



SFMTA
Municipal
Transportation
Agency

Red Light Camera Evaluation 2014

Collision Changes Associated with Red Light
Camera Installations in San Francisco

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Summary

This paper summarizes the safety and citation performance of the intersections that currently have red light camera enforcement. If they are to continue in operation, these locations will soon need to be upgraded to the latest digital photo technology. This upgrade will require significant investments at each affected intersection. This is therefore an opportune time to assess the need to continue photo enforcement at each location. The reports reviews collision, citation, and engineering history of each location to make recommendations on which should be retained. Additional new intersections are also discussed at the end.

Background

On Oct. 18, 1994, at the intersection of 19th Avenue and Holloway Avenue, next to the campus of San Francisco State University, a driver ran the northbound red light on 19th Avenue and attempted evasive maneuvers to avoid striking cross traffic. He lost control of his car and drove into a group of pedestrians waiting at a curbside bus stop. This horrific crash left 13 pedestrians injured. It also provided the impetus for the legislative support needed at the State level to start red light photo enforcement. The first red light photo enforcement systems, including one at 19th and Holloway Avenues, were installed in 1997. Since then an additional 25 intersections have received red light photo enforcement. These are listed below.

- 19th Avenue and Sloat Boulevard
- 1st Street and Folsom Street
- 3rd Street and Harrison Street
- 4th Street and Howard Street
- 5th Street and Mission Street
- 5th Street and Howard Street
- 5th Street and Harrison Street
- 6th Street and Bryant Street
- 7th Street and Mission Street
- 8th Street and Harrison Street
- 9th Street and Howard Street
- 14th Street and South Van Ness Avenue
- 15th Street and Mission Street
- Bush Street and Van Ness Avenue
- Ellis Street and Larkin Street
- Fell Street and Masonic Avenue
- Fulton Street and Park Presidio Boulevard
- Francisco Street and Richardson Avenue
- Franklin Street and Geary Street
- Geary Boulevard and Park Presidio Boulevard
- Hayes Street and Polk Street
- Lake Street and Park Presidio Boulevard
- Lyon Street and Marina Boulevard
- Oak Street and Octavia Boulevard
- Pine Street and Polk Street

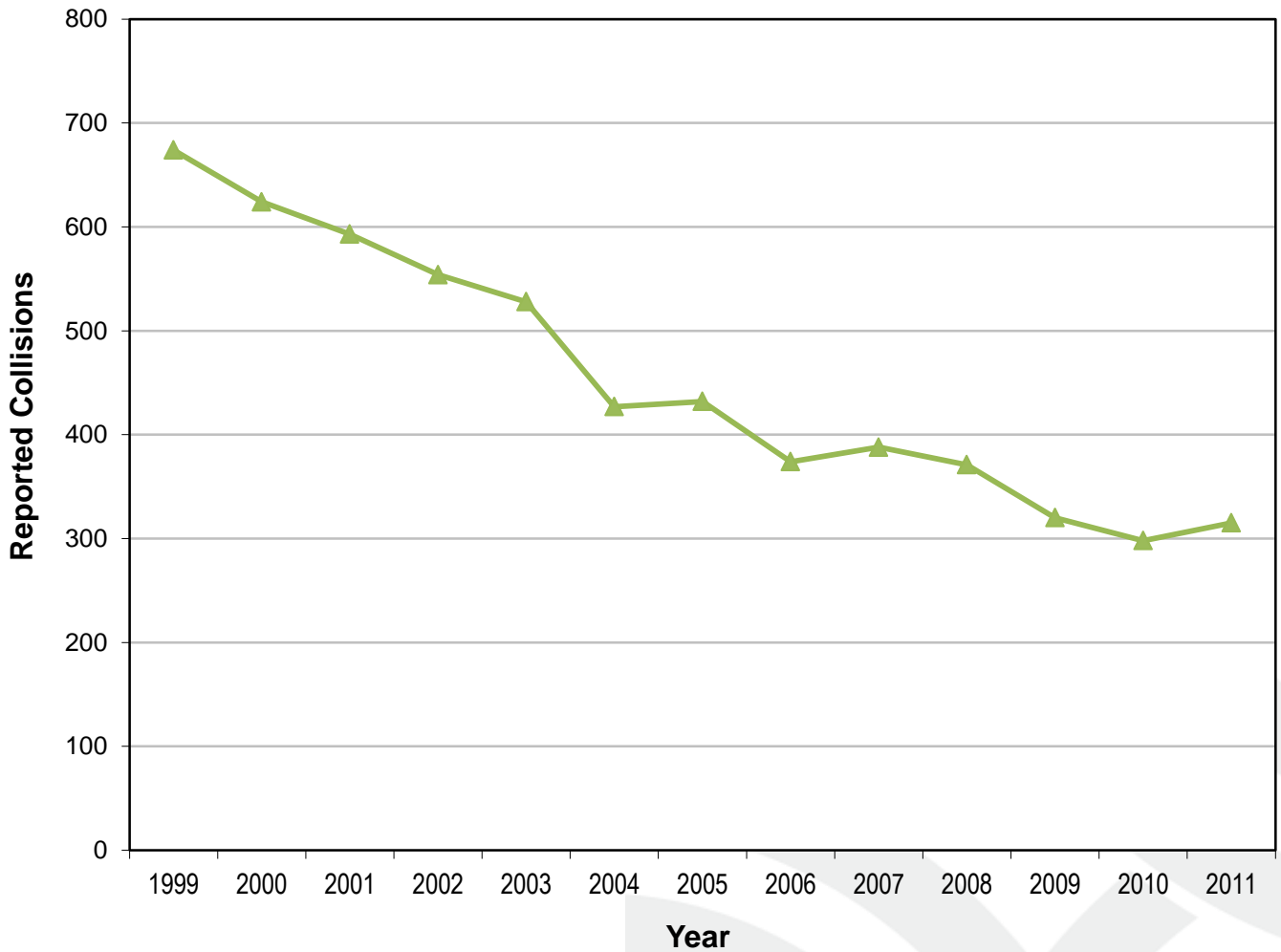


The red light photo enforcement at 19th and Holloway Avenues was in the end removed after other engineering solutions addressed the red light running issues there. San Francisco's red light camera program has always had as its central and only goal improving safety.

San Francisco Red Light Running Collision Trends

Figure 1 illustrates the trend in red light running injury collisions using California Vehicle Code Section 21453(A), failure by a motorist to obey traffic signals. Red light running collisions have shown a general decrease since the early 1990's, with 2011 recording the second lowest annual total in ten years. Signal hardware improvements funded by the City's transportation sales tax have helped reduce these types of collisions, most notably in the South of Market area. This drop coincides with the city's deployment of red light photo enforcement starting in the late 1990's. Other global factors such as education, motor vehicle design, or demographic changes could also be contributing to these trends.

Figure 1: San Francisco Injury Red Light Violation Colisions (1999-2011)



Intersection Collision Summary

Table 1 summarizes red violation collision totals for locations with camera enforcement in San Francisco. It provides injury/fatal collision totals for the five-year period ending in 2013. Six of the 25 intersections have an average at least one red light running collision a year. The remaining intersections have relatively low red light running collision totals. The data is broken down by the direction most likely at fault per San Francisco Police Department collision reports. Of the highest at fault approaches (at least 4 in a five year period), Fell and Masonic Avenue northbound and 1st and Folsom eastbound are the only ones that are currently not photo enforced. Both are not recommended for additional automated enforcement at this time, however, since there are major street redesigns pending construction (Masonic Avenue and Folsom Street streetscape projects).

Breakdown of annual collision totals is provided further in the report for all of these intersections.

**Table 1: Five-Year Red Light Running Injury/Fatal Collisions (CVC 21453 A)
By Party One Travel Direction (2009-2013)**

Intersection	CVC 21453A Northbound	CVC 21453A Southbound	CVC 21453A Eastbound	CVC 21453A Westbound	CVC 21453A Total
Oak Street and Octavia Boulevard	4	0	7	NA	11
Fell Street and Masonic Avenue	5	1	1	2	9
14th Street and South Van Ness Avenue	2	3	3	0	8
Hayes Street and Polk Street	NA	4	4	NA	8
1st Street and Folsom Street	NA	0	4	1	5
6th Street and Bryant Street	1	1	2	NA	5
Franklin Street and Geary Street	2	NA	NA	2	4
Pine Street and Polk Street	1	0	NA	1	3
19th Avenue and Sloat Boulevard	2	0	0	0	2
9th Street and Howard Street	1	NA	NA	1	2
Bush Street and Van Ness Avenue	1	1	0	NA	2
Geary Boulevard and Park Presidio Boulevard	0	1	1	0	2
4th Street and Howard Street	NA	1	NA	0	1
7th Street and Mission Street	0	NA	1	0	1
Fulton Street and Park Presidio Boulevard	0	1	0	0	1
Lake Street and Park Presidio Boulevard	0	1	0	0	1

Lyon Street and Marina Boulevard	0	1	0	0	1
15th Street and Mission Street	0	0	NA	0	0
3rd Street and Harrison Street	0	NA	0	0	0
5th Street and Harrison Street	0	1	0	NA	0
5th Street and Howard Street	0	0	NA	0	0
5th Street and Mission Street	0	0	0	0	0
8th Street and Harrison Street	NA	0	NA	0	0
Ellis Street and Larkin Street	0	NA	0	0	0
Francisco Street and Richardson Avenue	0	0	0	0	0

Intersection Citation Summary

Table 2 lists average monthly citations per year, for 2011 to 2013, and the first half of 2014. Not all intersection approaches are enforced every month. Cameras are rotated on an annual or biannual basis, and at times locations may be impacted by construction. Locations not enforced for any particular month were excluded from the average calculation. Three locations average citation totals over 3 a day: 1st Street at Folsom Street; Howard Street at 9th Street and Van Ness Avenue at Bush Street. There are no established guidelines on what constitutes a citation enforcement problem, but totals below 40 a month are considered by SFMTA to be relatively low. Twelve locations of the total of the 46 listed approaches had monthly citation average totals of 40 or above.

**Table 2: 2011-2014 Red Light Violation Citations, Monthly Average By Year
(Blank indicates inactive or non-enforced year)**

Intersection	2011	2012	2013	2014 (January to June)	Total Monthly Average
Fell St WB left lane at Masonic Ave		323	78	80	173
Van Ness Ave NB at Bush St	160	118	138	109	134
1 st St SB at Folsom St	104	128	163	140	133
Howard St WB at 9 th St	110	138	142	102	128
So. Van Ness Ave NB at 14 th St	76	108	88	29	80
Harrison St WB at 3 rd St	57	30	69	75	56

Franklin St NB at Geary Blvd	49	55	43		50
Hayes St WB at Polk St	60	46	44	24	49
Harrison St WB at 8 th St	23	48	48	55	43
19th Ave NB at Sloat Blvd	40	43	42	41	42
6 th St SB @ Bryant	34	43	44	44	41
Mission St WB at 7 th St	35	42	44	41	40
Bryant St EB at 6 th St	46	36	39	33	38
Park Presidio Blvd NB at Lake St	36	20	45	33	34
9th St NB at Howard St	54	27	21	20	32
Octavia Blvd NB at Oak St	33	31	31	32	31
Mission St NB at 15 th St	30	24	23	39	30
5 th St SB at Mission St	19	19	36	50	29
Mission St WB at 5 th St	21	27	29	37	27
Oak St EB at Octavia Blvd	28	31	24	25	27
7th St NB at Mission St	15	21	31	36	26
Polk St SB at Hayes	29	26	29	13	26
Park Presidio Blvd SB at Lake St	26	19	30	31	26
Larkin St NB at Ellis St	17	27	23	27	24
Park Presidio Blvd SB at Fulton St	26	23	20	26	23
19th Ave SB at Sloat Boulevard	22	20	18	26	21
3rd St NB at Harrison St	19	25	21	12	20
8 th St SB at Harrison St	23	15	20	21	20
Richardson Ave WB at Francisco St	12	14	21	22	19
6 th St NB at Bryant St	18	11	19	21	18

5 th St SB at Harrison St	18	16			17
Park Presidio Blvd NB at Fulton St	15	19	15	16	16
Geary Blvd WB at Franklin St	13	15	13	11	14
Mission St SB at 15 th St	7	6	7	12	14
14 th St EB at So. Van Ness Ave	10	11	11	18	13
Richardson Ave EB at Francisco St	15	12	12	13	13
Howard St WB at 5 th St	18	7		5	11
Pine St WB at Polk St	12	13		6	11
Harrison St WB at 5 th St	12	10			11
Howard WB at 4 th St	14	3			11
Park Presidio Blvd SB at Geary Blvd	17	8		6	10
5 th St NB at Mission St	5	5	10	12	9
Geary Blvd EB at Park Presidio Blvd	8	8		7	8
Marina Blvd EB at Lyon St		9	8		8
Geary Blvd WB at Park Presidio Blvd	5	7	8		7
Park Presidio Blvd NB at Geary Blvd	3	3		6	4

Previous Before and After Study Results

As part of an SFMTA staff study prepared in 2009, intersections with red light cameras installed since 1999 were analyzed for changes in broadside and rear-end injury collision totals in the two years before the red light camera installation year and the two years after the red light camera installation year. The study showed a combined drop from 107 to 40 injury collisions. However, only 2 of the 18 locations did not have other engineering changes implemented in the five year before-after window, making it difficult to conclude what intervention was the most effective, the red light camera enforcement or other engineering measures taken at the same time. No conclusions were derived from this study about the percentage change that red light cameras have on intersection collision totals.

At the time the report was prepared, some national studies had shown increases in rear-end collisions associated with automated enforcement. The before and after data for the San Francisco sample of red light camera locations did not suggest an increase in injury rear-end collisions to be a problem. The cameras had no effect on collision totals excluding red light-running, confirming that the devices are best used for specific signal violation problem by motor vehicles.

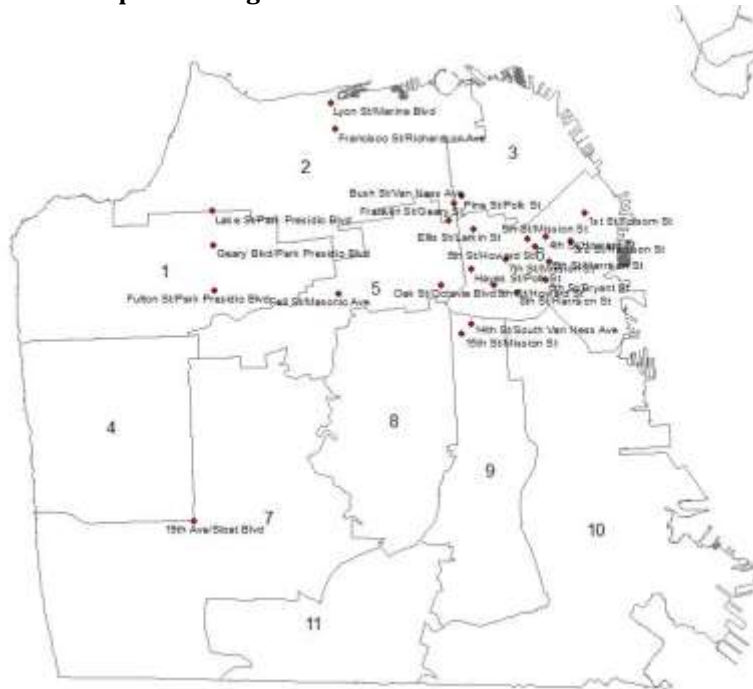
The report concluded that red light cameras may have some effect in reducing broadside collision incidence, but these effects appear secondary to the benefits provided by ensuring that locations have improved signal visibility and signal timing. Since then the city has continued to focus on installation of engineering improvements prior to the installation of enforcement equipment. The last installation of red light camera was at Fell Street and Masonic Avenue in 2012 to address a documented bicycle safety problem related to violations of a left turn red arrow. No red light cameras have been planned, designed or installed since then.

Engineering Changes at Red Light Camera Enforced Intersections

This section provides additional detailed information about each red light camera intersection, with a focus on highlighting other measures implemented that could have affected collision patterns. Annual collision patterns for red light running related collision are provided. In some cases, trends are positive due to a number of interventions. At some other intersections, there was no pattern of red light running collisions prior or after installation of cameras. There are generally two types of red light running. The first is the red light running that occurs fractions of a second following the end of the yellow. The safety problems associated with this type of red light running can be helped with longer yellow lights and all-red clearance phases. The second type is red light running that occurs well into the red light, when inattention to traffic controls may be an issue. That red light running is effectively addressed with signal visibility improvements that make signals more prominent.

7th and Mission Streets is an interesting case study of how a red light camera installation can at times leave an intersection’s collision trends unchanged. 7th and Mission Streets was one of the first red light cameras to be installed by the City in 1997. The location was selected for its above average collision totals. In 1998, after the red light camera had begun operation, the location reported a higher number of collisions and was one of the highest injury collision locations for the city. The location continued to average collision totals close or higher than those present before the red light camera, reporting its second highest annual total in a decade in 2002. In 2003 a major signal upgrade along the downtown portion of Mission Street was completed. This upgrade relocated signal poles, installed overhead (mast arm) signals, and installed pedestrian signal indications. Annual injury collisions since the upgrade dropped significantly, suggesting it was the signal engineering upgrade and not the enforcement mechanism that in this case reduced the intersection’s injury collision totals.

Map of Red Light Camera Enforcement Intersections



19th Avenue and Sloat Boulevard

Installation Dates: January 1997 (Northbound), February 1997 (Southbound)

Directions Enforced: Northbound and Southbound 19th Avenue

Date of Major Signal Upgrade: April 1999

Date of Yellow Light Changes: April 1998

Other signal modifications of note: April 2000, all-red added after Sloat Boulevard phase, pedestrian signals installed crossing 19th Avenue. August 2003, all-red added after 19th Avenue phase. November 2007, lagging eastbound left turn arrow installed.

