in analyzing the collision history of the photo enforced intersections as will be explained below.

In evaluating the effectiveness of RLC programs, attention must be given to analyzing relevant types of collisions. Red light cameras target drivers who impermissibly cross the limit line after the traffic light has turned red. Therefore, analysis of collisions for which the primary collision factor is listed in the database as a violation of CVC 21453A (solid red light) or 21453C (left turn arrow) provide the most information about the possible benefits of photo enforcement. Often, collision analysis may erroneously include collisions which are not actually caused by a red light running violation. For example, an analysis of broadside collisions may mistakenly be substituted for an analysis of red light collisions although they are not one and the same. Not all broadside collisions are caused by red light running and not all collisions that are caused by red light running result in a broadside collision. Likewise, collisions which occur "in the intersection" are sometimes erroneously substituted for red light collisions although, again, they are not necessarily equivalent.

Another error which can be made when reviewing the collision database is misidentifying the actual location of the collision. This can occur because the collisions in the database are designated as

occurring at the closest intersection although they may have occurred hundreds or thousands of feet away. The database does provide a field to designate the distance from the intersection where the collision occurred, but this is sometimes overlooked, and can lead to some collisions being credited with having occurred at a particular intersection when they, in fact, occurred at an adjacent intersection. It appears this may have been the case in the analysis of collisions which allegedly occurred at the intersection of El Camino Real and Encinitas Blvd. A full explanation of this error appears below.

Finally, care must be taken when drawing specific conclusions regarding the effectiveness of red light camera enforcement, as numerous factors may determine whether red light running collisions have increased or decreased from year to year over the study period, including traffic volume, signal timing changes, weather, driver impairment, distraction, and fatigue, etc.

We now turn to an analysis of the specific intersections in Encinitas.

### **El Camino Real and Encinitas Blvd.**

The Agenda Report indicates that there were 9 red light running collisions at this intersection in the 4.5 years prior to installation of the cameras. We believe this assertion is in error. Our review of the SWITRS database indicates that there were only 4 true red light running collisions in the 3.5 years prior to installation of the cameras (data for the year 2000 is no longer available in the SWITRS database).

#### 2001

For the year 2001, the Agenda Report indicates that 2 red light related (RLR) collisions occurred. The SWITRS database lists only one true RLR collision for this year (a violation of CVC 21453C) and one collision where the primary collision factor was a violation of CVC 21453B. As this is a violation for failing to yield while making a right turn on red *after stopping*, this collision cannot be counted as a red light running collision. We could find no other collision in the database that could reasonably be designated as red light related and therefore believe the analysis may have erroneously included this collision as a red light running collision.

#### 2002

For the year 2002, the Agenda Report indicates that 2 red light related (RLR) collisions occurred. The SWITRS database lists only one RLR collision for this year occurring at the intersection of El Camino Real and Encinitas Blvd. (a violation of CVC 21453A). The database also lists one RLR collision occurring 744 ft south of this intersection. That distance would place the collision at the unnamed signalized intersection of El Camino Real and the entrance/exit for the LA Fitness/99 Cent Store shopping center. We could find no other collision in the database that could reasonably be designated as red light related and therefore believe the analysis may have erroneously included this collision as occurring at the El Camino Real and Encinitas Blvd. intersection.

#### 2003

For the year 2003, the Agenda Report indicates that 2 red light related (RLR) collisions occurred. The SWITRS database does not list any collisions for which the primary collision factor was a violation of either CVC 21453A or CVC 21453C. However, one collision does have a designation of a violation of CVC 21453A as an *associated factor* for the collision. Without reviewing the collision narrative from the police report, we are unable to determine whether this was a true red light running collision. Regardless, we have included it in our analysis for completeness. However, we could find no other collision in the database that could reasonably be designated as red light related and therefore believe that the analysis may have erroneously included an additional collision for this year which was not red light related.

