Comprehensive Safety Program Produces Dramatic Results

BY NAZIR LALANI

In January 1988, the City of San Buenaventura, California, initiated a comprehensive traffic safety program aimed at reducing accidents at the highest accident locations in the city. The effort concentrated on identifying all intersections and half-mile street segments that had three or more accidents in a one-year period. The accident rate, which is expressed in accidents per million vehicles, was calculated for each location. These locations were then prioritized, and accident patterns at the highest accident rate locations were analyzed using collision diagrams (an example is shown in Figure 1). The collision diagrams used to be prepared manually, but were recently computerized using commercially available software. Mitigation measures were identified after the analysis had been completed for each location and summarized in the city's annual safety report.[1] Collision diagrams were used to identify the most frequent types of accidents occurring at a specific location. The most frequent pattern of accidents that was found to be correctable involved right-angle accidents. Mitigation measures such as improved corner sight distances, new traffic signals, improved traffic signal head visibility, and improved stop sign visibility were identified to reduce the frequency of such accidents based on the collision diagram information. Rear-end and left-turn accidents were typically reduced by providing left-turn lanes/phasing.

Conversion Factor

To convert from	to	multiply by
mi	m	1609

Program Implementation

Between January 1988 and December 1990, a total of 65 traffic safety improvement projects were implemented. These improvements included installing new traffic signals, coordinating traffic signals, striping left-turn lanes, installing larger stop signs, improving traffic signal head visibility, installing curve warning signs, and marking red curbs at intersections to improve sight distance. Some of the improvements were implemented by city crews. Major improvements, such as installing new traffic signals, were completed by contractors. Table 1 shows the before and after accident data for 28 of the 65 locations where the improvements were implemented and where a long enough time period had elapsed to provide at least one year of after data to illustrate the success of various types of safety improvements.

