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Safe Routes to School Safety and Mobility Analysis

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SAFE ROUTES TO SCHOOL

SAFETY & MOBILITY ANALYSIS

REPORT TO THE CALIFORNIA LEGISLATURE

BY

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STREETS AND HIGHWAYS CODE

SECTION 2333.5

Caltrans

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Safe Routes to School
Safety & Mobility Analysis

Report to the California Legislature

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CALIFORNIA
DEPARTMENT OF TRANSPORTATION

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EXECUTIVE SUMMARY

In the last decade, there has been an increased focus in California on encouraging children to walk and bicycle to school safely. Concern about the decline in numbers of children walking/bicycling to school, and about the risk of death or injury for those who do walk, led the California Legislature to create the Safe Routes to School (SR2S) program in 1999.

The SR2S program was enacted by the California State Legislature through Assembly Bill 1475, which provided federal transportation funds for the construction of bicycle and pedestrian safety and traffic calming projects. The legislation was amended by Senate Bill 10 in 2001 and by Senate Bill 1087 in 2004 to extend SR2S funding until January 1, 2008.

This landmark legislation authorized issuance of a competitive grant process for roadway construction projects. The legislation had two goals: to reduce child injuries and fatalities near schools and to increase walking and bicycling activity among students at elementary, middle and high schools. Since its inception in 2000, the SR2S program has funded 570 projects with a total cost of over $190 million.

This report evaluates the SR2S program for a number of mandated issues:

(i) The effectiveness of the program in reducing crashes, injuries and fatalities involving children in the vicinity of the projects;
(ii) The impact of the program on levels of walking and bicycling to school; and
(iii) The safety benefits of the program in comparison with other highway safety programs.

A previous report (Boarnet *et al.,* 2003) focused on the second goal, assessing the impact of the SR2S program on walking and bicycling to school. The evaluations in this current report are based on safety, cost and demographic data provided by a representative sample of 125 of the 570 projects that received SR2S funding in the first three years of the program. This information is supplemented by data from external sources such as collision data from the California Statewide Integrated Traffic Records System and land-use maps of the project areas.

Characteristics of SR2S projects

A total of 570 SR2S projects have been funded over the six cycles of the program to date. The SR2S funding for projects ranged from $10,800 to $450,000, with the requirement of a minimum of 10% in local matching funds. The SR2S program has thus far provided over $144 million to the projects, and the total costs of the projects are in excess of $190 million. The projects have been equitably distributed across the state, with proportional representation achieved geographically and by population.

Five basic types of infrastructure improvements were funded: sidewalk installation and upgrading, traffic calming and speed reduction measures, installation of traffic signals, pedestrian and bicycle crossing improvements, and construction of bicycle paths or other bicycle facilities. While most projects constructed improvements that affected only one or two schools, the number of schools affected by a single SR2S project extended as high as 21. The majority of schools affected were elementary schools (~ 70%).

The 125 projects included in the study sample appear to accurately represent the 570 projects in terms of geographical location, temporal distribution, scope of the project, types of improvements made, schools and student populations affected, and costs.

Effects on walking and bicycling

One of the specific goals of the Safe Routes to School program is to encourage increased walking and bicycling (mobility) among students. Walking rates have been on the decline in the student population for at least the last 35 years. In 1969, close to 50% of American children walked to school; today, that figure

is 12%. Walking to school has been replaced with motorized transport, particularly in private vehicles driven by parents.

The SR2S program has increased walking and bicycling among children, based on results found in both the 2003 study and the present study. The estimated effect varied greatly from school to school and also varied depending on the method used to determine changes in physical activity. Direct observations yielded increases that were often in the range of 20%-200%. Parental estimates were more conservative, generally in the range of a 10% increase overall. Students whose usual route passed the improvements were more than three times more likely to begin walking/biking than students whose usual route did not pass the improvements. These increases in mobility must be placed in the context of an overall decline in walking/bicycling in the State of California and the US as a whole.

Effects on child safety

There has been an overall decline in the numbers of child pedestrian/bicyclist injuries in the SR2S project areas, the study control areas, and in California as a whole. When compared with the control areas, the SR2S project areas did not show a greater decline in numbers of injuries. However, it is likely that the number of children walking/bicycling *decreased* in the control areas, and *increased* in the SR2S project areas over the relevant time frame. When these changes in mobility are taken into account, the SR2S program showed a decreased rate of injuries and a net benefit in terms of safety for affected students. The benefit was modeled at five possible levels of mobility change: no difference from the rest of California (e.g. a decline in walking), and increases of 10%, 25%, 50% and 100% in numbers of children walking/bicycling. These levels are all well within the range of observed increases in mobility in SR2S projects. The estimated safety benefit of the program ranged from no net change to a 49% decrease in the collision rate among children.

Other safety-related benefits of the SR2S program are also important to note. These include near-misses, personal perceptions of safety, amounts of vehicle traffic, and vehicle and pedestrian behaviors. These factors are examined through a qualitative evaluation of safety as reported by agencies in the questionnaires. In general, the agencies strongly felt that the SR2S program had succeeded in improving safety for the schoolchildren and for other neighborhood residents.

Cost-benefit comparisons

The benefits and costs of the SR2S program were estimated based on monetary values assigned to fatalities and injuries by Caltrans. The cost per collision reduced was modeled for the five levels of mobility change used in the safety analysis. The cost per collision reduced ranged between $40,397 and $282,779. These figures can be compared with the cost per collision reduced of $29,133 (2006 dollars) found by the Highway Safety Improvement Program (HSIP). However, the HSIP and SR2S programs differ in a number of important ways that may preclude a direct comparison of financial effectiveness.

There are a number of benefits produced by the SR2S project that are not easily amenable to inclusion in a cost-benefit evaluation. These include potential improvements in traffic congestion and in air quality near the schools. Safety improvements will affect not only school children, but also other pedestrians in the area. By encouraging walking and bicycling, the program may play a part in increasing physical activity among the students, and may affect the health consequences of inactivity, such as obesity and type II diabetes. Lastly, the SR2S projects targets children, who are among the most vulnerable road users and who are at particularly high risk of traffic collisions.

Recommendations

A number of recommendations were made in the areas of types of projects to be funded, evaluation, and future research needs, funding levels, administration, and integration with the federal Safe Routes to School program. Specific recommendations included:

Types of projects funded

- Increase consideration of proposals that lack collision data, but can demonstrate a high probability of future collisions.
- Strongly encourage agencies to complement construction projects with educational and outreach efforts.
- Consider targeting SR2S funds for elementary students, and further identifying the types of improvements that particularly affect older students.

Directions for evaluation and future research

- Develop an independent and systematic method for evaluating the success of individual projects that includes reliable, quantifiable estimates of the change from before the SR2S construction and after.
- Identify funding for Caltrans to conduct in-depth, independent, before-and-after assessments of a selection of projects.
- Increase response by agencies to questionnaires or other evaluation activities.
- Extend follow-up of the current SR2S program to determine long-term effects.

Funding levels

- Increasing both the total funding pool and the per-project cap on award amounts.

Administration

- Streamline the application process to decrease paperwork, and accelerate award notification.

Federal SRTS program

- The federal government is also beginning a Safe Routes to School program (SRTS) that is mandated under SAFETEA-LU. Although It is not yet clear what effect the federal SRTS program will have on the California SR2S program, future decisions should be harmonized with the federal program.

Summary

The Safe Routes to School program has captured the attention of traffic engineers, public health advocates, schools, communities and families. Anecdotally it has been a resounding success. Through the quantitative and qualitative analyses conducted as part of the legislative mandate, the SR2S program has been effective in achieving its goals of increasing walking/bicycling and improving safety.

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ACKNOWLEDGEMENTS

We extend our sincere thanks to the many people who made significant contributions to this project.

First, funding for this project was provided by a grant from the California Department of Transportation (Caltrans). We want to thank Randy Ronning, Caltrans Department of Local Assistance, who provided substantial input and support throughout the research.

We appreciate the support of the public agencies that completed the questionnaires sent to them; their data and stories were central to this effort.

We are grateful to Marlon Boarnet, Craig L. Anderson, Kristen Day, Tracy McMillan, and Mariela Alfonzo. Their 2003 evaluation of the effects of the California Safe Routes to Schools program on walking and bicycling rates strengthened our study.

Marilyn Sabin provided expert input into a next-to-final draft of this report, and her comments, as always, were insightful and helpful.

Section 1. INTRODUCTION

For almost a decade, there has been a strong focus in California on encouraging children to walk and bicycle to school safely. In 1999, the Safe Routes to School (SR2S) highway construction program was created by the California State Legislature through Assembly Bill 1475, which amended the California Vehicle Code (Section 2333.5) to provide federal transportation funds for the construction of bicycle and pedestrian safety and traffic calming projects. Senate Bill 10 was authorized in 2001 to extend the repeal date from January 1, 2002 to January 1, 2005. California Vehicle Code Section 2333.5 was further amended in 2004 by Senate Bill 1087, which extended SR2S funding until January 1, 2008.

This landmark legislation authorized issuance of a competitive grant process for highway construction projects. The legislation had two goals: to reduce child injuries and fatalities near schools and to increase walking and bicycling activity among students at elementary, middle and high schools.

Since its inception in 2000, the SR2S program has funded over 570 projects with a total cost of over $190 million. Table 1 shows the number of applications, awards and SR2S program funding associated with the program during its first six cycles. Each project was required to obtain a minimum of 10% in local matching funds, and the "total project cost" shown in the table includes these additional amounts.

Table 1: Safe Routes to School project awards, 1999-2006

	Number of applications	Number of project awards	SR2S program funds	Total project cost
1st cycle – *2000/2001*	729	85	$19,859,331	$25,150,032
2nd cycle – *2001/2002*	520	101	$24,328,658	$27,266,117
3rd cycle – *2002/2003*	427	87	$22,130,419	$28,814,521
4th cycle – *2003/2004*	422	85	$22,817,010	$26,361,982
5th cycle – *2004/2005*	381	97	$22,722,480	$25,496,860
6th cycle – *2005/2006*	364	115	$32,184,100	$57,676,665
Total to date	2,843	570	$144,041,998	$190,766,177

The program funded five basic types of infrastructure improvements: sidewalk installation and upgrading, traffic calming and speed reduction measures, installation of traffic signals, pedestrian and bicycle crossing improvements, and construction of bicycle paths or other bicycle facilities. In the first cycle, funding was limited to engineering improvements; however, subsequent application cycles allowed funds to be used for education and traffic safety awareness programs to support the infrastructure changes.

It was anticipated that a number of benefits would accrue as a result of these project awards. Some of the expected outcomes were:

- Increased bicycle, pedestrian, and traffic safety around schools
- More children walking and bicycling to and from schools
- Decreased traffic congestion around schools
- Reduced childhood obesity
- Improved air quality, community safety and security, community involvement
- Improved partnerships among schools, local agencies, parents, community groups, non-profit organizations
- Improved access and safety for disabled pedestrians

The legislation that created the SR2S program also mandated that the California Department of Transportation (Caltrans) study its effectiveness. Specific elements to be evaluated were:

(i) The effectiveness of the program in reducing crashes, injuries and fatalities involving children in the vicinity of the projects;

(ii) The impact of the program on levels of walking and bicycling to school; and

(iii) The safety benefits of the program in comparison with other highway safety programs.

The University of California Traffic Safety Center (TSC) was contracted by Caltrans to conduct this evaluation. This report presents an assessment of program effectiveness for a number of different outcomes, including changes in child pedestrian safety, changes in numbers of children walking/biking, and the cost-effectiveness of the SR2S program. This evaluation is based on information provided by a representative sample of agencies that received SR2S awards, and supplementary data from outside sources.

In this report, we first describe the methods that were used for gathering and collating data. We then characterize the projects that were in the SR2S program overall and those that comprised our study sample of 125 projects. The effects of the projects on walking and bicycling are reported. This is followed by a quantitative and a qualitative investigation of changes in child pedestrian/bicyclist safety due to the SR2S program. We attempt to quantify the relative costs and benefits of the SR2S program, particularly in relation to the Highway Safety Improvement Program of the FHWA. Last, we provide recommendations on possible future directions of the SR2S program, and suggestions for improvement.

Section 2. DATA SOURCES AND METHODS

Our evaluations are based on safety, cost and demographic data provided by the agencies that received funding from the SR2S program, as well as a review of statewide collision data analyzed for the cities in which these agencies operate. Not all funded projects contributed to this dataset. We asked for information only on projects that were funded under the first three program funding cycles, between 2000-2001 and 2002-2003. This limitation on dates was set so that the infrastructure changes would be completed and there would be sufficient time to observe post-implementation changes in traffic safety and pedestrian/vehicle behaviors. During the first three cycles, 273 projects were funded representing 191 different agencies. Twenty-nine of these projects were not completed by December 31, 2005, the cut-off date for inclusion in this research set, and were therefore excluded from participating in the evaluation. An additional 13 projects had been dropped by the local agencies for a variety of reasons. Surveys were sent to the responsible agency for the remaining 231 projects. Of these 231 projects, we received responses on 130, a response rate of 56%.

The remainder of this section will describe the methods that we used to collect data and the nature of the information that was collected.

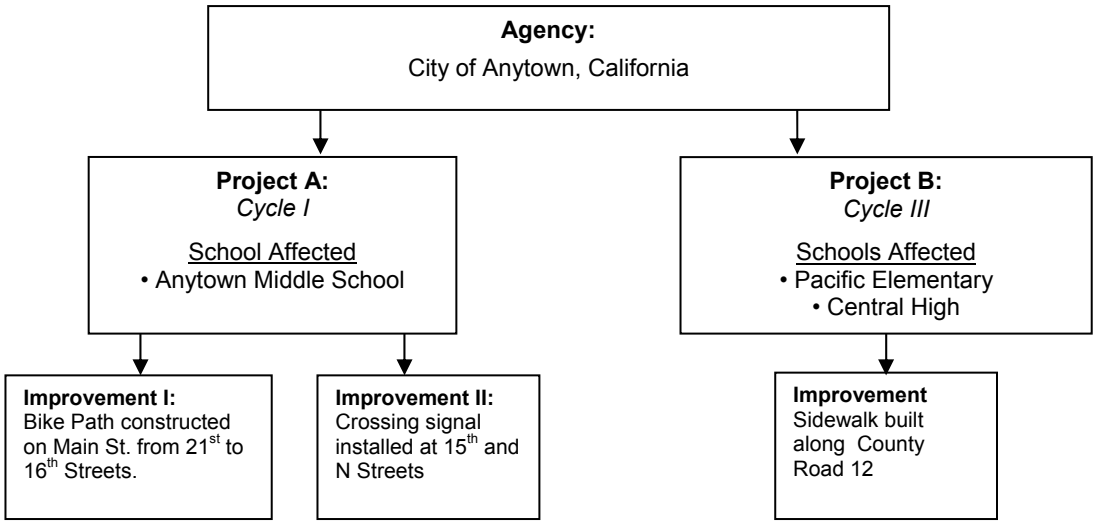
2.1. Definitions

This report uses the following definitions to avoid ambiguity:

- *Agency*: A city or a county that received funding. An agency may have more than one project associated with it.
- *Project*: A set of related improvements for which an agency received funding in a single funding cycle. The project may involve only one school, or it may involve several schools in close proximity.
- *School*: A single school that has had one or more improvements through a SR2S project.
- *Improvement*: A specific goal, such as the construction of a new sidewalk or installation of a crossing signal. Each improvement is linked to a particular project, but may affect more than one school.

An example of the relationships between agencies, projects and improvements can be seen in the graphical representation below in Figure 1. The figure shows one agency—the City of Anytown—receiving two separate SR2S projects in two different cycles. Project A, funded in Cycle I, affects one school and includes two types of improvements. Project B, funded in Cycle III, affects two schools and includes one improvement. As this example shows, the number of affected schools is larger than the number of projects, and the number of projects is larger than the number of responsible agencies.

Figure 1: Relationship between agencies, projects, schools and improvements



2.2. Data collected

The data collected for each project came from several sources: a) the original application for funding that described proposed changes and pre-improvement conditions; and b) a post-construction questionnaire (developed in conjunction with Caltrans) that provided details on actual improvements constructed and both quantifiable data and subjective opinions on the impact of the improvements. A sample of the questionnaire is provided as Appendix A.

Although a wide range of information was collected, the areas of primary interest were:

- Specific improvements completed
- Dates of construction commencement and completion
- Costs
- Delineation of schools and student populations affected by the changes
- Pre- and post-construction rates of walking and bicycling
- Observations of traffic and pedestrian behavior and interactions (including collisions)
- Complementary educational efforts

As stated above, the research team received 130 questionnaires of the 231 that were sent out, for a response rate of approximately 56%. Reminders by Caltrans and follow-up phone calls from the Traffic Safety Center were used to maximize the response rate. The scope and quality of the information provided varied greatly. For example, post-construction vehicle and pedestrian counts were only included in six percent (eight of 130) of applications returned.

The information provided by the agencies was supplemented by additional information gathered by the research team from public sources. This additional information included the official school address and attendance boundary maps, detailed land-use maps and satellite imagery, and data on traffic safety and conditions on streets and intersections surrounding these schools. The methods used to collect and analyze this data are further described in *Section 5.1: Methods for safety analysis* and in Appendix I.

2.3. Data excluded or collapsed

The 130 projects covered by the questionnaire responses were narrowed down to 125 projects for analysis. This collapsing was done because of the way in which information was provided in some questionnaires. In two instances, an agency provided only a single set of questionnaire responses covering two separate projects. In these instances, it was impossible to differentiate data for the two

projects, and thus the data was combined. In three other cases, a single set of improvements constructed at a single location over a short time span (~6 months) was funded through two separate SR2S applications. Although these were technically separate projects, we eliminated the duplication to avoid double-counting school or collision data. This approach reduced the 130 projects to 125.

These 125 projects reported 374 individual schools that would be affected by the improvements (some projects affected more than one school). We examined the characteristics and location of each school individually, and decided to exclude 24 of these schools from the analysis presented in this report. These exclusions were applied for either of two reasons: a) because the age range of the listed school was outside the SR2S target range (the school was either a nursery school or a college/university); or b) because the listed school was located so far from the improvements (far outside the school's attendance boundaries, or separated by a barrier such as a freeway or a lake) that we felt it was unlikely that the SR2S changes would demonstrably impact safety at the location.

Table 2 lists the 24 schools that were excluded and the reasons for doing so. After these exclusions, 350 schools remained in our sample. The names, locations and pertinent characteristics of the schools that remained in the sample are presented in full in Appendix D.

Table 2: Excluded schools

Project Number	Caltrans District	No. of schools listed in application	Number of dropped schools	Names of dropped schools	Grade Level	Reason
2174	7	12	4	Thomas B Moffit Elementary	K-5	Distance
				Loretta Lampton Elementary	K-5	Distance
				John Dolland Elementary	K-5	Distance
				Arturo Sanchez Elementary	K-5	Distance
2175	7	5	2	Raymond Elementary	K-8	Distance
				Imperial Elementary	K-3	Distance
2659	4	3	1	Tamalpais High	9-12	Distance
2667	5	2	1	UC Santa Cruz	Adult	Age range
2674	6	7	2	Stiern Middle	6-8	Distance
				Ruggenberg Carrier Center	Adult	Age range
2678	7	3	1	Methodist Nursery School	< K	Age range
2680	7	12	8	Roosevelt Elementary	K-6	Distance
				Lincoln Elementary	K-6	Distance
				Wilson Elementary	K-6	Distance
				Lynwood Middle	7-8	Distance
				Agnes (aka Rosa Parks) Elementary	K-6	Other*
				Mark Twain Elementary	K-6	Distance
				Abbot Elementary	K-6	Distance
				Washington Elementary	K-6	Distance
2682	7	18	1	Manzanita Elementary	K-5	Distance
2692	7	10	3	Wilson Middle	6-8	Distance
				Fremont Elementary	K-6	Distance
				Clark High	9-12	Distance
2934	6	5	1	Delano Adult School	Adult	Age range

** Agnes Elementary was renamed as Rosa Parks Elementary, and had originally been overlooked by the research team. The change was detected only after the analyses had been completed.*

Section 3. CHARACTERISTICS OF SR2S PROJECTS

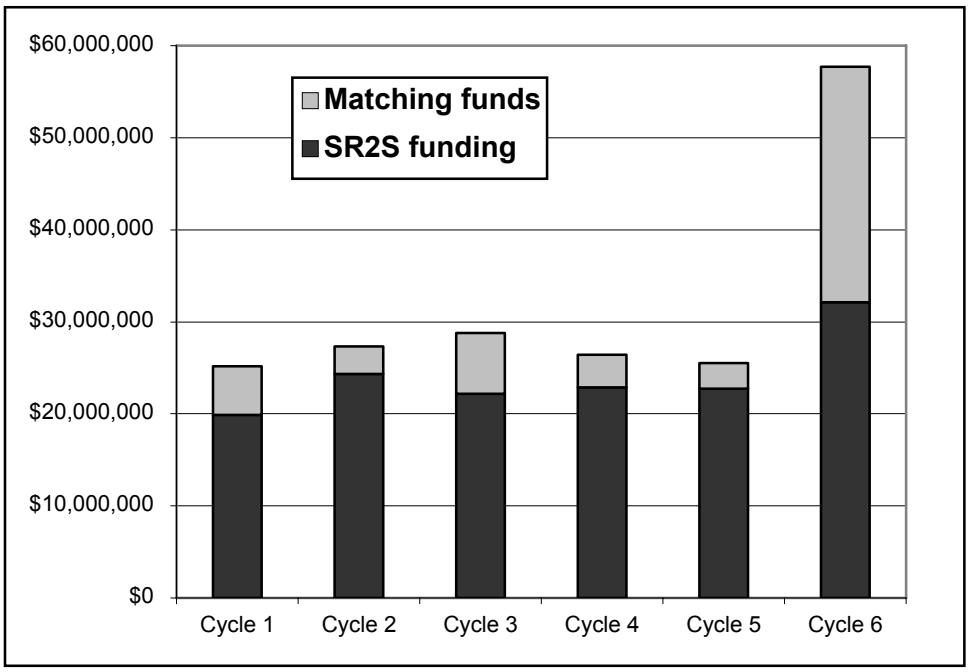
No attempt has previously been made to comprehensively characterize all the projects funded by the SR2S program. In this section, we present the SR2S projects in terms of a number of defining characteristics, including geographical location, temporal distribution, scope of the project, types of improvements made, schools and student populations affected, and costs.

In this section, where possible, we present information on all 570 projects funded in the six cycles of the SR2S program. However, where information is not available for this entire group, we use the study sample of 125 projects and 350 schools from the first three cycles. Each table and figure in this section is clearly labeled as to which sample set it presents.

3.1. Geographic and temporal distribution

A total of 570 projects were funded in the first six cycles of the program, with between 85 and 115 projects funded per cycle (Table 1 in the Introduction). The amount of SR2S program and matching funds awarded for projects remained relatively stable for each of the first five cycles, and increased dramatically for the sixth cycle (Figure 2). This large increase was due to a combination of two factors: (a) an increase of over 40% in the amount of federal funding provided (an increase from $22.7 to $32.2 million); and (b) several projects with extremely high levels of matching funds.

Figure 2: Funding for all 570 SR2S projects, Cycle 1 – Cycle 6



Our study sample of 125 projects represented only a portion of all 570 projects funded by the SR2S program. Table 3 shows the number and funding levels of the sample projects in comparison to all SR2S projects. By number, the 125 projects in our sample represented approximately 46% of all projects in the first three cycles of the SR2S program. By funding levels, the proportion of projects captured in our sample increased to 52%. These figures indicate both that the study sample captured a fairly large portion of the total projects funded in the first three cycles; and also that projects with higher funding were

more heavily represented in our sample (and conversely that smaller projects were relatively under-represented).