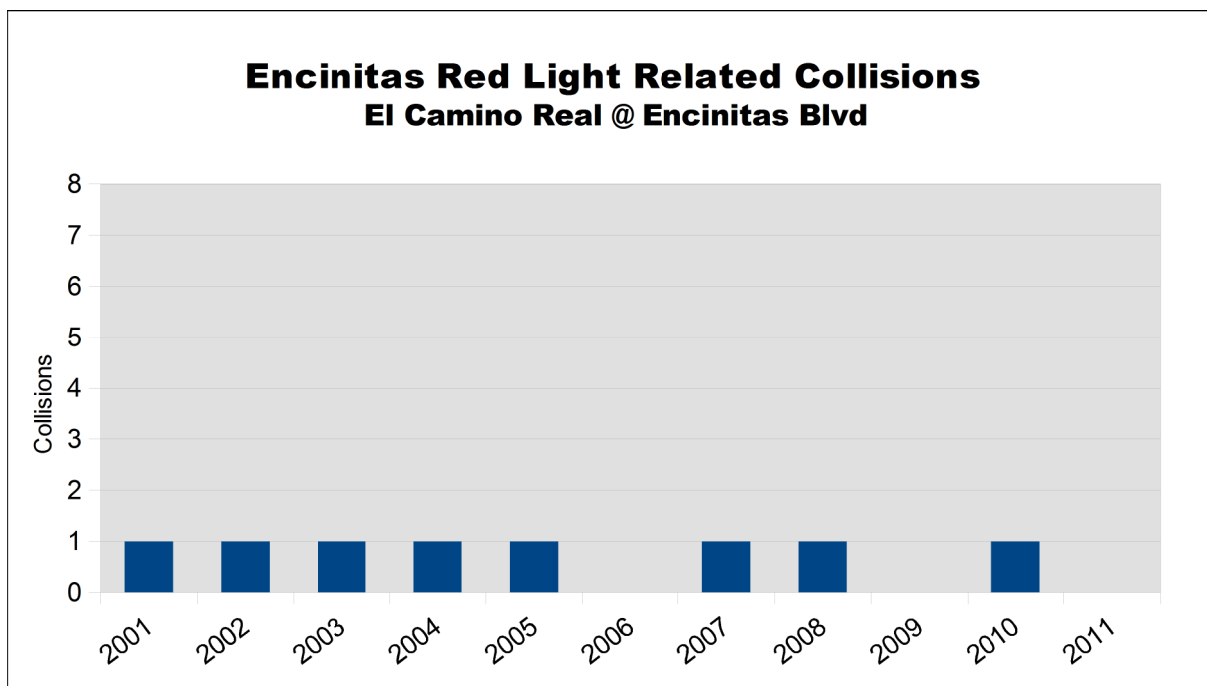
### 2004 - 2011

For the years 2004 - 2011, our count of red light related collisions from the SWITRS database matches the Agenda Report.

### Total Collisions

It should be noted that we were unable to consistently match the number of total collisions listed for each year on the Agenda Report with the number of collisions listed in the SWITRS database. As explained previously, collisions are listed based on their proximity to intersections. Therefore, the number of collisions considered to have occurred at an intersection is highly dependent on the maximum distance from the intersection one uses in their search criteria. We attempted to duplicate the results listed in the Agenda Report and could not find any consistent criteria we could use to obtain the same number of collisions listed for each year on the Agenda Report. Regardless, an analysis of total collisions is generally meaningless when considering the effectiveness of red light cameras as there has never been any suggestion that they have an effect on collisions with causes other than red light running (with the exception of rear end collisions which have been shown to increase in the presence of the cameras).

Our chart of red light running collisions at the intersection of El Camino Real and Encinitas Blvd. appears below.



As can be seen from this chart, the number of red light related collisions was extremely low prior to installation of the cameras and remains low. Due to the fact that this intersection did not have a red light running problem, it was likely not a good candidate for photo enforcement. Considering the extremely small number of collisions that were occurring at the intersection, small random changes from year to year may be magnified to appear more significant than they are. Also as conditions change over time, including traffic patterns and other possible engineering changes implemented at the subject location, it is impossible to directly tie any claimed reduction in collisions to the presence of red light cameras. In fact, the violation data suggests that some changes were made to this intersection in the latter part of 2005, most likely in the signal timing. This warrants more investigation as signal

timing improvements alone have been shown to significantly improve intersection safety. As a result, it is difficult to draw any firm conclusions about the effectiveness of camera enforcement but it is likely that little or no safety improvement has been gained through the use of photo enforcement.