Figure 2: 19th Avenue and Sloat Boulevard Injury Broadside Collisions (1995-2013)

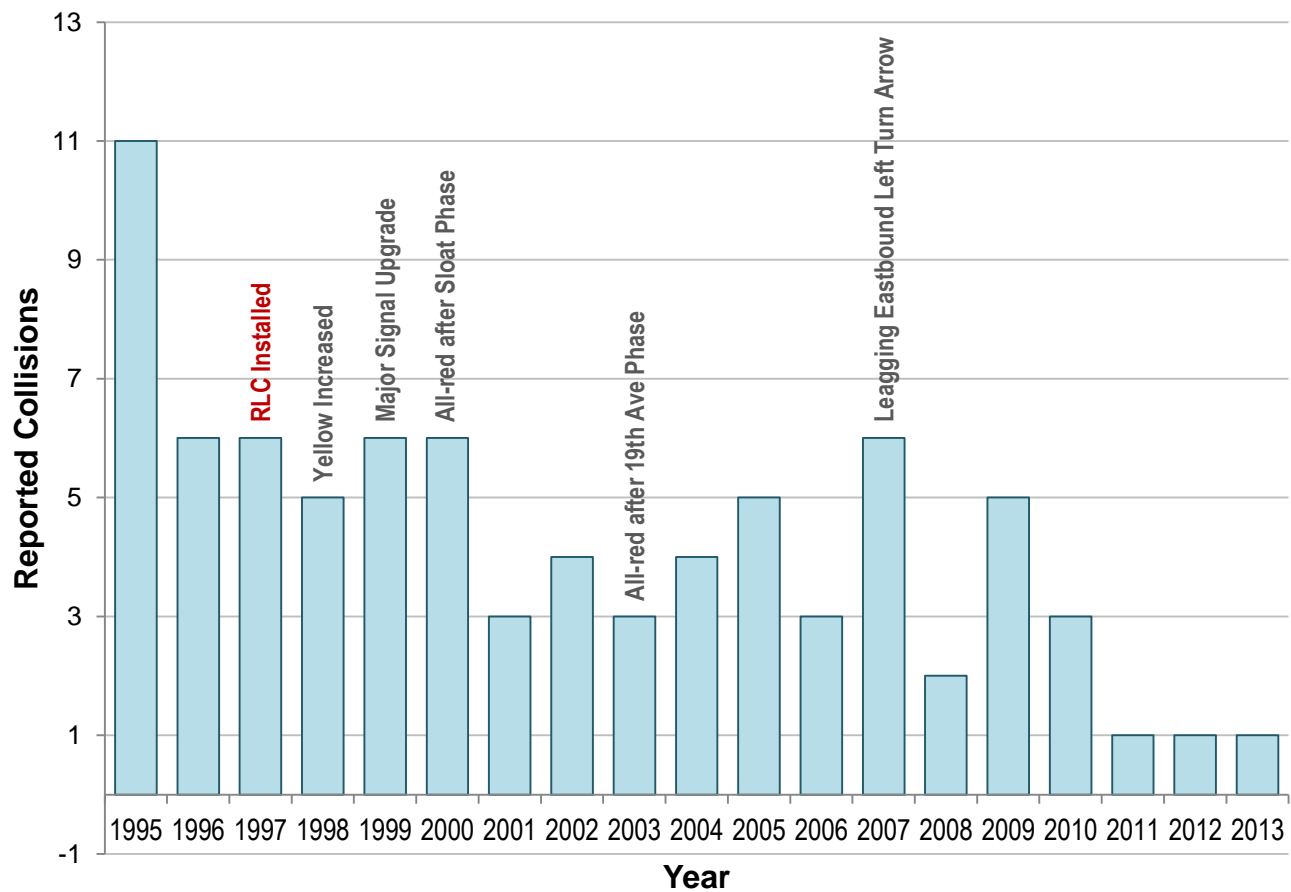


Figure 2: 19th Avenue and Sloat Boulevard Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	11	6	6	5	6	6	3	4	3	4	5	3	6	2	5	3	1	1	1

1st and Folsom Streets

Installation Dates: March 2000
 Directions Enforced: Southbound 1st Street
 Date of Major Signal Upgrade: October 1998
 Date of Yellow Light Changes: October 1998
 Other signal modifications of note: Pedestrian signals added August 2006

**Figure 3: 1st and Folsom Streets
 Injury Broadside Collisions (1995-2013)**

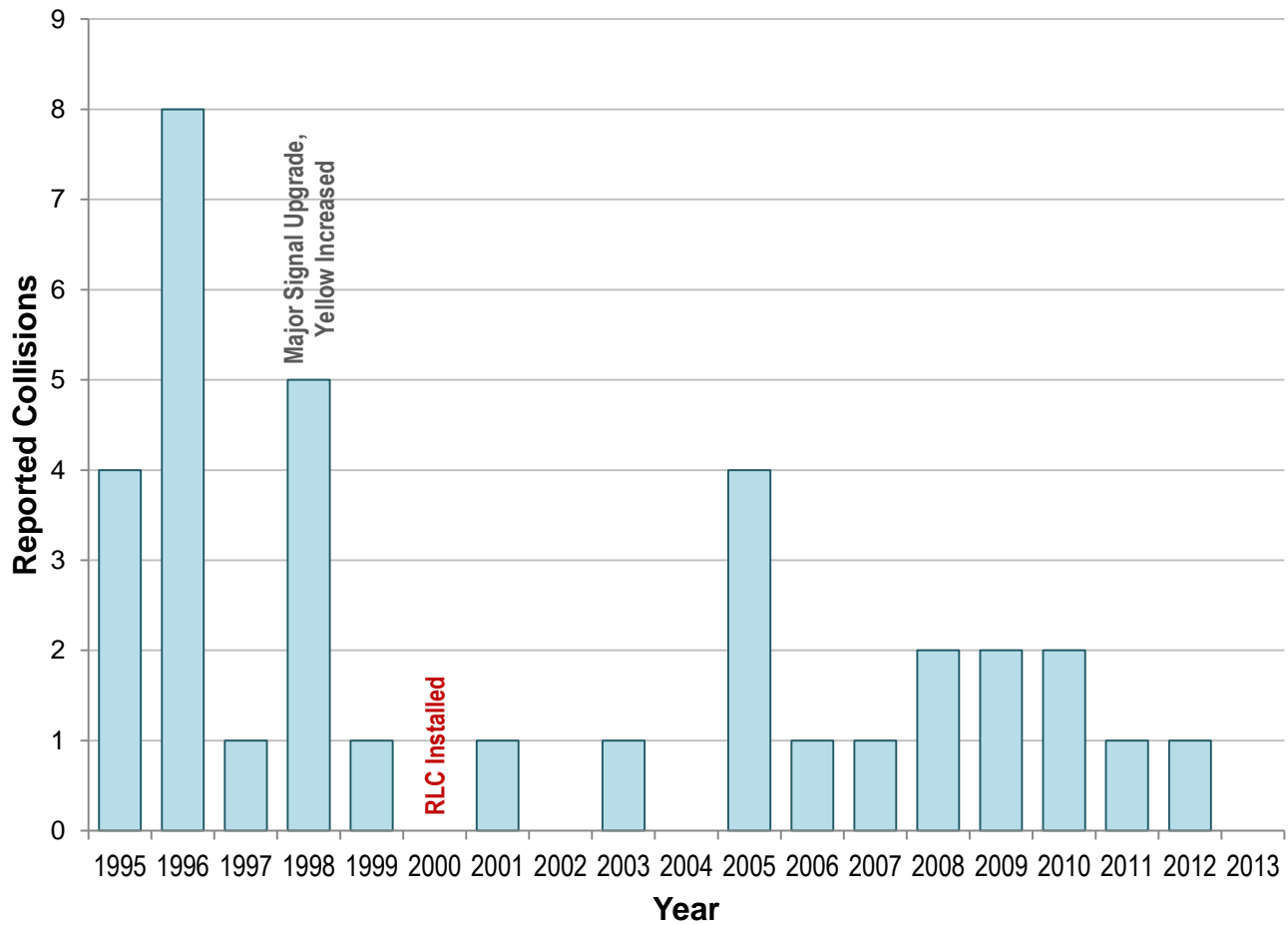


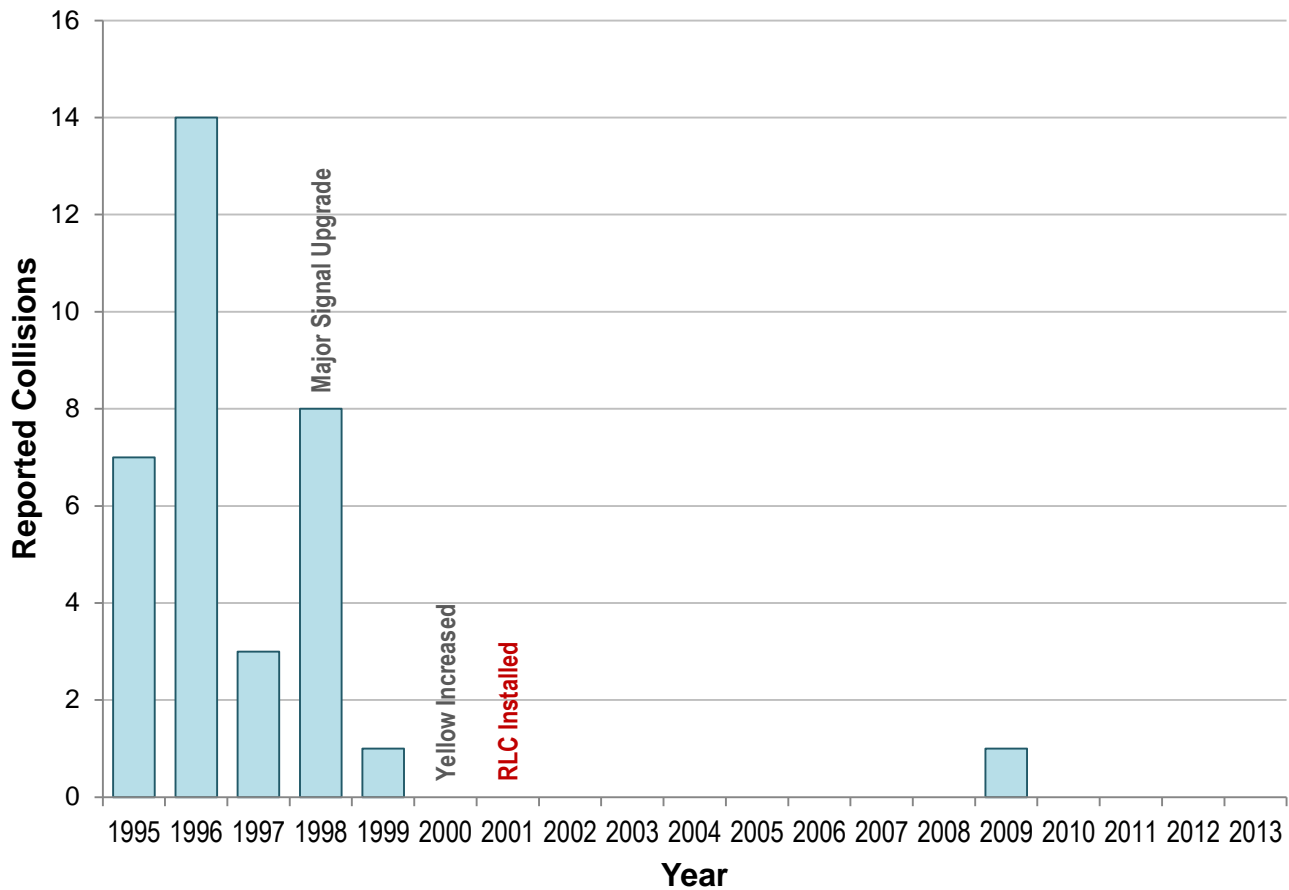
Figure 3: 1st and Folsom Streets
 Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	4	8	1	5	1	0	1	0	1	0	4	1	1	2	2	2	1	1	0

3rd and Harrison Streets

Installation Dates: February 2001
 Directions Enforced: All
 Date of Major Signal Upgrade: July 1998
 Date of Yellow Light Changes: March 2000
 Other signal modifications of note: Pedestrian signals added March 2000

**Figure 4: 3rd and Harrison Streets
 Injury Broadside Collisions (1995-2013)**



**Figure 4: 6th and Bryant Streets
 Injury Broadside Collisions (1995-2013)**

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	7	14	3	8	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0

4th and Howard Streets

Installation Dates: June 2004
 Directions Enforced: Westbound Howard Street
 Date of Major Signal Upgrade: March 1999 and February 2003
 Date of Yellow Light Changes:
 Other signal modifications of note: All-red added February 2003

**Figure 5: 4th and Howard Streets
 Injury Broadside Collisions (1995-2013)**

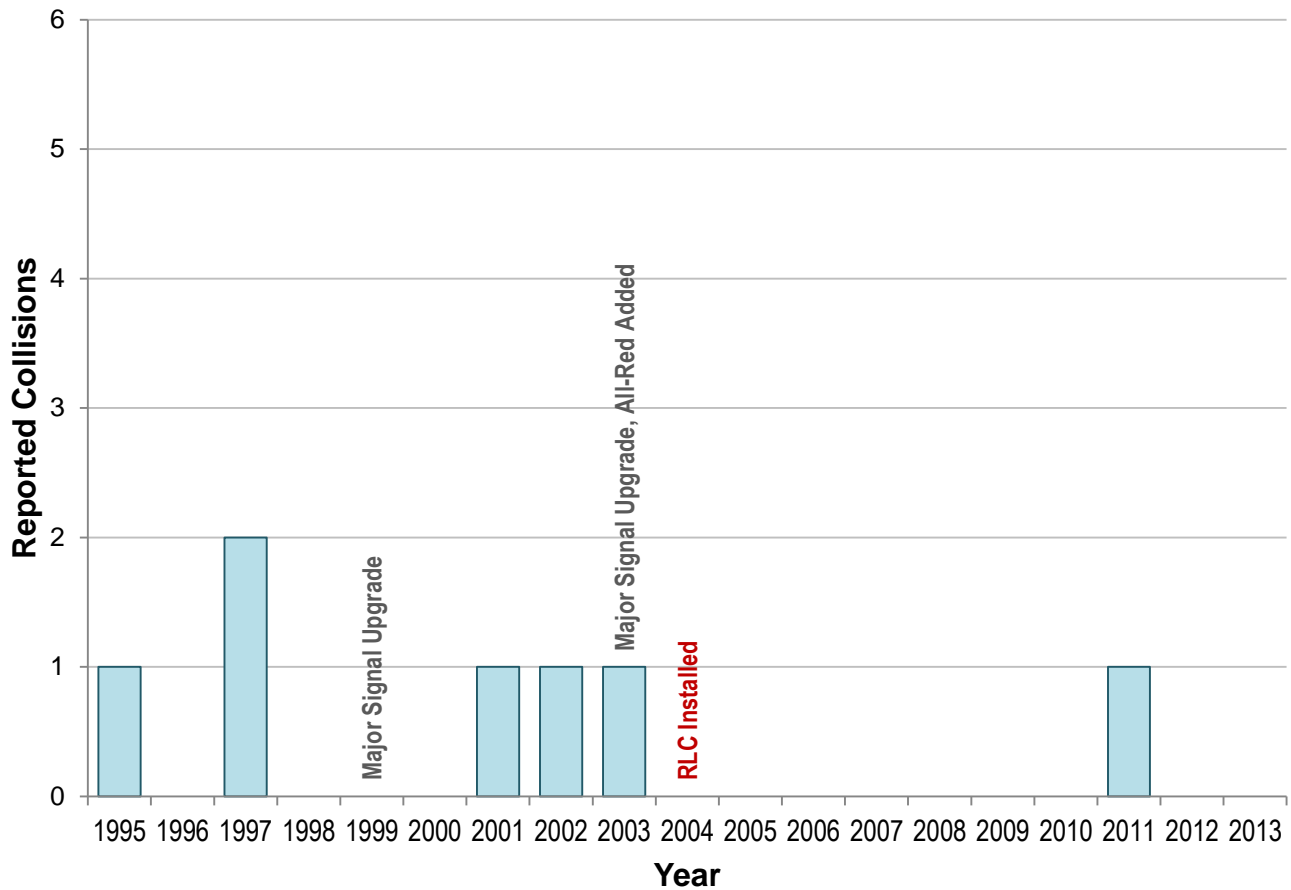


Figure 5: 4th and Howard Streets
 Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1	0	2	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0

5th and Harrison Streets

Installation Dates: February 2001

Directions Enforced: Southbound 5th Street, Westbound Harrison Street

Date of Major Signal Upgrade: July 1998

Date of Yellow Light Changes: July 2000

Other signal modifications of note: September 2004, all-red added after 5th St phases. November 2005, all-red added after Harrison St and offramp phases.