Table 3: Total projects and sample projects by cycle

	All SR2S projects		Projects in study sample			
	Number	**Funding**	**Number**	**Percent**	**Funding**	**Percent**
1st cycle – *2000/2001*	85	$25,150,032	37	43.5%	$13,540,765	53.8%
2nd cycle – *2001/2002*	101	$27,266,117	50	49.5%	$16,427,867	60.3%
3rd cycle – *2002/2003*	87	$28,814,521	38	43.7%	$12,239,686	42.5%
4th cycle – *2003/2004*	85	$26,361,982	0	0%	0	0%
5th cycle – *2004/2005*	97	$25,496,860	0	0%	0	0%
6th cycle – *2005/2006*	115	$57,676,665	0	0%	0	0%
Total	*570*	*$190,766,177*	*125*	*21.9%* *(46% of Cycles 1-3)*	*$42,208,318*	*22.1%* *(52% of Cycle 1-3)*

Some concern had been expressed by agencies that parts of the state were relatively under-represented in the SR2S program, most notably rural counties and Southern California. Table 4 presents the distribution of SR2S projects and funds by Caltrans districts. There are 12 Caltrans administrative districts throughout the state in total, and a map detailing Caltrans district and California county boundaries is presented in Appendix B. The population percentages for living in each of the 12 districts is also presented in the table. As shown, the districts with small populations have a relative excess of SR2S projects, counted both by number of projects and by funding received. This finding suggests that concerns about inequity for rural areas is unfounded. Southern California (Districts 7, 8, 11 and 12) has indeed received proportionately less relative to its population; however, these four districts still comprise approximately 50% of total projects to date, and 47.6% of total funds received.

Table 4 also shows the distribution of Caltrans districts among the 125 projects in our sample. While the distribution is not identical to that of all 570 projects, there is a reasonably good match, and only District 9 is missing from our sample entirely. This method of assessment supports our study sample as a representative subset of the entire SR2S program.

Table 4: Total projects and sample projects by Caltrans district

District number	District area	Percent of CA population in district	All SR2S projects		Projects in our sample	
			Number of projects (percent)	Percent of funding	Number of projects	Percent of funding
1	North Coast	0.9%	13 (2.3%)	3.1%	1 (0.8%)	2.0%
2	North Inland	1.0%	16 (2.8%)	3.3%	3 (2.4%)	3.1%
3	Sacramento Valley	7.0%	35 (6.1%)	7.3%	5 (4.0%)	6.0%
4	Bay Area	19.1%	98 (17.2%)	18.5%	28 (22.4%)	25.3%
5	Central Coast	3.8%	25 (4.4%)	5.8%	3 (2.4%)	2.3%
6	Fresno	6.4%	55 (9.6%)	7.5%	14 (11.2%)	8.6%
7	Los Angeles	29.9%	129 (22.6%)	24.7%	19 (15.2%)	16.1%
8	Inland Empire	10.6%	62 (10.9%)	7.9%	16 (12.8%)	7.2%
9	E. Sierra Nevada	0.1%	4 (0.7%)	0.4%	0 (0%)	0.0%
10	Central CA	4.3%	41 (7.2%)	6.6%	12 (9.6%)	12.0%
11	San Diego	8.6%	39 (6.8%)	8.2%	12 (9.6%)	13.4%
12	Orange County	8.5%	53 (9.3%)	6.8%	12 (9.6%)	3.9%
Total		100.0%	570 (100%)	100%	125 (100.0%)	100.0%

3.2. Improvement types

The SR2S program provides funding for five types of infrastructure improvements:

- Sidewalk installation and upgrading (e.g. constructing or improving sidewalks in locations where they were non-continuous or non-existent)
- Traffic calming and speed reduction measures (e.g. installation of speed bumps, curb bulb-outs, roundabouts, or traffic lights)
- Installation of traffic signals (e.g. pedestrian traffic signals, school signs, warning signs, illuminated crossing guard signs, etc.)
- Pedestrian and bicycle crossing improvements (e.g. sidewalk ramps, in-pavement crossing lights, school crossing signs and pavement markings or pedestrian-request crossing lights)
- Construction of bicycle paths or other bicycle facilities (e.g. connection of non-continuous bicycle paths or construction of bridges over major traffic arteries)

Most projects—well over half—included some type of sidewalk upgrade as part of the improvements. Upgrading intersection crossings was also a high priority for applicants, with more than one-third of projects including this component. Most projects included multiple improvement types.

Table 5 describes the funded projects by type of improvement. Detailed information on constructed improvements was only available for the projects in Cycles 1-3. Because some projects included more than one type of infrastructure upgrade, the figures in Table 5 total more than 100% of funded projects.

Table 5: Funded Projects by type of improvement

	All 273 projects in Cycle 1 through Cycle 3		125 projects in our sample	
	Number of projects	Percent of projects *	Number of projects	Percent of projects *
Sidewalk improvements	161	59.0%	89	71.2%
Traffic calming and speed reduction	47	17.2%	26	20.8%
Traffic signals	81	29.7%	25	20.0%
Crossing upgrades	93	34.1%	53	42.4%
Bicycle paths or other facilities	38	7.2%	15	12.0%

* Because projects often included more than one type of improvement, the percentages in this column total more than 100%

3.3. Affected schools and school populations

As mentioned previously, individual SR2S projects were able to have an impact on more than one school. The agencies carrying out the 570 projects estimated that a total of 1,684 schools would be affected by the improvements. Our sample of 350 schools represents approximately 21% of total schools affected overall.

The greatest proportion of schools affected by SR2S projects were elementary schools, as shown in Table 6. Given that there are a larger number of schools at elementary grade levels and students are funneled up to a small number of larger schools at higher grades, this finding is not particularly surprising.

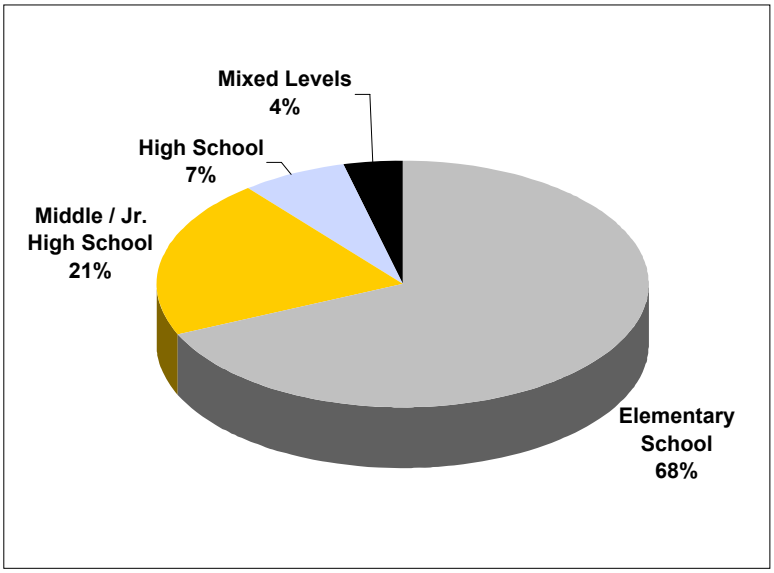
Table 6: Total projects and sample projects by type of school

	All SR2S projects	Projects in our sample
Elementary school	810 (48%)	241 (69%)
Middle / Jr. High school	259 (15%)	72 (21%)
High school	181 (11%)	23 (7%)
Other*	434 (26%)	14 (4%)
Total	1,684 (100%)	350 (100%)

** Schools that are not elementary, middle or high schools; or schools for which no detailed information was provided by local agencies.*

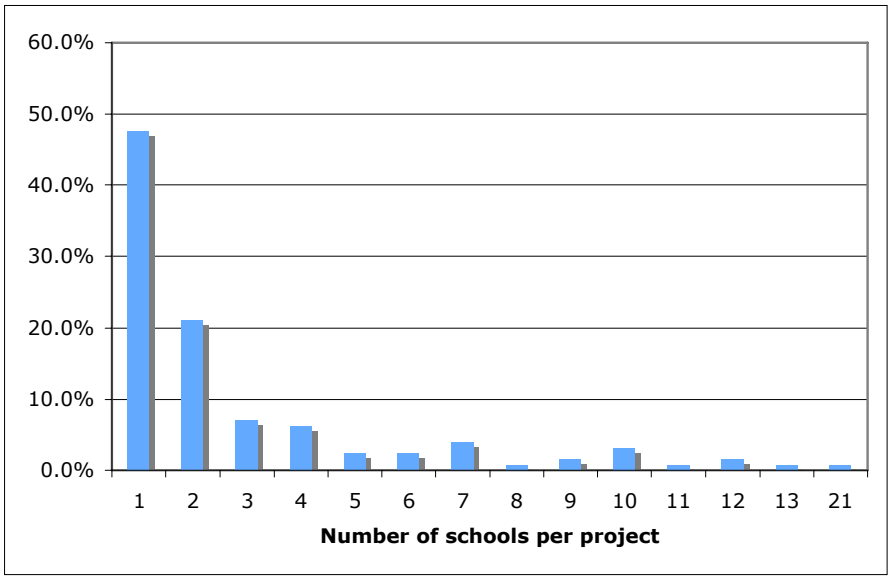
The projects in our sample turned up a higher proportion of elementary schools than did all SR2S projects (69% vs. 48%). However, this difference is likely driven by the additional work performed by our research team in determining the nature of affected schools. Almost one-third of school types were unable to be identified though the original applications (data not shown). The research team used additional resources to determine the exact school types for all sample projects, and was able to make a determination for all 350 schools. The 14 schools remaining in the "other" represent cases in which the grades spanned more than the usual grade level for each school type (for example, Kindergarten through 9th grade). We therefore feel that the proportions of each school type estimated by the projects in our sample are likely to be more accurate than those for all SR2S projects, as shown in the figure below.

Figure 3: True proportion of school types affected by SR2S projects



We also examined the distribution of how many schools were impacted by a given project. This information was not available for the total sample of 570 projects, but only for the projects in our sample. As shown in Figure 4 below, the number of schools affected by the projects ranged from one to twelve. The majority (approximately 70%) of projects affected only one or two schools.

Figure 4: Number of schools affected by each project (sample of 125 projects only)



The number of students impacted by each project was also examined for the 125 projects in the sample. This figure was estimated as the total number of students at all schools in the project area. While this estimation may overestimate the number of students who actually do take advantage of the improvements, it does not include parents, other community members, or students at other schools whose route may take them past the improvements. As shown in Table 7, most projects were anticipated to reach more than 1,000 people.

Table 7: Estimated student population affected by project (sample of 125 projects only)

Affected Population	Frequency	Percent
500 or fewer students	14	11.2%
501 - 1,000 students	45	36.0%
1,001 - 2,000 students	32	25.6%
3,000 or more students	34	27.2%

3.4. Collision victims

Between January 1, 1998 and December 31, 2005, 11 children were killed and 1,449 were injured in the vicinity of the 350 schools in the study. Of these, 644 (44%) were bicyclists and 816 (56%) were pedestrians. It is likely that bicyclists made up a disproportionately high percentage of collision victims, relative to the number of bicyclists. Other surveys have shown that the mode share for bicycling to school is low (national average of 2%), but the fatality rate is more than two times higher than for pedestrians.[1] Approximately 52% of those injured or killed in our sample were age 12 or less; 20% were ages 13-14 (roughly corresponding to junior high/middle school); and 3128 were ages 15-17. Because we do not know the total proportion of the study sample population that made up each of these age categories, it is not possible to determine whether any specific age group was at a particularly high risk.

Table 8: School area victims for 350 schools in study

	Number	Percent
Total number of victims	1,460	100%
Injury severity		
Fatal	11	0.75%
Severe injury	109	7.5%
Minor injury	774	53%
Complaint of injury	566	39%
Mode of transport		
Pedestrian	816	56%
Bicyclist	644	44%
Victim age		
12 or less	764	52%
13-14	294	20%
15-17	402	28%

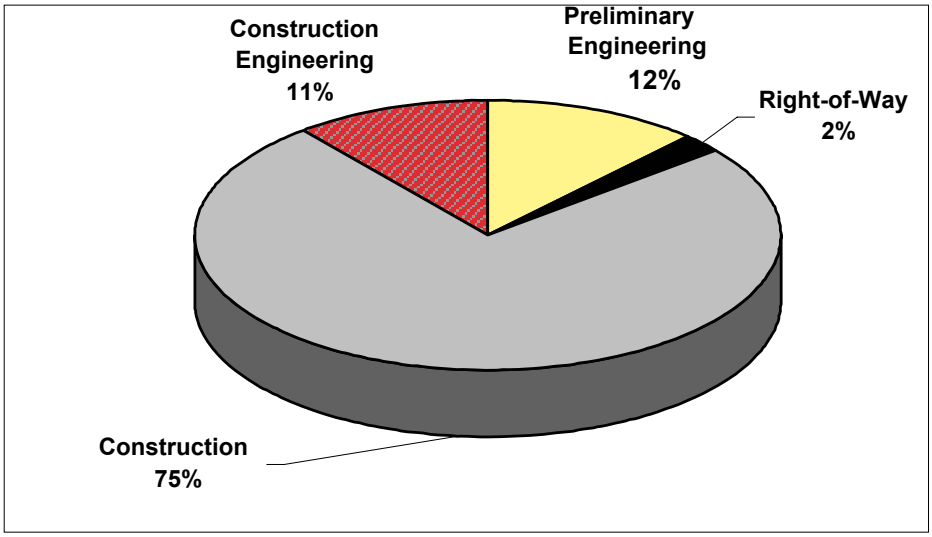
[1] *Source: The Relative Risks of School Travel: A National Perspective and Guidance for Local Community Risk Assessment: Transportation Review Board; 2002.*

3.5. Costs

The total costs for the SR2S program and the study sample were shown in Table 3. On average, the 570 projects received approximately $250,000 directly through SR2S funding, with matching funds topping the projects up to an average award of $335,000. Funding levels varied enormously between projects. The lowest SR2S award was $10,800 and the highest was $450,000 (the maximum allowed under the program).

We used the 125 projects in our sample to estimate the different types of costs that the program funds were used for. The four primary categories of costs for a project include preliminary engineering, construction engineering, construction and right-of-way. Agencies were asked to provide these costs in the questionnaire. Figure 5 shows the proportion of costs associated with each phase of project implementation as noted by projects that reported costs for at least the first three of these categories. The proportion of preliminary engineering (PE) costs may be artificially low, however, as many of the projects bore a portion of the PE costs internally.

Figure 5: Costs by cost category



3.6. Summary of sample characteristics

The SR2S program has provided the State of California with a key opportunity to protect many of our most vulnerable road users. Quantifying the projects according to the characteristics above is critical to helping understand the impact of the SR2S program.

Section 4. EFFECTS ON MOBILITY

One of the specific goals of the Safe Routes to School program is to encourage increased walking and bicycling among students. Increased walking/bicycling is desirable from a number of standpoints. By reducing the number of cars driving children to school, the potential for collisions is reduced. Further, other important public health benefits may ensue. With less driving, the air quality near the school may be improved. Active commuting may also increase overall physical activity levels or decrease overweight and obesity among the students—important issues that have been identified as a public health priority.

In general, walking rates are low, and have been on the decline in the student population for at least the last 35 years. In 1969, close to 50% of American children walked to school. Today, that figure is 12%. For children who live within one mile of school, the proportion declined from 87% to 31% in that same period. Similar trends have been noted in many other Western countries and are projected to occur in parts of the developing world as well. Walking to school has been replaced with motorized transport, particularly in private vehicles driven by a parent.

This section contains a review of a study that was conducted in 2003, also pursuant to California Vehicle Code 2333.5 to assess the impact of the SR2S program on mobility among students. The review is supplemented by empirical data gathered from schools in this current study.

4.1. Mobility study by Boarnet *et al.*

The most in-depth study of changes in mobility in the SR2S program has been conducted by Boarnet, Anderson, Day, McMillan and Alfonzo for their 2003 *Report to the Legislature*. Boarnet *et al*. assessed changes in mobility in two different ways. The first way was through on-site observations of students walking or bicycling before the SR2S project was constructed, and then again after construction had finished. The second way was through a survey of parents whose children attended the school. The survey asked the parents to compare whether the child walked more, the same, or less than before the SR2S improvements had been put in.

Boarnet's intensive study was conducted using a "convenience sample" of 10 elementary schools. Elementary schools were chosen because most schools in the first and second cycles of the SR2S program (70%) were elementary schools, and because elementary schools are traditionally sited to serve local populations, indicating that walking might be feasible for many elementary school students who live nearby.

The number of schools studied was low due to deadline requirements associated with that 2003 report; projects must not have been started by spring 2002 so that observations could be made before construction began, but projects had to be completed by fall 2003 to allow for students to start using the improvements. Sixty-four percent (16 of 25) of eligible schools agreed to participate. Construction was delayed at six of these schools, leaving 10 in the study. Characteristics of these schools are presented in the table below.

Table 9: Characteristics of the 10 elementary schools studied by Boarnet et al.

School Name	City	Percent of students with walk/bike as primary mode of travel	Median household income (for ZIP code)	SR2S Improvement Type
Cesar Chavez	Bell Gardens	46%	$30,029	Traffic control
Glenoaks	Glendale	10%	$41,674	Intersection crossing
Jasper	Alta Loma	14%	$66,668	Intersection crossing
Juan Cabrillo	Malibu	8%	$100,857	Sidewalk
Mt. Vernon	San Bernardino	44%	$23,498	Intersection crossing
Murrieta	Murrieta	6%	$61,583	Sidewalk
Newman	Chino	17%	$55,185	Traffic control
Sheldon	El Sobrante	5%	$61,494	Sidewalk
Valley	Yucaipa	6%	$39,286	Sidewalk
West Randall	Fontana	22%	$35,008	Sidewalk

Of the six types of possible improvements funded by the SR2S program, three types were represented in this sample. Five schools added sidewalk improvements (new sidewalks, filling gaps in the sidewalk network, construction of a walking path, and the installation of curbs and curb cuts). Three schools added intersection crossing upgrades crosswalks, installing in-pavement crosswalk lighting, and installing a pedestrian-activated, "count-down" street-crossing signal) and two schools added traffic control devices (installation of a traffic signal).

Direct observations of changes in walking/bicycling

Traffic data were collected at each school location by a team of three or four observers. Among the information collected by the observers was counts of the number of pedestrians and bicyclists both before and after the SR2S project was constructed. The observations were made over a 2-day period, from 30 minutes before until 15 minutes after the start of the school day, and then again from 15 minutes before until 30 minutes after the end of the school day. Results of the direct observations of students walking/bicycling are presented in Table 10.

Table 10: Observed changes in numbers of students walking to school, before and after SR2S improvements

School Name	SR2S Improvement Type	Before project	After project	Difference
Juan Cabrillo	Sidewalk	274	302	+10%
Murrieta	Sidewalk	2	19	+850%
Sheldon	Sidewalk	138	152	+10%
Valley	Sidewalk	64	89	+39%
West Randall	Sidewalk	692	1146	+66%
Cesar Chavez	Traffic control	1,701	2,047	+20%
Newman	Traffic control	143	250	+75%
Glenoaks	Intersection crossing	(a)	974	--
Jasper	Intersection crossing	51	57	+12%
Mt. Vernon	Intersection crossing	193	137	-29%

(a) 'Before project' counts were originally published as 148, yielding an increase in walking of 558%. However, there was some uncertainty as to whether the same site was observed before and after construction, and thus the authors deem the "before" estimate unreliable.

In eight out of nine schools, an increase in walking/biking was observed after the SR2S project was completed. These increases ranged from 10% at Juan Cabrillo and Sheldon Elementary schools to 850% at Murietta Elementary. A decrease in walking of 29% was observed at one school, Mt. Vernon Elementary. An increase of 558% percent was estimated for the tenth school (Glenoaks), but there was some uncertainty as to whether the same site had been used by the observers for both the "before" and "after'" counts, and the results are discounted by the authors. These results strongly suggest that increases in mobility occurred as a direct result of the SR2S projects. However, the number of schools examined is too small to be able to draw any firm conclusions about the types of improvements or

characteristics of schools or students that are most likely to increase walking.

Another change seen through the study's direct observations was the decrease in numbers of students walking on the street or on the shoulder of the road, for schools that had instituted sidewalk improvements. The table below demonstrates that overall, far fewer students walked on the road once sidewalk improvements were made. This data corroborates the qualitative evaluations that were received for this 2007 study (see Section 6: Qualitative Evaluations of Safety).

Table 11: Percent of students observed walking on the road or shoulder, before and after SR2S improvements (only projects with sidewalk improvements)

School Name	Before project	After project	Difference
Juan Cabrillo	7%	2%	-5%
Murrieta	0%	5%	+5%
Sheldon	66%	35%	-31%
Valley	42%	4%	-38%
West Randall	75%	5%	-70%

Parental reports of changes in walking/bicycling

The second way in which Boarnet *et al*. assessed changes in walking/biking behavior was through a survey of parents at the ten schools. A questionnaire was distributed to parents of students in the third, fourth and fifth grades at the ten schools. The questionnaire included the following question:

Think about how often your child walked or bicycled to school before the SR2S project was built. Would you say that your child now walks or bicycles to school:

(1) Less than before the project was built
(2) The same amount as before the project was built
(3) More than before the project was built

3,222 surveys were distributed, and 1,244 were returned, for a response rate of 39%. The 1,244 responses were pared down to 862 who also answered the question of whether the SR2S improvements were along the child's usual route to school – that is, whether the child would normally pass the improvements while traveling to school.

Table 12 shows the percent of students who were more likely to walk/bike more after the SR2S improvements, for each school and improvement type. The table differentiates between those children whose route passed the SR2S improvements, and those whose route did not. Among students whose route passed the improvements, there was a reported increase in walking/biking of between 3% and 29%, with an average increase of 15.4%. However, students whose route did not pass the improvements were far less likely to begin walking; most schools reported no increase in walking at all among these students, and the average increase was only 4.3%. This finding makes intuitive sense – the students whose walking/biking behavior were most affected by the SR2S program were the ones whose routes passed by the improvements.

Table 12: Parental report of students walking/bicycling more after SR2S project, by school

		Percent who walk / bike more	
School Name	**SR2S Improvement Type**	**Project is along student's usual route**	**Project is NOT along student's usual route**
Juan Cabrillo	Sidewalk	6.7%	0.0%
Murrieta	Sidewalk	13.7%	2.4%
Sheldon	Sidewalk	15.6%	0.0%
Valley	Sidewalk	11.6%	0.0%
West Randall	Sidewalk	28.6%	7.4%
Cesar Chavez	Traffic control	20.6%	6.2%
Newman	Traffic control	10.9%	0.0%
Glenoaks	Intersection crossing	12.0%	7.7%
Jasper	Intersection crossing	3.1%	0.0%
Mt. Vernon	Intersection crossing	19.0%	5.7%

Table 13 below shows the distribution of responses to the question posed above on how student walking/biking changed from before to after the SR2S project: whether students walked/biked more, the same, or less once the project was complete. Overall, a 10.6% increase in walking / biking was reported. At the same time, 18% of students were reported to walk / bike less than before the SR2S project was installed. This steep decline is lamentable, but is also congruent with an overall national trend of decreased walking,

Table 13: Parental report of change in walking/bicycling behavior before and after SR2S project construction, all 10 schools

	Walk/bike more	**No change**	**Walk/bike less**
Project is along student's route to school	15.4%	67.1%	17.5%
Project is NOT along student's route to school	4.3%	77.1%	18.6%
Total	**10.6%**	**71.5%**	**18.0%**

To examine this phenomenon further, the authors examined whether rates differed between those children whose route passed the SR2S improvements, and those whose route did not. As shown below, students whose route passed the improvements were much more likely to walk / bike more: 15.4% versus 4.3%. This difference indicates that the SR2S project likely had a positive impact on promoting walking among these students.

Interestingly, there was little difference in the percentage of students who were less likely to walk/bike between the two groups: 17.5% versus 18.6%. There was also no consistency among schools as to who was less likely to walk: students whose routes passed the improvements, or those whose routes did not. This lack of a difference between the two groups suggests that the change from walking to not walking is not likely driven by the SR2S projects, but by other, external factors.