### Citations

It should be noted that at the eastbound approach to this intersection, approximately 77% of the citations are issued for rolling right turns. While these types of violations are “easy pickins” for enforcement, they generally pose little to no safety hazard unless the turn is made at a high rate of speed. Our analysis in Los Angeles found that the chance that a rolling right turn might result in a collision was approximately 1 in 345,000. While these violations are technically considered equivalent to straight through violations with regards to the fines and penalties imposed, carrying an almost \$500 penalty and the potential for a license point, they are not equivalent in terms of the danger posed to other roadway users. It is highly unlikely that when the Encinitas City Council approved the use of ticketing cameras, they intended for the program to be almost entirely based on rolling right turn ticketing. Yet this is the reality of the city's program as it exists today.

### **El Camino Real and Leucadia Blvd/Olivenhain Rd**

The Agenda Report indicates that there were 11 red light running collisions at this intersection in the 5.9 years prior to installation of the cameras. We believe this assertion is in error. Our review of the SWITRS database indicates that there were only 6 true red light running collisions in the 4.9 years prior to installation of the cameras (data for the year 2000 is no longer available in the SWITRS database).

#### 2001 - 2002

For the years 2001 - 2002, our count of red light related collisions from the SWITRS database matches the Agenda Report.

#### 2003

For the year 2003, the Agenda Report indicates that 3 red light related (RLR) collisions occurred. The SWITRS database does not list any collisions for which the primary collision factor was a violation of either CVC 21453A or CVC 21453C. However, one collision is listed where the primary collision factor was a violation of CVC 21453B. As this is a violation for failing to yield while making a right turn on red *after stopping*, this collision cannot be counted as a red light running collision. In addition, two collisions have a designation of a violation of CVC 21453A as an associated factor for the collision. However, one of these collisions has a primary collision factor related to driving under the influence. As the driver's impairment was the cause of the collision and the running of the red light was incidental to the impairment, it is improper to include this type of collision in a before and after study of the effectiveness of photo enforcement as red light cameras cannot prevent collisions due to impairment. Finally the third collision has a primary collision factor related to failure to make a turn from the appropriate lane. It is unclear as to why this type of collision might have been designated with an associated factor related to red light running. Therefore we do not include this collision in our analysis.

#### 2004

For the year 2004, the Agenda Report indicates that 3 red light related (RLR) collisions occurred. The SWITRS database lists only two RLR collision for this year, both for a violation of CVC 21453A. The database also lists one additional broadside collision with no primary collision factor. Since the actual cause of this collision is unknown and we do not know if this is the additional collision listed in the Agenda Report, we do not include this collision in our analysis.

### 2005 - 2007

For the years 2005 - 2007, our count of red light related collisions from the SWITRS database matches the Agenda Report.

### 2008

For the year 2008, the Agenda Report indicates that 1 red light related (RLR) collision occurred. The SWITRS database does not list any collisions for which the primary collision factor was a violation of either CVC 21453A or CVC 21453C. One collision has a designation of a violation of CVC 21453A as an associated factor for the collision. However, this collision has a primary collision factor related to driving under the influence. As the driver's impairment was the cause of the collision and the running of the red light was incidental to the impairment, it is improper to include this type of collision in a before and after study of the effectiveness of photo enforcement as red light cameras cannot prevent collisions due to impairment. Therefore we do not include this collision in our analysis. It should be noted, though, that the occurrence of this collision at a red light camera enforced intersection lends credence to the argument that red light cameras do not prevent the most dangerous red light running incidents which occur late into the red phase and are mostly the result of driver impairment, distraction or fatigue.

### 2009

For 2009, our count of red light related collisions from the SWITRS database matches the Agenda Report.