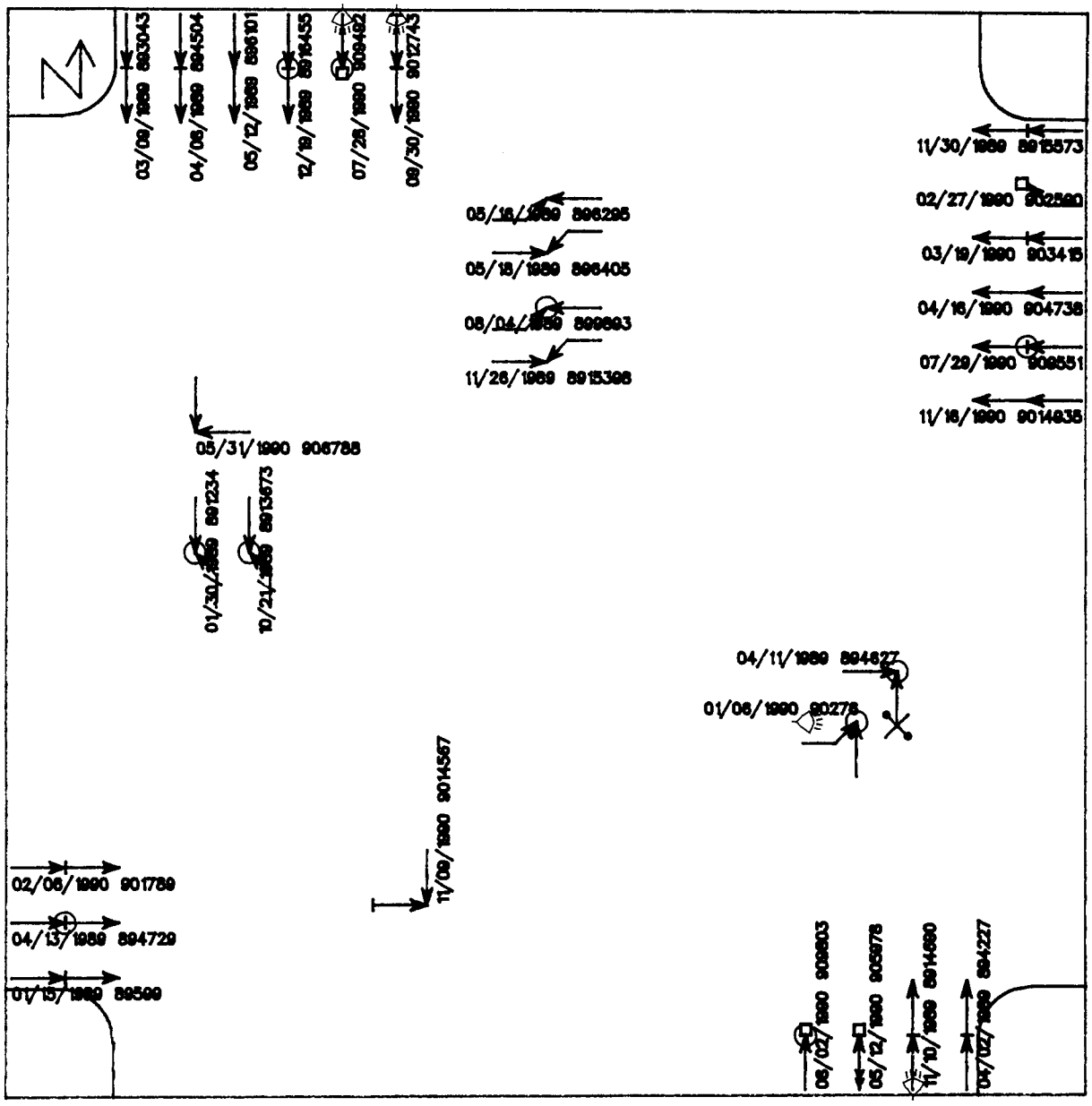
Results

The reportable accident statistics contained in Table 2 demonstrate the effectiveness of the city's traffic safety program. Any collision within the public right-of-way that involved a fatality, personal injury, or property damage was reported as an accident. The criteria for reportable accidents remained unchanged between 1985 and 1990.

There has been an 18 percent reduction in number of accidents from 1987 (2,690 accidents) to the end of 1990 (2,159 accidents). This significant reduction in the total number of accidents per year occurred even though traffic volumes have been increasing at an annual rate of 6 percent per year, based on average daily volume count data that were collected citywide at more than 300 locations. Figure 2 shows the trend in the citywide accident rate per million vehicles since 1985. There has been a 34 percent reduction in the accident rate between 1988 and 1990. Even the 1987 accident rate shows a slight improvement from 1986 because several improvements that had a beneficial effect of traffic safety were implemented between October and December of 1987. A check of accident data at intersections where no improvements had been made indicated that the accident frequency at those locations had not changed significantly between 1988 and 1990.

Benefit-Cost Analysis

Between December 1987 and December 1990, a total of more than 700 accidents were avoided through implementation of the traffic safety improvement projects. This has meant a savings of $5 million in reduced accident cost to the citizens of Ventura based on accident cost data published by the National Highway Transportation Safety Administration. The cost for implementing all of the



29 accidents. (0 not plottable)

KEY

moving straight	injury	side–swipe
backing	fatality	nightime
turning left	pedestrian	bicycle
stopped	fixed object	DUI
turning right		
unknown movement		

Figure 1. Sample of a collision diagram—Seaward amd Harbor, 1/1/89–12/31/90.

Table 1. Summary of Before and After Accident Studies

Location	Improvements	Date Implemented	No. Accidents One Year Before	No. Accidents One Year After
Donlon/Market	Install Traffic Signal	Oct. '87	5	2
Palma/Market	Install Traffic Signal	Oct. '87	8	1
Telephone/Transport	Install Traffic Signal	Oct. '87	17	0
Olivas Park/Telephone	Install Traffic Signal	Nov. '88	4	3
Victoria Ave.	Coordinate Signals	Nov. '87	179	129
Olivas Park/Victoria	Coordinate Signals	Sept. '89	16	12
Telephone/Transport to Petit	Coordinate Signals	Oct. '89	129	103
Eastman/Market	Red Curb for Sight Distance	Feb. '88	4	3
Laurel/Santa Clara	Red Curb for Sight Distance	Oct. '88	9	2
Virginia/Loma Vista	Red Curb for Sight Distance	July '89	2	0
Lemon Grove/Preble	Increase Red Curb Zones	Feb. '89	2	0
Olive/Harrison	Increase Red Curb Zones	Mar. '89	4	1
Harbor/Seaward	Stripe Two-Way Left Lane	Apr. '88	18	9
Telegraph E. of Glen Ellen	Stripe Two-Way Left Lane	June '88	9	5
Ventura/Stanley/Dakota	Stripe Two-Way Left Lane	July '88	8	5
Loma Vista/Ashwood	Stripe Two-Way Left Lane	Jan. '89	3	1
Thompson/Oak to Chestnut	Stripe Two-Way Left Lane	Sept. '89	35	11
Victoria/Telegraph	Improve Clearance Timing	July '88	17	7
Telephone/Hill	Improve Clearance Timing	July '88	7	4
Thompson/Borchard	Improve Clearance Timing	Jan. '89	10	6
Poli/Cedar	Install Chevron Signs	Mar. '89	8	4
Petit/North Bank	Install Chevron Signs	Sept. '89	3	0
Pierpont/Ayala	Install Chevron Signs	Oct. '89	3	0
Ventura/Thompson	Rephase Signal	May '88	6	0
Ventura/Center/Ramona	Install Mastarm Signals	June '88	10	4
Ventura/Santa Clara	Install 12" Signal Heads	Oct. '89	7	4
Main/Telegraph	Restrict WB Left Turns	Aug. '88	4	3
Catalina N. of San Nicholas	Stop Signs in Alley	Oct. '87	3	0
TOTAL			530	319