Summary of the study by Boarnet *et al.*

Using a convenience sample of ten schools allowed Boarnet *et al*. to examine changes in walking and bicycling associated with the SR2S project. Both direct observation and parental report indicated that the projects caused an increase in the number of students who walked/biked to school. This increase was generally in the range of 10% to 75%. Students whose usual route passed the improvements were more than three times more likely to begin walking/biking than students whose usual route did not pass the

improvements. The improvements also affected pedestrian behavior; students were much more likely to stay off the road once sidewalk improvements were built. At the same time, there was a large decrease proportion of students overall who walked/biked to school. This decline in walking/biking did not seem to be associated with the SR2S projects, but rather mirrored an overall decline in walking among students in California.

Complete details of the Boarnet *et al*. study, including methods, a listing of the schools, and the full analysis is available from these sources:

- Boarnet MG, Anderson C, Day K, McMillan TE, Alfonzo M. Safe routes to school, vols. 1 and 2. Sacramento: California Department of Transportation, 2003.

- Boarnet MG, Anderson CL, Day K, McMillan T, Alfonzo M. Evaluation of the California Safe Routes to School legislation: urban form changes and children's active transportation to school. American Journal of Preventive Medicine, 2005 Feb;28(2 Suppl 2):134-40.

- Boarnet MG, Day K, Anderson C, McMillan T, Alfonzo M. California's Safe Routes to School program: impacts on walking, bicycling and pedestrian safety. Journal of the American Planning Association, 2005;71(3):301-17.

4.2. Review of mobility among 125 SR2S projects

A small number of projects among the 125 in the study sample collected counts of pedestrians / bicyclists both before and after the project construction. In this section, we review the data on changes in mobility that were provided by these projects.

a. City of Los Altos (Santa Clara County)

The City of Los Altos installed a series of landscaped median islands to reduce traffic speeds, and a raised crosswalk at a crossing near Almond Elementary School. The total project cost was $325,055. The school had a student population of 555 at the time. Approximately 100 of these students traveled along this route to school.

Consultants evaluated changes in mobility at the crosswalk, with before and after counts taken five months apart. The report documented a pedestrian volume increase of 58% in the morning peak and 292% in the afternoon peak (Table 14). It was not clear how much of the pedestrian activity was school-related, as the observations did not distinguish between students and other users.

Table 14: Changes in walking/biking in the City of Los Altos

	Before SR2S project	After SR2S project	Change
Morning peak time	36 (33 walk, 3 bike)	56 (52 walk, 4 bike)	+58%
Afternoon peak time	25 (24 walk, 1 bike)	96 (94 walk, 2 bike)	+292%
Total	**61**	**152**	**+149%**

b. City of Campbell (Santa Clara County)

The city of Campbell installed a number of upgrades near Westmont High School (estimated school population of 1,749 in 2004). The improvements included the construction of sidewalks, bike lanes, curb ramps, streetlights, and crosswalks. The total cost of the project was approximately $1.5 million, with the SR2S program providing $450,000.

Observations of walking/biking activity were taken before and after construction, with a 20-month period between the observations. As shown in Table 15, walking increased dramatically, with the number of

pedestrians tripling in both the morning and afternoon peak periods. The project was less successful in increasing bicycle traffic; there was an observed increase of 160% in the morning and no change in the afternoon. However, the school had experienced a bicycle collision in the 2-year period prior to the project, so increasing bicycle safety–even without increasing mobility–may have been a priority for this area.

Table 15: Changes in walking/biking in the City of Campbell

	Before SR2S project	After SR2S project	Change
Morning peak time	32 (22 walk, 10 bike)	115 (89 walk, 26 bike)	+259%
Afternoon peak time	35 (22 walk, 13 bike)	100 (87 walk, 13 bike)	+186%
Total	**66**	**215**	**+223%**

c. City of Artesia (Los Angeles County)

The city of Artesia, covering an area of only 1.5 square miles, is a small, highly urbanized city in Los Angeles County. The population is small (15,500) but weekday traffic is equivalent to that of a city of 100,000 due to its location and pass-through traffic. Artesia installed a wide range of improvements including sidewalks, handicapped ramps, upgraded crossing signs and crosswalks. There were five elementary schools impacted by the improvements: Niemes, Kennedy, Burbank, Carver and William Elliott elementary schools, with a total school population of over 2,600 students. Over half of the students walk to school. Only between two and ten students at each school was reported to commute by bicycle. The total cost of the project was $550,000. Although no specific counts were provided the city indicated that surveys had shown an overall increase of eight percent in students walking to and from school as a result of the improvements.

d. City of Santa Cruz (Santa Cruz County)

The City of Santa Cruz used SR2S funds to complete a primary bicycle commute corridor that affected one elementary school and the high school. The city hosts a bi-annual Bike to Work / School day and keeps a tally of the number of students from each school that participate in the event every year. The numbers of students participating in the event at the two schools affected by the SR2S project did not increase immediately after the post-construction period, and even decreased slightly. However, the Bike to Work/School event does not necessarily represent typical usage patterns. Bicycles use on this day (both before and after the SR2S improvements) is likely to be highly affected by other factors, such as promotional campaigns and peer decisions.

e. Other cities

No other agencies provided counts of pedestrian or bicycle activity. However, three cities offered personal assessments of the change in mobility as a result of the SR2S projects. The Principal of Wren Elementary School in the city of Concord (Contra Costa County) noted that “the faculty has observed increased heavy use by the students.” He adds “Wren Elementary School faculty is very pleased with the increased bike usage and believed this is due to the increased safety.” The city of Waterford (Stanislaus County) notes “an increase in bicycles in the bike racks and in children walking to school is evident.” And last, the city of Merced (Merced County) states the project “increased the number of children and parents who walk to school.”

4.3. Summary of SR2S effects on mobility

Both Boarnet *et al*. and the present study found increases in mobility as a result of the SR2S projects. The estimated effect varied greatly from school to school and also varied depending on the estimation method. Direct observations yielded increases that were often in the range of 20%-200%. Parental estimates were more conservative, generally in the range of a 10% increase overall. Although only a small number of schools contributed to the mobility study, it is important to remember that these schools

were not picked as examples because of their success, but were, for the most part, independently evaluated before the project construction began.

It is promising that the SR2S program appears to have increased mobility in these areas, in light of an overall decline in walking/bicycling in the State of California and the US as a whole.

Section 5. EVALUATION OF SR2S IMPACT ON SAFETY

Understanding whether the SR2S projects improved safety among students is critical in evaluating and appraising the SR2S program. In this section, we present the results of a set of statistical analyses that were performed specifically to address this issue. We begin with an explanation of the methods that were used to perform the statistical analyses, followed by the presentation of results.

5.1. Methods for safety analysis

This section presents a brief overview of the methods used for data collation and statistical analyses; full details on the methods can be found in Appendix I.

Overview

The safety analysis is based on a comparison of school areas that were affected by SR2S projects (*school areas*), and nearby areas that were unlikely to be affected by the SR2S improvements (*control areas*). For both the school areas and the control areas, the change in number of collisions was compared for the period before the SR2S construction took place (the *pre-construction* phase) and the period after the SR2S construction was completed (*post-construction*).

Collision Data Source

The California Statewide Integrated Traffic Records System (SWITRS) is a database of police-reported collisions operated by the California Highway Patrol. Local police departments are required by law to submit information on all reported traffic collisions involving any injury or fatality. In addition, some departments voluntarily submit information on property-damage-only collisions. Injury and fatality data were obtained from this records system for the period of January 1, 1998 through Decemer 31, 2005. A working data file was created of collisions that involved a pedestrian or bicyclist aged 5-17 years and in which at least one injury was reported.

School Areas

School areas were based on the list of affected schools provided by the agencies. For each school, a boundary area was defined that circumscribed both the SR2S improvements and a proximate area that was likely to have been impacted by the improvements. The boundary area was created from an examination of street maps and aerial photographs of the neighborhood. In addition, school attendance boundary maps were useful in identifying areas that were likely to have been impacted by the program and to exclude nearby areas that, despite their proximity, would not have been plausible routes along which children travel, given the geographic areas served by that school.

Most school areas enclosed only one school. However, a number of projects affected several schools that were in close proximity (<1/2 mile apart and sharing a number of intersections used by students). In these cases, the nearby schools were grouped into a single *"school area"* unit, and were treated as one unit in the analysis. All areas inside the boundary were assigned to that one school area. This was done to avoid double counting collisions for geographically proximate schools. A list of school areas can be found in Appendix H.

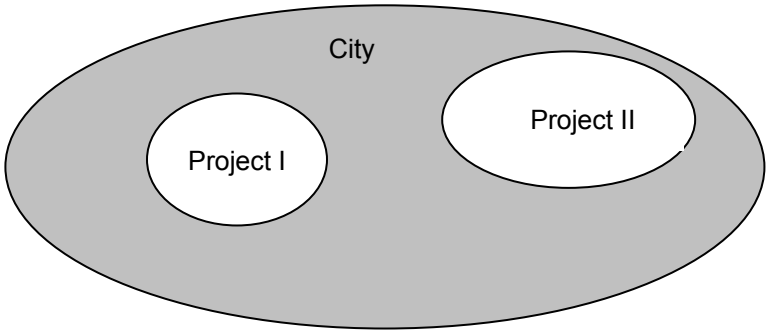
Identifying Affected Intersections

Because collisions in SWITRS are coded according to the nearest intersection, intersections within a ¼-mile radius of a school's main entrance were selected for the collision analysis. The distance of ¼ mile is arbitrary, but represents an area of capturing the majority of children approaching the school on foot or bicycle. A number of intersections outside the ¼ mile radius were included, and some within the radius were excluded, based on the relevance to project-related changes in walking/biking. Appendices E, F and G provide examples of maps showing areas captured by these methods of intersection coding.

Control Areas

The control area was defined as all intersections in the city boundaries that were not included as intersections affected by a SR2S project. In the figure below, the two white ovals represent the impact areas of two projects, and the control area is shown in grey.

Figure 6: Project and control areas

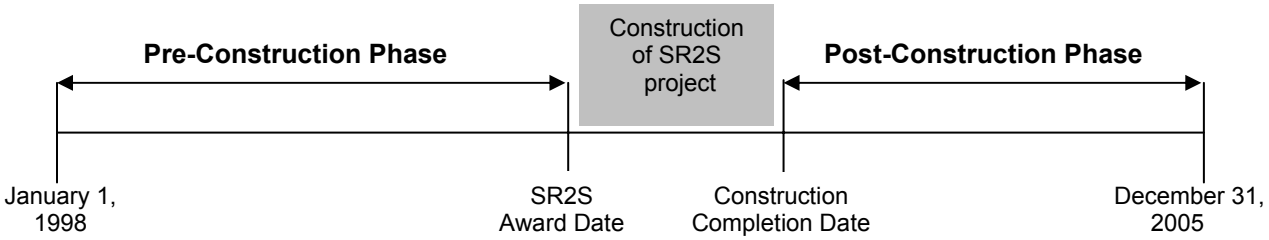


The control areas covered a significant portion of the state of California, as they comprised the non-SR2S project areas of all towns and cities that had an SR2S project in one of the first three cycles. When measured as a proportion of the total child pedestrian/bike collisions in California, the control areas represented almost 40% of the state.

Pre- and Post-Construction Dates

The pre-construction phase was defined as the period between January 1, 1998 and the award date for the SR2S project. The post-construction phase was defined as the period between the completion of construction on the project and December 31, 2005. The amount of time in the two phases varied between different projects, as projects had different award dates, and different construction completion dates. This difference is represented in Figure 7 below. There was an average of 283 weeks in the pre-construction period, and an average of 102 weeks in the post-construction period, although the length of these periods varied greatly for different projects. Appendix H shows the relevant dates and lengths of time for each project in the study.

Figure 7: Pre-construction and post-construction phases



Statistical tests

Rates were calculated as counts per unit of time. Post-intervention rates were compared with pre-intervention rates, summing across all school areas. An estimate of the average yearly change in injury occurrence in the control areas was obtained by fitting a linear regression to collision injury counts. The changes in collision rates in the school areas were estimated with rate ratios obtained from a Mantel-Haenszel person-time rate ratio estimator and were adjusted by the change observed in the control areas over the same average time period. All analyses were performed with Stata software.

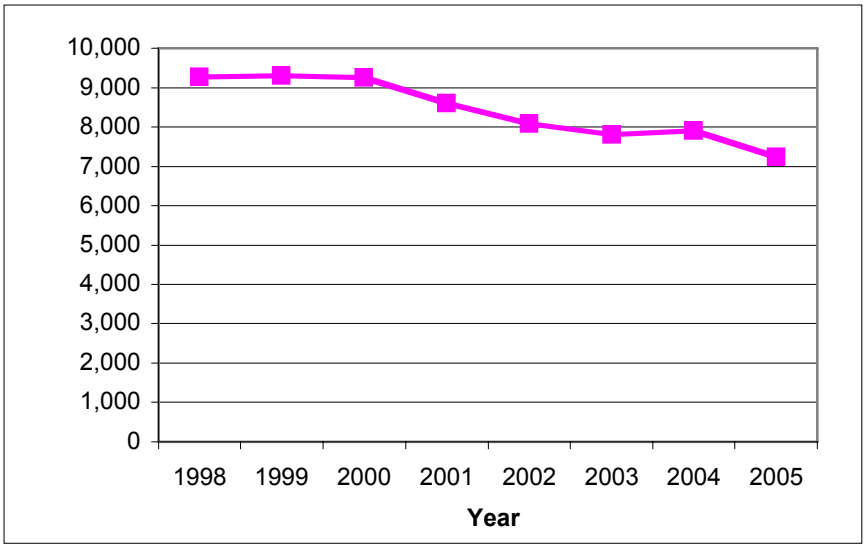
5.2. Results of safety analysis

a. Collision trends over time

It has been noted elsewhere [2] that the number of collisions involving school-age pedestrians and bicyclists have been decreasing over time in California. Some of this decrease may be due to better safety measures or to increased awareness of traffic safety by the pedestrians or by drivers. However, it has also been suggested that this decline is the result of decreased exposure; the number of children walking and bicycling has also been in decline, and the fewer number of pedestrians and bicyclists leads to fewer collisions.

The graph below presents the number of child pedestrians and bicyclists who were injured (fatally or nonfatally) in California for the years 1998-2005 (Figure 8). The data was taken from SWITRS and includes injured children ages 5-18. The data included all areas of California, including SR2S project areas, control areas, and all other areas in the state. The results are shown in Figure 8 below. The number of injured children declined approximately 22% over the period, from 9,271 in1998 to 7,236 in 2005.

Figure 8: Child pedestrians/bicyclists injured in collisions, all of California, 1998-2005



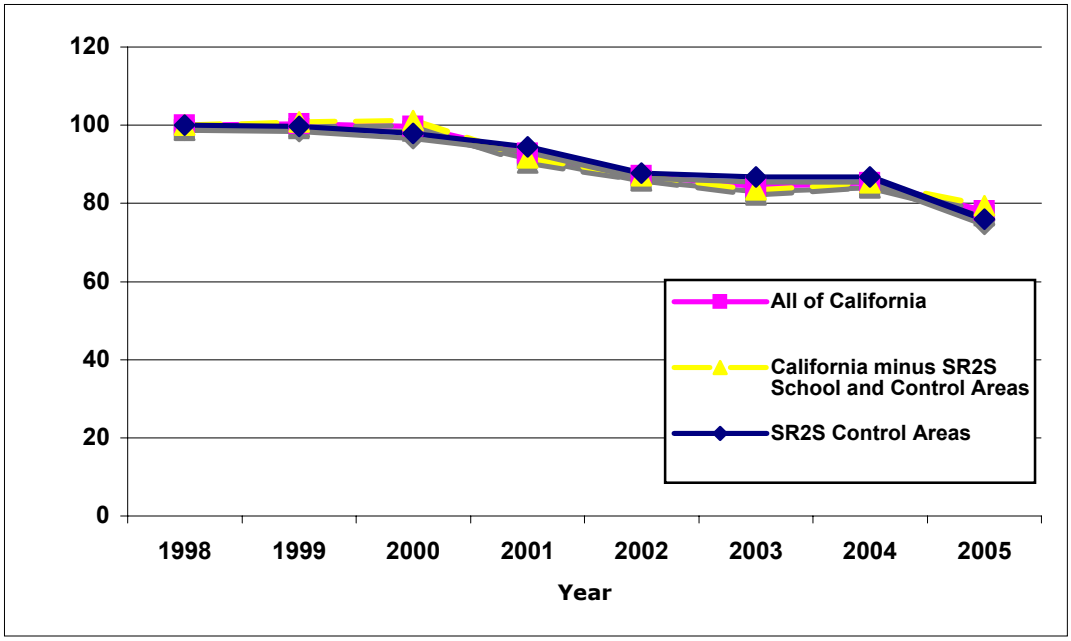
[2] *2004 Annual Report of Fatal and Injury Motor Vehicle Traffic Collisions*, Tables 7G and 7N, California Highway Patrol.

b. Control areas vs. California

We then compared the same data for SR2S control areas and for the parts of California that were not control areas (Figure 9). This allowed us to assess how representative the control areas were with respect to overall trends in child pedestrian/bicyclist collisions. The number of child inujuries for control areas and for the rest of California have been standardized to 100 for 1998 to allow us to assess the relative decline among populations of different sizes.

As shown in the figure, the decline in injuries in the SR2S control areas very closely parallels the decline in the rest of the state. This similarity indicates that the control areas are indeed representative of state trends in child pedestrian safety.

Figure 9: Child pedestrians/bicyclists injured in collisions, SR2S control areas and California, 1998-2005

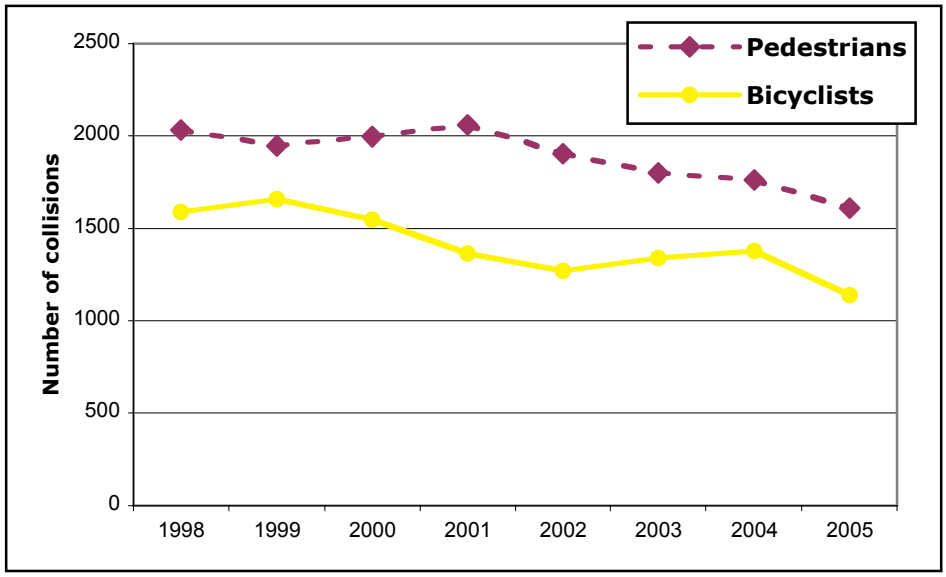


c. Characteristics of collisions and victims

The collisions were examined by a number of different characteristics, such as mode of transportation, severity of injury, and child's age category. These results are presented in the three figures below.

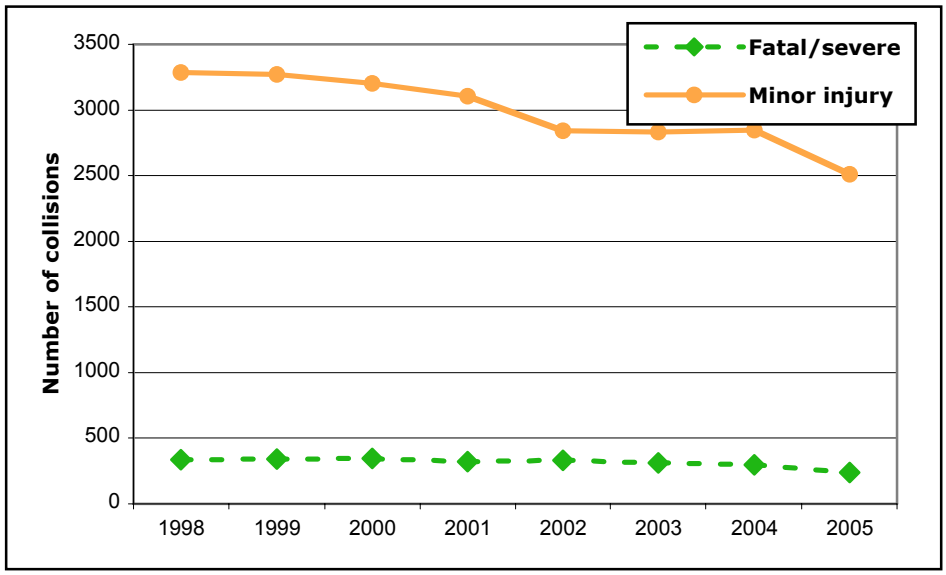
There were approximately 25% fewer collisions involving bicyclists than pedestrians. As mentioned previously, bicycling is a much rarer activity than walking among this age group, but the per-trip fatality rate tends to be much higher.

Figure 10: Injured pedestrians and bicyclists in control areas



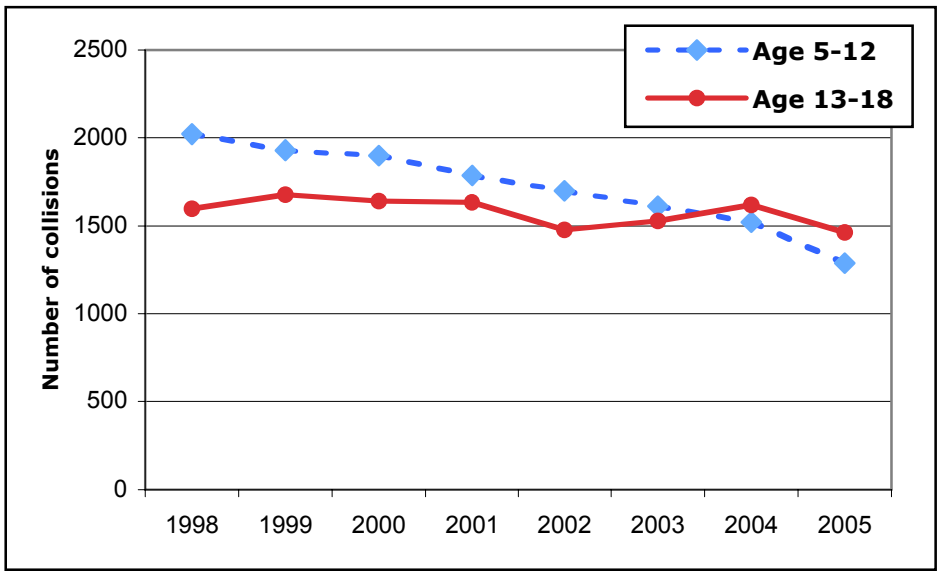
Over the eight years, there has been a decrease in the numbers of severe/fatally-injured children and in those with minor injuries.

Figure 11: Children with fatal/severe and minor injuries in control areas



While a pronounced downward trend in collisions is seen among children ages five to twelve, a similar trend is not observed for older children, ages 13 to 18. The decrease among younger children is 36% over the eight-year period, whereas the net change for older children is less than 9%. This difference shows that the decrease in overall collisions is driven by a change primarily among younger children. The change could result from increased safety awareness and behaviors among these children, or more likely from a societal shift away from walking in this age group. It is important to note that young children bear a higher risk for being injured or killed in pedestrian-related motor vehicle crashes.