**Figure 6: 5th and Harrison Streets
Injury Broadside Collisions (1995-2013)**

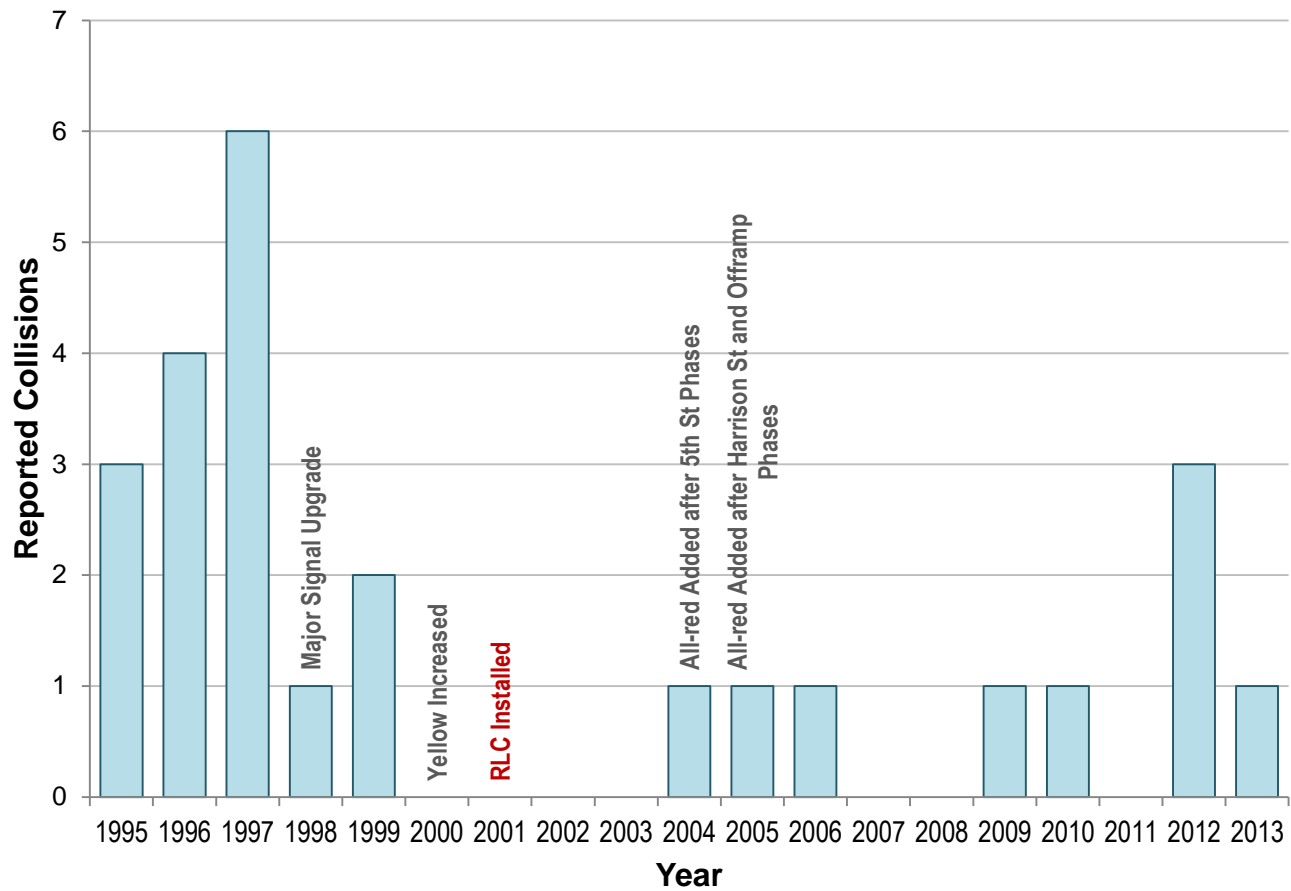


Figure 6: 5th and Harrison Streets
Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	3	4	6	1	2	0	0	0	0	1	1	1	0	0	1	1	0	3	1

5th and Howard Streets

Installation Date: November 1996
 Directions Enforced: Westbound Howard Street
 Date of Major Signal Upgrade: March 1999
 Date of Yellow Light Changes: December 1997, February 2012
 Other signal modifications of note:

**Figure 7: 5th and Howard Streets
 Injury Broadside Collisions (1995-2013)**

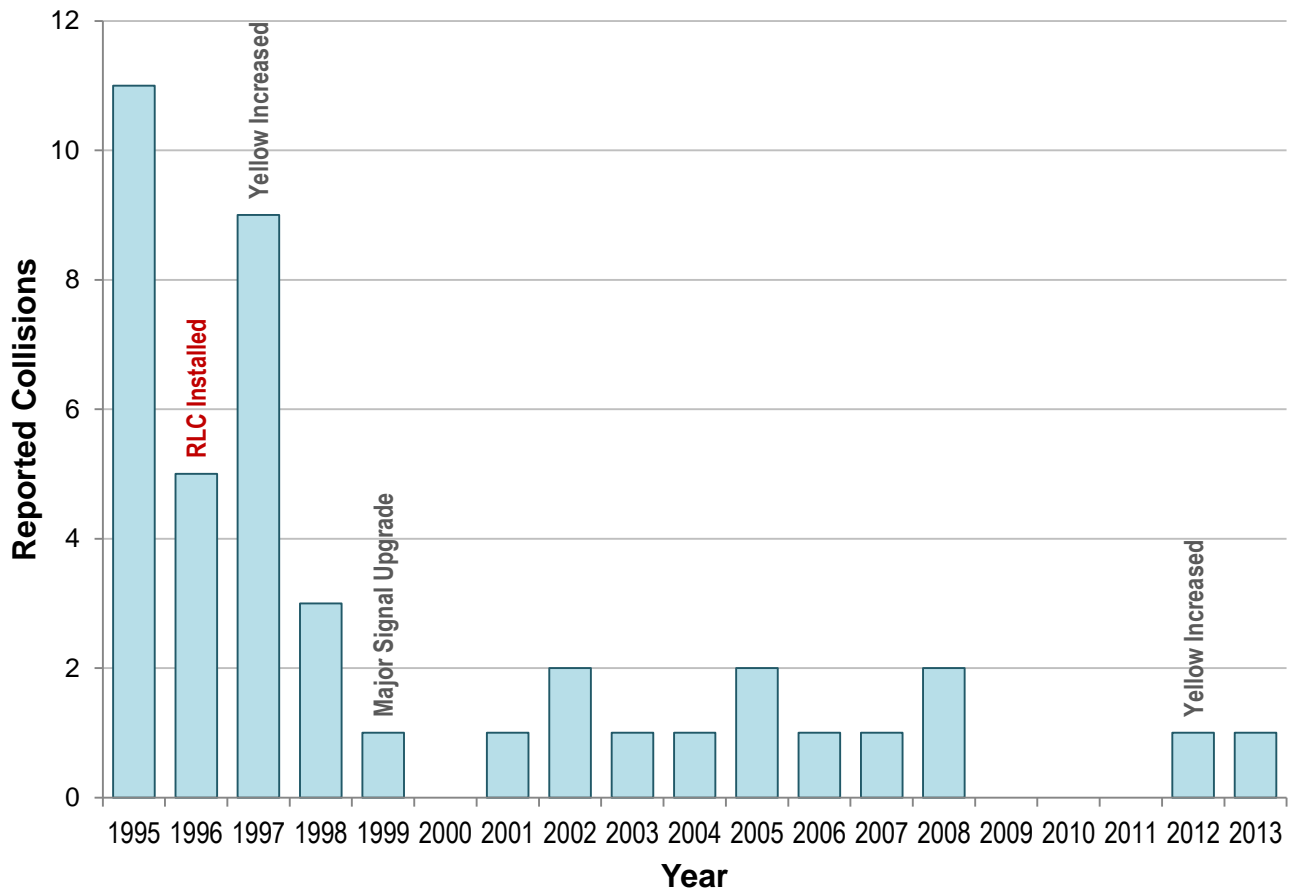


Figure 7: 5th and Howard Streets
 Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	11	5	9	3	1	0	1	2	1	1	2	1	1	2	0	0	0	1	1

5th and Mission Streets

Installation Dates: October 2000 (Northbound), November 2000 (Southbound and Westbound)
 Directions Enforced: Northbound and Southbound 5th Street, Westbound Mission Street
 Date of Major Signal Upgrade: April 1999 and October 2003
 Date of Yellow Light Changes: April 1999
 Other signal modifications of note: All-red added September 1997 and increased October 2003.

**Figure 8: 5th and Mission Streets
 Injury Broadside Collisions (1995-2013)**

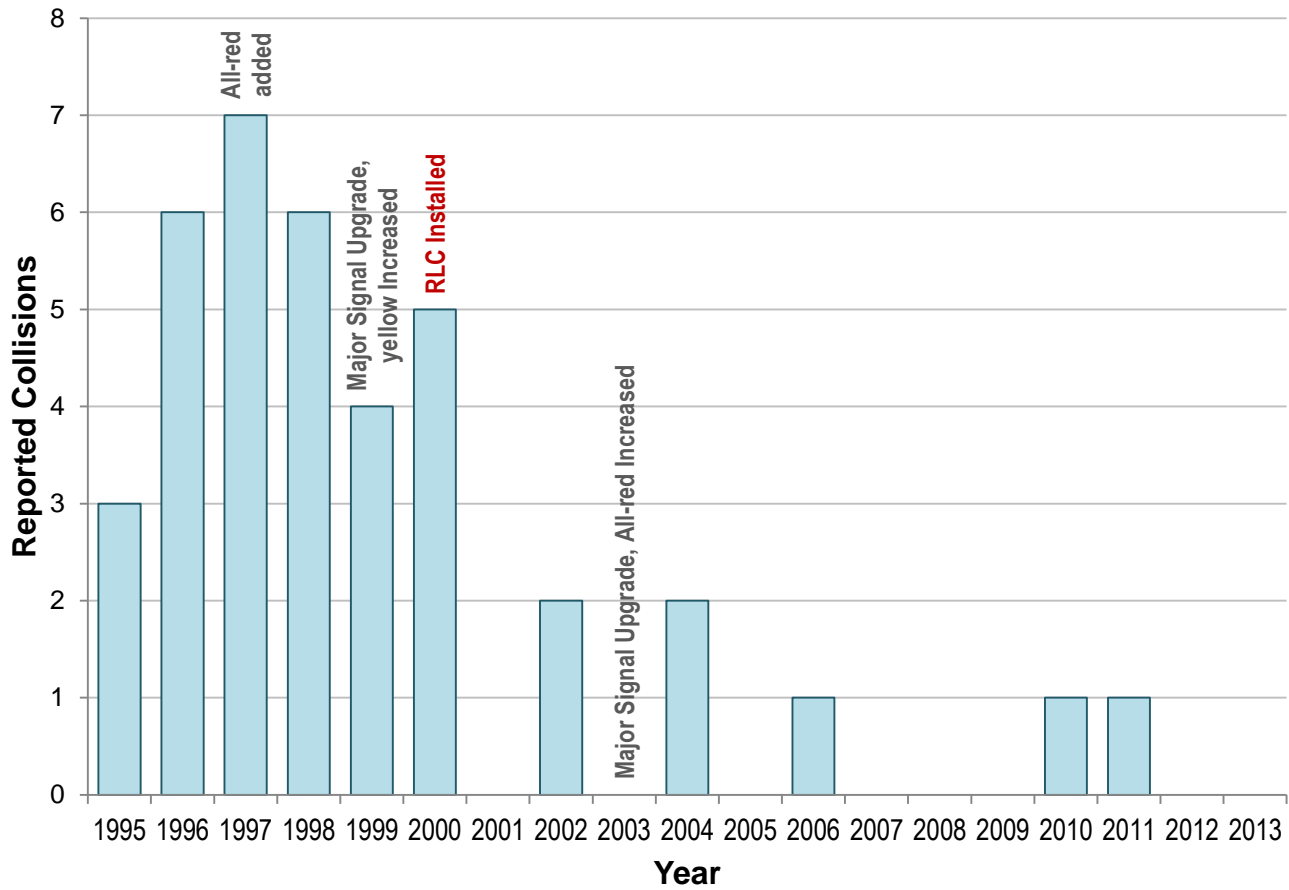


Figure 8: 5th and Mission Streets
 Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	3	6	7	6	4	5	0	2	0	2	0	1	0	0	0	1	1	0	0

6th and Bryant Streets

Installation Dates: December 1999 (Northbound), February 2000 (Southbound) and April 2000 (Eastbound)

Directions Enforced: All

Date of Major Signal Upgrade: September 1997

Date of Yellow Light Changes: July 2000, eastbound and southbound. May 2004 northbound.

Other signal modifications of note: Southbound left turn arrows added September 1997

**Figure 9: 6th and Bryant Streets
Injury Broadside Collisions (1995-2013)**

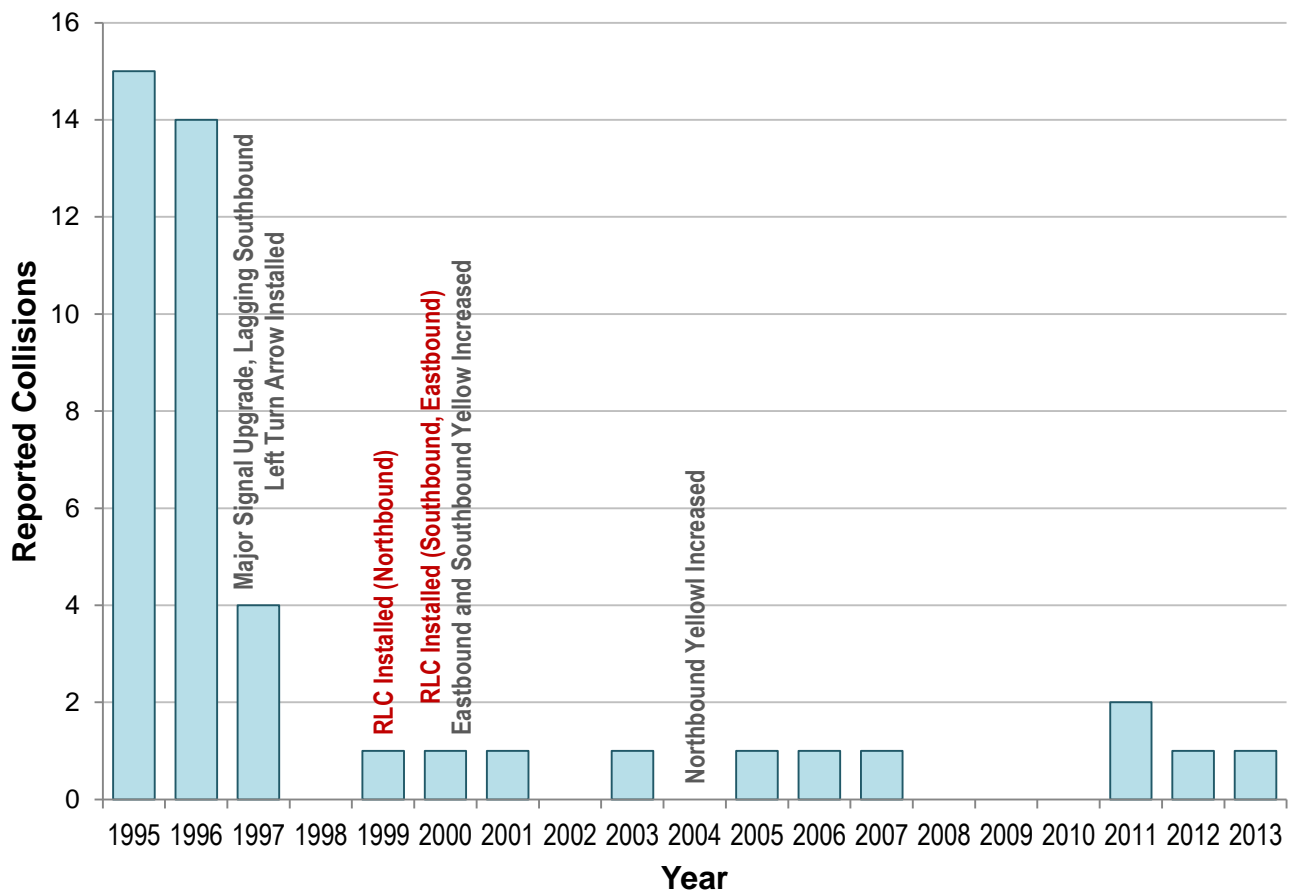


Figure 9: 6th and Bryant Streets
Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	15	14	4	0	1	1	1	0	1	0	1	1	1	0	0	0	2	1	1

7th and Mission Streets

Installation Dates: September 1997 (Northbound), November 1998 (Westbound)
 Directions Enforced: Northbound 7th Street, Westbound Mission Street
 Date of Major Signal Upgrade: August 2002
 Date of Yellow Light Changes: August 1998
 Other signal modifications of note:

Figure 10: 7th and Mission Streets Injury Broadside Collisions (1995-2013)

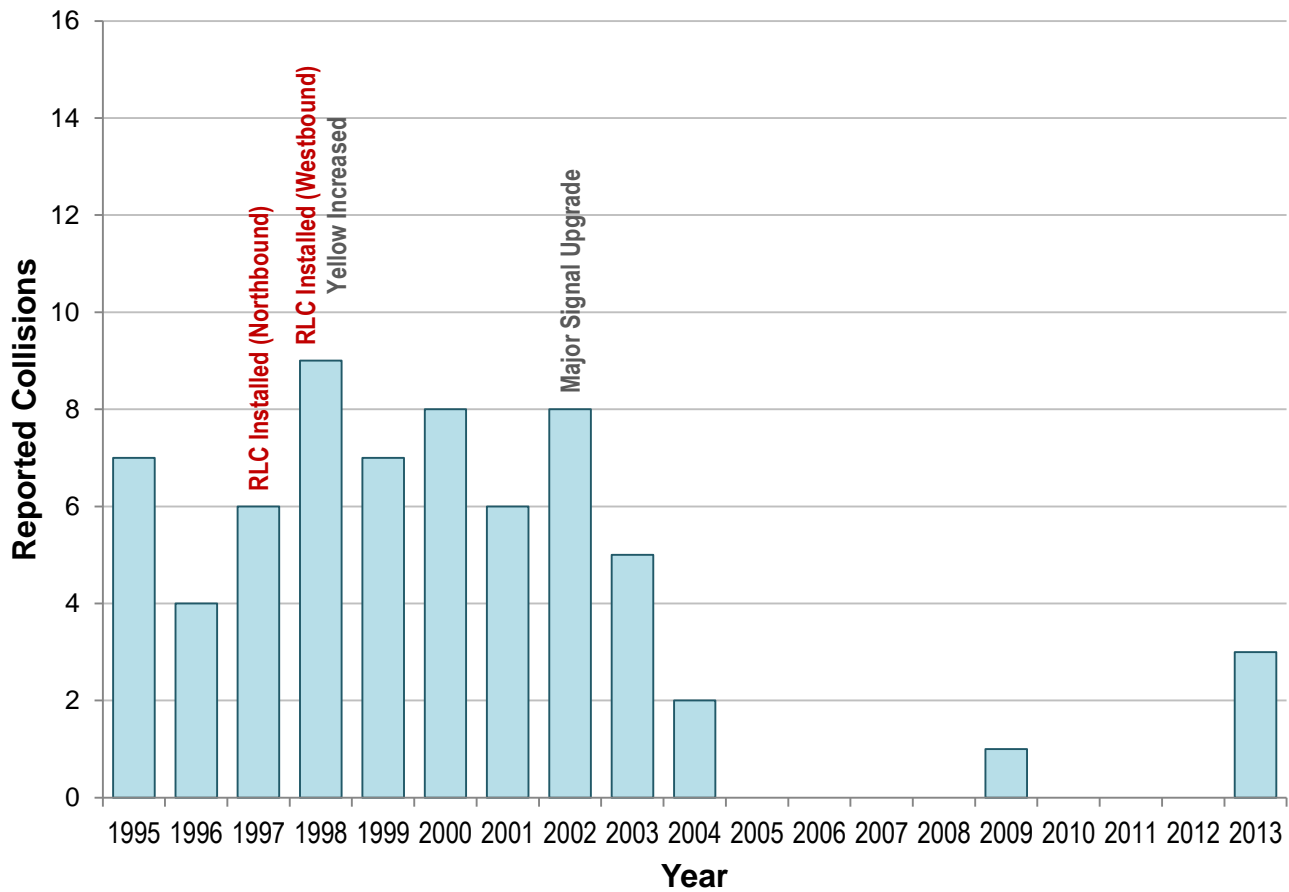


Figure 10: 7th and Mission Streets Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	7	4	6	9	7	8	6	8	5	2	0	0	0	0	1	0	0	0	3

8th and Harrison Streets

Installation Dates: January 2001
 Directions Enforced: All
 Date of Major Signal Upgrade: August 1998
 Date of Yellow Light Changes: July 2000
 Other signal modifications of note: September 2005, all-red added.