### 2010

For the year 2010, the Agenda Report indicates that 2 red light related (RLR) collisions occurred. The SWITRS database lists only one collision for which the primary collision factor was a violation of CVC 21453A. In addition, one collision has a designation of a violation of CVC 21453A as an associated factor for the collision. However, this collision has a primary collision factor related to driving under the influence. As the driver's impairment was the cause of the collision and the running of the red light was incidental to the impairment, it is improper to include this type of collision in a before and after study of the effectiveness of photo enforcement as red light cameras cannot prevent collisions due to impairment. Therefore we do not include this collision in our analysis. It should be noted, though, that the occurrence of this collision at a red light camera enforced intersection lends credence to the argument that red light cameras do not prevent the most dangerous red light running incidents which occur late into the red phase and are mostly the result of driver impairment, distraction or fatigue.

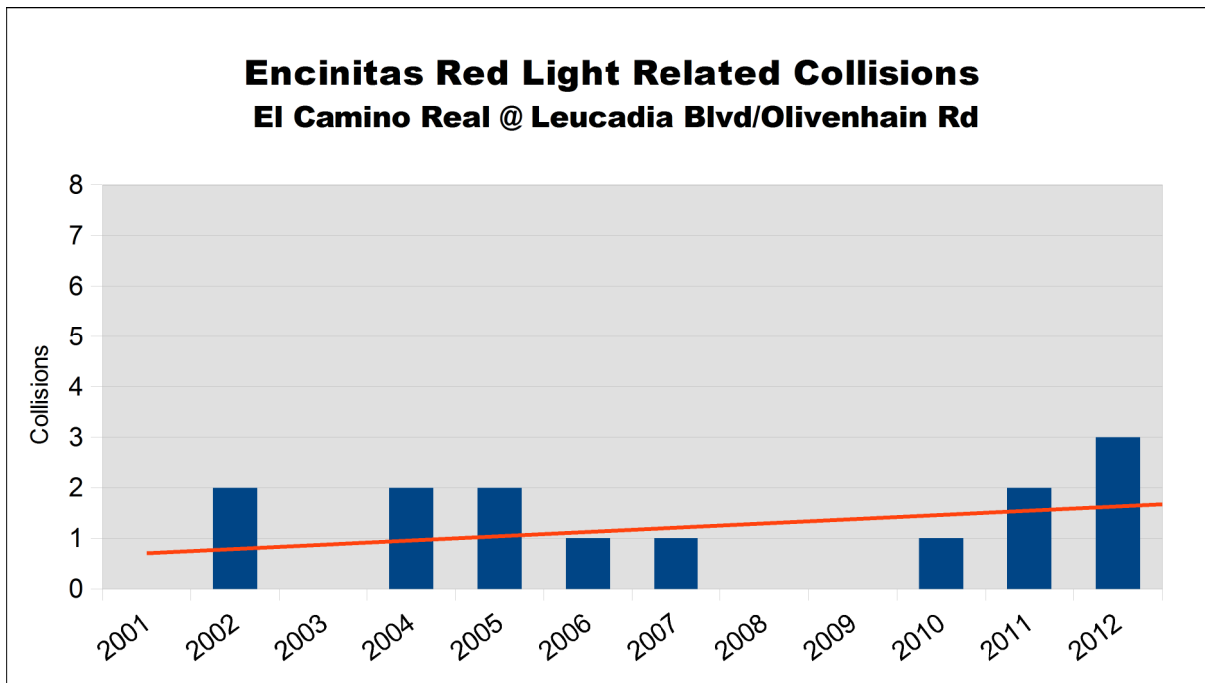
### 2011

For 2011, our count of red light related collisions from the SWITRS database matches the Agenda Report.

### 2012

Since collision data for 2012 is not yet available through the SWITRS database, we include the collisions reported in the Agenda Report in our analysis.

Our chart of red light running collisions at the intersection of El Camino Real and Leucadia Blvd/Olivenhain Rd appears below.