Figure 12: Injured children ages 5-12 and 13-18 in control areas



d. SR2S project areas

It is not appropriate to construct a time-series graph similar to those above for SR2S project areas, as the individual projects had widely varying construction dates. Instead, the statistical analyses accounted for the different lengths in pre- and post-construction periods for each school area.

For the SR2S school areas, the overall change observed between the pre-intervention and the post-intervention periods was a 13% reduction in annual numbers of injured child pedestrian/bicyclists. The 95% confidence interval for this figure is between 2% and 23%. The 95% confidence interval is a parameter used to capture the 'true' change in risk in this population (all children affected by SR2S improvements) based on the results obtained among our sample. We can be 95% certain that the "true" change is between 2% and 23%, and 13% represents the best estimate, based on observed data.

The various categories of collisions and victims were not affected uniformly. As shown in the table below, the largest change was observed among children ages 5 to 12, with an observed reduction in injuries of 27.6% among this group. While this group also had the largest decrease in the control areas, the SR2S program appears to have had additional impact among this group. In other words, the SR2S program made the most noticeable safety improvements among children ages 5 to 12. Also notable is that minor injuries were clearly reduced, while this reduction was not observed among fatal/severe injuries. However, because the numbers of fatal/severe injuries were extremely low in the SR2S project areas, it is impossible to articulate any trend with statistical certainty.

Table 16: Change in collisions among collision and victim categories

	Number of collisions in this category	Change in Collisions*	95% Confidence Interval*
Overall	1,460	-13%	(-23% to +2%)
Mode of transportation			
Bicycle	644	-11.6%	(-26.4% to +5.8%)
Walking	816	-13.9%	(-26.8% to +1.1%)
Severity of injury			
Fatal or severe injury	120	+28%	(-14.5% to +90%)
Minor or complaint of injury	1,340	-16.1%	(-26.1% to -4.9%)
Age			
5 to 12	764	-27.6%	(-39.4% to -13.9%)
13 to 17	696	+5.0%	(-11.3% to +23%)

**Negative number is a decrease in collisions, positive number is an increase.*

d. SR2S project areas vs. control areas

As shown above, both the control areas and the rest of California experienced a decline in numbers of injured children over the time frame during which the SR2S projects were implemented. Therefore, an attempt was made to control the observations for the overall downward shift in collisions.

The same pre-intervention and post-intervention periods used for the school areas were applied to the control areas, as described in the Methods, above, and the change in collisions for the control areas was estimated for that time interval. This change was found to be a decrease of 15%, similar to the 13% found for the SR2S intervention areas. Alone, this finding would indicate that the SR2S program resulted in no net benefit in terms of reducing numbers of crashes among affected students.

e. Results in context of changes in mobility

The results above are based on an assumption of similarity between the SR2S intervention areas and the control areas. However, these areas are likely to be different in one important way that may affect the safety analysis.

As noted above, there is an overall trend in decreasing numbers of child pedestrians in California, and this decrease may be responsible for the decline in collisions seen both in California and in the control areas: fewer pedestrians means fewer collisions.

However, as demonstrated in the Mobility section of this report, there is evidence that the SR2S program may have succeeded in increasing walking/cycling rates among children. If that is the case, we would have expected to see an increase in the numbers of collisions among the SR2S project areas. The fact that the numbers did not increase, but instead decreased, may mean that the SR2S project was indeed successful in improving safety for the affected children.

The number of schools that quantitatively assessed changes in walking/biking are few, and their results varied greatly. Therefore, we do not feel that there is a single ‘”best” estimate of the change in mobility that likely occurred across the SR2S program. Table 17 below models SR2S safety improvements for a range of possible changes in mobility. The top row shows five levels of possible change in mobility. The first possibility is “same as control areas”, which represents an unspecified decrease in walking/bicycling that is the same as what occurred in the control areas (the general downward trend in California and the US). The other levels of mobility change are increases in walking/biking of 10%, 25%, 50% and 100%. All these figures are well within the range of actual observed changes in mobility that resulted from the SR2S program. The figures below the row entitled “change in collision rate” show the net change in collisions that would result from each level of change in mobility. For example, an increase of 50% in

walking/bicycling would mean that the overall collision rate decreased 32% from before to after the SR2S project.

Table 17: Changes in safety with changes in mobility

	Increase in walking/bicycling				
	Same as control areas (decrease)	**10%**	**25%**	**50%**	**100%**
	Change in collision rate*				
Overall	**+2%**	**-7%**	**-18%**	**-32%**	**-49%**
Mode of transportation					
Bicycle	+9%	-1%	-13%	-28%	-46%
Walking	-2%	-11%	-22%	-35%	-51%
Severity of injury					
Fatal or severe injury	+52%	+38%	+21%	+1%	-24%
Minor or complaint of injury	-1%	-10%	-21%	-34%	-51%
Age					
5 to 12	-6%	-14%	-25%	-37%	-53%
13 to 17	+11%	+1%	-11%	-26%	-44%

**Negative number is a decrease in collisions, positive number is an increase.*

Table 17 shows that expected changes in mobility have likely resulted in a net improvement in safety associated with the SR2S program. The only scenario that signifies no program benefit is the scenario of no change (0%) in walking and bicycling in the program community, which the mobility data do not support. The overall benefit ranges from a 2% increase to a 50% decrease in the collision rate. While it not possible to know with any degree of certainty which of the scenarios is closest to the truth, the exposure reductions that are consistent with the available evidence on mobility are associated with significant reductions in injury risk to children.

e. Summary of safety analysis

There has been an overall decline in the numbers of child pedestrian/bicyclist collisions in the SR2S project areas, the study control areas, and in California as a whole. When compared with the control areas, the SR2S project areas did not show a greater decline in numbers of collisions. However, it is likely that the number of children walking/bicycling *decreased* in the control areas, and *increased* in the SR2S project areas over the relevant time frame. When the change in mobility in the program areas is taken into account, the SR2S program appears to have had a net benefit in terms of safety for affected students.

5.3. Limitations of safety analysis approach

The quantitative analysis above provides important information and represents one way to assess potential improvements in safety associated with the SR2S program. However, the quantitative analysis does not tell the whole story, and there are several important considerations.

First, collisions are relatively rare events, although they often have catastrophic consequences. As a result, a small variation in the number of collisions in a certain area—even if it is the result of random circumstances—can greatly influence the outcome of the analysis.

Second, collisions result from a combination of circumstances: how many vehicles are in the area, combined with the number of pedestrians (including bicyclists), and the behavior of both the vehicles and pedestrians. The SR2S projects are designed to impact safety mainly by altering behavior: causing

drivers to slow down or to yield to pedestrians, or removing pedestrians from the roads and onto sidewalks. It is also hoped that there will be relatively more pedestrians and fewer vehicles as a result. However, the numbers of vehicles and pedestrians were not, for the most part, assessed before and after these projects. As a result, the *exposure* of pedestrians to vehicles – that is, the risk that pedestrians face – has not been assessed, and is not therefore taken into account in the safety analysis.

Lastly, collisions are only one aspect of safety. Other factors are also related to safety, and may be equally important to address. These include near-misses, personal perceptions of safety, walking/biking rates, amounts of vehicle traffic, and vehicle and pedestrian behaviors.

The next section addresses other ways of evaluating the success of the SR2S program. We present results of a qualitative evaluation of safety as reported by agencies in the questionnaires. This is followed by an examination of the costs and benefits of the SR2S program.

Section 6. QUALITATIVE EVALUATIONS OF SAFETY

The research team also assessed the potential improvements in safety associated with the SR2S program from a qualitative perspective. For this assessment, we used information provided by school and agency officials and others who have been present to observe changes in behavior and safety as a result of the interventions. These opinions and observations bring out aspects of improvements not otherwise documented, such as impacts on the community and changes in pedestrian or driver behavior. This information directly complements the quantitative information that describes the impact in terms of reducing injuries and providing cost-effective improvements.

One hundred fourteen sets of comments were received in response to specific questions asking about perceptions of changes in safety and the impact of the program. This number is smaller than the number of affected schools or agencies, because some agencies did not respond to these questions, and others used the opportunity to respond about several different projects administered by that agency. Only two of the sets of the comments were not, on balance, favorable. While it is not surprising that schools that received infrastructure upgrades have viewed those improvements favorably, the range of their answers shed some light on exactly how the SR2S program affected schools, students and the wider community. The remainder of this section reviews a representative sample of the comments that were received.

Satisfaction was expressed by a wide range of stakeholders: parents, school boards, school officials and administrators, teachers, local communities and residents, and other involved parties. Comments such as "this program was a great success" were common.

> *"This project was a great success. Nearly two years later, we are still being thanked for putting in this sidewalk. Students, parents, teachers, administrators and school bus operators all appreciate the increase in safety and easier access to school. Vehicle and pedestrian traffic from the school now has less impact on the neighborhood traffic flow. The neighborhood also appreciates the increased visibility and safety that came with the three new street lights." (Stockton, San Joaquin County)*
>
> *"We received emails from happy parents after the project was completed." (Ojai, Ventura County)*
>
> *"The project is a resounding success for children who walk to school and for the many children and adults that use the school facilities after school and weekends." (Humboldt County)*
>
> *"The community and school felt the project was a success. The improvements are good for both the schools and the neighborhood." (Santa Ana, Orange County)*
>
> *"Several members of the community have expressed strong support for the completed project to Board of Supervisors and local transportation commission." (Amador County)*
>
> *"Norwalk's community leaders enthusiastically believe that the SR2S project was a complete success." (Norwalk, Los Angeles County)*

Many respondents specifically addressed the question of whether they felt the SR2S projects had affected safety.

> *"The Alameda County Public Works Agency has been very pleased with SR2S program. The SR2S funds have been a great value in increasing the safety of children walking to and from school in Alameda County." (Alameda County)*
>
> *"The sidewalks have greatly increased the safety and comfort of our students and parents at Fair Oaks School. Since the vast majority of our students walk to school the sidewalks have improved their trip considerably. The students are not walking at the edge of the roadway; they have a safe*

sidewalk to separate them from the cars. Not only is it safer but the school is cleaner in the rainy season since students no longer have to walk through the mud. We appreciate your help getting us the sidewalks." (San Mateo County)

"Through informal conversations with residents I know that people feel student safety has been increased by the installation of sidewalks along the routes to school." (Yolo County)

"Student pedestrian and bicycle traffic has been removed from the vehicle right-of-way, to the safety of the children." (Lemoore, Kings County)

Few schools conducted before- or after-implementation surveys of traffic counts or crashes. However, many subjective opinions were provided on the effect of the SR2S interventions on collisions or near-collisions.

"The lack of pedestrian and bicycle collisions at the location, in spite of increased speeds along 19th Street, indicate a successful project and good use of SR2S funds." (Rancho Cucamonga, San Bernardino County)

"The former exit led children through a small parking lot, causing congestion and direct competition of pedestrians, cyclists and drop-off vehicles. Near-misses were common. Now, drop-off vehicles are separated from pedestrians. Buses can now stop very near the new gate, allowing students to enter school grounds immediately." (Stockton, San Joaquin County)

"Overall, the project was a success. Even though detailed speed surveys have not been performed yet, in the field it was noticed that traffic has slowed down. Whether this is a long term success is yet to be determined." (Vista, San Diego County)

Several agencies reported a change in driver yielding behavior after implementation of project improvements. Driving yielding behavior is related to crashes between pedestrians/bicyclists and motor vehicles.

"The crossing guards previously had difficulties in getting drivers to yield the right of way to school pedestrians crossing at this intersection. Since the installation of the project we have had positive feedback from the crossing guard at this location." (Tustin, Orange County)

"The in-roadway light systems have been very successful. Prior to the installation of in-roadway warning light systems an average of only 19% of motorists yielded to pedestrians at the uncontrolled crosswalks in daytime hours and 15% in night-time hours. With the installation of the systems throughout the city, the percentages increased to 79% in daytime hours and 87% in night-time hours. In addition, about 90% of pedestrians are using the in-roadway warning systems." (Glendale, Los Angeles County)

"Although there have not been formal studies conducted by the city of San Jose Department of Transportation for these locations, subsequent incidental interviews with motorists, students, parents and teachers all report a greater feeling of safety, and notice an increase in compliance of motorists stopping for pedestrians within the crosswalk." (San Jose, Santa Clara County)

Others framed their evaluations in terms of increased numbers of students walking or bicycling, as a result of increased perceptions of safety.

"An increase in bicycles in the bike racks and in children walking to school is evident." (Waterford, Stanislaus County)

"Wren Elementary School Faculty is very pleased with the increase bike usage and believes this is due to the increased safety." (Concord, Contra Costa County)

"The T Y Lin International/CCS Report documented that pedestrian volumes increased by 58% in the morning peak and 292% in the afternoon peak." (Los Altos, Santa Clara County)

"The flow of traffic is more efficient. Pedestrians, bicyclists and children can cross the street more safely as well." (Turlock, Stanislaus County)

"The project was a great success. It increased the number of children and parents who walk to school." (Merced, Merced County)

"The program encourages students to walk and bike to school and decreases the localized traffic and pollution." (Walnut Creek, Contra Costa County)

Students, other pedestrians and drivers appeared to conform to the new behaviors indicated by the infrastructure changes.

"No formal surveys or reports were completed by teachers, students and parents regarding their feelings on the signal improvements. However, based on field observations, students were using the signals. It was easier for the crossing guards (provided by the school district) to cross the students compared to prior to the installation of the traffic signal when the school crosswalk was uncontrolled." (Riverside, Riverside County)

"City officials have noticed a significant amount of school children and parents using the Safe Routes to School sidewalks on both Melba Rd. and Santa Fe Drive." (Encinitas, San Diego County)

"Pre-construction estimates were that about 800 of the school's approximately 1000 students walked to school each day without the use of the sidewalk. The number of children now walking to school without walking on the road suggests this was a project well worth doing, and we consider it a success here at the Kern County Roads Department." (Kern County)

Several agencies felt that significant and important improvements occurred that were unlikely to be documented by collision statistics, due to the infrequency of collisions. These agencies emphasized the importance of continuing safety-related infrastructure improvements, even in the absence of "hard" numerical evidence.

"Even if it does not show reduced accidents … I can tell you that the unseen or unstudied benefits (physical health, community pride, environmental / air quality, etc.) will continue to benefit taxpayers for a good number of years to come." (Waterford, Stanislaus County)

"The current emphasis on accident data is reactive rather than proactive. With the tremendous growth in the Riverside-San Bernardino MSA, there is a current surge of the new school construction, often in spaces made available by developers, not necessarily at a location that is the best fit for a community. Urgent needs for safety improvements are often identifiable before traffic collisions might occur but local funding is insufficient for known needs. Local agencies, whether Cities or Counties, could likely mitigate safety issues with advance state or federal funding. However, under the current program, proposals without supporting 'collision data' are unlikely to be prioritized highly enough to be funded. Consider a "block grant" program for safety projects within one mile of a school facility where local traffic and planning experts may determine the greatest return on the safety dollar." (San Bernardino County)

Several agencies funded near the beginning of the program noted that changes could have been significantly enhanced if funding had been allowed for traffic safety education and outreach in addition to infrastructure improvements. Beginning in the second cycle, the SR2S program did allow funds to be used for complementary educational efforts, and several projects implemented after that date noted that this use of funds created additional value for the projects.

> *"The project was a great success. From the public outreach efforts and community-wide education on how to safely use the constructed improvements, to the actual improvements that were installed, this project provided pedestrian continuity, safety and visibility to a community that was once lacking these elements... Furthermore, educating the children on how to use the improvements was also a huge and instrumental benefit of the program." (San Diego, San Diego County)*

> *"Yes, the program was a huge success. Not only did it provide much needed sidewalks for the area's schools but it got the schools involved. They are teaching the younger students roadway walking and bike safety. The students of all ages used to walk and ride their bikes right down the middle of the roadway." (Yolo County)*

Agencies also commonly reported that the improvements made through the SR2S program had long been recognized and needed, but were only made possible through SR2S funding.

> *"The program also gets both the jurisdiction and the school talking together and discussing how to solve real problems that deal with traffic around and near the schools. I think a good many engineers and Public Works officials had and have great plans to increase safety around the schools in their respective jurisdiction. What has always lacked was the dollars to do it. This program takes care of that problem and gives them an avenue to make their plans become reality. This program is one of the smartest ones out there." (Waterford, Stanislaus County)*

> *"A huge success that allowed us to fund a very expensive project that otherwise would not have been constructed." (Paradise, Butte County)*

> *"This addition of traffic signal at a busy intersection with high school-age pedestrian activity would not have been possible without the SR2S program as a funding source." (Tulare, Tulare County)*

> *"The project was very successful addressing numerous school crossings in Oakland with high volumes of pedestrians and vehicular traffic...Without SR2S the signal probably would not have been a possibility." (Oakland, Alameda County)*

Section 7. COST-BENEFIT COMPARISONS

7.1. Cost-benefit analysis of changes in collisions

Based on the decreases in collision rates identified in Section 5.2, a cost-benefit ratio can be generated to estimate the financial efficacy of the SR2S program. This estimate is based on the costs incurred by the SR2S program to construct safety improvements, and the benefits gained in terms of lives saved and injuries avoided.

A complete cost-benefit analysis is based on a large number of assumptions and parameters, many of which are not relevant to the SR2S program, or for which information is not available. The cost-benefit presented below is therefore fairly rudimentary. It is, however, one of the few methods available for quantifying the impacts of the program and for comparing it to competing options for other safety programs.

The cost-benefit analysis below is based on the following assumptions and parameters:

- The costs are total program costs of the 99 projects (214 out of 307 school areas) that contributed collisions to our counts.
- The cost comprises only the initial program cost. No other costs, such as continuing maintenance or operation of the safety improvements, are included in the cost amount, since these costs are not borne by the SR2S program.
- Because of the wide variety and programmatic combinations of interventions in the SR2S program, the effective service life of the SR2S improvements could not be modeled.
- The values assigned to fatalities and injuries avoided are:

Fatal injury	$3,927,372
Severe injury	$198,899
Other visible injury	$51,740
Complaint of pain	$24,944

  These figures come from Caltrans estimates from 1997, adjusted to 2006 dollars.
- The cost per collision reduced is based on one year of collision avoidance.
- It is assumed that the SR2S program has no differential effect on types of injuries: that is, the proportion of fatalities, severe injuries and minor injuries remains the same. Although the safety analysis indicated that the observed projects may have had a greater impact on minor collisions, the number of fatalities was very small and more subject to random variation.

The table below shows the costs and benefits for each of the modeled levels of change in walking/biking. The cost per collision reduced ranges from $40,397 (based on a 100% increase in walking/ bicycling from the SR2S project) to $282,779 (based on a 10% increase in walking/bicycling).

Table 18: Cost-benefit analysis for the SR2S program

Change in walking/biking	Change relative to control areas	Cost of program ($ millions)	Benefit per year ($ millions)	Cost per collision reduced
Same as control areas *(decrease in walking)*	No effective difference	$28.9	$0	n/a
10% increase	7% decrease	$28.9	$8.33	$282,779
25% increase	18% decrease	$28.9	$21.43	$109,970
50% increase	32% decrease	$28.9	$38.09	$61,858
100% increase	49% decrease	$28.9	$58.33	$40,397

7.2. Comparison with the Hazard Elimination Safety Program

The continuing Hazard Elimination Safety (HES) program provides an interesting comparison to the SR2S program. The HES program began in 1974 and by 1996 had allocated over $4.5 billion dollars to 35,000 projects. The projects consisted primarily of improving traffic channelization (to separate or regulate conflicting traffic movements), installing and upgrading traffic signals, upgrading guardrails, median barriers and shoulders, improving pavement skid resistance and upgrading pavement markings. A 1996 report–the *Annual Report on Highway Safety Improvement Program* –presented the effectiveness of the HES program in reducing the number and severity of motor vehicle traffic accidents.

The HES program is one of the few large traffic safety programs that has evaluated its effectiveness through both risk reduction estimates and cost-benefit analyses. As such, a comparison between the HES and SR2S programs may be informative.

In 1996, the FHWA presented results of the impact of the HES program on traffic safety, based on an evaluation of approximately 20% of the funded projects. The program was assessed on its success in reducing rates of fatal and injury collisions, and on a cost-benefit analysis to estimate the cost per life saved and non-fatal injury avoided. Results of these evaluations are discussed below.

The HES Program accomplished reductions in fatal, non-fatal injury and combined (fatal plus non-fatal injury) collision rates of 51%, 27% and 27% respectively (Table 19). The average costs per unit reduction in fatal collisions and combined (fatal plus non-fatal injury) collisions were $377,500 and $16,400 (costs used a combination of 1987 and 1995 dollars).

Table 19: Safety improvements achieved by the HES program

	Fatalities	Non-fatal injury	All collisions (fatal plus non-fatal injury)
Reduction in rate	51%	27%	27%
Cost per collision reduced (*1987 dollars)*	$377,500	--	$16,400
Cost per collision reduced (*2006 dollars)*	$670,594	--	$29,133

The cost-benefit analysis was based on a number of parameters including a cost of $2.7 million per fatality and $57,000 per injury (1995 dollars). Other parameters included the basis of the service life of the improvements, an interest rate of 10 percent, and assumptions of zero maintenance costs and salvage values. A cost index was used to convert the original construction cost of each project to 1987 dollars. Details on these evaluations can be found in: *The 1996 Annual Report on Highway Safety Improvement Programs: Report to the Secretary of Transportation to the United States Congress.*

Prepared by the US Department of Transportation Federal Highway Administration, Office of Highway Safety, April 1996.

The cost per collision reduced was less for HES projects than for SR2S projects modeled at 10% to 100% increases in mobility. However, there are several important ways in which the HES and the SR2S programs differ, and a direct comparison of the cost-benefit ratios may be inappropriate. To begin with, the HES was conducted at a time when traffic fatality rates were decreasing across most developed countries. This decrease was occurring for a variety of reasons, including enforcement of seatbelt use, changes in the engineering of cars, etc. The HES was therefore able to capitalize on decreased collision rates in the overall environment, which is applicable to the SR2S program.

Secondly, the HES evaluations were performed only in hazardous highway locations where the potential for collisions was significant. By contrast, the SR2S programs target areas in which the rates of collisions are much lower to begin with, and collisions are only examined in the small population of pedestrians, rather than all motorists.

7.3. Benefits of intangible impacts

The cost-benefit analyses above are based on a monetary valuation of changes in collision rates and decreases in human injury. However, there are a number of other products of the SR2S program that are not easily quantified or valued.

Many of the SR2S improvements reduce the speed of traffic surrounding the school area through traffic calming strategies. By reducing the average speed of vehicles, the severity of injuries to a pedestrian or bicycle struck will be reduced.

The SR2S program may reduce the number of cars on the road, if more children walk or bike, rather than being driven. This reduction in school-related traffic may ease local congestion, improve drivability in the neighborhood, and ease competition for parking spaces. It may also result in improvements in local air quality near the school, which may have a positive impact on asthma among vulnerable students.

The projects increase traffic safety not only for students at the affected school but also for other pedestrians, including community members and students from other schools whose route takes them past the improvements. Increased perceptions of safety may also improve a sense of community among residents.

By encouraging walking and bicycling, the program may play a part in increasing physical activity among the students. Low levels of physical activity have been linked with health problems such as obesity and Type II Diabetes even among young children. Walking and physical activity early in life is also associated with higher rates of physical activity as an adult. Further, exercise (through walking and bicycling to school) has been positively associated with greater ability to focus in classrooms.

Lastly, it is important to bear in mind that the populations most affected by the SR2S projects consist of some of the most vulnerable road users. Children are at particularly high risk of traffic collisions, and it is a terrible—and usually avoidable—tragedy when a child is killed in these circumstances. By focusing on the safety of very young pedestrians, the SR2S program helps protect the segment of society that most greatly needs it.

Section 8. RECOMMENDATIONS

The Safe Routes to School program has been effective in achieving its goals of increasing walking/bicycling and improving safety. The recommendations below have been identified by a number of sources, including the authors of this report, Caltrans, agencies that received SR2S funds, the 2003 report by Boarnet *et al*., and from independent reviewers. The recommendations below are grouped into thematic categories and encompass both small details and broad thematic concerns.