safety improvements was estimated at $1.8 million. The funds were obtained from several sources: $100,000 per year from the city's management and operations budget, which is specifically identified for traffic safety; $100,000 per year from the city's capital improvement program (CIP) budget to implement transportation improvement projects; and $400,000 from the CIP budget for installing new signals and upgrading existing signals. A benefit-cost ratio of 2.7 was therefore accomplished by this program.

Conclusions

The city's program to reduce accidents in the city has been a team effort primarily involving two divisions in the Public Works Department: the Engineering Division, which identified and designed the mitigation measures, and the Maintenance Services Division, which actually implemented many of the measures in the field, although some of the major improvements were implemented by contractors. This involved a total of 12 persons in the two divisions. The success of the city's program indicates that a comprehensive approach such as that implemented by the City of San Buenaventura can have a major effect on the level of accidents citywide and can produce dramatic results.

Table 2. Citywide Annual Accidents

Year	Total Accidents
1985	2,483
1986	2,676
1987	2,690
Traffic Safety Program Begins	
1988	2,579
1989	2,405
1990	2,159

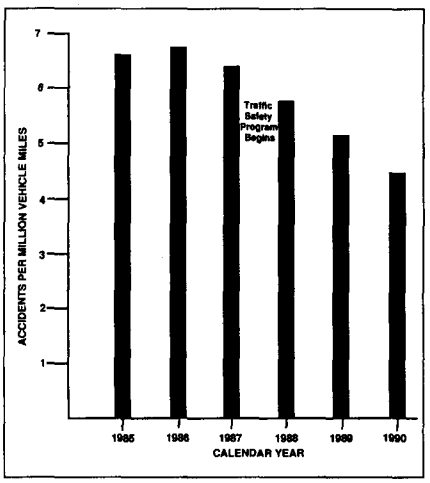


Figure 2. Trends in citywide accident rate.

Recommendations

Other agencies are encouraged to implement comprehensive safety programs. San Buenaventura's experience indicates that such a program can produce a dramatic reduction in number of accidents on a citywide basis. A comprehensive safety program may include the following:

1. Identification of all intersections and half-mile major and collector street segments that have three or more accidents per year. A threshold of three accidents per year is recommended for agencies similar in size to Ventura in order to limit study locations to a manageable level. Agencies significantly smaller or larger than Ventura might use lower or higher thresholds.
2. Accident rates or indexes should be calculated for all the locations identified in item 1.
3. The locations should be prioritized by accident rate so that the locations with the highest rates are listed at the top. Alternatively, if staff time is available, a hazard index can be calculated that takes into account the severity of accidents at each location.
4. The locations should be broken down separately so that all major/major, major/collector, major/local, collector/collector, collector/local, and local/local intersections are listed in separate tables. Three separate tables should also be developed for all major, collector, and local half-mile street segments.
5. Collision diagrams should be developed for the top 5 to 10 locations in each table, depending on the availability of staff time to analyze the data, develop mitigation measures, and implement improvements.
6. Traffic safety mitigation measures should be identified for each location based on the accident patterns identified in the collision diagrams.
7. A funding program should be established for implementing all mitigation measures within a 12-month period, except for locations that would require major reconstruction. These locations should be scheduled for funding as part of the capital improvement program budget.

Reference

1. City of San Buenaventura. *Annual Safety Report.* San Buenaventura, Calif.: City of San Buenaventura, 1987, 1988, 1989. ∎

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