As can be seen from this chart, the number of red light related collisions was extremely low prior to installation of the cameras and remains relatively low. Due to the fact that this intersection did not have a red light running problem, it was likely not a good candidate for photo enforcement. In addition, when we add the trend line based on regression analysis of the data, it appears as though red light running collisions are trending slightly higher despite the presence of the cameras. Considering the extremely small number of collisions that were occurring at this intersection, small random changes from year to year may be magnified to appear more significant than they are. As a result, it is difficult to draw any firm conclusions about the effectiveness of camera enforcement but it is likely that no safety improvement has been gained through the use of photo enforcement.

### **Financial Considerations**

While the Agenda Report lists the direct cost of paying the camera vendor and the fine revenue returned to the city, it does not account for the full costs of the program to the citizens of Encinitas. Although the report mentions additional costs for staff time and the duties of a Community Service Officer, it does not list the actual costs associated with these items. Therefore, it is not possible to determine whether the program's direct costs exceed the revenue from fines or not. On page 3 of the report is a notation that if the program is terminated, there would be a loss to the city of approximately \$85,000 per year. Apparently, this is the difference between the total direct costs to the city and the revenue returned in fines, but without additional information this is not possible to confirm. However, this analysis does not take into account the economic loss to the city due to the almost \$500 ticket cost, additional costs for attending traffic school, costs of increased insurance premiums on drivers who receive these tickets, and the bad will generated due to the public's perception of the program as a revenue enhancement scheme.

According to the Agenda Report, the city has issued approximately 2400 citations in 2012 resulting in about \$1,200,000 in fines issued. Assuming a conservative 70% payment rate, this translates into approximately \$850,000 removed from the local economy annually. Again, this does not include the cost of additional insurance premiums which could easily equal this amount or more. Also, it is impossible to measure the economic loss to the city due to visitors avoiding the town due to the

presence of the red light cameras. Once burned by a red light camera ticket for a slow rolling right turn or fraction of a second late into red violation, many visitors and shoppers vow never to return to a city which they believe is engaged in unfair and heavy-handed enforcement of traffic laws. In all, while it is difficult to assign a dollar figure, the economic loss to the City of Encinitas from the red light camera program is undoubtedly substantially more than the \$85,000 per year the city may receive in net income.

### Alternatives to Photo Enforcement

It is one of the goals of Safer Streets L.A. to provide elected officials with information regarding cost effective alternatives to ticketing cameras. We believe that engineering countermeasures are superior to enforcement in many cases and should be the first countermeasure tried before installing red light cameras. One such countermeasure that has proven to be extremely effective in improving intersection safety is increasing the yellow and all-red signal phases. While the amber signal durations currently being employed at photo enforced intersections in Encinitas likely meet the minimum times required by the State of California, officials should be aware that the protocol for setting those required minimum times in California does not adhere to proper engineering standards and ensures that more red light running incidents than necessary are occurring at signalized intersections. This is especially true in turning lanes where it appears most of the citations in Encinitas are being generated. We have attached a report from the city's red light camera vendor which charts the number of violations as a function of the time into red that they are occurring for the month of July 2010. You will note that with the exception of the one right turn lane being monitored for rolling right turns, almost all the violations are occurring within the first few fractions of a second after the light turns red. These violations can be mostly eliminated with a slightly longer yellow phase. The scientific explanation of this concept is beyond the scope of this correspondence, but we will be happy to provide additional information on this topic if requested to do so.

It should be noted that supporters of red light cameras and the camera industry have traditionally argued that increasing the yellow signal phase will either be ineffective or will cause problems at other intersections. None of the arguments against this safety countermeasure are factually true, nor can they be supported by the scientific evidence. Yet those who have a financial interest in keeping ticketing at a high level can be expected to continue to make these arguments regardless of whether they are scientifically supportable. Again, this correspondence does not afford the opportunity to provide a full discussion on this topic but we are happy to engage with you on this issue in the future.

You may also hear that the yellow signal times are already longer than that mandated by the state. This may or may not be true in some instances but the issue is not if they are already longer, but how much longer and whether an additional extension may provide additional safety benefits. Again, we can provide more information on this topic upon your request.