Types of projects funded

- In addition to proposals that demonstrate high collision rates, proposals that are unable to use collision data but can demonstrate the probability of future collisions, should be given serious consideration for funding.
- Strongly encourage agencies to complement construction projects with educational and outreach efforts.
- The greatest successes in the SR2S program have been seen for younger students. Additional targeting of SR2S funds for elementary students may be appropriate, and further identification of the types of improvements that particularly affect older students may be appropriate.

Directions for evaluation and future research

- A significant challenge is the lack of data for evaluating the success of individual projects. While success can be defined in a number of different ways–through changes in collisions, near-collisions, traffic speeds, numbers of children walking/bicycling, children's overall physical activity levels, etc. –it is important to obtain reliable, quantifiable estimates of the change from before the SR2S construction and after.
- In order to provide this data, identify funding for Caltrans to conduct in-depth, independent, before-and-after assessments of a selection of projects. It may also be feasible to require agencies to provide information such as pedestrian counts, based on methods developed by Caltrans.
- For future evaluation efforts, increase the response rate of agencies responding to questionnaires. 56% of eligible agencies responded to the questionnaire distributed for this study. Consider making funding contingent on the completion of a similar questionnaire or final report.
- An evaluation of changes in safety should be repeated in 2-3 years' time. The additional years of data on collisions will help demonstrate long-term changes in safety and will provide a greater sample size for statistical analyses.

Funding levels

- The per-project cap of $450,000 in SR2S-awarded funds should be increased, due to increased construction costs.

Administration

- Several agencies expressed frustration at the amount of paperwork and bureaucracy involved in the application process and suggested it be streamlined.
- It was also suggested that funding should come from the state rather than federal government because of the difficulty and burden (particularly for small agencies) in complying with federal paperwork requirements and deadlines.
- Successful applications should be announced more quickly and feedback should be given to agencies that were not successful.
- Some agencies felt that additional funding for the entire SR2S program should be used to make the application process less competitive and to more closely match expressed need.

Federal SRTS program

- The federal government is also beginning a Safe Routes to School program (SRTS) that is mandated under SAFETEA-LU. The SRTS program will have its own eligibility requirements and funding sources. It is not yet clear what effect the federal SRTS program will have on the California SR2S program. Additionally, California's Strategic Highway Safety Implementation Plan will likely affect the SR2S program in the State. Future decisions about the state SR2S program should be harmonized with these other programmatic areas.

APPENDICES

Appendix A – QUESTIONNAIRE SENT TO ALL AGENCIES

Safe Routes to School Questionnaire
April 2006

Agency	
SR2S Cycle	
Caltrans District	
Project ID #	(To be completed by Caltrans)
LP2000 File #	(To be completed by Caltrans)

1. On what date was the construction contract awarded?_____

2. On what date was the construction work completed?_____
(Note: We are looking for the date in which the construction work was completed and students were able to begin using the facility(ies). This date should always precede the date that the construction contract was accepted by the Construction/Resident Engineer.)

3. How many schools were impacted by the improvements?_____
(Note: We are looking for the number of schools where the constructed improvements assisted the students in walking and/or biking to and from the school.)

4. Describe the actual improvements that were constructed and the location where they were constructed: Use street names and intersections as often as possible to describe limits of work.

Description of Work	Location of Work

Hint: To add lines to the table, highlight an entire line (make the line turn entirely black), then just do a 'copy' and 'paste' routine for as many times as you need. To delete lines, highlight the entire line and hit 'backspace' key.

5. Identify the actual costs in the project phases shown below:

Project Phase	Costs
Preliminary Engineering	
Right of Way	
Construction	
Construction Engineering	
Total	

(Note: Please attach the successful contractor's bid item list, if available)

6. Has your agency or the affected school(s) conducted any post-construction surveys or counts of the students' usage of the new facilities and improvements.?.

If yes, please attach the surveys, count data and any analysis performed on the data.

7. If the project included any traffic calming features that reduced the speed of vehicles, were any post-construction speed surveys conducted?

If yes, please attach project-related speed surveys or reports.

8. Do the students, teachers and parents feel that the project has increased safety for students to walk or bike to school?

Elaborate and attach documentation, as appropriate.

9. Were any school or newspaper articles published that highlighted the improvements?

Please attach a copy of the articles or identify newspaper to contact.

10. Please attach any public or school outreach and education flyers, pamphlets or products that were used before, during or after the project was constructed.

11. Overall, was the project a success? Should the SR2S program be continued at current, lesser or greater funding levels?

12. Do you have any complaints or criticisms of the SR2S program? What would you like to see changed to improve the program?

13. Senate Bill 1087, the bill that extended the program 3 more years, placed a primary emphasis on evaluating the SR2S program's impact on accident, injury and fatality rates involving pedestrians and bicycles in the vicinity of the projects. Please respond to these questions as thoroughly as you can.

Pre-construction Accident History:

Describe the pedestrian and bicycle accident history - of the immediate area where improvements were made - prior to the construction contract being awarded. The history should precede the award date by 2 years.

Identify the period of time of your pre-construction investigation:

_____ to _____

Month/Day/Year to Month/Day/Year

Post-Construction Accident History:

Describe the pedestrian and bicycle accident history – of the area where improvements were made – after the construction contract was completed.
Note: The researchers will take into account the time periods available for this post-construction history and weight the rates accordingly.

Identify the period of time for your post-construction investigation:

_____ to _____

Month/Day/Year to Month/Day/Year

Please attach the back up data for both the 'pre-' and 'post-construction' analysis and any other supporting documentation that you consider relevant.

Name of person to contact regarding information contained in this report:

Name_____

Email_____

Phone_____

Appendix B – CALTRANS DISTRICTS

Appendix C – LIST OF AGENCIES THAT RETURNED THE QUESTIONNAIRE

List of agencies that returned the questionnaire

LP2000 ID #	Program Year	Program Release Date	District	Agency	County
2136	2001	9/22/2000	8	Rancho Cucamonga	San Bernardino County
2137	2001	9/22/2000	8	San Bernardino County	San Bernardino County
2141	2001	9/22/2000	10	Waterford	Stanislaus County
2143	2001	9/22/2000	10	Merced	Merced County
2144	2001	9/22/2000	10	Turlock	Stanislaus County
2145	2001	9/22/2000	10	Merced County	Merced County
2146	2001	9/22/2000	10	Turlock	Stanislaus County
2147	2001	9/22/2000	11	San Diego County	San Diego County
2152	2001	9/22/2000	12	Garden Grove	Orange County
2153	2001	9/22/2000	12	Santa Ana	Orange County
2154	2001	9/22/2000	12	Santa Ana	Orange County
2157	2001	9/22/2000	12	Santa Ana	Orange County
2161	2001	9/22/2000	7	Ojai	Ventura County
2163	2001	9/22/2000	8	Murrieta	Riverside County
2164	2001	9/22/2000	8	Yucaipa	San Bernardino County
2165	2001	9/22/2000	6	Kern County	Kern County
2166	2001	9/22/2000	6	Central Union School District	Kings County
2167	2001	9/22/2000	6	Dinuba	Tulare County
2168	2001	9/22/2000	6	Clovis	Fresno County
2169	2001	9/22/2000	6	Clovis	Fresno County
2172	2001	9/22/2000	7	Artesia	Los Angeles County
2173	2001	9/22/2000	7	Los Angeles	Los Angeles County
2174	2001	9/22/2000	7	Norwalk	Los Angeles County
2175	2001	9/22/2000	7	Downey	Los Angeles County
2181	2001	9/22/2000	7	Los Angeles	Los Angeles County
2182	2001	9/22/2000	7	Santa Monica	Los Angeles County
2187	2001	9/22/2000	7	Rosemead	Los Angeles County
2188	2001	9/22/2000	7	Baldwin Park	Los Angeles County
2191	2001	9/22/2000	4	Sebastopol	Sonoma County
2192	2001	9/22/2000	4	Belmont	San Mateo County
2194	2001	9/22/2000	4	San Francisco County	San Francisco County
2195	2001	9/22/2000	4	Santa Rosa	Sonoma County
2197	2001	9/22/2000	4	Union City	Alameda County
2198	2001	9/22/2000	4	Oakland	Alameda County
2199	2001	9/22/2000	4	Napa	Napa County
2201	2001	9/22/2000	5	Santa Barbara	Santa Barbara County
2205	2001	9/22/2000	1	Humboldt County	Humboldt County
2213	2001	9/22/2000	4	Berkeley	Alameda County
2218	2001	9/22/2000	4	Contra Costa County	Contra Costa County
2641	2002	11/27/2001	1	Humboldt County	Humboldt County
2643	2002	11/27/2001	2	Red Bluff	Tehama County
2648	2002	11/27/2001	3	Woodland	Yolo County
2649	2002	11/27/2001	4	Solano County	Solano County
2651	2002	11/27/2001	4	Santa Rosa	Sonoma County
2652	2002	11/27/2001	4	Walnut Creek	Contra Costa County
2655	2002	11/27/2001	4	San Jose	Santa Clara County
2656	2002	11/27/2001	4	Campbell	Santa Clara County
2657	2002	11/27/2001	4	Albany	Alameda County

List of agencies that returned the questionnaire					
LP2000 ID #	**Program Year**	**Program Release Date**	**District**	**Agency**	**County**
2659	2002	11/27/2001	4	Mill Valley	Marin County
2660	2002	11/27/2001	4	Alameda County	Alameda County
2661	2002	11/27/2001	4	Oakland	Alameda County
2662	2002	11/27/2001	4	Vacaville	Solano County
2664	2002	11/27/2001	4	San Jose	Santa Clara County
2666	2002	11/27/2001	4	Fremont	Alameda County
2667	2002	11/27/2001	5	Santa Cruz	Santa Cruz County
2670	2002	11/27/2001	6	Fresno	Fresno County
2672	2002	11/27/2001	6	Fresno	Fresno County
2674	2002	11/27/2001	6	Kern County	Kern County
2675	2002	11/27/2001	6	Bakersfield	Kern County
2677	2002	11/27/2001	6	Fresno	Fresno County
2678	2002	11/27/2001	7	Malibu	Los Angeles County
2679	2002	11/27/2001	7	Norwalk	Los Angeles County
2680	2002	11/27/2001	7	Lynwood	Los Angeles County
2682	2002	11/27/2001	7	Covina	Los Angeles County
2683	2002	11/27/2001	7	Downey	Los Angeles County
2687	2002	11/27/2001	7	Artesia	Los Angeles County
2692	2002	11/27/2001	7	Glendale	Los Angeles County
2694	2002	11/27/2001	7	Lancaster	Los Angeles County
2695	2002	11/27/2001	7	Whittier	Los Angeles County
2704	2002	11/27/2001	7	Pomona	Los Angeles County
2705	2002	11/27/2001	8	Riverside County	Riverside County
2707	2002	11/27/2001	8	Chino	San Bernardino County
2709	2002	11/27/2001	8	San Bernardino County	San Bernardino County
2711	2002	11/27/2001	8	Rancho Cucamonga	San Bernardino County
2712	2002	11/27/2001	8	Grand Terrace	San Bernardino County
2714	2002	11/27/2001	8	Rancho Cucamonga	San Bernardino County
2715	2002	11/27/2001	8	Moreno Valley	Riverside County
2716	2002	11/27/2001	8	San Bernardino	San Bernardino County
2719	2002	11/27/2001	10	Amador County	Amador County
2721	2002	11/27/2001	10	Merced County	Merced County
2724	2002	11/27/2001	10	Ceres	Stanislaus County
2727	2002	11/27/2001	11	San Diego	San Diego County
2728	2002	11/27/2001	11	Encinitas	San Diego County
2729	2002	11/27/2001	11	Vista	San Diego County
2732	2002	11/27/2001	11	La Mesa	San Diego County
2733	2002	11/27/2001	11	Santee	San Diego County
2734	2002	11/27/2001	11	San Diego County	San Diego County
2735	2002	11/27/2001	11	San Diego	San Diego County
2737	2002	11/27/2001	12	Santa Ana	Orange County
2738	2002	11/27/2001	12	Fullerton	Orange County
2740	2002	11/27/2001	12	Santa Ana	Orange County
2908	2003	11/3/2002	2	Susanville	Lassen County
2909	2003	11/3/2002	2	Shasta County	Shasta County
2911	2003	11/3/2002	3	Paradise	Butte County
2913	2003	11/3/2002	3	Nevada County	Nevada County
2914	2003	11/3/2002	3	Yolo County	Yolo County
2917	2003	11/3/2002	3	Willows	Glenn County
2920	2003	11/3/2002	4	Concord	Contra Costa County

List of agencies that returned the questionnaire					
LP2000 ID #	**Program Year**	**Program Release Date**	**District**	**Agency**	**County**
2921	2003	11/3/2002	4	Foster City	San Mateo County
2924	2003	11/3/2002	4	Los Altos	Santa Clara County
2926	2003	11/3/2002	4	Napa	Napa County
2927	2003	11/3/2002	4	Vacaville	Solano County
2928	2003	11/3/2002	4	Solano County	Solano County
2929	2003	11/3/2002	4	Santa Rosa	Sonoma County
2933	2003	11/3/2002	5	Santa Cruz	Santa Cruz County
2934	2003	11/3/2002	6	Delano	Kern County
2938	2003	11/3/2002	6	Lemoore	Kings County
2939	2003	11/3/2002	6	Kern County	Kern County
2941	2003	11/3/2002	6	Tulare	Tulare County
2942	2003	11/3/2002	6	Tulare	Tulare County
2947	2003	11/3/2002	7	El Monte	Los Angeles County
2958	2003	11/3/2002	8	San Bernardino County	San Bernardino County
2963	2003	11/3/2002	8	Riverside County	Riverside County
2965	2003	11/3/2002	8	San Bernardino County	San Bernardino County
2967	2003	11/3/2002	8	Montclair	San Bernardino County
2969	2003	11/3/2002	10	Plymouth	Amador County
2970	2003	11/3/2002	10	Riverbank	Stanislaus County
2971	2003	11/3/2002	10	Waterford	Stanislaus County
2973	2003	11/3/2002	10	Stockton	San Joaquin County
2975	2003	11/3/2002	11	El Cajon	San Diego County
2978	2003	11/3/2002	11	Lemon Grove	San Diego County
2981	2003	11/3/2002	11	San Diego	San Diego County
2982	2003	11/3/2002	11	La Mesa	San Diego County
2984	2003	11/3/2002	12	Santa Ana	Orange County
2985	2003	11/3/2002	12	Garden Grove	Orange County
2989	2003	11/3/2002	12	Tustin	Orange County
2990	2003	11/3/2002	12	Garden Grove	Orange County
2991	2003	11/3/2002	12	Santa Ana	Orange County
2992	2003	11/3/2002	12	Santa Ana	Orange County
3099	2001	9/22/2000	4	Santa Rosa	Sonoma County

Appendix D – LIST OF SCHOOLS IN THE STUDY

List of schools in the study				
Agency	**Name**	**Address**	**Grade Level**	**LP2000 ID#**
Rancho Cucamonga	Jasper Elementary	6881 Jasper St, Alta Loma, CA 91701	K-6	2136
San Bernardino	West Randall Elementary	15620 Randall Ave, Fontana, CA	K-5	2137
Waterford	Waterford Middle	12916 Bentley St, Waterford, CA 95386	6-8	2141
Merced	Burbank Elementary	609 E Alexander Ave Merced CA	K-5	2143
Turlock	Dutcher Elementary	1441 Colorado Ave.	1-6	2144
Merced	Schendel Elementary	16464 August Ave, Delhi, CA 95315	K-5	2145
Turlock	Wakefield Elementary	400 South Ave Turlock CA	K-6	2146
San Diego County	Lindo Park Elementary	12824 Lakeshore Drive, Lakeside CA 92040-0578	K-5	2147
San Diego County	El Capitan High	10410 Ashwood St, Lakeside, CA 92040	9-12	2147
San Diego County	Tierra del Sol Middle	9611 Petite Lane, Lakeside, CA 92040-4317	6-8	2147
Garden Grove	Meairs Elementary	12272 Wilken Way Garden Grove, CA 92840	K-5	2152
Garden Grove	Zeyen Elementary	12081 S Magnolia Garden Grove, CA 92841	K-6	2152
Garden Grove	Violette Elementary	12091Lampson Ave Garden Grove, CA 92840	K-6	2152
Garden Grove	Crosby Elementary	12181 West St. Garden Grove, CA 92840	K-6	2152
Garden Grove	Parkview Elementary	12272 Wilken Way Garden Grove, CA 92840	K-6	2152
Garden Grove	Eisenhower Elementary	13221 Lilly St Garden Grove, CA 92845	K-6	2152
Garden Grove	Brookhurst Elementary	9821 Catherine Ave, Garden Grove CA 92841	K-6	2152
Santa Ana	Diamond Elementary	1450 S Center Santa Ana CA	K-5	2153
Santa Ana	Harvey Elementary	1635 S Center, Santa Ana CA	K-5	2153
Santa Ana	Henninger Elementary	417 W Walnut, Santa Ana CA	K-5	2153
Santa Ana	Valley High	1810 S Greenville, Santa Ana CA	9-12	2153
Santa Ana	Santa Ana High	510 W Walnut, Santa Ana CA	9-12	2153
Santa Ana	Carr Intermediate	2120 W Edinger, Santa Ana CA	6-8	2153
Santa Ana	Lowell Elementary	700 S Florez, Santa Ana CA	K-5	2154
Santa Ana	Pico Pico Elementary	931 W Highland, Santa Ana CA	K-5	2154
Santa Ana	King Elementary	1001 S Graham Lane, Santa Ana CA	K-5	2157
Ojai	Mantilija Junior	703 El Paseo Rd, Ojai, CA	7-8	2161
Murrieta	Murrieta Elementary	24725 Adams Ave. Murrieta CA	K-5	2163
Yucaipa	Valley Elementary	12333 Eighth Street, Yucaipa, CA 92399	K-6	2164
Yucaipa	Dunlamp Elementary	32870 Avenue E, Yucaipa, CA 92399	K-6	2164
Kern County	Mt Veron Elementary	2161 Potomac Ave. Bakersfield, CA 93307-2426	K-6	2165
Central Union School District	RJ Neutra School	967 Community Center Dr, Lemoore, CA	K-8	2166
Central Union School District	Akers School	Coral Sea Ave & Constellation Ave, Lemoore, CA 93245	K-8	2166
Dinuba	Roosevelt Elementary	1311 Euclid Ave Dinuba CA	K-5	2167
Clovis	Dry Creek Elementary	1273 N Armstrong, Clovis CA 93611	K-6	2168
Clovis	Weldon Elementary	150 DeWitt, Clovis CA 93612	K-6	2169
Artesia	Burbank Elementary	17711 Roseton Ave., Artesia, CA 90701	K-6	2172
Artesia	Niemes Elementary	16715 Jersey Ave., Artesia, CA 90701	k-6	2172
Los Angeles	Loreto St School	3408 Arroyo Seco, Los Angeles CA	K-5	2173
Los Angeles	Nightingale Middle	3311 Figueroa St, Los Angeles	6-8	2173
Norwalk	Studebacker Elementary	11800 Halcourt Ave, Norwalk, CA 90650	K-5	2174
Norwalk	William Orr Elementary	12130 South Jersey Ave, Norwalk, CA 90650	K-5	2174
Norwalk	Crenssan Elementary	11650 East Cresson St, Norwalk, CA 90650	K-5	2174
Norwalk	Lakeside Middle	11000 East Kenney Street, Norwalk, CA 90650	6-8	2174

List of schools in the study				
Agency	**Name**	**Address**	**Grade Level**	**LP2000 ID#**
Downey	Alameda Elementary	8613 Alameda St, Downey, CA	K-3	2175
Downey	EW Ward Elementary	8851 Adoree St, Downey, CA	K-3	2175
Downey	South Middle School	12500 Birchdale, Downey CA	6-8	2175
Los Angeles	Mouth Washington Elementary	3981 San Rafael Ave, Los Angeles CA	K-5	2181
Santa Monica	Will Rogers Elementary	2401 14th Street Santa Monica CA	K-5	2182
Santa Monica	John Muir Elementary	2526 Sixth Street Santa Monica CA	K-5	2182
Santa Monica	John Adams Middle	2425 16th Street Santa Monica CA	6-8	2182
Santa Monica	Santa Monica Alternative	2525 Fifth Street Santa Monica CA	K-8	2182
Rosemead	Rice Elementary	2150 North Angelus Ave Rosemead CA 91770	K-6	2187
Rosemead	Williams Elementary	2444 North Del Mar Ave Rosemead CA 91770	K-6	2187
Rosemead	Frances Willard Elementary	3152 North Willard Ave Rosemead CA 91770	K-6	2187
Rosemead	Savannah Elementary	3720 Rio Hondo Ave Rosemead CA	K-6	2187
Rosemead	Encinita Elementary	4515 Encinita Ave Rosemead CA	K-6	2187
Rosemead	Bitely Elementary	7501 East Fern Ave, Rosemead, CA 91770	K-6	2187
Rosemead	Ralph Waldo Elementary	7544 East Emerson Pl, Rosemead, CA 91770	K-6	2187
Rosemead	Duff Elementary	7830 Dorothy St, Rosemead, CA 91770	K-6	2187
Rosemead	Shuey Elementary	8472 East Wells St Rosemead CA	K-6	2187
Rosemead	Janson Elementary	8628 Marshall Ave Rosemead CA	K-6	2187
Rosemead	Garvey Intermediate	2720 North Jackson Ave, Rosemead, CA 91770	7-8	2187
Rosemead	Muscatel Middle	4201 East Ivar Ave Rosemead CA	7-8	2187
Rosemead	Sanchez Elementary	8470 East Ferm Ave Rosemead CA 91770	K-8	2187
Baldwin Park	De Anza Elementary	12820 Bess St, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Elwin Elementary	13010 East Waco St, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Tracy Elementary	13350 Tracy St, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Foster Elementary	13900 Foster Ave, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Margaret Heath Elementary	14321 School St, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Ernest Regeddes Elementary	14600 Cavette Pl, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Central Elementary	14741 Central Ave, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Pleasant View School	14900 East Nubia St, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Vineland Elementary	3609 Vineland Ave, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Kenmore Elementary	3823 Kenmore Ave, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Charles Burch Elementary	4245 North Merced Ave, Baldwin Park, CA 91706	K-6	2188
Baldwin Park	Walnut Elementary	4701 North Walnut St, Baldwin Park, CA 91706	K-6	2188
Sebastopol	Pine Crest Elementary	7285 Hayden Avenue Sebastopol CA	3-5	2191
Belmont	Nesbit Elementary	500 Biddulph Way, Belmont, CA	K-5	2192
San Fransisco Transportation Agency	Fairmount Elementary	65 Chenery Street, San Francisco, CA, 94131	K-5	2194
Santa Rosa	Yulupa Elementary	2250 Mesquite Dr, Santa Rosa, CA 95405	K-3	2195
Union City	Barnard White Middle	725 Whipple, Union City, CA , 94587	6-8	2197
Oakland	Washington Early Childhood Center	6097 Racine St, Oakland, 94609	K-5	2198
Oakland	Elmhurst Middle	1800 98th Ave, Oakland, CA 94603	6-8	2198
Oakland	Simmons Calvin Junior High	2101 35th Ave, Oakland, CA 94601	6-8	2198
Napa	El Centro Elementary	1480 El Centro Ave	K-5	2199
Napa	Phillips Elementary	1210 Shetler Avenue, Napa	K-6	2199
Santa Barbara	Harding Elementary	1625 Robbins Street, Santa Barbara, CA 93101	K-5	2201
Santa Barbara	Hope Elementary	3970-A La Colina Road, Santa Barbara, CA 93110	K-5	2201
Santa Barbara	Monroe Elementary	431 Flora Vista Drive, Santa Barbara 93109	K-5	2201