**Figure 11: 8th and Harrison Streets
 Injury Broadside Collisions (1995-2013)**

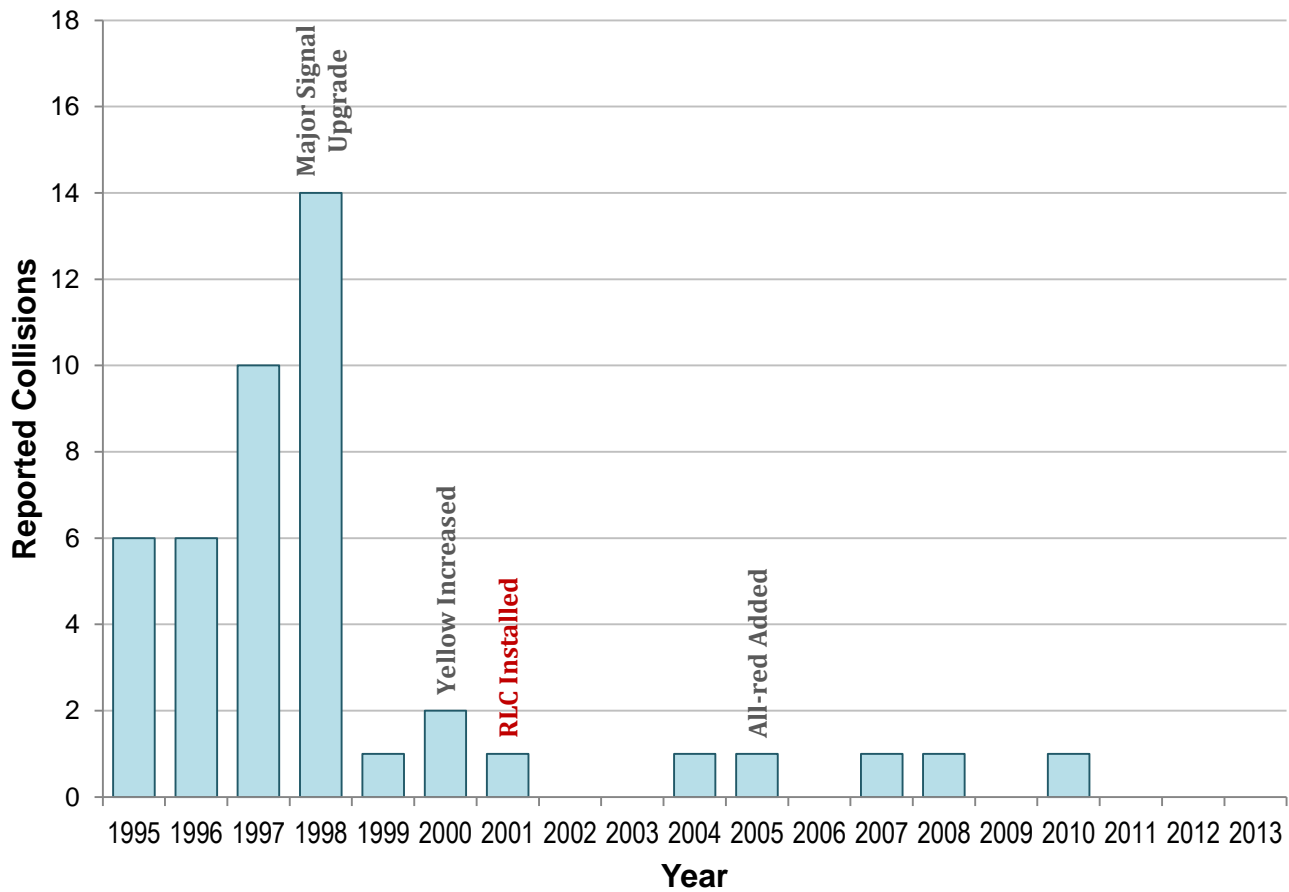


Figure 11: 8th and Harrison Streets
 Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	6	6	10	14	1	2	1	0	0	1	1	0	1	1	0	1	0	0	0

9th and Howard Streets

Installation Dates: September 1997 (Northbound), March 2010 (Westbound)
 Directions Enforced: Northbound 9th Street, Westbound Howard Street
 Date of Major Signal Upgrade: March 1999
 Date of Yellow Light Changes: December 1997
 Other signal modifications of note: Pedestrian signals installed October 2004

**Figure 12: 9th and Howard Streets
 Injury Broadside Collisions (1995-2013)**

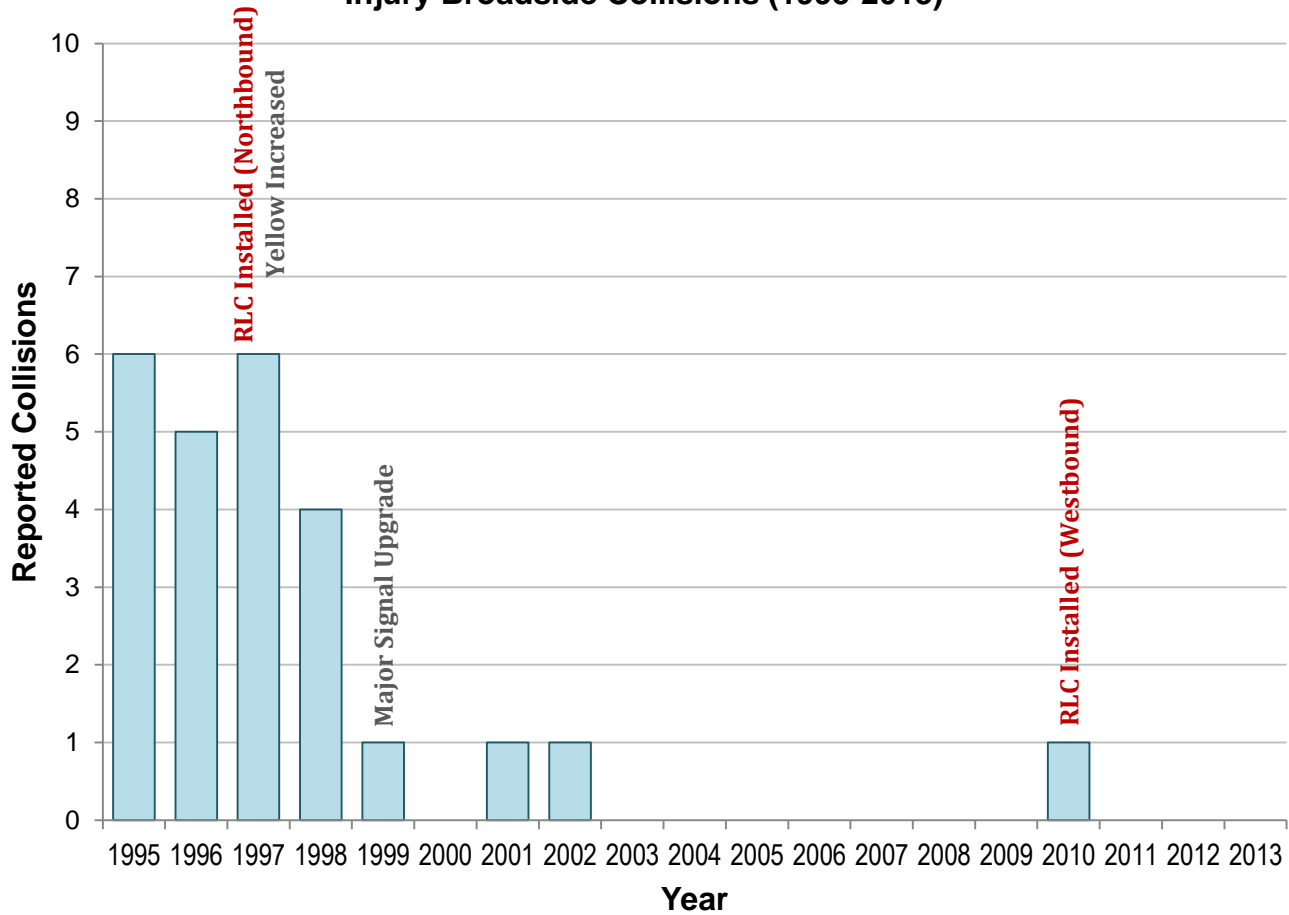


Figure 12: 9th and Howard Streets
 Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	6	5	6	4	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0

14th Street and South Van Ness Avenue

Installation Dates: June 2000 (Eastbound), February 2001 (Northbound)
 Directions Enforced: Northbound South Van Ness Avenue, Eastbound 14th Street
 Date of Major Signal Upgrade: Pending (2015)
 Date of Yellow Light Changes: August 2000
 Other signal modifications of note: July 2001, all South Van Ness Ave northbound heads and one 14th St eastbound head upgraded from 8" to 12". February 2010, all remaining 8" heads upgraded to 12" heads

Figure 13: 14th Street and South Van Ness Avenue Injury Broadside Collisions (1995-2013)

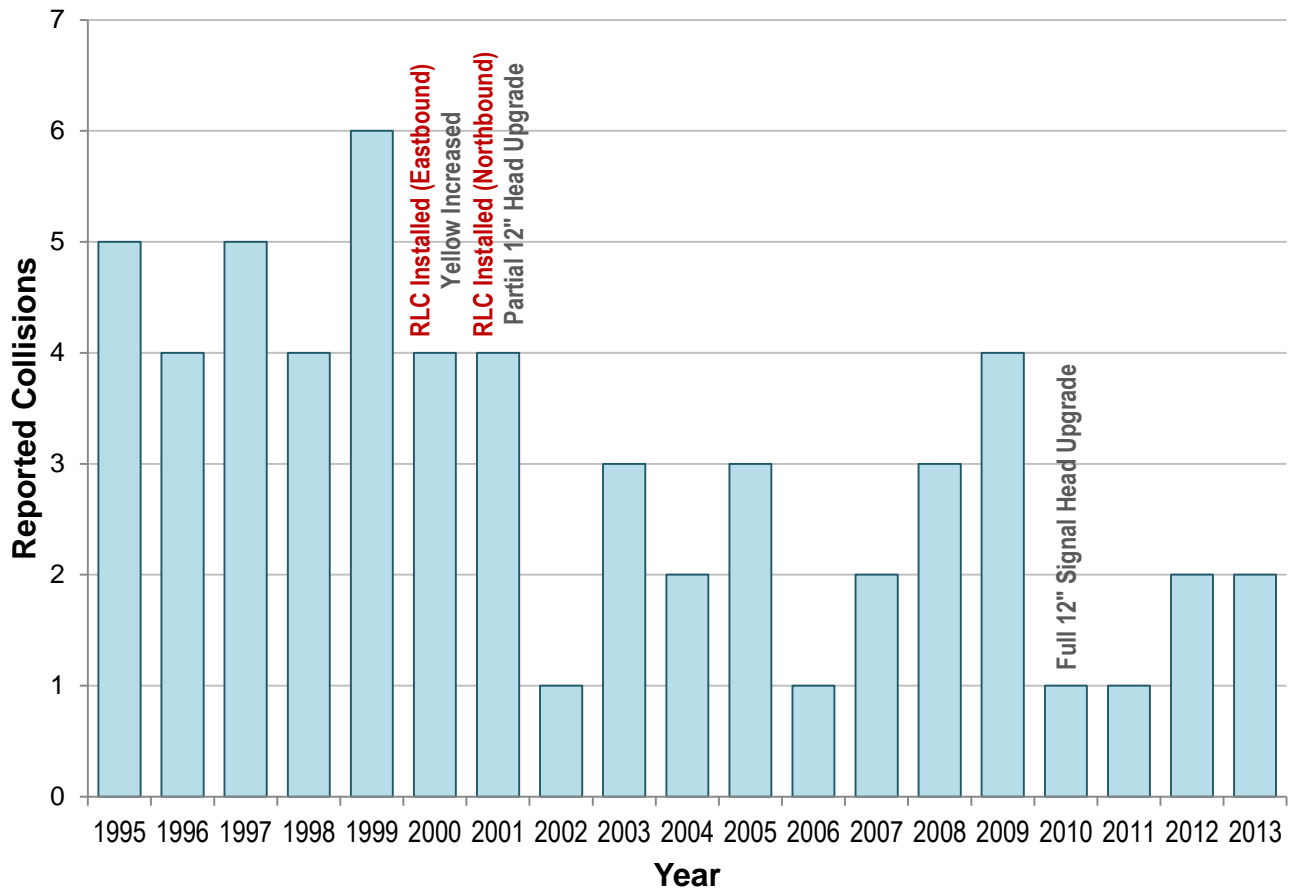


Figure 13: 14th Street and South Van Ness Avenue Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	5	4	5	4	6	4	4	1	3	2	3	1	2	3	4	1	1	2	2

15th and Mission Streets

Installation Dates: June 2000 (Southbound), August 2000 (Northbound)
 Directions Enforced: Northbound and Southbound Mission Street
 Date of Major Signal Upgrade: November 2007
 Date of Yellow Light Changes: June 1999
 Other signal modifications of note:

Figure 14: 15th and Mission Streets Injury Broadside Collisions (1995-2013)

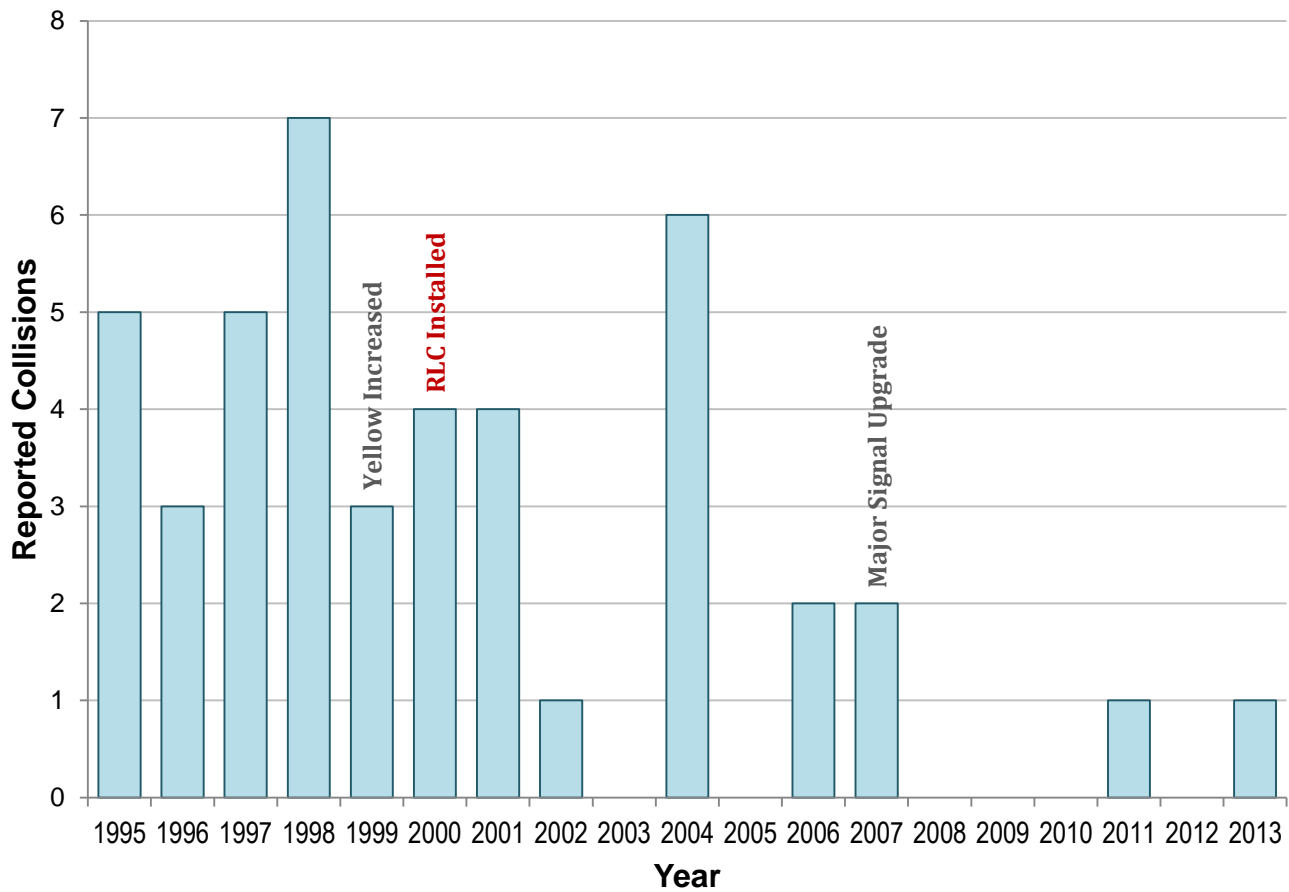


Figure 14: 15th and Mission Streets Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	5	3	5	7	3	4	4	1	0	6	0	2	2	0	0	0	1	0	1

Bush Street and Van Ness Avenue

Installation Dates: March 2001

Directions Enforced: Northbound Van Ness Avenue

Date of Major Signal Upgrade: June 2004

Date of Yellow Light Changes: January 2000

Other signal modifications of note: June 2004, all-red added. July 2004, pedestrian signals crossing Van Ness installed.