Finally, you should be aware that additional engineering countermeasures may be available to you in your quest to improve safety at intersections within Encinitas. Please contact us if you would like further information regarding these possibilities.

Sincerely,

Jay Beeber  
Executive Director, Safer Streets L.A.  
Member - ITE



## Encinitas Violations as a Function of Time into Red

Key:

Lanes are numbered starting from the center median. Lane #1 is the leftmost lane.

**ENC-ECEN-01** = Southbound approach to El Camino Real and Encinitas Blvd.

Lanes 1 & 2 are left turn lanes

Lanes 3 & 4 are through lanes

**Notes:** There are very few straight through violations occurring at this intersection. It is highly likely that the yellow time at this location is up to 1 second longer than the state mandated minimum. The majority of the violations are in the left turn lanes and are occurring mainly within the first second of the light turning red. These violations generally do not pose a danger due to the start-up delay of the oncoming traffic and any all-red phase programmed into the signal timing. These violations can be eliminated by slightly increasing the yellow arrow time up to about 1 second or through other signal timing changes.

**ENC-ENEC-01** = Eastbound approach to El Camino Real and Encinitas Blvd.

Lanes 1 & 2 are left turn lanes

Lane 3 is a through lane

Lane 4 serves both through and right turn traffic

**Notes:** There are virtually no straight through violations occurring at this intersection. It is highly likely that the yellow time at this location is up to 1 second longer than the state mandated minimum. The majority of the violations in the left turn lanes are occurring mainly within the first second of the light turning red. These violations generally do not pose a danger due to the start-up delay of the oncoming traffic and any all-red phase programmed into the signal timing. These violations can be eliminated by slightly increasing the yellow arrow time up to about 1 second or through other signal timing changes. The vast majority of violations (up to 77%) are for rolling right turns. These types of violations pose little danger to other roadway users and occur at almost every signalized intersection in large numbers. However, at locations such as this, rolling right turns are actually encouraged by the signal phasing. Drivers making a right turn on red correctly perceive that their movement is protected from the cross traffic by the left turning vehicles traveling southbound on El Camino Real during the protected left turn phase for those vehicles. The rolling right turn violations can be virtually eliminated by installing the new permissive flashing yellow arrow signals recently approved for use in California. In fact, this new signal is mandated due to the requirement that the least restrictive traffic device be used where appropriate.

**ENC-OLEC-01** = Westbound approach to El Camino Real and Leucadia Blvd/Olivenhain Rd

Lanes 1 & 2 are left turn lanes

Other lanes are not photo enforced

**Notes:** There are relatively few violations occurring at this intersection, approximately 50 per month. The majority of the violations in the left turn lanes are occurring mainly within the first second of the light turning red. These violations generally do not pose a danger due to the start-up delay of the oncoming traffic and any all-red phase programmed into the signal timing. These violations can be eliminated by slightly increasing the yellow arrow time up to about 1 second or through other signal timing changes.



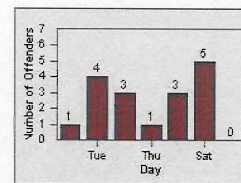
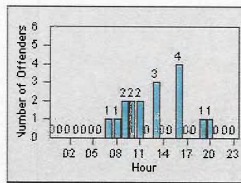
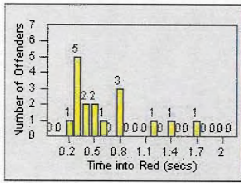
# Redflex Redlight Offender Statistics

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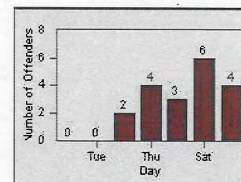
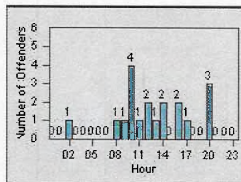
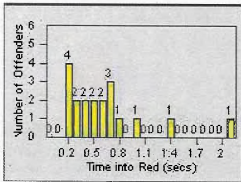
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 DATE TO: 1/Aug/2010



## LANE 1



## LANE 2



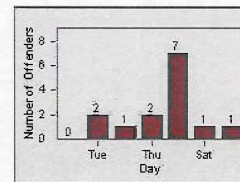
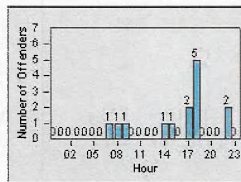
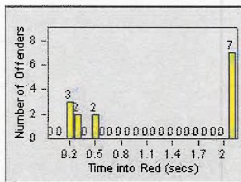
## LANE 3

Redflex Traffic Systems, Inc.