List of schools in the study				
Agency	**Name**	**Address**	**Grade Level**	**LP2000 ID#**
Santa Barbara	Franklin Elementary	1111 East Mason Street, Santa Barbara, CA 93103	K-6	2201
Santa Barbara	Cleveland Elementary	123 Alameda Padre Serra, Santa Barbara 93103	K-6	2201
Santa Barbara	Monte Vista Elementary	730 N. Hope Avenue, Santa Barbara, CA 93110	K-6	2201
Santa Barbara	La Cumbre Middle	2255 Modoc Road, Santa Barbara, CA 93101	6-8	2201
Berkeley	Le Conte Elementary	2241 Russell St, Berkeley, CA	K-5	2213
Berkeley	Willard Middle	2425 Stuart St, Berkeley, CA	6-8	2213
Contra Costa County	Sheldon Elementary	29 6th St, Richmond CA 94801	K-5	2218
Humboldt County	Morris Elementary	2395 McKinleyville Avenue, McKinleyville, CA. 95519-3479	K-5	2641
Humboldt County	McKinleyville Middle	2285 Central Avenue, McKinleyville, CA. 95519-3685	6-8	2641
Red Bluff	Jackson Heights Elementary	225 Jackson St, Red Bluff, CA	K-6	2643
Woodland	Prairie Elementary	1444 Stetson St Woodland, CA 95776	K-6	2648
Woodland	Zamora Elementary	1716 Cottonwood St Woodland CA	K-6	2648
Woodland	Dingle Elementary	625 Elm St Woodland, CA 95695	K-6	2648
Woodland	Tofoya Elementary	720 Homestead Way Woodland CA	K-6	2648
Solano County	Franklin Middle	501 Starr Ave, Vallejo, CA	6-8	2649
Santa Rosa	JX Wilson Elementary	246 Brittain LN, Santa Rosa, CA	K-6	2651
Santa Rosa	Rincon Valley Middle	4650 Badger Rd, Santa Rosa, CA	K-6	2651
Santa Rosa	Binkley Elementary	4965 Canyon Dr, Santa Rosa, CA	K-6	2651
Santa Rosa	Abraham Lincoln Elementary	850 W 9th St, Santa Rosa, CA	K-6	2651
Santa Rosa	Maria Carrillo High	6975 Montecito Blvd, Santa Rosa, CA	9-12	2651
Santa Rosa	Hidden Valley School	3435 Bonita Vista LN, Santa Rosa, CA	7-8	2651
Santa Rosa	Hidden Valley Satellite School	3555 Parker Hill Rd, Santa Rosa, CA	K-12	2651
Santa Rosa	Rincon Valley Christian	4585 Badger Rd, Santa Rosa, CA	K-12	2651
Walnut Creek	Walnut Creek Intermediate	2425 Walnut Boulevard, Walnut Creek, CA	6-8	2652
San Jose	Leitz Elementary	5300 Carter Ave, San Jose, CA 95118	K-5	2655
San Jose	Lane View Elementary	2095 Warmwood Ln, San Jose, CA 95132	K-5	2655
San Jose	San Antonio Elementary	1855 East San Antonio St, San Jose, CA 95116	K-6	2655
San Jose	Kennedy Elementary	1865 Monrovia Dr, San Jose, CA 95121	K-6	2655
San Jose	Alex Anderson Elementary	5800 Calpine Dr, San Jose, CA 95123	K-6	2655
San Jose	Leyva Middle	1865 Monrovia Dr, San Jose, CA 95121	6-8	2655
San Jose	Morril Elementary	1970 Morrill Ave, San Jose, CA 95132	6-8	2655
San Jose	Dartmouth Middle	5575 Dartmouth Dr, San Jose, CA 95118	6-8	2655
San Jose	Burnett Jr High	850 North Second St, San Jose, CA 95112	6-8	2655
San Jose	Herman Leonard Intermediate	5955 Blossom Ave, San Jose, CA 95123	7-8	2655
Campbell	Westmont High	4805 Westmont Ave, Campbell, CA 95008	9-12	2656
Albany	Cornell Elementary	920 Talbot Ave, Albany, CA 94706	K-5	2657
Albany	Albany High	603 Key Route Blvd, Albany, CA 94706	9-12	2657
Albany	Albany Middle	1259 Brighton Ave, Albany, CA 94706	6-8	2657
Mill Valley	Edna Maguire Elementary	80 Lomita Dr, Mill Valley, CA	K-5	2659
Mill Valley	Mill Valley Middle	425 Sycamore Ave, Mill Valley, CA	6-8	2659
Alameda County	Marshall Elementary	20111 Marshall St, Castro Valley, CA	K-5	2660
Alameda County	Creekside Middle	19722 Center St, Castro Valley, CA	6-8	2660
Oakland	Brookfield Elementary	01 Jones Ave, Oakland, CA 94603	K-5	2661
Oakland	La Escuelita Elementary	1100 Third Ave, Oakland, CA 94606	K-5	2661
Oakland	Burbank Elementary	3550 64th Ave Oakland CA	K-5	2661
Oakland	Longfellow Elementary	3877 Lusk St, Oakland, CA 94608	K-5	2661
Oakland	Hawthorne Elementary	700 28th Ave, Oakland, CA 94601	K-5	2661

List of schools in the study				
Agency	**Name**	**Address**	**Grade Level**	**LP2000 ID#**
Oakland	Markham Elementary	7220 Krause Ave, Oakland, CA 94605	K-5	2661
Oakland	Parker Elementary	7929 Ney Ave, Oakland, CA 94605	K-5	2661
Oakland	Prescott Elementary	920 Campbell St, Oakland, CA 94607	K-5	2661
Oakland	Webster Elementary	8000 Birch St, Oakland, CA 94621	K-6	2661
Oakland	Westlake Middle	2629 Harrison St, Oakland, 94612	6-8	2661
Oakland	Washington Middle	581 61st St, Oakland, 94609	6-8	2661
Vacaville	Padan Elementary	200 Padan School Rd. Vacaville CA	K-6	2662
Fremont	Warm Springs Elementary	47370 Warm Springs Blvd, Fremont, CA 94539	3-6	2666
Fremont	Leitch Elementary	47100 Fernald St, Fremont, CA 94539	K-2	2666
Fremont	Parkmont Elementary	2601 Parkside Dr, Fremont, CA 94536	K-6	2666
Fremont	Warwick Elementary	3375 Warwick Rd, Fremont, CA 94555	K-6	2666
Fremont	Ardenwood Elementary	33955 Emelia Ln, Fremont, CA 94555	K-6	2666
Fremont	Patterson Elementary	35521 Cabrillo Dr, Fremont, CA 94536	K-6	2666
Fremont	Mission Valley Elementary	41700 Denise St, Fremont, CA 94539	K-6	2666
Fremont	Millard Elementary	5200 Valpey Park, Fremont, CA 94538	K-6	2666
Fremont	Chad Bourne Elementary	801 Plymouth Ave, Fremont, CA 94539	K-6	2666
Santa Cruz	Bay View Elementary	1231 Bay Street, Santa Cruz, California 95060	K-6	2667
Fresno	Jefferson Elementary	202 N. Mariposa St. Fresno CA	K-6	2670
Fresno	Homan Elementary	1602 Harvard Ave Fresno CA 93705	K-5	2672
Kern County	Garza Elementary	2901 Center St Bakesfield CA	K-5	2674
Kern County	Pioneer Elementary	4404 Pioneer Dr Bakersfield CA	K-5	2674
Kern County	Voorhees Elementary	6001 Pioneer Dr Bakesfield CA	K-5	2674
Kern County	Foothill High	501 Park Dr Bakersfield CA	9-12	2674
Kern County	Sierra Middle	3017 Center St Bakersfield CA	6-8	2674
Fresno	Muir Elementary	410 E. Dennett Fresno CA	K-6	2677
Malibu	Cabrillo Elementary	30237 Morningview Dr, Malibu, CA 90265	K-5	2678
Malibu	Malibu High	30215 Morningview Dr, Malibu, CA 90265	6-12	2678
Norwalk	Lakeland Elementary	11224 Bombardier Ave, Norwalk, CA 90650	K-5	2679
Norwalk	Paddison Elementary	12100 Crewe St, Norwalk, CA 90650	K-5	2679
Norwalk	New River Elementary	13432 South Halcourt Ave, Norwalk, CA 90650	K-5	2679
Norwalk	Johnston Elementary	13421 South Fairford, Norwalk, CA 90650	K-5	2679
Norwalk	Morrison Elementary	13510 South Maidstone, Norwalk, CA 90650	K-5	2679
Norwalk	Chavez Elementary	12110 East Walnut St, Norwalk, CA 90650	K-5	2679
Norwalk	Glazier Elementary	10932 East Excelsior Dr, Norwalk, CA 90650	K-5	2679
Norwalk	Nuffer Elementary	14821 South Jersey Ave, Norwalk, CA 90650	K-5	2679
Norwalk	Edmondson Elementary	15121 South Grayland Ave, Norwalk, CA 90650	K-5	2679
Norwalk	Dolorez Huerta Elementary	15415 South Pioneer Blvd, Norwalk, CA 90650	K-5	2679
Norwalk	Norwalk Brethren School	11005 Foster Road, Norwalk, CA 90650	K-6	2679
Norwalk	Glenn High	13520 Shoemaker Ave, Norwalk, CA 90650	9-12	2679
Norwalk	Norwalk High	11356 East Leffingwell Rd, Norwalk, CA 90650	9-12	2679
Norwalk	Hargitt Middle	12940 East Foster Rd, Norwalk, CA 90650	5-8	2679
Norwalk	Corvallis Middle	11032 East Leffingwell Rd, Norwalk, CA 90650	6-8	2679
Norwalk	Waite Middle	14320 South Norwalk Blvd, Norwalk, CA 90650	6-8	2679
Norwalk	Los Alisos Middle	14800 South Jersey Ave, Norwalk, CA 90650	6-8	2679
Norwalk	Nazarene Christian	15014 Studebaker Road, Norwalk, CA 90650	K-11	2679
Norwalk	Grace Christian School	12722 Woods Avenue, Norwalk, CA 90650	K-12	2679
Norwalk	St John of God	13817 South Pioneer Boulevard, Norwalk, CA 90650	K-8	2679

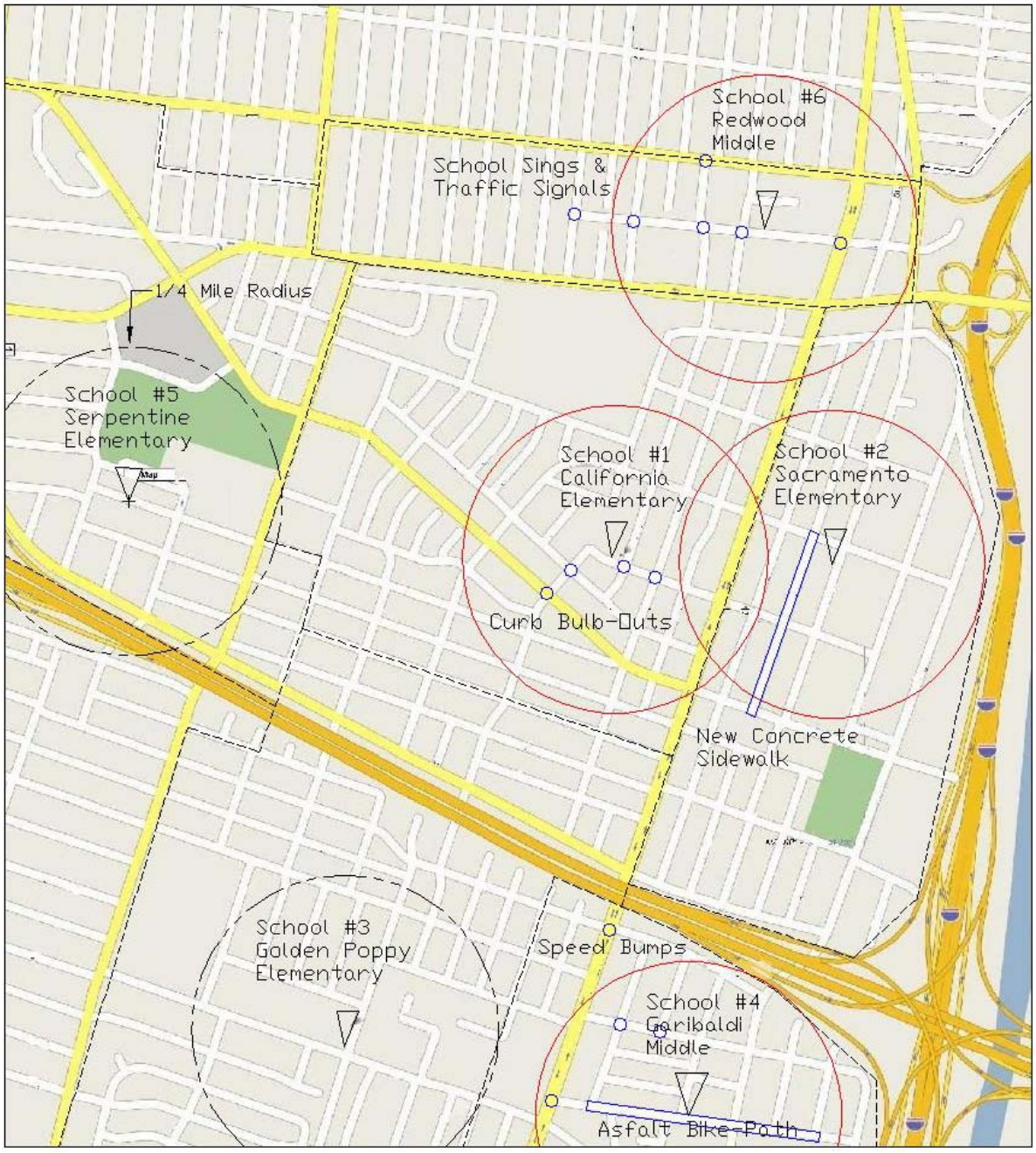
List of schools in the study				
Agency	**Name**	**Address**	**Grade Level**	**LP2000 ID#**
Norwalk	St Linus School	13913 Shoemaker Avenue, Norwalk, CA 90650	K-8	2679
Lynwood	Will Rogers Elementary	11229 Duncan Ave Lynwood CA	K-6	2680
Lynwood	Lindbergh Elementary	3309 Cedar Ave Lynwood CA	K-6	2680
Lynwood	Lugo Elementary	4325 Pendleton St Lynwood CA	K-6	2680
Lynwood	Hostler Middle	11300 Spruce St Lynwood CA	7-8	2680
Covina	Glen Oak Elementary	1000 North Sunflower Ave, Covina, CA 91724	K-5	2682
Covina	Cedargrove Elementary	1209 North Glendora Ave, Covina, CA 91723	K-5	2682
Covina	Covina Elementary	160 North Barranca Ave, Covina, CA 91723	K-5	2682
Covina	Baldillo Elementary	1771 East Old Badillo Ave, Covina, CA 91723	K-5	2682
Covina	Ben Lomond Elementary	21 East Covina Blvd, Covina, CA 91722	K-5	2682
Covina	Cypress Elementary	351 West Cypress Ave, Covina, CA 91723	K-5	2682
Covina	Lark Ellen Elementary	4555 North Lark Ellen Ave, Covina, CA 91722	K-5	2682
Covina	Valencia Elementary	58 West Grondahl, Covina, CA 91722	K-5	2682
Covina	Barranca Elementary	727 S. Barranca Ave Covina CA	K-5	2682
Covina	Royal Oak Intermediate	303 Glendora Ave, Covina, CA 91724	6-8	2682
Covina	Las Palmas Middle	41 North Lark Ellen Ave, Covina, CA 91722	6-8	2682
Covina	Sierra Vista Middle	777 East Puente St, Covina, CA 91723	6-8	2682
Downey	Warren High	8141 De Palma St, Downey, CA 90241	9-12	2683
Artesia	Carver Elementary	1401 West Santa Ana Blvd, Santa Ana, CA 92703	K-3	2687
Artesia	Niemes Elementary	16715 Jersey Ave, Artesia, CA 90701	K-6	2687
Artesia	Kennedy Elementary	17500 Belshire Ave, Artesia, CA 90701	K-6	2687
Artesia	Burbank Elementary	17711 Roseton Ave, Artesia, CA 90701	K-6	2687
Artesia	William Elliot Elementary	18415 Cortner Ave, Artesia, CA 90703	K-6	2687
Artesia	Fay Ross Middle	17707 Elaine Ave, Artesia, CA 90701	7-8	2687
Glendale	Cerritos Elementary	120 E Cerritos Ave Glendale CA	K-6	2692
Glendale	Glenoaks Elementary	2015 E Glenoaks Blvd Glendale CA	K-6	2692
Glendale	Columbus Elementary	425 Milford St Glendale CA 91203	K-6	2692
Glendale	Lincoln Elementary	4310 New York Ave La Cresenta CA	K-6	2692
Glendale	Dunsmore Elementary	4727 Dunsmore Ave La Cresenta CA	K-6	2692
Glendale	Muir Elementary	912 S Chevy Chase Dr Glendale CA	K-6	2692
Glendale	Glendale High	1440 East Broadway, Glendale, CA 91205	9-12	2692
Glendale	Toll Middle	700 Glen wood RD Glendale CA	6-8	2692
Lancaster	Monte Vista Elementary	1235 West Kettering Lancaster CA	K-5	2694
Lancaster	Desert View Elementary	1555 West Avenue H-10 Lancaster CA	K-5	2694
Lancaster	Tierra Bonita Elementary	44900 North 27th St. East Lancaster CA	K-5	2694
Lancaster	Linda Verde Elementary	44924 5th Street East Lancaster CA	K-5	2694
Lancaster	Cole Middle	3126 East Avenue Lancaster CA	6-8	2694
Lancaster	Piute Middle	425 East Avenue H-11Lancaster CA	6-8	2694
Whittier	Evergreen Elementary	12915 East Helmer Dr, Whittier, CA 90602	K-5	2695
Pomona	Montvue Elementary	1440 San Bernardino Av Pomona CA	K-5	2704
Pomona	Alcott Elementary	1600 South Towne Ave Pomona CA	K-5	2704
Pomona	Philadelphia Elementary	600 East Philadelphia St Pomona CA	K-5	2704
Pomona	Roosevelt Elementary	701 North Huntington Blvd Pomona CA	K-5	2704
Pomona	Deker Elementary	20 Village Loop Rd Pomona CA	K-6	2704
Pomona	Ganesha High	1151 Fairplex Dr Pomona CA	9-12	2704
Pomona	Marshall Middle	1921 Arroyo Ave Pomona CA	6-8	2704
Pomona	Palomares Middle	2211 North Orange Grove Ave Pomona CA	6-8	2704

List of schools in the study				
Agency	**Name**	**Address**	**Grade Level**	**LP2000 ID#**
Pomona	Simons Middle	900 East Franklin Ave Pomona CA	6-8	2704
Riverside County	Lyndon B Johnson Elementary	44-640 Clinton St Indo CA	K-5	2705
Chino	Newman Elementary	4150 Walnut Ave Chino CA	K-6	2707
San Bernardino County	Monterrey Elementary	24644 East Monterey Ave, San Bernardino, CA 92410	K-5	2709
Grand Terrace	Monterrey Elementary	794 E Monterey Ave, San Bernardino, CA	K-5	2709
Rancho Cucamonga	Etiwanda Intermediate	6925 Etiwanda Ave, Etiwanda, 91739	6-8	2711
Grand Terrace	Terrace Hills Middle	22579 De Berry St Grand Terrace CA	6-8	2712
Rancho Cucamonga	Cucamonga Elementary	8677 Archibald Ave, Rancho Cucamonga, CA 91730	K-5	2714
Rancho Cucamonga	Rancho Cucamonga Middle	8776 Archibald Ave, Rancho Cucamonga, CA 91730	6-8	2714
Monterey County	Mountain View Middle	13130 Morrison St, Moreno Valley, CA	6-8	2715
San Bernardino	Mt Vernon Elementary	1271 West Tenth St, San Bernardino, CA 92411	K-5	2716
Amador County	Pine Grove Elementary	20101 State Highway 88 Pine Grove, CA 95665	K-6	2719
Merced County	Planada Elementary	9525 Broderick Street, PO Box 236 Planada CA	K-5	2721
Ceres	Virginia Parks Elementary	1021 Moffett Rd Ceres, CA 95307-0307	K-6	2724
Ceres	Caswell Elementary	1800 North Central Ave. Ceres, CA 95307-0307	K-6	2724
Ceres	Carroll Flower Elementary	2611 Garrison St, Ceres, CA 95307-0307	K-6	2724
Ceres	Walter White Elementary	2904 Sixth St.Ceres, CA 95307-0307	K-6	2724
San Diego County	John Adams Avenue	4672 35th St San Diego CA	K-5	2727
Encinitas	Ocean Knoll Elementary	910 Melba Rd, Encinitas, CA	K-6	2728
Encinitas	San Dieguito Academy	710 Encinitas Blvd Encinitas CA 92024	9-12	2728
Encinitas	Oakcrest Middle	675 Balour Dr, Encinitas, CA	7-8	2728
Vista	Grapevine Elementary	630 Grapevine Rd Vista CA	K-5	2729
La Mesa	Maryland Ave Elementary	5400 Maryland Ave, La Mesa, CA 91942	K-5	2732
Santee	Santana High	9915 Magnolia Avenue Santee CA	9-12	2733
Scotts Valley	Rio Seco Elementary	9545 Cuyamaca Street Santee CA	K-8	2733
San Diego County	Fallbrook St Elementary	405 W Fallbrook Street, Fallbrook CA 92028	K-6	2734
San Buena Ventura	Euclid Elementary	4166 Euclid Ave San Diego CA 92105	K-5	2735
Santa Ana	Roosevelt Elementary	501 South Halladay, Santa Ana, CA 92701	K-5	2737
Santa Ana	Walker Elementary	811 E Bishop St, Santa Ana, CA	K-5	2737
Santa Ana	Villa Intermediate	1441 E Chestnut Ave Santa Ana Ca	6-8	2737
Fullerton	Laguna Road Elementary	300 Laguna Rd, Fullerton CA 92835	K-6	2738
Fullerton	Hermosa Elementary	400 E Hermosa Dr, Fullerton, CA 92835	K-6	2738
Fullerton	Valencia Park Elementary	455 W Baker Ave, Fullerton, CA	K-6	2738
Santa Ana	Hazard Elementary	4218 W Hazard Ave, Santa Ana CA	K-6	2740
Santa Ana	Rosa Elementary	4726 W Hazard Ave, Santa Ana CA	K-6	2740
Susanville	Diamond View	850 Richmond Rd Susanville CA	7-8	2908
Shasta County	Happy Valley Elementary	17480 Palm Avenue, Anderson, CA 96007	4-8	2909
Ontario	Paradise Elementary	588 Pearson Rd, Paradise, CA	K-6	2911
Paradise	Paradise Intermediate	6473 Clark Rd, Paradise, CA	7-8	2911
Nevada County	Hennessy Elementary	225 South Auburn Street Grass Valley CA	K-3	2913
Nevada County	Scotlen Elementary	10821 Squirrel Creek Road Grass Valley CA	K-5	2913
Nevada County	Lyman Middle	10837 Rough & Ready Hwy Grass Valley CA	K-5	2913
Nevada County	Alta Sierra Elementary	16607 Annie Drive Grass Valley CA	K-5	2913
Nevada County	Nevada Union High	11761 Ridge Road Grass Valley CA	9-12	2913
Nevada County	Clear Creek School	17700 McCourtney Road Grass Valley CA	K-8	2913
Yolo County	Esparto Elementary	17120 Omega St, Esparto, CA 956270069	K-5	2914
Yolo County	Esparto High	17121 Yolo Avenue Esparto CA	9-12	2914