Figure 15: Bush Street and Van Ness Avenue Injury Broadside Collisions (1995-2013)

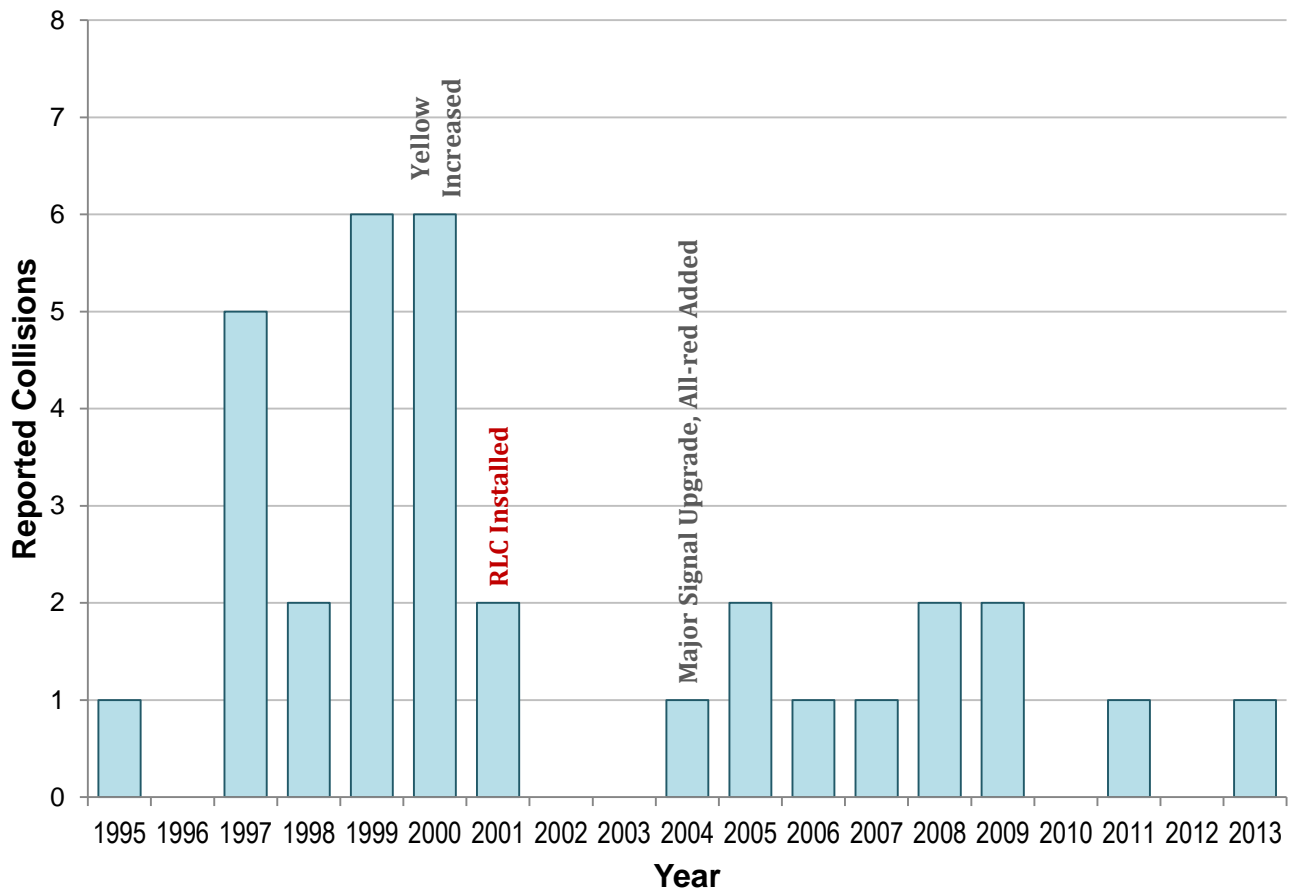


Figure 15: Bush Street and Van Ness Avenue Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1	0	5	2	6	6	2	0	0	1	2	1	1	2	2	0	1	0	1

Ellis and Larkin Streets

Installation Dates: February 2010

Directions Enforced: Northbound Larkin Street, Westbound Ellis Street

Date of Major Signal Upgrade:

Date of Yellow Light Changes: June 2003

Other signal modifications of note: January 2007, all-red added. June 2011, 12" heads and pedestrian signals installed.

**Figure 16: Ellis and Larkin Streets
Injury Broadside Collisions (1995-2013)**

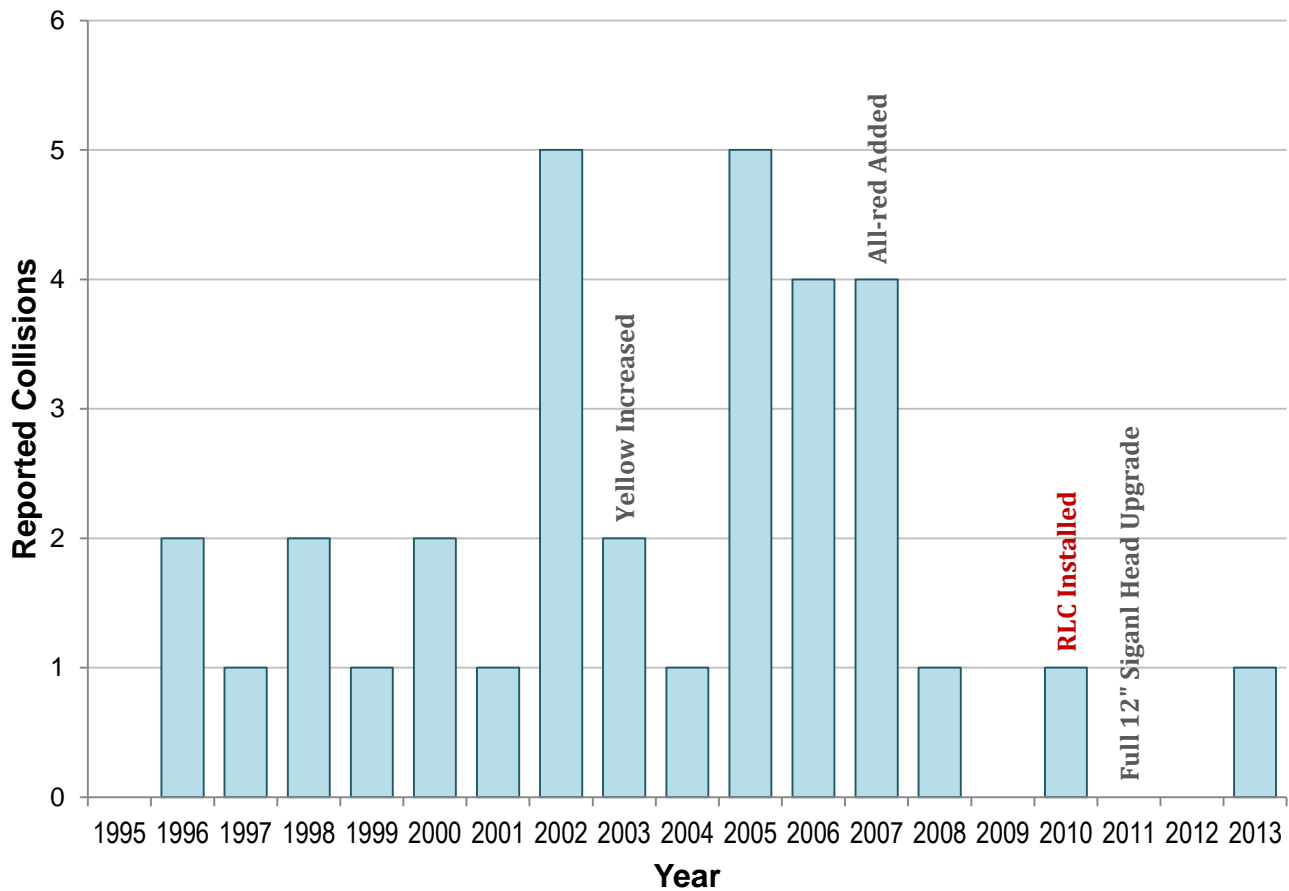


Figure 16: Ellis and Larkin Streets
Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	0	2	1	2	1	2	1	5	2	1	5	4	4	1	0	1	0	0	1

Fell Street and Masonic Avenue

Installation Date: January 2012
 Directions Enforced: Westbound Fell Street
 Date of Major Signal Upgrade: June 2003 and September 2012
 Date of Yellow Light Changes: September 2010
 Other signal modifications of note: April 2002, all-red added.

Figure 17: Fell Street and Masonic Avenue Injury Broadside Collisions (1995-2013)

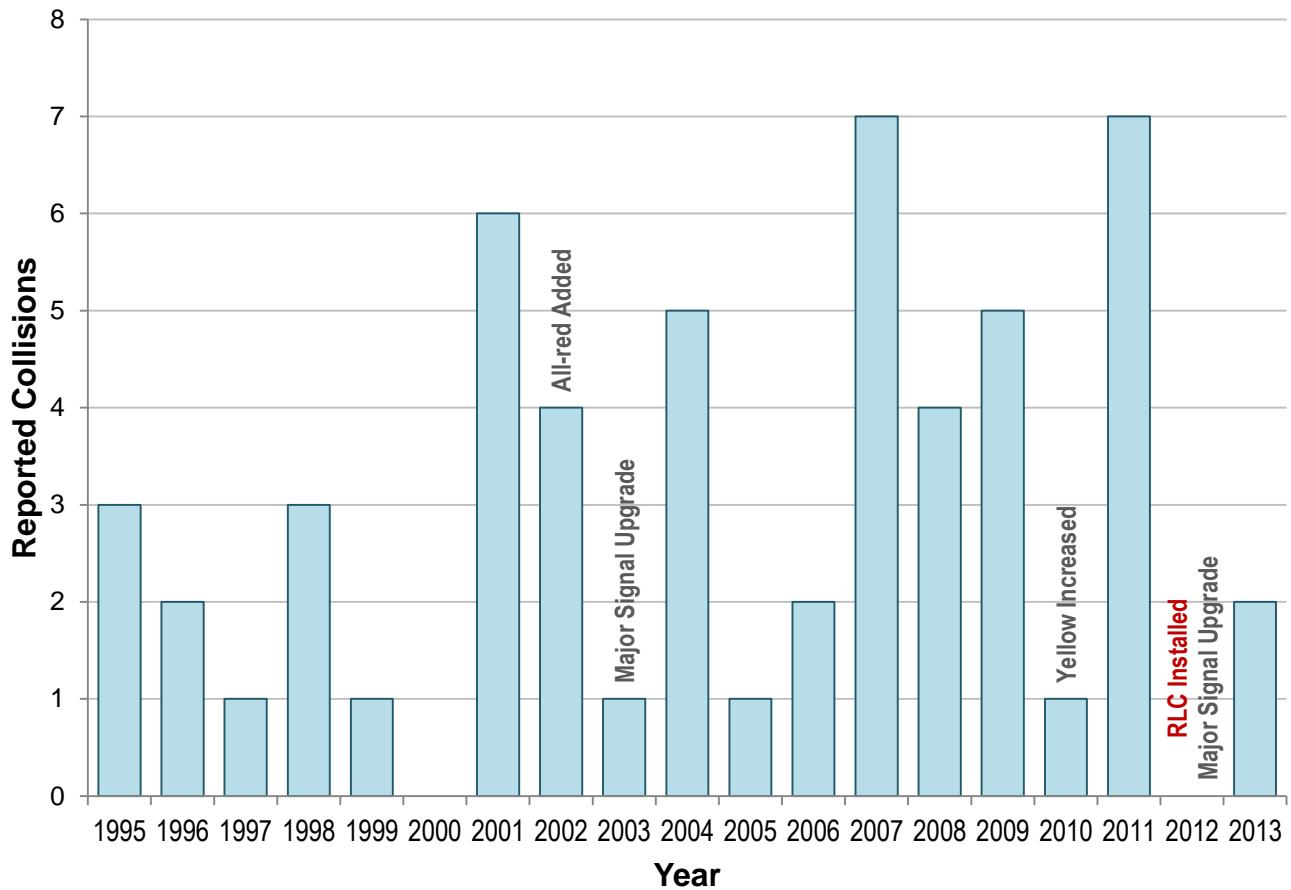


Figure 17: Fell Street and Masonic Avenue Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	3	2	1	3	1	0	6	4	1	5	1	2	7	4	5	1	7	0	2

Fulton Street and Park Presidio Boulevard

Installation Dates: May 2004 (Northbound), June 2004 (Southbound)
 Directions Enforced: Northbound and Southbound Park Presidio Boulevard
 Date of Major Signal Upgrade: April 2009
 Date of Yellow Light Changes:
 Other signal modifications of note: August 2003, all-red added.

Figure 18: Fulton Street and Park Presidio Boulevard Injury Broadside Collisions (1995-2013)

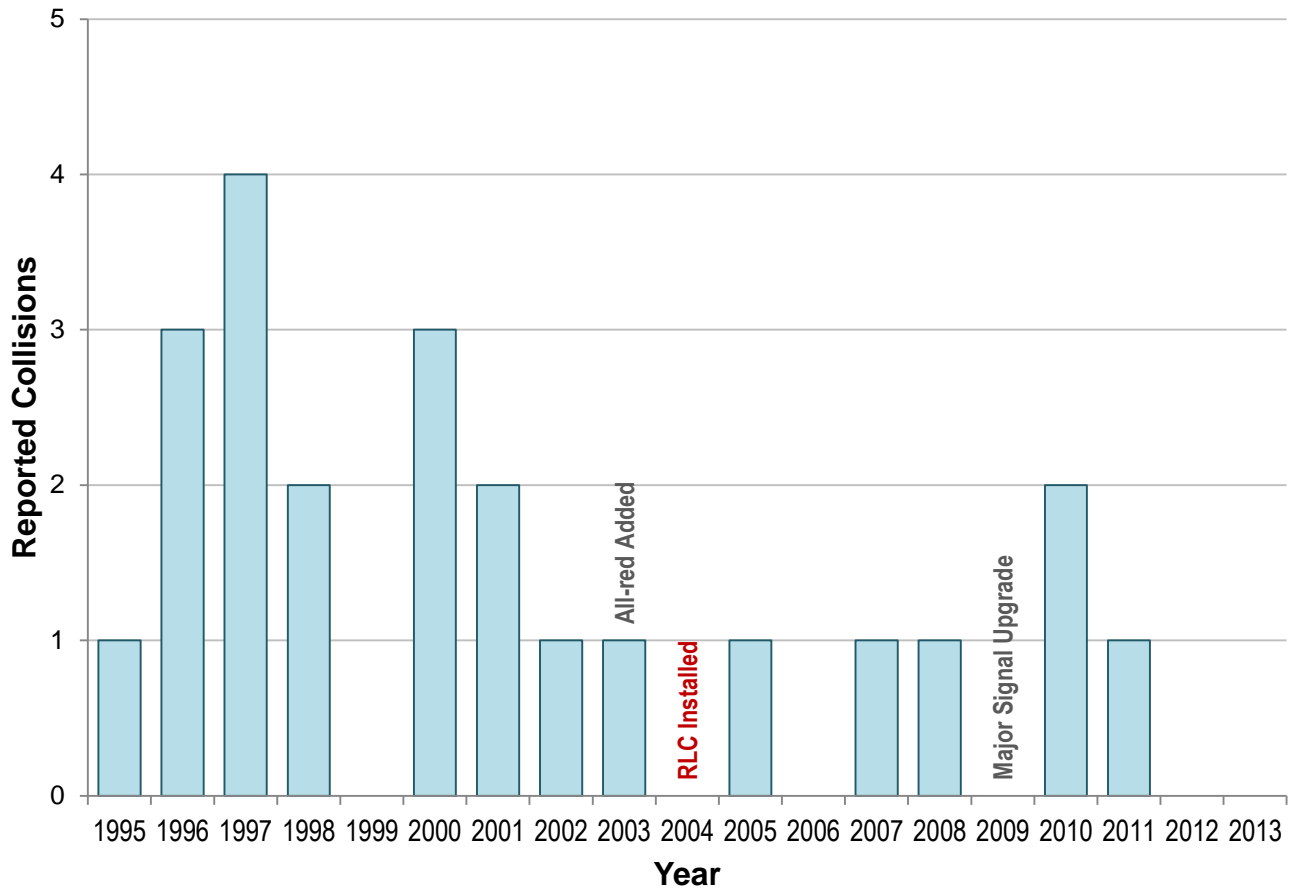


Figure 18: Fulton Street and Park Presidio Boulevard Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1	3	4	2	0	3	2	1	1	0	1	0	1	1	0	2	1	0	0

Francisco and Richardson Streets

Installation Dates: May 2004 (Westbound), June 2004 (Eastbound)

Directions Enforced: Eastbound and Westbound Richardson Avenue

Date of Major Signal Upgrade: August 2006

Date of Yellow Light Changes:

Other signal modifications of note: April 2003, all-red added after Francisco phase. August 2006, all-red added after Richardson phase, pedestrian signals installed.