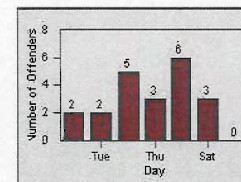
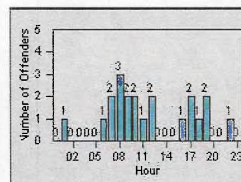
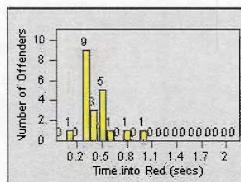
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CONTRACT: Encinitas  
 DATE FROM: 1/Jul/2010

LOCATION: ENC-ECEN-01 Intersection of El Camino Real and Encinitas  
 DATE TO: 1/Aug/2010



## LANE 4



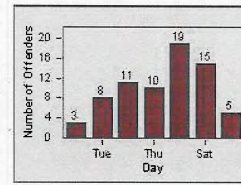
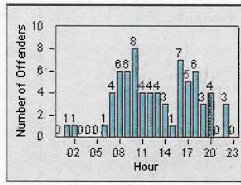
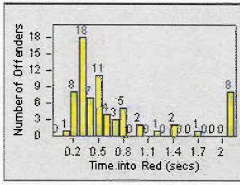
## LANE TOTAL

Redflex Traffic Systems, Inc.

# Redflex Redlight Offender Statistics

CONTRACT: Encinitas  
 DATE FROM: 1/Jul/2010

LOCATION: ENC-ECEN-01 Intersection of El Camino Real and Encinitas  
 DATE TO: 1/Aug/2010



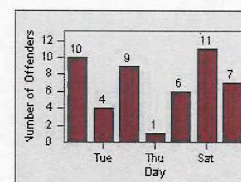
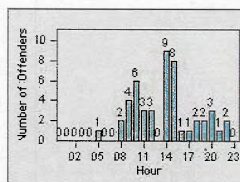
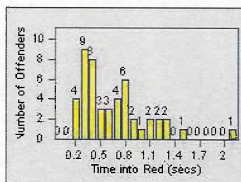
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 DATE FROM: 1/Jul/2010

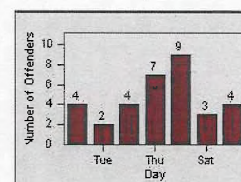
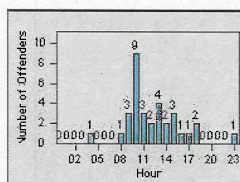
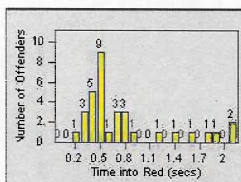
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 DATE TO: 1/Aug/2010



LANE 1



LANE 2

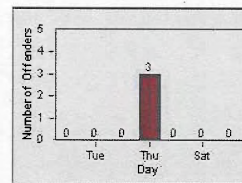
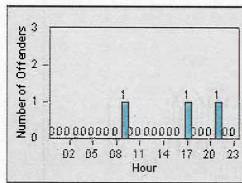
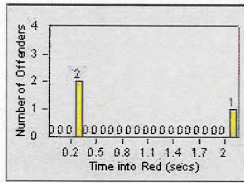


LANE 3

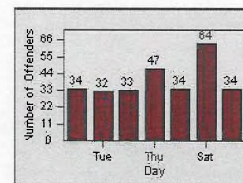
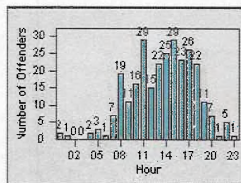
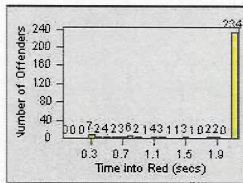
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CONTRACT: Encinitas  
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LOCATION: ENC-ENEC-01 Intersection of Encinitas and El Camino Real  
 DATE TO: 1/Aug/2010