List of schools in the study				
Agency	**Name**	**Address**	**Grade Level**	**LP2000 ID#**
Yolo County	Esparto Middle	26058 Co. Rd. 21A, Esparto, CA 95627	6-8	2914
Willows	Murdock Elementary	655 West French St Willows CA	K-4	2917
Woodland	Willows Community High	823 West Laurel St Willows CA	K-4	2917
Willows	Willows High	203 North Murdock Ave. Willows CA	9-12	2917
Willows	Willows Intermediate	1145 West Cedar St Willows CA	5-8	2917
Concord	Wren Elementary	3339 Wren Ave Concord CA	K-5	2920
Foster City	Foster City Elementary	461 Beach Park Blvd Foster City CA	K-5	2921
Foster City	Bowditch Middle	1450 Tarpon St. Foster City CA	6-8	2921
San Mateo County	Fair Oaks Elementary	2950 Fair Oaks Ave, Redwood City, CA 94063	K-5	2922
Los Altos	Almond Elementary	550 Almond Ave, Los Altos, CA 94022	K-6	2924
Napa	Silverado Middle	1333 Coombsville Rd Napa CA 94558	6-8	2926
Vacaville	Ulatis Elementary	100 McClellan St Vacaville CA	K-6	2927
Vacaville	Markham Elementary	101 Markham Ave, Vacaville, CA 95688	K-6	2927
Vacaville	Elm Elementary	129 Elm St Vacaville CA	K-6	2927
Vacaville	Fairmont Elementary	1355 Marshall Rd, Vacaville, CA 95687	K-6	2927
Vacaville	Sierra Vista Elementary	301 Bel Air Dr, Vacaville, CA 95687	K-6	2927
Vacaville	Foxboro Elementary	600 Morning Glory Dr, Vacaville, CA 95687	K-6	2927
Vacaville	Vacaville High	100 Monte Vista Ave, Vacaville, CA 95688	9-12	2927
Vacaville	Will C Wood High	998 Marshall Rd, Vacaville, CA 95687	9-12	2927
Vacaville	Vaca Pena Middle	200 Keith Way, Vacaville, CA 95687	7-8	2927
Vacaville	Jeapson Middle	580 Elder St Vacaville CA	7-8	2927
Santa Rosa	Strawberry School	2311 Horseshoe Dr, Santa Rosa, CA 95405	4-6	2929
Santa Rosa	Albert F Biella	2140 Jennings Ave, Santa Rosa, CA 95401	K-6	2929
Santa Rosa	Schafer School	26268 Flamingo Ave, Hayward, CA 94544	K-6	2929
Santa Rosa	Herbert Slanter Middle	3500 Sonoma Ave, Santa Rosa, CA 95405	7-8	2929
Santa Rosa	Santa Rosa Middle	500 E St, Santa Rosa, CA 95404	7-8	2929
Wheatland	Branciforte Middle	315 Poplar Ave, Santa Cruz, CA	6-8	2933
Wheatland	Monarch School	840 N Branciforte Ave Santa Cruz CA	K-8	2933
Delano	Del Vista Elementary	1405 12th Ave, Delano, CA 93215	K-5	2934
Delano	Terrace Elementary	20th and Norwalk, Delano, CA 93215	K-5	2934
Delano	Priceton Elementary	1959 Princeton St, Delano, CA 93215	K-6	2934
Delano	Delano High	1331 Cecil Ave, Delano, CA 93215	9-12	2934
Delano	Ygnacio Valencia High	1925 Randolph St, Delano, CA 93215	9-12	2934
Lemoore	PV Engvall Elementary	19th and Cedar, Lemoore, CA 93245	K-6	2938
Lemoore	Liberty Middle	1000 Liberty Dr, Lemoore, CA 93245	6-8	2938
Kern County	Orangewood Elementary	9600 Eucalyptus Dr. Bakersfield CA 93306	K-4	2939
Tulare County	Roosevelt Elementary	1046 West Sonora St, Tulare, CA 93274	K-5	2941
Tulare County	Alice Mulcahy Middle	1001 West Sonora St, Tulare, CA 93274	6-8	2941
Tulare	Maple Ave Elementary	640 W Cross Ave, Tulare CA	K-5	2942
Tulare	Tulare Western High	824 West Maple Tulare CA	9-12	2942
El Monte	Columbia Elementary	3400 California Ave El Monte CA	K-5	2947
El Monte	Wright Elementary	11317 McGirk Ave El Monte CA	K-6	2947
El Monte	Baker Elementary	12043 Exline St El Monte CA	K-6	2947
San Bernardino County	Doris Dickson Elementary	3930 Pamela Dr, Chino, CA	K-6	2958
Riverbank	Pedley Elementary	5871 Hudson St Riverside	K-6	2963
Riverside	Rustic Line Elementary	6420 Rustic Lane, Riverside	K-6	2963
San Bernardino County	Crestmore Elementary	18870 Jurupa Ave, Bloomington, CA	K-6	2965

List of schools in the study				
Agency	**Name**	**Address**	**Grade Level**	**LP2000 ID#**
Montclair	Buena Vista Elementary	5685 San Bernardino St, Montclair, CA 91763-2941	K-6	2967
Monrovia	Vernon Middle	9775 Vernon Ave, Montclair, CA 91763-2947	7-8	2967
Plymouth	Plymouth Elementary	10601 Sherwood, Plymouth, CA 95669	K-6	2969
Riverbank	California Ave Elementary	3800 California Ave, Riverbank, CA 95367	K-5	2970
Waterford	Waterford Middle	12193 Bentley St, Waterford, CA 95386	K-4	2971
Westminster	Moon Elementary	319 North Reinway Ave, Waterford, CA 95386	K-4	2971
Waterford	Waterford High	121 South Reinway, Waterford, CA 95386	9-12	2971
Stockton	Harrison Elementary	3203 Sanguinetti Stockton CA	K-6	2973
El Cajon	Cuyamaca Elementary	851 S Johnson Ave, El Cajon, CA	K-5	2975
El Cajon	Emerald Middle	1221 Emerald Ave, El Cajon, CA	6-8	2975
Lemon Grove	Golden Avenue Elementary	7885 Golden Ave, Lemon Grove CA	K-5	2978
Lemon Grove	Lemon Grove Middle	7866 Lincoln St, Lemon Grove CA	6-8	2978
San Diego	Horton Elementary	505 Guymon St, San Diego	K-6	2981
San Diego	Gompers Secondary	1005 47th St San Diego	7-9	2981
La Mesa	Lemon Avenue Elementary	8787 Lemon Ave La Mesa CA	K-5	2982
Santa Ana	Garfield Elementary	850 Brown St, Santa Ana CA	K-5	2984
Garden Grove	Simmons Elementary	11602 Steele Dr Garden Grove CA 92840	K-6	2985
Garden Grove	Evans Elementary	12281 Nelson St Garden Grove 92840	K-6	2985
Garden Grove	Peters Elementary	13162 Newhope St Garden Grove CA 92843	K-6	2985
Garden Grove	Clinton Elementary	13641 Clinton St, Garden Grove, CA 92844	K-6	2985
Garden Grove	Lake Middle	10801 Orangewood Ave Garden Grove CA	7-8	2985
Garden Grove	Ralston Middle	10851 Lampson Ave Garden Grove CA	7-8	2985
Tustin	Jeanne Thorman	1402 Sycamore Avenue, Tustin CA	K-5	2989
Tustin	AG Currie Middle	1402 Sycamore Ave, Tustin, CA	6-8	2989
Santa Ana	Washington Elementary	910 Anahurst Pl, Santa Ana CA	K-5	2991

Appendix E – EXAMPLE OF SCHOOL SECTION MAP



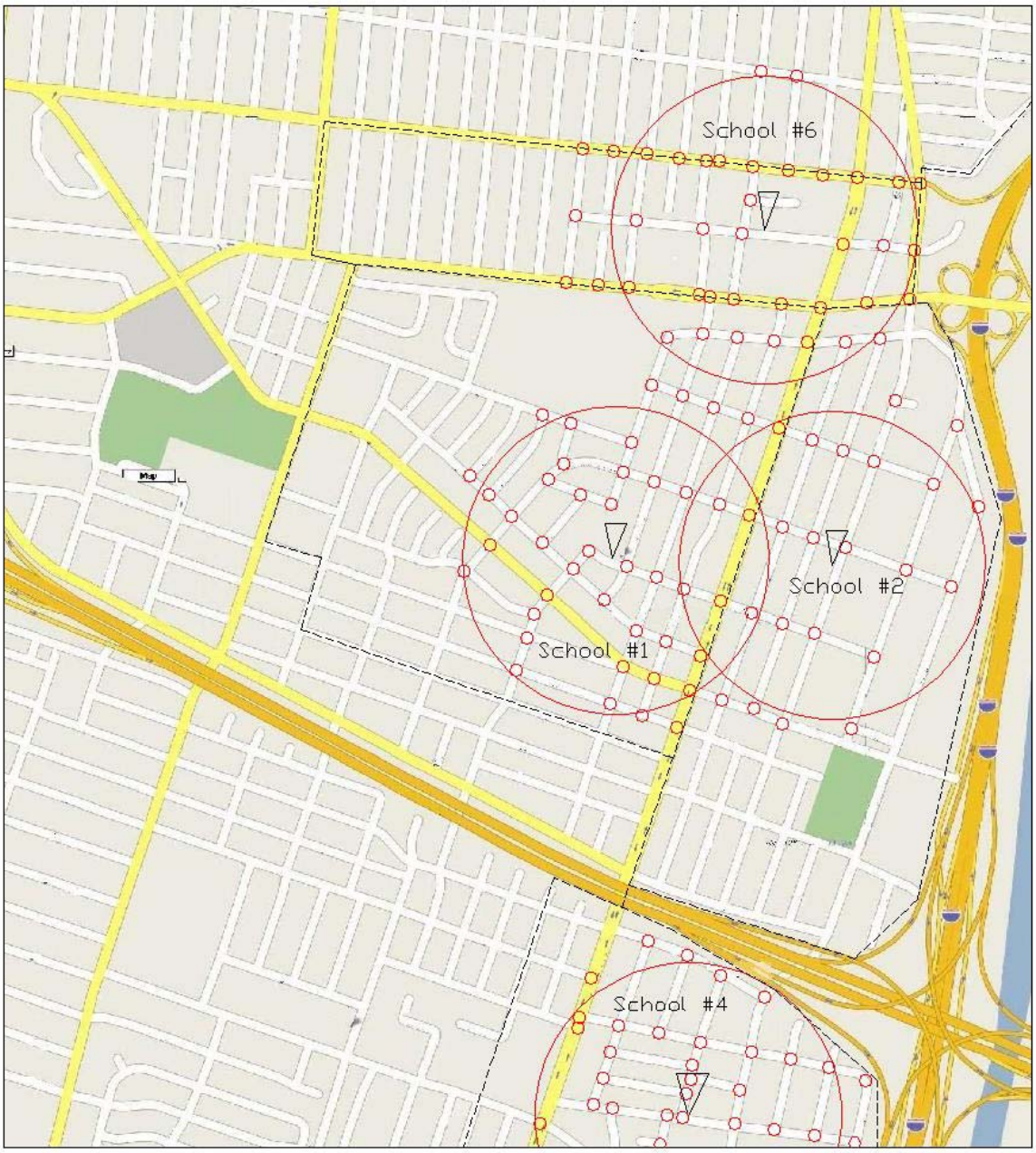
∇ : School Location
From this point the ¼ mile radius is measured (represented by the large circles)

○═══ Improvements

- - - - - - - - - - - School Attendance Boundaries

The ¼ mile radius for Serpentine and Golden Poppy Elementary lie far outside the improvements. Therefore these two schools are not included in the safety analysis.

Appendix F – EXAMPLE OF INTERSECTION SELECTION MAP



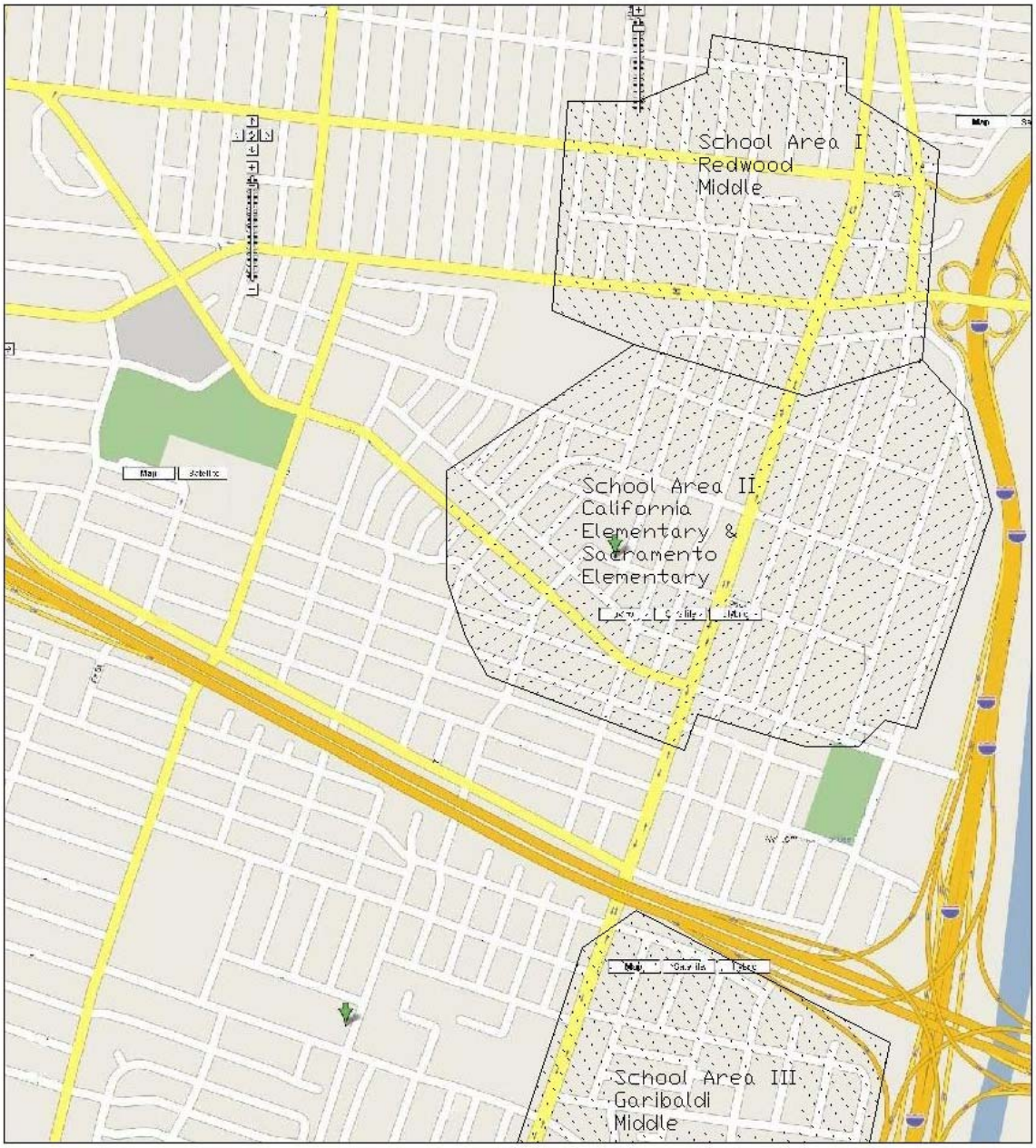
` ◯ Coded Intersection

▽ School Location

------- School Attendance Boundary

These intersections were selected to represent the area around the affected schools.

Appendix G – EXAMPLE OF SWITRS INTERSECTION AREA



These shaded areas represent the actual area captured in the Impact of Safety Study. In this example, four schools are coded in three “School Areas” California and Sacramento Elementary are coded in School Area II.

Appendix H – PRE-CONSTRUCTION AND POST-CONSTRUCTION INTERVALS

This table shows the dates on which the agency received the award of SR2S funding, and the date on which construction was completed, such that students could begin using the SR2S improvements. The pre-construction period is considered to be from January 1, 1998 through the award date. The post-construction period extends from the date of construction completion to December 31, 2005. The safety analysis compares collision and safety data from these two periods.

Pre-construction and post-construction intervals

City Name	School Name	SR2S Award Date	Construction Completion Date	Pre-Construction Weeks	Post-Construction Weeks
ALBANY	Albany Middle / Albany High	27-Dec-2002	28-Mar-2003	260	144
ALBANY	Cornell Elementary	27-Dec-2002	28-Mar-2003	260	144
ANDERSON	Happy Valley Elementary	7-Sep-2004	1-Jul-2006	349	0
BAKERSFIELD	Foothill High	28-Sep-2004	26-Apr-2005	352	36
BAKERSFIELD	Mt Vernon Elementary	20-Nov-2001	13-Dec-2001	203	211
BAKERSFIELD	Orangewood Elementary	28-Sep-2004	26-Apr-2005	352	36
BAKERSFIELD	Pioneer Elementary	18-Jan-2005	26-Apr-2005	368	36
BAKERSFIELD	Ramon Garza / Sierra Middle	18-Jan-2005	26-Apr-2005	368	36
BAKERSFIELD	Voorhies Elementary	18-Jan-2005	26-Apr-2005	368	36
BALDWIN PARK	Central Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Charles Bursch Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	De Anza Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Elwin Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Foster Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Geddes Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Kenmore Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Margaret Heath Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Pleasant View	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Tracy Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Vineland Elementary	7-Mar-2001	29-Oct-2001	166	218
BALDWIN PARK	Walnut Elementary	7-Mar-2001	29-Oct-2001	166	218
BELMONT	Nesbit Elementary	30-Sep-2002	13-Feb-2004	248	98
BERKELEY	Willard Middle / Leconte Elementary	28-Mar-2002	23-Sep-2002	221	171
BLOOMINGTON	Crestmore Elementary	1-Feb-2005	21-Jul-2005	370	23
CAMPBELL	Westmont High	4-May-2004	27-Aug-2004	331	70
CASTRO VALLEY	Creekside Middle / Marshall Elementary	30-Sep-2003	16-Jul-2004	300	76
CERES	Carroll Flower Elementary	13-Oct-2003	26-Feb-2004	302	96
CERES	Caswell Elementary	13-Oct-2003	26-Feb-2004	302	96
CERES	Virginia Parks Elementary	13-Oct-2003	26-Feb-2004	302	96
CERES	Walter White Elementary	13-Oct-2003	26-Feb-2004	302	96
CHINO	Doris Dickson Elementary	3-May-2005	7-Oct-2005	383	12
CHINO	Newman Elementary	15-Apr-2003	13-Aug-2003	276	124
CLOVIS	Dry Creek Elementary	8-Oct-2001	12-Nov-2001	197	216
CLOVIS	Weldon Elementary	7-Jan-2002	1-May-2002	210	191
CONCORD	Wren Avenue Elementary	27-Apr-2004	14-Sep-2004	330	68
COVINA	Badillo Elementary	17-Jun-2003	22-Sep-2003	285	119
COVINA	Barranca Elementary	17-Jun-2003	22-Sep-2003	285	119
COVINA	Ben Lomond Elementary	17-Jun-2003	22-Sep-2003	285	119
COVINA	Cedargrove Elementary	17-Jun-2003	22-Sep-2003	285	119
COVINA	Covina Elementary	17-Jun-2003	22-Sep-2003	285	119
COVINA	Cypress Elementary	17-Jun-2003	22-Sep-2003	285	119
COVINA	Glen Oak Elementary	17-Jun-2003	22-Sep-2003	285	119
COVINA	Lark Elementary / Las Palmas	17-Jun-2003	22-Sep-2003	285	119

Pre-construction and post-construction intervals					
City Name	**School Name**	**SR2S Award Date**	**Construction Completion Date**	**Pre-Construction Weeks**	**Post-Construction Weeks**
COVINA	Royal Oak Intermediate	17-Jun-2003	22-Sep-2003	285	119
COVINA	Sierra Vista Intermediate	17-Jun-2003	22-Sep-2003	285	119
COVINA	Valencia Elementary	17-Jun-2003	22-Sep-2003	285	119
DELANO	Del Vista Elementary	7-Mar-2005	9-Nov-2005	375	7
DELANO	Delano High	7-Mar-2005	9-Nov-2005	375	7
DELANO	Princeton Middle	7-Mar-2005	9-Nov-2005	375	7
DELANO	Terrace Elementary	7-Mar-2005	9-Nov-2005	375	7
DELANO	Ygnacio Valencia High	7-Mar-2005	9-Nov-2005	375	7
DELHI	Schendel Elementary	23-Oct-2001	25-Jul-2003	199	127
DINUBA	Roosevelt Elementary	10-Dec-2002	3-Dec-2003	258	108
DOWNEY	Alameda Elementary	24-Jul-2001	25-Oct-2001	186	218
DOWNEY	Ew Ward	24-Jul-2001	25-Oct-2001	186	218
DOWNEY	South Middle	24-Jul-2001	25-Oct-2001	186	218
DOWNEY	Warren High	13-May-2003	17-Oct-2003	280	115
EL CAJON	Cuyamaca And Emerald M	13-Apr-2004	28-Jun-2004	328	79
EL MONTE	Baker Elementary	1-Mar-2004	1-Sep-2004	322	69
EL MONTE	Columbia Elementary	1-Mar-2004	1-Sep-2004	322	69
EL MONTE	Wright Elementary	1-Mar-2004	1-Sep-2004	322	69
EL SOBRANTE	Sheldon Elementary	9-Apr-2002	12-Sep-2002	223	172
ENCINITAS	Oakcrest Middle	9-Jun-2004	20-Dec-2004	336	54
ENCINITAS	Ocean Knoll Elementary	9-Jun-2004	20-Dec-2004	336	54
ENCINITAS	San Dieguito Academy	9-Jun-2004	20-Dec-2004	336	54
ESPARTO	Esparto Elementary	3-Aug-2004	28-Sep-2004	344	66
ESPARTO	Esparto High	3-Aug-2004	28-Sep-2004	344	66
ESPARTO	Esparto Middle	3-Aug-2004	28-Sep-2004	344	66
FALLBROOK	Fallbrook St Elementary	9-Jan-2003	9-Dec-2004	262	55
FONTANA	West Randall Elementary	19-Nov-2002	9-Jan-2003	255	155
FOSTER CITY	Bowditch Middle	1-Mar-2004	1-Jul-2004	322	78
FOSTER CITY	Foster City Elementary	1-Mar-2004	1-Jul-2004	322	78
FREMONT	Ardenwood Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Chadbourne Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Durham Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Leitch Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Millard Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Mission Valley Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Paramount Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Patterson Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Warm Springs Elementary	27-May-2003	2-Sep-2003	282	122
FREMONT	Warwick Elementary	27-May-2003	2-Sep-2003	282	122
FRESNO	Homan Elementary	22-Apr-2003	29-Sep-2003	277	118
FRESNO	Jefferson Elementary	22-Apr-2003	29-Sep-2003	277	118
FRESNO	Muir Elementary	22-Apr-2003	29-Sep-2003	277	118
FULLERTON	Hermosa Elementary	30-Mar-2004	7-Sep-2004	326	69
FULLERTON	Laguna Road Elementary	30-Mar-2004	7-Sep-2004	326	69
FULLERTON	Valencia Elementary	30-Mar-2004	7-Sep-2004	326	69
GARDEN GROVE	Brookhurst Elementary	12-Mar-2002	25-Feb-2003	219	149
GARDEN GROVE	Clinton Elementary	13-Apr-2004	28-Sep-2004	328	66
GARDEN GROVE	Eisenhower Elementary	12-Mar-2002	25-Feb-2003	219	149
GARDEN GROVE	Evans Elementary / Ralston Middle	13-Apr-2004	28-Sep-2004	328	66
GARDEN GROVE	Lake Middle / Simmons Elementary	13-Apr-2004	28-Sep-2004	328	66
GARDEN GROVE	Mearis Elementary	12-Mar-2002	25-Feb-2003	219	149