Figure 19: Francisco Street and Richardson Avenue Injury Broadside Collisions (1995-2013)

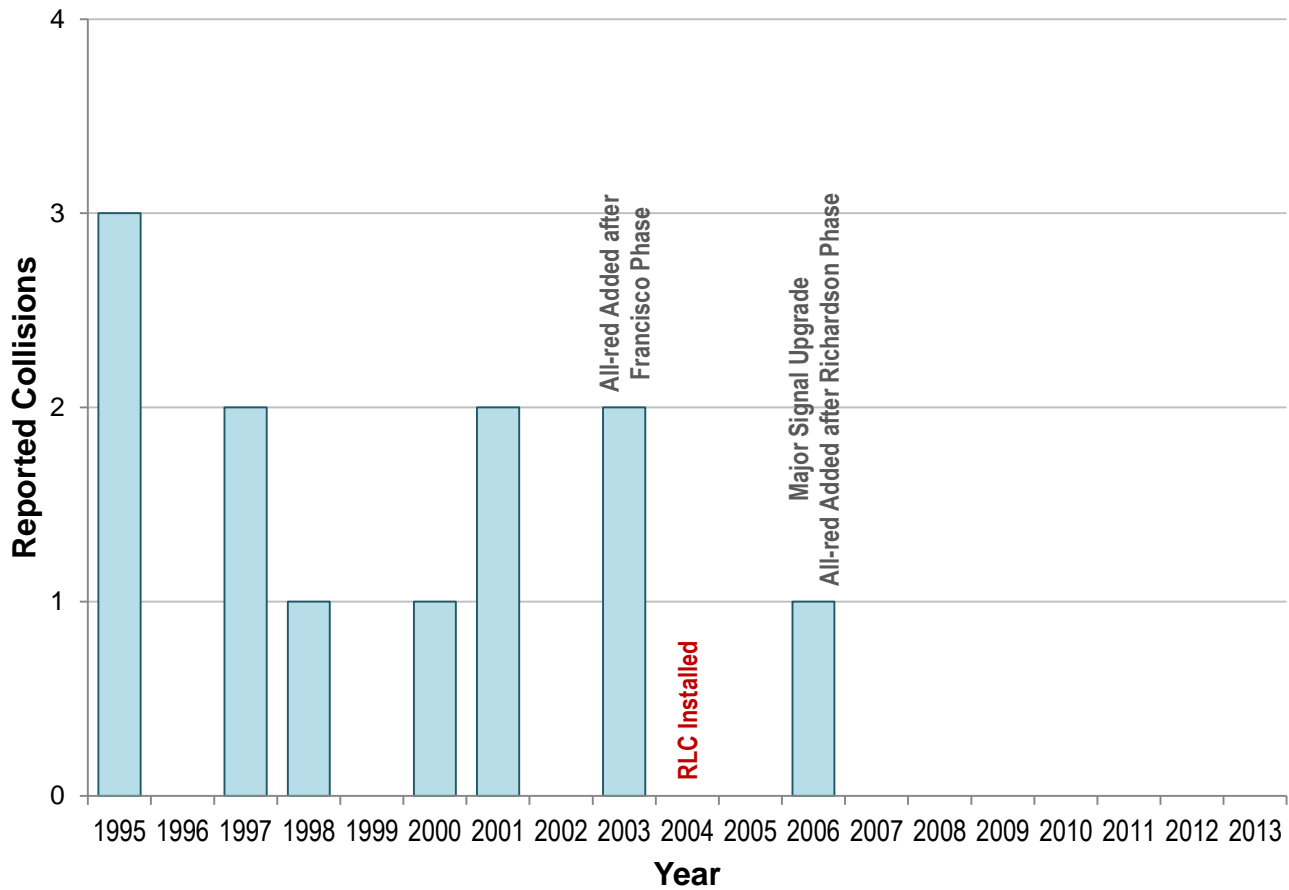


Figure 19: Francisco Street and Richardson Avenue Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	3	0	2	1	0	1	2	0	2	0	0	1	0	0	0	0	0	0	0

Franklin and Geary Streets

Installation Dates: April 2000 (Westbound), June 2000 (Northbound)

Directions Enforced: All

Date of Major Signal Upgrade: April 2014

Date of Yellow Light Changes: July 1999

Other signal modifications of note: June 1997, all-red increased. May 1998, Franklin signal heads upgraded from 8" to 12". October 2009, all remaining signals upgraded to 12" heads.

**Figure 20: Franklin and Geary Streets
Injury Broadside Collisions (1995-2013)**

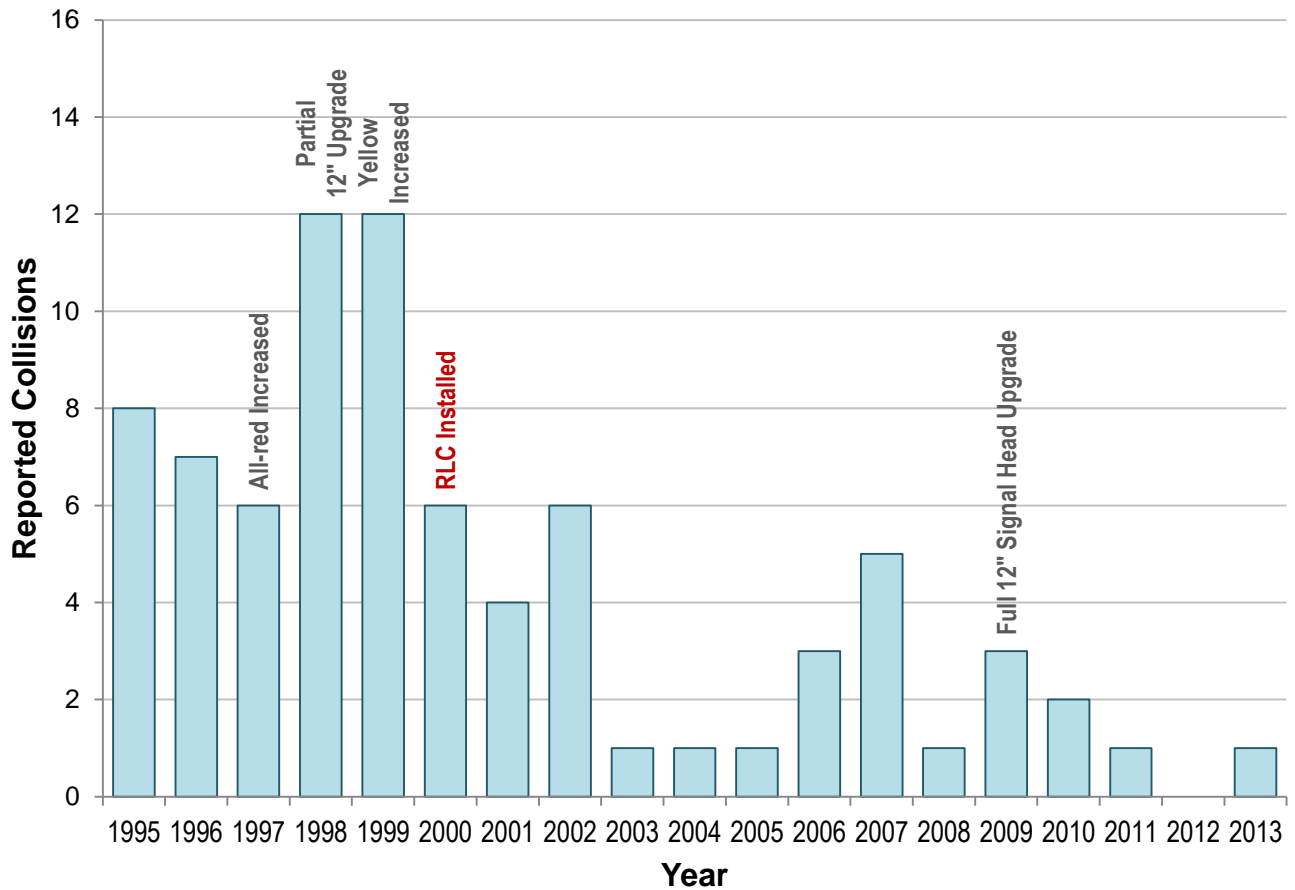


Figure 20: Franklin and Geary Streets
Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	8	7	6	12	12	6	4	6	1	1	1	3	5	1	3	2	1	0	1

Geary and Park Presidio Boulevards

Installation Dates: May 2004(Southbound), June 2004 (Northbound, Westbound, Eastbound)
 Directions Enforced: All
 Date of Major Signal Upgrade: December 2009
 Date of Yellow Light Changes:
 Other signal modifications of note: August 2003, all-red added.

**Figure 21: Geary and Park Presidio Boulevards
 Injury Broadside Collisions (1995-2013)**

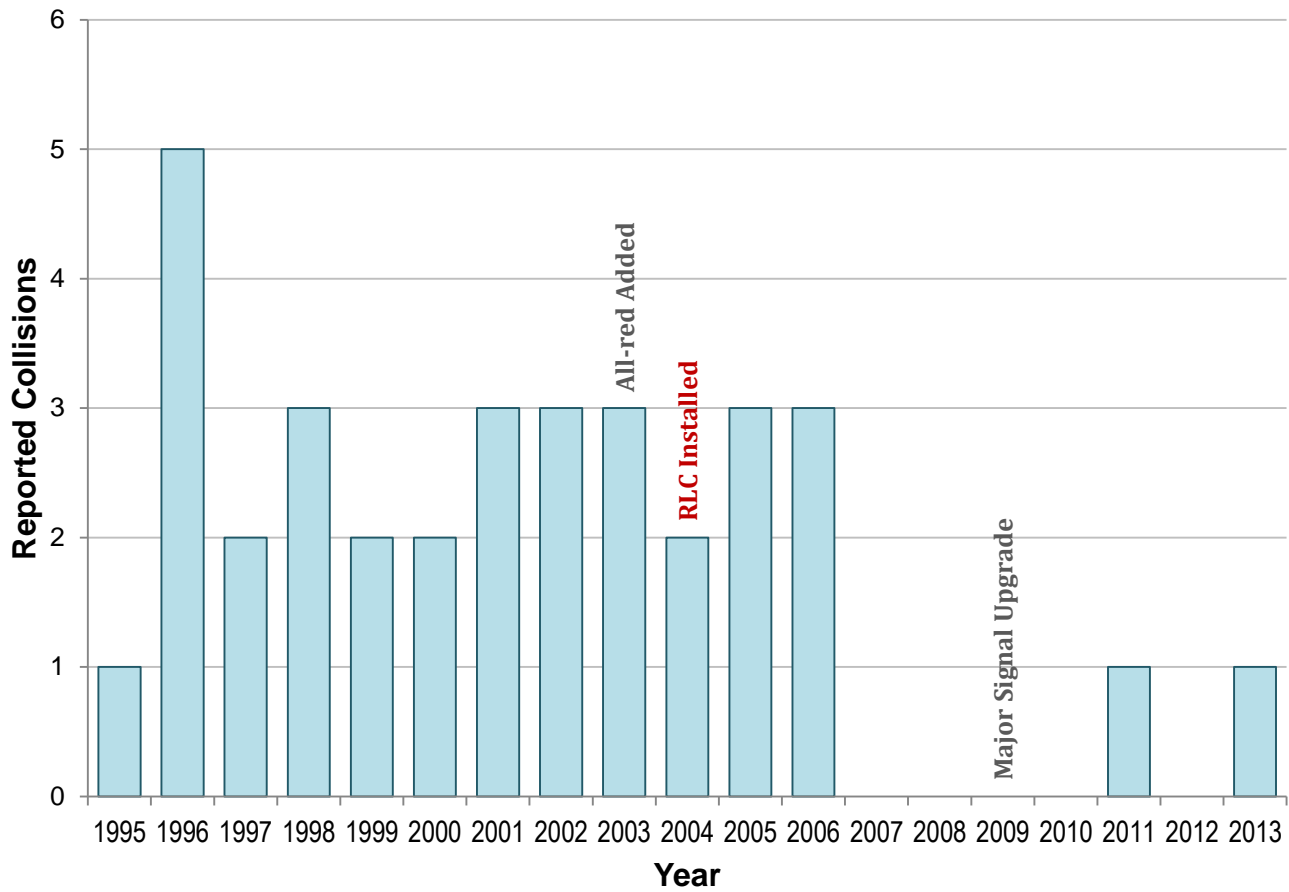


Figure 21: Geary and Park Presidio Boulevards
 Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1	5	2	3	2	2	3	3	3	2	3	3	0	0	0	0	1	0	1

Hayes and Polk Streets

Installation Dates: September 2000

Directions Enforced: All

Date of Major Signal Upgrade: March 2003

Date of Yellow Light Changes: September 1999

Other signal modifications of note: March 2003, all-red added. April 2005, pedestrian signals added.

**Figure 22: Hayes and Polk Streets
Injury Broadside Collisions (1995-2013)**

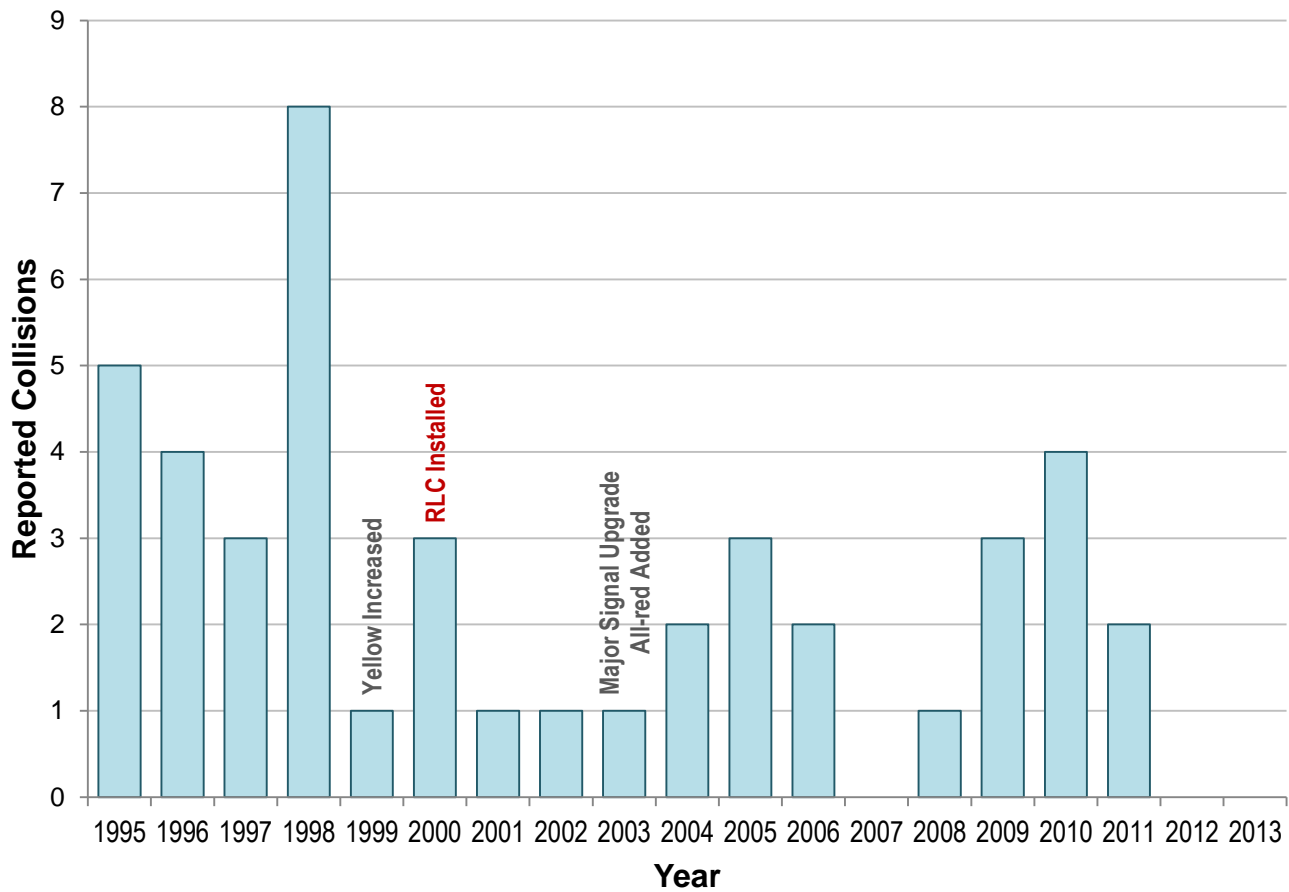


Figure 22: Hayes and Polk Streets
Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	5	4	3	8	1	3	1	1	1	2	3	2	0	1	3	4	2	0	0

Lake Street and Park Presidio Boulevard

Installation Dates: May 2004 (Northbound), June 2004 (Southbound)
 Directions Enforced: Northbound and Southbound Park Presidio Boulevard
 Date of Major Signal Upgrade:
 Date of Yellow Light Changes: August 2003
 Other signal modifications of note: March 2002, Pedestrian signals installed. August 2003, all-red increased. July 2010, all signals upgraded to 12" heads.

Figure 23: Lake Street and Park Presidio Boulevard Injury Broadside Collisions (1995-2013)

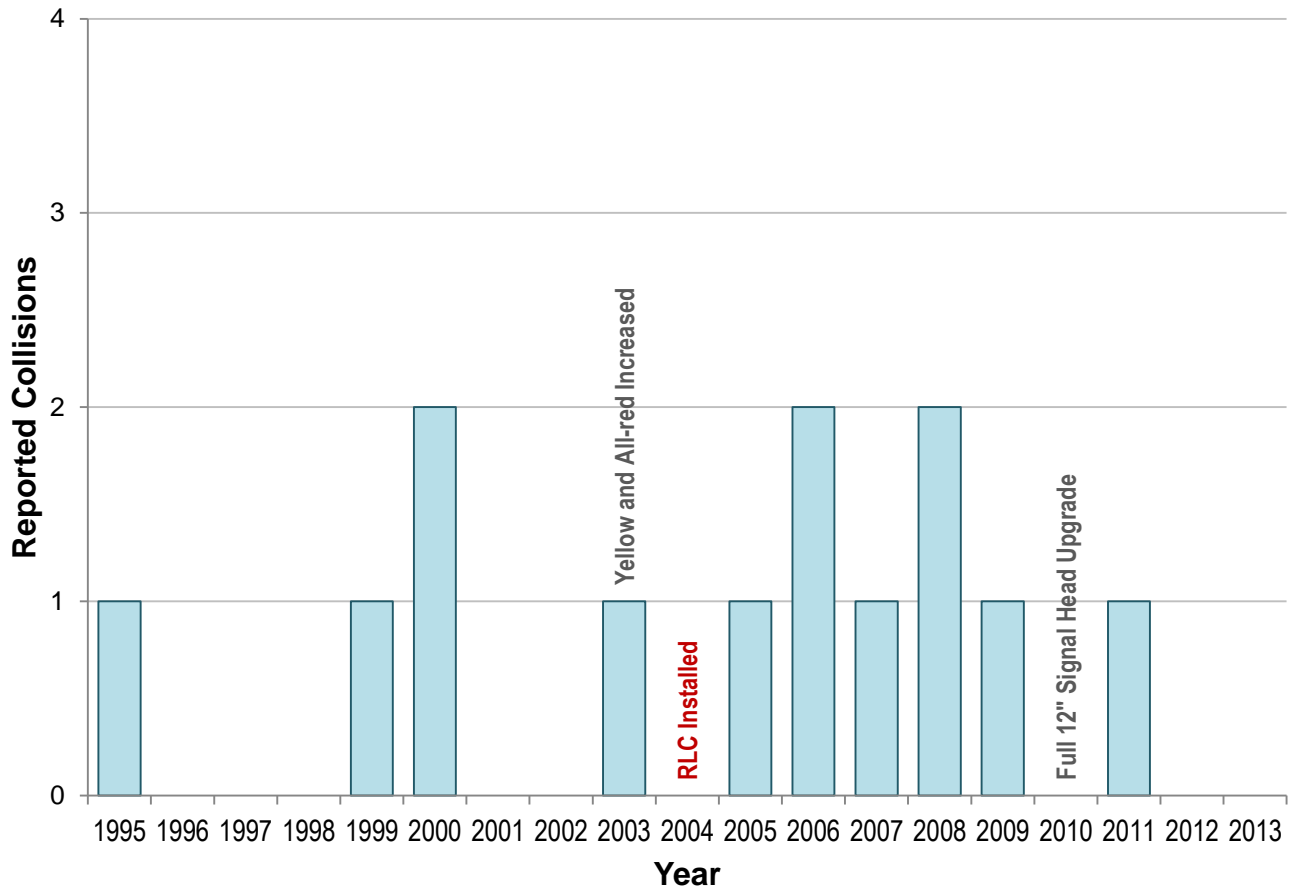


Figure 23: Lake Street and Park Presidio Boulevard Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1	0	0	0	1	2	0	0	1	0	1	2	1	2	1	0	1	0	0

Marina Boulevard and Lyon Street

Installation Dates: May 2004

Directions Enforced: Eastbound Marina Boulevard

Date of Major Signal Upgrade:

Date of Yellow Light Changes:

Other signal modifications of note: June 2012, all-red added after Lyon and Mason phases, pedestrian signals added crossing Lyon and Mason. Doyle Drive construction and re-alignment in 2012.