LANE 4

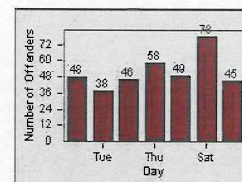
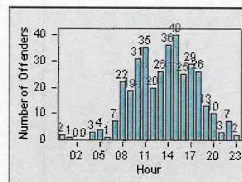
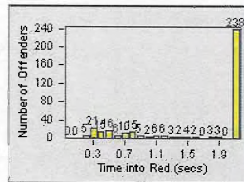


LANE TOTAL

# Redflex Redlight Offender Statistics

CONTRACT: Encinitas  
 DATE FROM: 1/Jul/2010

LOCATION: ENC-ENEC-01 Intersection of Encinitas and El Camino Real  
 DATE TO: 1/Aug/2010



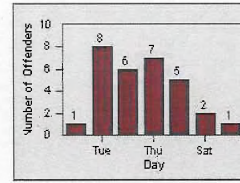
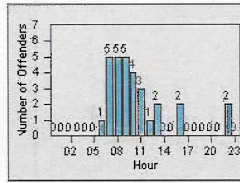
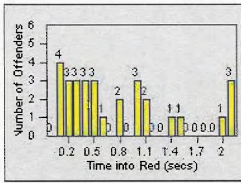
# Redflex Redlight Offender Statistics

CONTRACT: Encinitas  
 DATE FROM: 1/Jul/2010

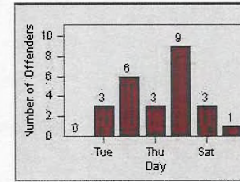
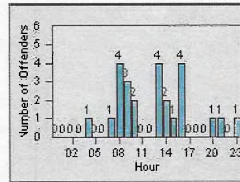
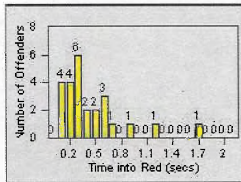
LOCATION: ENC-OLEC-01 Leucadia Blvd/Olivenhain Rd  
 DATE TO: 1/Aug/2010



## LANE 1



## LANE 2



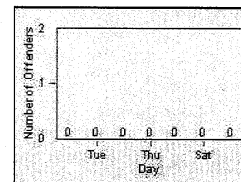
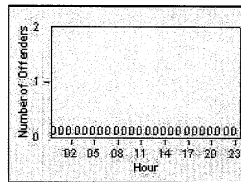
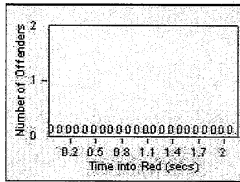
## LANE 3

Redflex Traffic Systems, Inc.

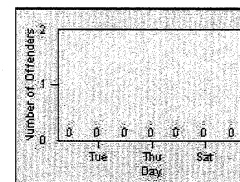
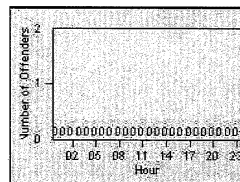
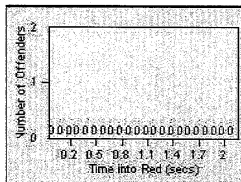
# Redflex Redlight Offender Statistics

CONTRACT: Encinitas  
 DATE FROM: 1/Jul/2010

LOCATION: ENC-OLEC-01 Leucadia Blvd/Olivenhain Rd  
 DATE TO: 1/Aug/2010



## LANE 4



## LANE TOTAL

Redflex Traffic Systems, Inc.

# Redflex Redlight Offender Statistics

CONTRACT: Encinitas  
DATE FROM: 1/Jul/2010

LOCATION: ENC-OLEC-01 Leucadia Blvd/Olivenhain Rd  
DATE TO: 1/Aug/2010