Pre-construction and post-construction intervals					
City Name	**School Name**	**SR2S Award Date**	**Construction Completion Date**	**Pre-Construction Weeks**	**Post-Construction Weeks**
GARDEN GROVE	Park View / Crosby / Violet Elementary	12-Mar-2002	25-Feb-2003	219	149
GARDEN GROVE	Peters Elementary	13-Apr-2004	28-Sep-2004	328	66
GARDEN GROVE	Zeyen Elementary	12-Mar-2002	25-Feb-2003	219	149
GRAND TERRACE	Terrace Hills Middle	29-Jan-2003	17-Feb-2004	265	98
GRASS VALLEY	Alta Sierra	25-Jun-2003	19-Mar-2004	286	93
GRASS VALLEY	Clear Creek Elementary	25-Jun-2003	19-Mar-2004	286	93
GRASS VALLEY	Hennessy Elementary	25-Jun-2003	19-Mar-2004	286	93
GRASS VALLEY	Nevada Union High	25-Jun-2003	19-Mar-2004	286	93
GRASS VALLEY	Scotten / Lyman Elementary	25-Jun-2003	19-Mar-2004	286	93
INDIO	Lyndon B Johnson Elementary	26-Aug-2003	5-Apr-2004	295	91
LA CRESCENTA	Cerritos Elementary	3-Sep-2002	15-Apr-2003	244	142
LA CRESCENTA	Columbus Elementary	3-Sep-2002	15-Apr-2003	244	142
LA CRESCENTA	Dunsmore Elementary	3-Sep-2002	15-Apr-2003	244	142
LA CRESCENTA	Glendale High	3-Sep-2002	15-Apr-2003	244	142
LA CRESCENTA	Glenoaks Elementary	3-Sep-2002	15-Apr-2003	244	142
LA CRESCENTA	Lincoln Elementary	3-Sep-2002	15-Apr-2003	244	142
LA CRESCENTA	Muir Elementary	3-Sep-2002	15-Apr-2003	244	142
LA CRESCENTA	Toll Middle	3-Sep-2002	15-Apr-2003	244	142
LA MESA	Lemon Avenue Elementary	8-Jun-2004	21-Aug-2004	336	71
LA MESA	Maryland Elementary	9-Dec-2003	7-Jan-2004	310	103
LAKESIDE	El Capitan High	20-May-2004	5-Nov-2005	333	8
LAKESIDE	Lindo Park Middle	20-May-2004	5-Nov-2005	333	8
LANCASTER	Col Middle	24-Mar-2004	9-Feb-2005	325	46
LANCASTER	Desert View Elementary	24-Mar-2004	9-Feb-2005	325	46
LANCASTER	Linda Verde Elementary	24-Mar-2004	9-Feb-2005	325	46
LANCASTER	Monte Vista Elementary	24-Mar-2004	9-Feb-2005	325	46
LANCASTER	Puit Middle	24-Mar-2004	9-Feb-2005	325	46
LANCASTER	Tierra Bonita Elementary	24-Mar-2004	9-Feb-2005	325	46
LEMON GROVE	Golden Avenue Elementary	7-Sep-2004	21-May-2005	349	32
LEMON GROVE	Lemon Grove Middle	7-Sep-2004	21-May-2005	349	32
LEMOORE	Liberty Middle	1-Oct-2002	19-Oct-2004	248	63
LEMOORE	Pv Engvall Elementary	1-Oct-2002	29-Oct-2004	248	61
LEMOORE	Rj Neutra Elementary / Akers Elementary	14-Nov-2003	30-Sep-2004	306	65
LOS ALTOS	Almond Elementary	25-Jan-2005	29-Nov-2005	369	5
LOS ANGELES	Loreto Elementary / Nightingale Middle	10-Apr-2001	30-Jun-2001	171	235
LOS ANGELES	Mt Washington Elementary	26-Jul-2002	4-Dec-2002	238	160
LYNWOOD	Hostler Middle	15-Jun-2004	9-Dec-2004	337	55
LYNWOOD	Lindberg Elementary	15-Jun-2004	9-Dec-2004	337	55
LYNWOOD	Lugo Elementary	15-Jun-2004	9-Dec-2004	337	55
LYNWOOD	Will Rogers	15-Jun-2004	9-Dec-2004	337	55
MALIBU	Malibu High / Cabrillo Elementary	12-Nov-2002	22-Sep-2003	254	119
MCKINLEYVILLE	Morris / McKinleyville	28-Apr-2004	15-Jun-2004	330	81
MERCED	Burbank Elementary	18-Mar-2002	7-Oct-2002	220	169
MILL VALLEY	Edna Maguire Elementary	12-Sep-2002	17-Apr-2003	245	141
MILL VALLEY	Mill Valley Middle	12-Sep-2002	17-Apr-2003	245	141
MONTCLAIR	Vernon Middle / Buena Vista Elementary	3-May-2003	13-Oct-2004	278	63
MORENO VALLEY	Mountain View Middle	7-May-2003	12-Oct-2003	279	116
MURRIETA	Murrieta Elementary	6-Jan-2003	21-Oct-2003	262	115
NAPA	El Centro Elementary School	20-Mar-2003	3-Jul-2003	272	130
NAPA	Phillips Elementary	20-Mar-2003	3-Jul-2003	272	130
NAPA	Silverado Elementary	24-May-2004	5-Nov-2005	334	8

Pre-construction and post-construction intervals					
City Name	**School Name**	**SR2S Award Date**	**Construction Completion Date**	**Pre-Construction Weeks**	**Post-Construction Weeks**
NORWALK	Anna Glazier Elementary / Nazarene Christian..	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Brethren E New River E Johnston E Corvallis	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Burbank Elementary	28-Jan-2002	18-Jul-2003	213	128
NORWALK	Carver Elementary	14-Apr-2003	18-Jul-2003	276	128
NORWALK	Cesar Chavez Elementary / Nettle L Waite Mid..	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Cora Harriett M John H Glenn H Linus E	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Cressan Elementary / Lakeland Elementary	4-Sep-2001	22-Mar-2002	192	197
NORWALK	Dolores Huerta Elementary	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Earl Edmondson Elementary	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Grace Christian	16-Sep-2003	31-Mar-2004	298	91
NORWALK	John H Nuffer Elementary / Los Alisos Middle	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Julia B Morrison E / St John Of God	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Kennedy Elementary / Fay Ross Junior High	12-Apr-2003	18-Jul-2003	275	128
NORWALK	Kennedy Elementary / Ross Middle	28-Jan-2002	18-Jul-2003	213	128
NORWALK	Lakeland Elementary	4-Sep-2001	31-Mar-2004	192	91
NORWALK	Niemes Elementary	12-Apr-2003	18-Jul-2003	275	128
NORWALK	Niemes Elementary	28-Jan-2002	18-Jul-2003	213	128
NORWALK	Paddison Elementary	16-Sep-2003	31-Mar-2004	298	91
NORWALK	Studebaker Elementary / Lakeside Middle	4-Sep-2001	22-Mar-2002	192	197
NORWALK	William E Elliott Elementary / Holy Family C..	12-Apr-2003	18-Jul-2003	275	128
NORWALK	William Elliot Elementary / Holy Family	28-Jan-2002	18-Jul-2003	213	128
NORWALK	William Orr Elementary	4-Sep-2001	22-Mar-2002	192	197
OAKLAND	Brookfield Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Burbank Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Elmhurst Middle	8-Jan-2002	14-Oct-2002	210	168
OAKLAND	Hawthorne Elementary	8-Jan-2002	14-Oct-2002	210	168
OAKLAND	Hawthorne Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	La Escuelita Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Long Fellow Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Markham Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Parker Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Prescott Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Simmons Calving Jh	8-Jan-2002	14-Oct-2002	210	168
OAKLAND	Washington Middle	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Washington Early Childhood Center	8-Jan-2002	14-Oct-2002	210	168
OAKLAND	Webster Elementary	16-Sep-2003	30-Apr-2004	298	87
OAKLAND	Westlake Middle	16-Sep-2003	30-Apr-2004	298	87
OJAI	Matilija Junior High	15-May-2003	17-Oct-2003	280	115
PARADISE	Paradise Elementary	10-May-2005	24-Aug-2005	384	18
PARADISE	Paradise Intermediate	10-May-2005	24-Aug-2005	384	18
PINGROVE	Pine Grove Elementary	1-May-2004	1-Nov-2004	330	61
PLANADA	Planada Elementary	19-Sep-2003	17-Feb-2004	298	98
PLYMOUTH	Plymouth Elementary	28-Nov-2005	19-Aug-2005	413	19
POMONA	Alcott Elementary	27-Jun-2003	17-Feb-2004	286	98
POMONA	Deker Elementary	27-Jun-2003	17-Feb-2004	286	98
POMONA	Ganesha High / Marshall Middle	27-Jun-2003	17-Feb-2004	286	98
POMONA	Marshall Middle	27-Jun-2003	17-Feb-2004	286	98
POMONA	Montvue Elementary	27-Jun-2003	17-Feb-2004	286	98

Pre-construction and post-construction intervals					
City Name	**School Name**	**SR2S Award Date**	**Construction Completion Date**	**Pre-Construction Weeks**	**Post-Construction Weeks**
POMONA	Palomares Middle	27-Jun-2003	17-Feb-2004	286	98
POMONA	Philadelphia	27-Jun-2003	17-Feb-2004	286	98
POMONA	Roosevelt Elementary	27-Jun-2003	17-Feb-2004	286	98
RANCHO CUCAMONGA	Cucamonga Elementary And Middle	15-Dec-2004	1-Jun-2005	363	30
RANCHO CUCAMONGA	Etiwanda Intermediate	21-May-2003	17-Mar-2004	281	93
RANCHO CUCAMONGA	Jasper Elementary	21-Aug-2002	13-Mar-2003	242	146
RED BLUFF	Jackson Heights Elementary	15-Jun-2004	30-Jun-2005	337	26
REDWOOD CITY	Fair Oaks Elementary	26-Apr-2005	5-Aug-2005	382	21
RIVERBANK	California Ave Elementary	15-Jun-2004	13-Dec-2004	337	55
RIVERSIDE	Pedley Elementary	22-Jun-2004	27-Sep-2004	338	66
RIVERSIDE	Rustic Lane Elementary	22-Jun-2004	27-Sep-2004	338	66
ROSEMEAD	Duff Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Encinita Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Garvey Intermediate / Bitely Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Jason Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Muscatel Middle	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Ralph Waldo Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Rice Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Sanchez Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Savannah Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Shuey Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Willard Elementary	25-Sep-2001	10-May-2002	195	190
ROSEMEAD	Williams Elementary	25-Sep-2001	10-May-2002	195	190
SAN BERNARDINO	Monterey Elementary	28-Sep-2004	20-Jan-2005	352	49
SAN BERNARDINO	Mt Vernon Elementary	18-Nov-2002	7-May-2003	255	138
SAN DIEGO	Euclid Elementary	22-Jan-2004	30-Jun-2004	316	78
SAN DIEGO	Gompers Secondary	20-Oct-2004	30-Jul-2005	355	22
SAN DIEGO	Horton Elementary	20-Oct-2004	30-Jul-2005	355	22
SAN DIEGO	John Adams Avenue	25-Aug-2005	22-Feb-2006	399	0
SAN FRANCISCO	Fairmount Elementary	10-Apr-2003	30-Apr-2005	275	35
SAN JOSE	Alex Anderson Elementary	2-Mar-2004	7-Nov-2004	322	60
SAN JOSE	George Leyva Middle	2-Mar-2004	7-Nov-2004	322	60
SAN JOSE	Herman Intermediate	2-Mar-2004	7-Nov-2004	322	60
SAN JOSE	Kennedy Elementary	2-Mar-2004	7-Nov-2004	322	60
SAN JOSE	Laneview Elementary / Morrill Middle	2-Mar-2004	7-Nov-2004	322	60
SAN JOSE	Leitz Elementary / Dartmouth Middle	2-Mar-2004	7-Nov-2004	322	60
SAN JOSE	Peter Burnett Middle	2-Mar-2004	7-Nov-2004	322	60
SAN JOSE	San Antonio Elementary	2-Mar-2004	7-Nov-2004	322	60
SANTA ANA	Diamond Elementary Harvey Elementary Carr In..	19-Aug-2002	3-Nov-2003	242	113
SANTA ANA	Diamond Harvey Elementary / Carr Elementary	20-Sep-2004	19-Dec-2005	351	2
SANTA ANA	Garfield Elementary	20-Sep-2004	9-Dec-2005	351	3
SANTA ANA	Hazard Elementary / Rosita Elementary	2-Sep-2003	18-Jun-2004	296	80
SANTA ANA	King Elementary	15-Jul-2002	22-May-2003	237	136
SANTA ANA	Pico And Lowell	19-Aug-2002	14-Mar-2003	242	146
SANTA ANA	Roosevelt Elementary / Walker Elementary	2-Sep-2003	18-Jun-2004	296	80
SANTA ANA	Santa Ana High	20-Sep-2004	19-Dec-2005	351	2
SANTA ANA	Santa Ana High And Henninger Elementary	19-Aug-2002	11-Mar-2003	242	147
SANTA ANA	Villa Intermediate	2-Sep-2003	18-Jun-2004	296	80

Pre-construction and post-construction intervals					
City Name	**School Name**	**SR2S Award Date**	**Construction Completion Date**	**Pre-Construction Weeks**	**Post-Construction Weeks**
SANTA ANA	Washington Elementary	20-Sep-2004	19-Dec-2005	351	2
SANTA BARBARA	Cleveland Elementary	9-Nov-2001	1-May-2002	201	191
SANTA BARBARA	Franklin Elementary	9-Nov-2001	1-May-2002	201	191
SANTA BARBARA	Harding Elementary	9-Nov-2001	1-May-2002	201	191
SANTA BARBARA	Hope Elementary	9-Nov-2001	1-May-2002	201	191
SANTA BARBARA	La Cumbre Middle	9-Nov-2001	1-May-2002	201	191
SANTA BARBARA	Monroe Elementary	9-Nov-2001	1-May-2002	201	191
SANTA BARBARA	Mont vista Elementary	9-Nov-2001	1-May-2002	201	191
SANTA CRUZ	Bay View Elementary	13-May-2003	14-Oct-2003	280	116
SANTA CRUZ	Branciforte Middle	21-Jun-2004	8-Feb-2005	338	47
SANTA CRUZ	Monarch Elementary	21-Jun-2004	8-Feb-2005	338	47
SANTA MONICA	John Adams / Will Rogers	8-Oct-2002	1-Oct-2003	249	117
SANTA MONICA	John Muir Elementary / Smash Alternative	8-Oct-2002	1-Oct-2003	249	117
SANTA ROSA	Abraham Lincoln	18-Nov-2003	21-May-2004	307	84
SANTA ROSA	Albert F Biella Elementary	22-Jun-2004	23-Dec-2004	338	53
SANTA ROSA	Binkley Elementary	18-Nov-2003	21-May-2004	307	84
SANTA ROSA	Herbert Slater Middle	22-Jun-2004	23-Dec-2004	338	53
SANTA ROSA	Hidden Valley	18-Nov-2003	21-May-2004	307	84
SANTA ROSA	Hidden Valley Satellite	18-Nov-2003	21-May-2004	307	84
SANTA ROSA	JX Wilson Elementary	18-Nov-2003	21-May-2004	307	84
SANTA ROSA	Maria Carrillo	18-Nov-2003	21-May-2004	307	84
SANTA ROSA	Rincon Valley Middle / Christian	18-Nov-2003	21-May-2004	307	84
SANTA ROSA	Santa Rosa Middle	22-Jun-2004	23-Dec-2004	338	53
SANTA ROSA	Schafer Park Elementary	22-Jun-2004	23-Dec-2004	338	53
SANTA ROSA	Strawberry Elementary	14-Jan-2003	23-Dec-2004	263	53
SANTA ROSA	Yulupa Elementary	19-Mar-2002	25-Sep-2002	220	170
SANTEE	Rio Seco Elementary	9-Jun-2004	6-Dec-2004	336	56
SANTEE	Santana High	9-Jun-2004	6-Dec-2004	336	56
SEBASTOPOL	Pine Crest Elementary	11-Jun-2003	8-Oct-2003	284	116
STOCKTON	Harrison Elementary	9-Jun-2004	24-Sep-2004	336	66
SUSANVILLE	Diamond View	7-Apr-2004	30-Jul-2004	327	74
TULARE	Alice Mulcahy Middle / Roosevelt Elementary	21-Sep-2004	9-Jun-2005	351	29
TULARE	Maple Elementary / Western High	17-Aug-2004	22-Jun-2005	346	27
TURLOCK	Dutcher Elementary	10-Jul-2001	7-Feb-2002	184	203
TURLOCK	Wakefield Elementary	9-Oct-2001	28-May-2002	197	188
TUSTIN	Jeann Thorman and Ag Currie	7-Mar-2005	5-Dec-2005	375	4
UNION CITY	Barnard White Middle	28-Jan-2003	1-Oct-2003	265	117
VACAVILLE	Edwin Markham Elementary	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Elm Elementary	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Fairmont Elementary	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Foxboro Elementary	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Padan Elementary	14-Jan-2003	10-Feb-2004	263	99
VACAVILLE	Sierra Vista Elementary	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Ulatis Elementary	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Vaca Pena Middle	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Vacaville High	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Will Wood High	4-Mar-2004	30-Jun-2004	322	78
VACAVILLE	Willis Jepson Middle	4-Mar-2004	30-Jun-2004	322	78
VALLEJO	Benjamin Franklin Middle	11-Jul-2002	9-Aug-2003	236	125
VALLEJO	Franklin Middle	3-Jul-2003	9-Aug-2003	287	125

Pre-construction and post-construction intervals					
City Name	**School Name**	**SR2S Award Date**	**Construction Completion Date**	**Pre-Construction Weeks**	**Post-Construction Weeks**
VISTA	Grapevine Elementary	10-Dec-2002	13-Jun-2006	258	0
WALNUT CREEK	Walnut Creek Intermediate	16-Sep-2003	29-Jan-2004	298	100
WATERFORD	Moon Elementary	1-Sep-2003	1-Mar-2004	296	96
WATERFORD	Waterford High	1-Sep-2003	1-Mar-2004	296	96
WATERFORD	Waterford Middle	20-Jul-2001	14-Jun-2004	185	81
WHITTIER	Evergreen Elementary	23-Sep-2003	23-Aug-2004	299	71
WILLOWS	Murdock Elementary	1-Mar-2004	19-Oct-2004	322	63
WILLOWS	Willow Community High	1-Mar-2004	19-Oct-2004	322	63
WILLOWS	Willows High	1-Mar-2004	19-Oct-2004	322	63
WILLOWS	Willows Intermediate	1-Mar-2004	19-Oct-2004	322	63
WOODLAND	Dingle Elementary	15-Apr-2003	15-Feb-2005	276	46
WOODLAND	Tofoya Elementary	15-Apr-2003	15-Feb-2005	276	46
WOODLAND	Woodland Prairie Elementary	15-Apr-2003	15-Feb-2005	276	46
WOODLAND	Zamora Elementary	15-Apr-2003	15-Feb-2005	276	46
YUCAIPA	Dunlap Elementary	12-Aug-2002	10-Dec-2002	241	160
YUCAIPA	Valley Elementary	12-Aug-2002	10-Dec-2002	241	160

Appendix I – METHODS FOR STATISTICAL ANALYSES

Study Design

A before-and-after study design was employed to estimate changes in collision occurrence that may be attributable to the SR2S intervention. Rates were calculated as counts of injured or killed children per unit of time, and post-intervention rates were compared with pre-intervention rates. Analyses were conducted at the school level. The changes in collision rates were estimated with rate ratios obtained using Poisson regression. Control areas were defined as non-intervention areas in the SR2S program cities, and changes in collision occurrence in the control areas was estimated in order to adjust for changes that would be expected in the school areas, independent of the SR2S program and its safety improvements. Rate ratios were also adjusted for possible changes in the prevalence of walking and bicycling. Because it is not known to what extent walking and bicycling changed among SR2S school students, various scenarios are presented to examine how the study results would be interpreted under a variety of conditions.

Collision Data Source

The California Statewide Integrated Traffic Records System (SWITRS) is a database of police-reported collisions operated by the California Highway Patrol. Data for fatal and injury collisions were obtained from years 1998-2005. A dataset of all pedestrians and bicyclists age 5-18 who were involved in injury-producing traffic collisions was created. This dataset was queried to identify relevant collisions using the Stata statistical software package.

School Area Identification

The objective of the site selection process was to identity streets on which the SR2S intervention was likely to have had an effect on walking, bicycling, and driving behaviors. Because of the variability in geography, street density, and types of improvement, the identification of evaluation sites was conducted on a school-by-school basis. Using Google Earth software (http://earth.google.com), street maps and aerial photographs of each school neighborhood were examined and SR2S improvements were drawn onto the maps.

Because collisions in SWITRS are coded according to the nearest street intersection, intersections were used as the reference for identifying collision locations. All street intersections within a ¼-mile radius of a school's main entrance were selected for the safety analysis. The distance of ¼ mile was chosen in an attempt to capture all child-involved collisions that were associated with walking or bicycling to or from the school. The choice of radius size was viewed as a trade-off between the inclusion of possibly less informative data and study efficiency. A large radius, such as ½ mile, would have captured areas not affected by the intervention and with few, if any, relevant collisions, but would have required a greatly increased amount of intersection coding (due to the non-linear relationship of a circle's radius to its area). A smaller radius would have increased the probability of missing relevant traffic collisions and thereby reducing study efficiency and statistical power. The choice of ¼ mile, while arbitrary, allowed for reasonable statistical power, given available resources.

In addition to all points within the ¼-mile radius, we also included proximate intersections of major roads, and important walking/biking connections. Conversely, some intersections within the ¼-mile radius were excluded because they were separated from the school by some geographic or infrastructural feature (e.g., a freeway) that would prevented children from traveling from these intersections to the school. School attendance boundary maps were available for some schools and were useful in identifying areas that were likely to have been impacted by the program. Appendices E, F and G provide examples of maps showing areas captured by these method of intersection coding.

The surrounding geographic region selected for each SR2S school was referred to as a "school area." If two or more schools were within each other's ¼-mile radius and shared any intersections, the schools were grouped into one school area. All intersections inside the boundary were selected and assigned to that school area.

Control Area Identification
The control areas were defined as all streets in SR2S program cites that were not included in any school areas. The control areas covered a significant portion of the state of California, as they comprised all towns and cities that had an SR2S project in one of the first three cycles. When measured as a proportion of the total child pedestrian/bike collisions in California, the control areas represented almost 40% of the state.

Data Query
Intersection collisions are coded in SWITRS by the names of the 2 intersecting streets; non-intersection collisions are coded by the direction and distance to the nearest intersection. The data query specified only intersections so that it would identify any collision that occurred at a given intersection or on any street between the intersection and the mid-point of the street segment.

The query was written using “regular expressions” in the Stata programming language. The city name and intersecting street names entered into a spreadsheet text file, and Perl text processing software was used to synthesize the query language and the intersection names. The automated procedure was employed to reduce the probability of syntax errors. The query searched for collisions at or near more than 13,000 street intersections.

Pre- and Post-Construction Periods
The pre-construction period was defined as the interval between January 1, 1998 and the award date for the SR2S project. The post-construction period was defined as the interval between the completion of construction on the project and December 31, 2005. The amount of time in the two periods varied between different projects, as projects had different award dates and different construction completion dates.

Data Analysis
All injured pedestrians and bicyclists age 5-18 identified by the query were coded according to whether the incident was in the pre- or post-construction period. A working data set was created for school area collisions that contained the number of injured children and the length of the time period. This was done separately for pre- and post-construction periods. The change in injury rates in the school areas was estimated with rate ratios obtained with a Poisson regression. The results were confirmed with a Mantel-Haenszel person-time estimation procedure. Linear regression was used to estimate the expected percent change in collision injury rates in the control areas, and the estimates were adjusted by this factor. For example, if a rate ratio of .95 was observed in the control areas (a 5% reduction) and a rate ratio of 0.8 was observed in the school areas (a 20% reduction), the adjusted school area rate ratio would be 0.8 / 0.95, or 0.84, which indicates a a 16% reduction, after accounting for the observed changes in the control area data.