**Figure 24: Marina Boulevard and Lyon Street
Injury Broadside Collisions (1995-2013)**

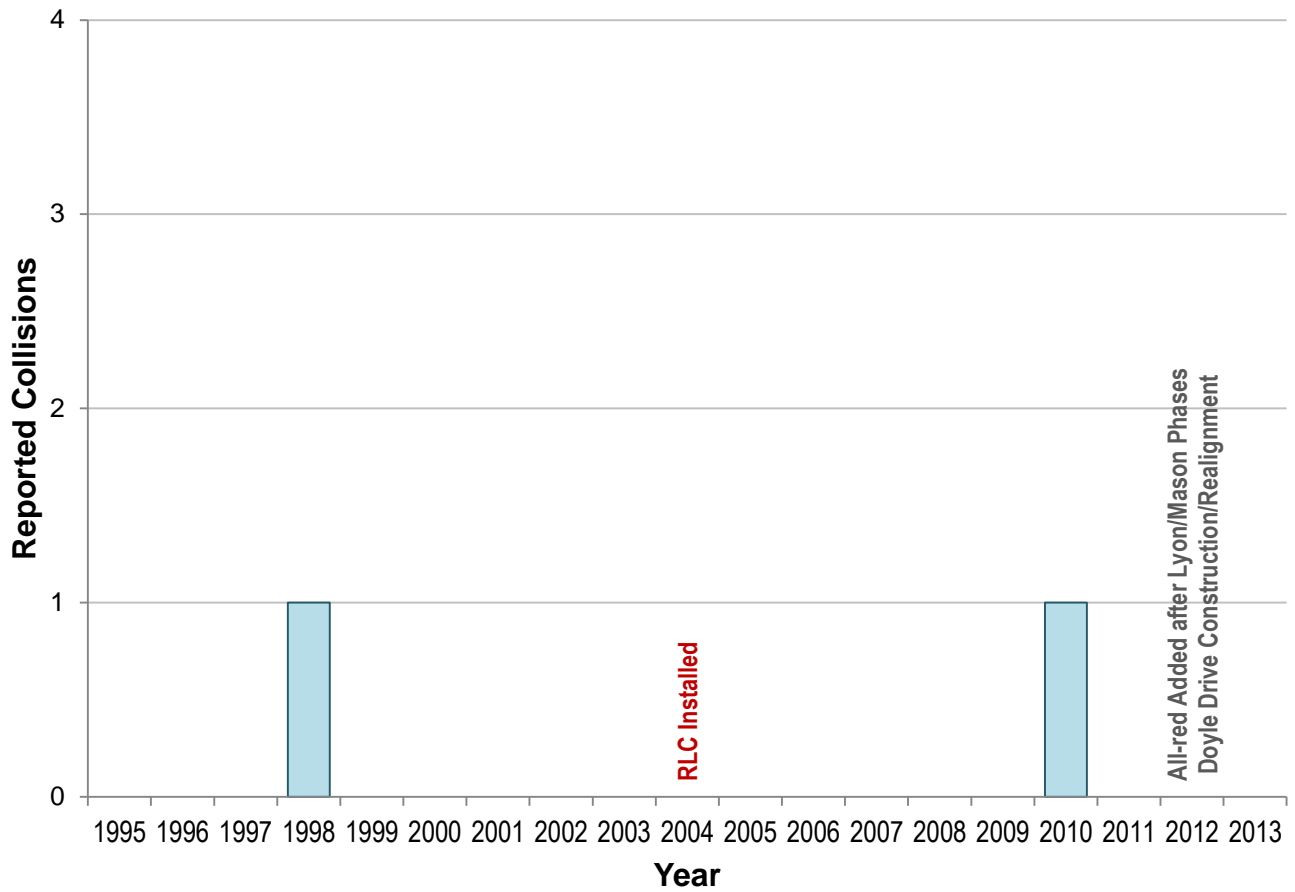


Figure 24: Marina Boulevard and Lyon Street
Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Oak Street and Octavia Boulevard

Installation Date: December 2009

Directions Enforced: Northbound Octavia Boulevard, Eastbound Oak Street

Date of Major Signal Upgrade: July 2005 (Octavia Boulevard opening)

Date of Yellow Light Changes: September 2010

Other signal modifications of note: December 2001, all-red added, pedestrian signals installed.

Figure 25: Oak Street and Octavia Boulevard Injury Broadside Collisions (1995-2013)

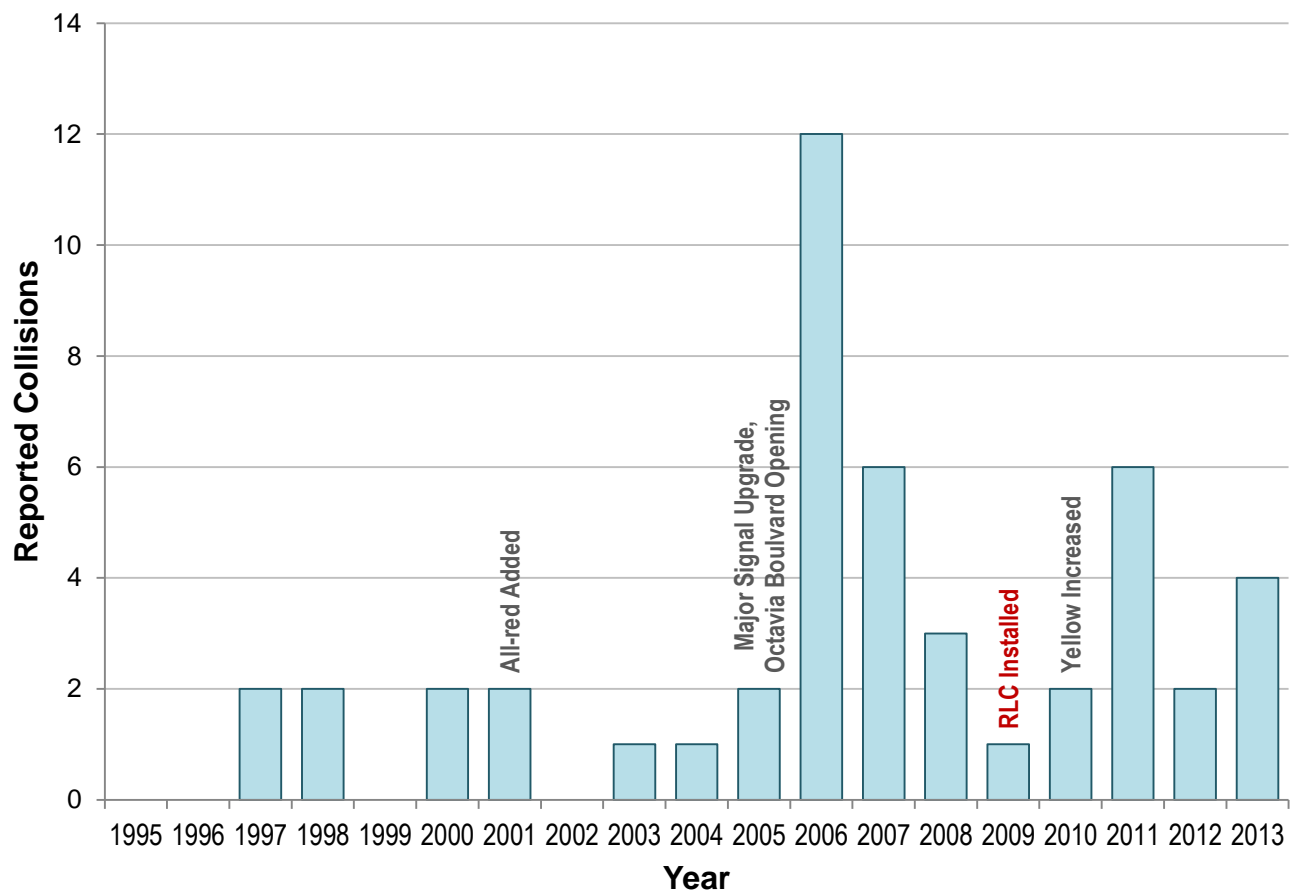


Figure 25: Oak Street and Octavia Boulevard Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	0	0	2	2	0	2	2	0	1	1	2	12	6	3	1	2	6	2	4

Pine and Polk Streets

Installation Dates: June 2000
 Directions Enforced: Westbound Pine Street
 Date of Major Signal Upgrade: April 2002
 Date of Yellow Light Changes: September 1998, October 2010
 Other signal modifications of note: April 2002, all-red added.

Figure 26: Pine and Polk Streets Injury Broadside Collisions (1995-2013)

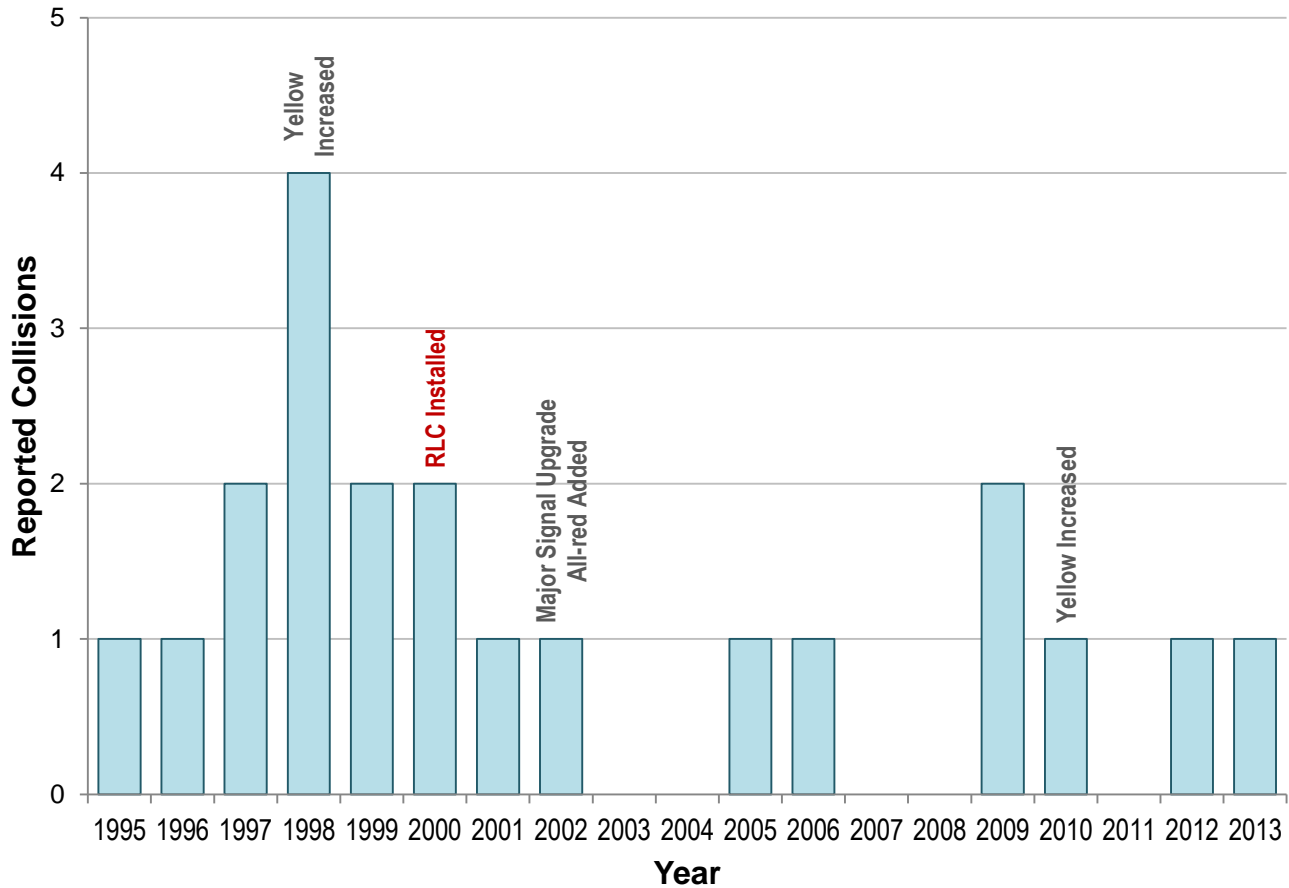


Figure 26: Pine and Polk Streets Injury Broadside Collisions (1995-2013)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1	1	2	4	2	2	1	1	0	0	1	1	0	0	2	1	0	1	1

2014 Yellow Light Timing Changes

The purpose of the yellow light is to provide motorists with advance notice that a traffic signal is about to change to red. The duration of a yellow light is related to the speed of approaching vehicles. The yellow formula used in California is given by the *California Manual on Uniform Traffic Control Devices* (CA MUTCD) Table 4D-102. It uses posted speeds as an approximation of prevailing speeds. One concern with photo enforcement of red lights has been that if yellows are too short this increases the number of citations given to motorists. Based on 2013 discussions at the state level organized by the California Traffic Control Devices Committee (CTCDC), Caltrans has decided that if posted speeds are used to calculate yellow timings, that these be calculated using posted speed limit plus 7 MPH for posted speeds of 30 MPH and higher, and posted speed limit plus 10 miles if posted speed is 25 MPH. The proposed Caltrans changes are summarized below.

Table 3: State Yellow Timings Compared to San Francisco Yellow Timing Prior to 2014

Posted Speed	State Yellow Prior to 11/2014	State Yellow After 11/2014	Prior SF Yellow Guideline
25 MPH	3.0 seconds	3.6 seconds	3.5 seconds
30 MPH	3.2 seconds	3.7 seconds	4.0 seconds
35 MPH	3.6 seconds	4.1 seconds	4.0 seconds
40 MPH	3.9 seconds	4.4 seconds	4.5 seconds
45 MPH	4.3 seconds	4.8 seconds	5.0 seconds

San Francisco has always had higher yellow time durations than the minimums required by the State. Previous recommended practice for San Francisco was to use a speed 5 MPH higher than the posted speed for the calculation of a yellow light. The new San Francisco guideline as of January 2014 is to use a speed 10 MPH higher than the posted speed to calculate the yellow timing for all posted speeds. This is more conservative than the current San Francisco approach or using the State's 7 MPH figure. The result of this calculation with rounding is given in the "Intersection Approach New 2014 Yellow" column below. Per discussions led by the CTCDC, red light camera locations will be prioritized for yellow upgrades. The Caltrans deadline to implement new yellow timing changes at red light camera intersections statewide is August 1 of 2015. All San Francisco locations not yet updated will be completed in 2014.

Table 4: Yellow Light Timing at Photo Enforced Intersections

Intersection	2014 Approach Speed Limit (MPH)	Caltrans Minimum Yellow before 2014 (seconds)	Intersection Approach Yellow before 2014 (seconds)	Caltrans Minimum Yellow 2014 (seconds)	Intersection Approach New 2014 Yellow (seconds)	2014 Yellow Implementation Date
19 th Avenue and Sloat Boulevard	30	3.2	4.0	3.7	4.0	Already meets new yellows
1 st Street and Folsom Street	25	3.0	3.5	3.6	4.0	Est. Early 2015
3 rd Street and Harrison Street	25	3.0	3.5	3.6	4.0	6/24/2014
4 th Street and Howard Street	25	3.0	3.5	3.6	4.0	5/29/2014
5 th Street and Harrison Street	25	3.0	3.5	3.6	4.0	8/28/2014
5 th Street and Howard Street	25	3.0	4.0	3.6	4.0	Already meets new yellows

5 th Street and Mission Street	25	3.0	3.5	3.6	4.0	8/27/2014
6 th Street and Bryant Street	25	3.0	3.5	3.6	4.0	8/27/2014
7 th Street and Mission Street	25	3.0	3.5	3.6	4.0	8/27/2014
8 th Street and Harrison Street	25	3.0	3.5	3.6	4.0	8/27/2014
9 th Street and Howard Street	25	3.0	3.5	3.6	4.0	5/28/2014
14 th Street and South Van Ness Avenue	25	3.0	3.5	3.6	4.0	5/29/2014
15 th Street and Mission Street	25	3.0	3.5	3.6	4.0	8/27/2014
Bush Street and Van Ness Avenue	25	3.0	3.5	3.6	4.0	5/28/2014
Ellis Street and Larkin Street	25	3.0	3.5	3.6	4.0	5/28/2014
Fell Street and Masonic Avenue	30	3.2	4.0	3.7	4.0	Already meets new yellows
Fulton Street and Park Presidio Boulevard	35	3.6	4.0	4.1	4.5	6/16/2014
Francisco Street and Richardson Avenue	35	3.6	4.5	4.1	4.5	Already meets new yellows
Franklin Street and Geary Street	25	3.0	3.5	3.6	4.0	4/10/2014
Geary Boulevard and Park Presidio Boulevard	NB/SB: 35 EB/WB: 25	NB/SB: 3.6 EB/WB: 3.0	NB/SB: 4.0 EB/WB: 4.0	NB/SB: 4.1 EB/WB: 3.6	NB/SB: 4.5 EB/WB: 4.0	6/16/2014
Hayes Street and Polk Street	25	3.0	3.5	3.6	4.0	5/1/2014
Lake Street and Park Presidio Boulevard	35	3.6	4.5	4.1	4.5	Already meets new yellows
Lyon Street and Marina Boulevard	25	3.0	4.5	3.6	4.5	Already meets new yellows
Oak Street and Octavia Boulevard	30	3.2	4.0	3.7	4.0	Already meets new yellows
Pine Street and Polk Street	30	3.2	4.0	3.7	4.0	Already meets new yellows

Table 5 summarizes the changes in citation issuance for the yellow changes implemented in May and June of this year at locations that were actively citing in 2013 and 2014. Combined number of citations dropped by 65 percent for the five intersections, a total of over 1,000 citations issued from July to September 2014 compared to the same period last year. The data suggests that the yellow timing changes implemented (typically 0.5 second increase) can further decrease red light running totals. This is true even in San Francisco's case, where yellow timings were already higher than the State minimum guidelines.

**Table 5: Preliminary changes in citations at select yellow upgrade intersections
Three month before and after period in 2013 and 2014**

Intersection	Before (July-September 2013)	After (July-September 2014)	Total Change	Percentage Change
9 th Street and Howard Street	533	188	-345	- 65%
14 th Street and South Van Ness Avenue	418	89	-329	-79%
Bush Street and Van Ness Avenue	474	204	-270	-60%
Ellis Street and Larkin Street	75	54	-21	-28%
Fulton Street and Park Presidio Boulevard	126	34	-92	-73%
TOTAL	1,626	569	-1,057	-65%

It should be noted that in San Francisco the actual point at which an infraction is recorded is not the immediate end of the approach yellow interval but 0.3 seconds after. By policy choice San Francisco has had a 0.3 grace period. The proposed 2014 Caltrans yellows listed above are at no intersection higher than 0.3 seconds than the pre-2014 San Francisco yellows, so San Francisco citations were in effect already compliant with 2014 revised Caltrans yellow guidelines.

Signage at Photo Enforced Locations

Until the end of 2013 San Francisco had adopted a signage plan that had PHOTO ENFORCED signs at all entrances to the city, such as major freeway off-ramps. The State legislature changed the California Vehicle Code (Section 21455.5) in 2014 to require that all approaches to each photo enforced intersection have signs. Analysis of January through April data from 2013 and 2014 indicate that this signage change appears to have had no effect in citation issuance. In the before period of January to April 2013, with signs only at key entrances to San Francisco, 5,233 citations were issued. In the after period of January to April 2014, with signs both at intersections and entrances to the city, 5,567 citations were issued. There were somewhat more citations issued after the approach signs were installed, but no correlation can be assumed given the limited data. All that can be concluded is that installing signs for each approach did not reduce citation issuance citywide.



Recommendations: Existing Enforcement Intersections

This section of the reports analysis whether a location should be retained or whether it should be discontinued. The column to the right on Table 6 briefly explains the primary reason for the recommendation, which mainly focus on the following three factors:

- Does a location have average citation totals above 40 a month?
- Does a location have on average more than one red light running related collision a year?
- Is the location pending a signal upgrade or other major construction?

Table 6: Proposed Red Light Photo Enforced Locations to be Maintained or Removed

Intersection	Monthly Citations (Table 2)	Approach Collisions (Table 1)	Design Considerations	Proposed Action	Primary Reason for Proposed Action
19th Ave NB at Sloat Blvd	42	2	Has signal mast arms	Maintain	Moderate citation total
19th Ave SB at Sloat Boulevard	21	0	Has signal mast arms	Maintain	Complements maintained NB 19 th Ave approach
1 st St SB at Folsom St	133	0	Has signal mast arms	Maintain	High citations
6 th St SB at Bryant St	41	1	Has signal mast arms	Maintain	Moderate citation total
Bryant St EB at 6 th St	38	2	Has signal mast arms	Maintain	Complements maintained SB 6 th Street approach
Fell St WB left lane at Masonic	173	2	Has signal mast arms	Maintain	High citations and collisions
Hayes St WB at Polk St	49	4	Has signal mast arms	Maintain	Moderate citation and high collision total
Howard St WB at 9 th St	128	1	Has signal mast arms	Maintain	High citations
Oak St EB at Octavia Blvd	27	7	Has signal mast arms	Maintain	High collision total
Octavia Blvd NB at Oak St	31	4	Has signal mast arms	Maintain	High collision total
Park Presidio Blvd NB at Lake	34	0	Signal upgrade pending	Maintain	Maintain (not upgraded)
Park Presidio Blvd SB at Lake	26	2	Signal upgrade pending	Maintain	Maintain (not upgraded)
Polk St SB at Hayes St	26	4	Signal upgrade pending	Maintain	High collision total
So. Van Ness Ave NB at 14 th St	80	2	Signal upgrade pending	Maintain	High citation total
14 th St EB at So. Van Ness Ave	13	3	Signal upgrade pending	Remove	Low citation total
3rd St NB at Harrison St	20	0	Has signal mast arms	Remove	Low citation and collision total
5th St NB at Mission St	29	0	Has signal mast arms	Remove	Low citation and collision total
5 th St SB at Harrison St	17	1	Has signal mast arms	Remove	Low citation total

5 th St SB at Mission St	29	0	Has signal mast arms	Remove	Low citation and collision total
6 th St NB at Bryant St	18	1	Has signal mast arms	Remove	Low citation total
7 th St NB at Mission St	26	0	Has signal mast arms	Remove	Low citation and collision total
8 th St SB at Harrison St	20	0	Has signal mast arms	Remove	Low citation and collision total
9 th St NB at Howard St	32	1	Has signal mast arms	Remove	Low citation and collision total
Geary Blvd EB at Park Presidio Blvd	8	1	Has signal mast arms	Remove	Low citation and collision total
Geary Blvd WB at Park Presidio Blvd	7	0	Has signal mast arms	Remove	Low citation and collision total
Harrison St WB at 5 th St	11	0	Has signal mast arms	Remove	Low citation total (new site proposed at 4 th)
Harrison St WB at 3 rd St	56	0	Has signal mast arms	Remove	Low collision total (new site proposed at 4 th)
Howard St WB at 5 th St	11	0	Has signal mast arms	Remove	Low citation total
Harrison St WB at 8 th St	43	0	Has signal mast arms	Maintain	Low collision total
Howard WB at 4 th St	11	0	Has signal mast arms	Remove	Low citation and collision total
Larkin St NB at Ellis St	24	0	Signal upgrade pending	Remove	Low citation and collision total
Marina Blvd EB at Lyon St	8	0	Signal upgrade completed	Remove	Low citation and collision total
Mission St NB at 15 th St	30	0	Has signal mast arms	Remove	Low citation and collision total
Mission St SB at 15 th St	14	0	Has signal mast arms	Remove	Low citation and collision total
Mission St WB at 5 th St	27	0	Has signal mast arms	Remove	Low citation and collision total
Mission St WB at 7 th St	40	0	Has signal mast arms	Remove	Lower citation and collision total
Park Presidio Blvd NB at Fulton St	16	0	Has signal mast arms	Remove	Low citation and collision total
Park Presidio Blvd NB at Geary Blvd	4	0	Has signal mast arms	Remove	Low citation and collision total
Park Presidio Blvd SB at Fulton St	23	1	Has signal mast arms	Remove	Low citation and collision total
Park Presidio Blvd SB at Geary Blvd	10	1	Has signal mast arms	Remove	Low citation and collision total
Pine St WB at Polk St	11	1	Has signal mast arms	Remove	Low citation and collision total

Richardson Ave EB at Francisco St	13	0	Has signal mast arms	Remove	Low citation and collision total
Richardson Ave WB at Francisco St	19	0	Has signal mast arms	Remove	Low citation and collision total
Van Ness Ave NB at Bush St	134	1	Van Ness BRT project construction	Remove	Long-term construction impact
Franklin St NB at Geary Blvd	50	2	Signal upgraded (2014)	Removed (2014)	Signal upgrade
Geary Blvd WB at Franklin St	14	2	Signal upgraded (2014)	Removed (2014)	Signal upgrade

Of the listed 46 approaches with red light photo enforcement, 32 are recommended to be discontinued and two were already removed (Geary and Franklin Streets) as part of a 2014 signal upgrade.

Highest Red Light Running Intersections

Should red light photo enforcement be expanded to new intersections? Installing photo enforcement equipment involves significant capital investments, and these should be evaluated as would any other funds devoted to safety. While data is inconclusive in San Francisco’s case about how much of a collision factor reduction can be expected to be obtained from installation of photo enforcement, there are national studies suggesting that cameras, when properly installed and operated, can help increase compliance with signal control devices.¹

According to provisions in the California Vehicle Code (Section 21455.5) “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.” To satisfy these criteria, this report recommends the following process for evaluating red light photo enforcement candidate locations:

1. Consider only a location that is among the top collision locations citywide in terms of violation of California Vehicle Code Section 21453(A), red light running.
2. Recommend photo enforcement if other engineering design interventions such as signal visibility or timing improvements have failed to improve collision totals.
3. Select locations that are feasible to build and operate photo enforcement systems, on corridors that are not expected to undergo significant redesign, construction or alterations.

Table 7 summarizes the highest red light running injury intersections, in this period locations having five or more red light running collision resulting in at least one injury from 2011 to 2013. Some locations with photo enforcement are in this list, meaning higher collisions totals continue to be reported despite the presence of the camera system. A large number of intersections recently completed or are pending signal upgrades or other engineering changes that would make installation of photo enforcement premature. Globally, the citywide upgrade of yellow lights will also have some effect in reducing red light running, though at this point it is difficult to say how it will affect collision totals. Yellow light increases may reduce red light running that is a

¹ See for example *Automated Enforcement for Speeding and Red Light Running*, NCHRP Report 729 (2012).

fraction of a second into the start of the red light, but the most severe collisions occur when vehicles run red lights well into the red phase, when cross traffic has already entered the intersection. All-red clearance phases are also being added and lengthened citywide to reduce broadside collisions.

Table 7: Top Injury Collision Intersections Associated with Red Light Running Five or More California Vehicle Code Violation 21453A Collisions (2011-2013)

Intersection	Injury Collisions	Notes
Golden Gate and Webster	12	Signal upgrade pending
Oak and Octavia	11	Already camera enforced, but consider adding eastbound right turn lanes
6 th St and Folsom	8	Possible new camera location
Golden Gate and Gough	8	Signal upgrade pending
4 th St and Harrison	8	Possible new camera location
Fell and Masonic	8	Already camera enforced
Post and Van Ness	8	Signal upgrade pending
Ellis and Van Ness	8	Signal upgrade pending
Fulton and Webster	8	Signal upgrade pending
Battery and Broadway	7	Signal upgrade pending
Battery and Pine	7	Signal not upgraded, under review
Sacramento and Van Ness	7	Signal upgrade pending
Fell and Van Ness	7	Signal upgrade pending
15 th St and S Van Ness	7	Signal upgrade pending
Fell and Franklin	6	Signal upgrade pending
Leavenworth and Turk	6	Signal 12-inch head upgrade pending
Eureka and Market	6	Retime signals
5 th St and Market	6	Signal upgrade pending
Filbert and Van Ness	6	Signal upgrade pending
Broadway and Franklin	6	Signal upgrade pending
6 th St and Bryant	5	Already camera enforced
California and Laguna	5	Signal not upgraded, under review
Clay and Montgomery	5	Added nearside signal for Clay in 2012
25 th Ave and Fulton	5	Signal upgrade completed in 2014
30 th Ave and Fulton	5	Upgraded to 12-inch signal heads in 2012
Eddy and Mason	5	Signal upgrade pending
Duboce, Otis and Mission	5	Under review
Sacramento and Montgomery	5	Signal not upgraded, under review
Polk and Turk	5	Signal upgrade pending
Polk and Post	5	Signal upgrade pending
Hayes and Polk	5	Already camera enforced
California and Scott	5	Signal 12-inch head upgrade pending
Ocean and Sunset	5	Signal upgrade completed in 2014

Larkin and Sutter	5	Upgraded to 12-inch signal heads in 2013
Turk and Taylor	5	Signal upgrade pending
10 th St and Folsom	5	Under review

Possible New Enforcement Sites

It is recommended that photo enforcement be added for the eastbound right-turn only lanes on Oak Street at Octavia Boulevard. Right now only the through eastbound lanes are enforced. The two locations listed as “possible new camera location” in Table 7 are further analyzed in Table 8, which provides a prioritization list based on the approaches that appear most at issue for the reported injury red light running collisions (like Table 1). Highest red light running approaches are identified based on the designation of the party most likely at fault (party one) according to the SFPD police officer on the scene. The intersections listed have a clear directional pattern. A lack of directional pattern means that one could choose to enforce multiple directions, or conclude that each approach does not by itself merit red light photo enforcement given the reduced cost to benefit ratios.

**Table 8: Five-Year Red Light Running Injury/Fatal Collisions (2009-2013)
By Party One Travel Direction (Most Likely At Fault)**

Intersection	CVC 21453A Northbound	CVC 21453A Southbound	CVC 21453A Eastbound	CVC 21453A Westbound	CVC 21453A Total
4 th St and Harrison St	NA	7	1	2	10
6 th St and Folsom St	1	5	2	NA	8

The locations listed above are only preliminary pending final review by SFMTA. Constructability issues need to be analyzed in more detail, as not all locations make suitable candidates for red light camera enforcement once field conditions are taken into consideration.

SFMTA will continue to monitor San Francisco for collision changes that may justify other locations or priorities. Any location recommended to be discontinued at this time could be reinstated in the future if data changes. Therefore no changes listed here should be seen as final, rather part of a process to rationalize funding to where it is needed most first.

Caltrans Permits

In February of 2014 Caltrans issued a Policy Directive (14-01) stating that all automated red light enforcement systems (ARLES) on state right-of-way had to be reviewed for meeting the need provisions of California Vehicle Code 21455.5. Caltrans has clarified to San Francisco that this applies even to preexisting systems (the CVC requirement applies only to new installations after January 1, 2013). Per the Caltrans Directive:

“Governmental agencies are required to make and adopt finding of fact establishing that the system is required at a specific location for safety improvement purposes. Continuation of a permit for operation of a system must demonstrate a continued need at a location based upon a traffic engineering study.”

Table 9 summarizes the results of this study as it pertains to San Francisco maintained signals that are on a Caltrans State Highway.

Table 9: Automated Red Light Enforcement Recommendations on Caltrans Highways

Intersection with Red Light Camera	Highway	Recommendation
19th Avenue and Sloat Boulevard	1	Retain. Moderate citation history and citywide high collision location.
Bush Street and Van Ness Avenue	101	Retain in 2015. High citation history. Discontinue and remove equipment with the Van Ness BRT construction.
Fulton Street and Park Presidio Boulevard	1	Discontinue. Low red light running collision and citation totals. Remove equipment later when new red light upgrade contract is issued.
Francisco Street and Richardson Avenue	101	Discontinue. Low red light running collision and citation totals. Remove equipment later when new red light upgrade contract is issued.
Geary Boulevard and Park Presidio Boulevard	1	Discontinue. Low red light running collision and citation totals. Remove equipment later when new red light upgrade contract is issued.
Lake Street and Park Presidio Boulevard	1	Retain. Intersection has yet to have its traffic signals upgraded.
Lyon Street and Marina Boulevard	101	Discontinue. Low red light running collision and citation totals. Remove equipment later when new red light upgrade contract is issued.

Costs of Upgrading and Adding Locations to the Photo Enforcement Program

The current photo enforcement systems use first generation wet-film (non-digital) technology. As the current contract comes to an end in 2016, a new one will have to consider the costs to upgrade all present camera enforced intersections to the latest digital technology. Wet film is an obsolete technology that is harder to maintain, particularly as companies stop making products and film. Digital cameras are considered to have better image quality, which could decrease the percentage of violations that are dismissed.

The current estimate is that it will cost \$232,502 per approach to purchase digital camera equipment and upgrade intersection. The cost is less if rather than purchasing the equipment the SFMTA decides to lease it. A build and lease approach would cost \$126,500 per approach for construction and approximately \$2,000 a month for the lease. Regardless of whether equipment is leased or bought, there would be an estimated vendor administration cost of about \$3,400 per month per intersection. These costs do not include those of SFMTA and SFPD staff, who have to oversee the program as well as review and defend citations.

If the proposals in this report are followed, the SFMTA would have to allocate the following one time capital resources to the red light camera program:

- \$1,771,000 to upgrade 14 existing approaches.
- \$126,500 for each new approach that is installed

The capital resources allocated to the program will not be recovered through citation revenues. As has been seen from the citation volume data presented, citation totals are generally low and they would in the best case scenario only cover monthly operation costs.

In addition to the red light camera locations, there is one photo enforcement of illegal right turns at Market Street and Octavia Boulevard, which should also be upgraded with a new contract, at a cost of \$126,500.

The estimated cost to remove red light camera equipment is \$2,500. It is recommended that ultimately all discontinued locations be physically removed. While it can be argued that there is some deterrence value in leaving inactive red light photo enforcement equipment behind, ultimately the public trust is better served with having only active systems in operation.

Summary of Recommendations

Approach Red Light Systems to be Maintained

19th Ave NB at Sloat Blvd
19th Ave SB at Sloat Boulevard
1st St SB at Folsom St
6th St SB at Bryant St
Bryant St EB at 6th St
Fell St WB left lane at Masonic
Hayes St WB at Polk St
Howard St WB at 9th St
Oak St EB at Octavia Blvd
Octavia Blvd NB at Oak St
Park Presidio Blvd NB at Lake
Park Presidio Blvd SB at Lake
Polk St SB at Hayes St
So. Van Ness Ave NB at 14th St
Market St EB at Octavia Blvd (separate right turn enforcement system)

Design/construction cost with lease option: **\$1,897,500**

Systems to be Removed

Remaining 32 approaches listed in Table 6

Construction removal costs: **\$80,000**

Systems to be Added (Higher Priority Only)

Southbound 4th Street at Harrison Street
Westbound Harrison Street at 4th Street
Southbound 6th Street at Folsom Street
Eastbound right turn lanes on Oak Street at Octavia Boulevard

Design/construction cost with lease option: **\$506,000**

Total Estimated Funding Need: \$2,483,500