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California's Freeway Service Patrol Program Management: Information System Annual Report Fiscal Year 2004-05

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California's Freeway Service Patrol Program

Management Information System Annual Report Fiscal Year 2004-05

Michael Mauch and
Alex Skabardonis

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16. Abstract

The Freeway Service Patrol (FSP) is an incident management program implemented by Caltrans, the California Highway Patrol and local partner agencies to quickly detect and assist disabled vehicles and reduce non-recurring congestion along the freeway during peak commute hours. The first FSP program was piloted in Los Angeles, and was later expanded to other regions by state legislation in 1991. As of June 2005, there were ten participating FSP Programs operating in California, deploying over 315 tow trucks and covering over 1,500 (center-line) miles of congested California freeways.

The purpose of this research project was to evaluate the effectiveness of the Caltrans FSP program in reducing incident durations and removal of other obstructions that directly contribute to freeway congestion for Caltrans fiscal year 2004-2005. The project provides valuable information to agencies managing the FSP program so that resources are distributed within the various statewide FSP operations in the most efficient and cost-effective manner possible. The tools used and the operational performance measures provided by this research effort will significantly contribute on the ongoing agencies' efforts to improve the efficiency and effectiveness of the FSP program.

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CALIFORNIA'S FREEWAY SERVICE PATROL PROGRAM

Management Information System Annual Report

Fiscal Year 2004/05

Prepared for the California Department of Transportation

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Section 1: Executive Summary

1.1 *Introduction*

The Freeway Service Patrol (FSP) is a program run jointly by Caltrans, the California Highway Patrol (CHP) and local transportation agencies. Whether fixing a flat tire, towing a disabled vehicle to a safe location, clearing debris from a lane of traffic, or providing a gallon of gasoline to a motorist that has run out of fuel, California's fleet of FSP roving tow trucks have two primary benefits. First, the patrolling trucks of the FSP find congestion-causing incidents and clear them quickly. Second, tow drivers provide direct assistance to stranded motorists, increasing safety and security for them in a moment of need. This service reduces delay for other motorists by maintaining the capacity of our highway system and increases safety for motorists by clearing hazards that may cause secondary incidents. The operational performance measures contained in this report were developed for program managers at Caltrans and partner agencies as tools for improving the efficiency and effectiveness of the FSP program.

This report seeks to increase the information available to state and local agencies running the FSP programs so that resources are distributed within the various statewide FSP operations in the most cost-effective manner possible.

1.2 *FSP Database Summary*

The bulk of the data used to develop the measures contained in this report were obtained directly from each FSP program. Each dataset was standardized to the greatest extent possible to allow data comparability between FSP programs. Unfortunately, the majority of the FSP programs collects and records their operational data in substantially different formats.

The following points summarize the primary outputs of the FSP programs into the statewide Management Information System (MIS) databases for fiscal year 2004/05**:**

(1) In fiscal year 2004/05, the roving tow trucks of the FSP program provided approximately 619,500 assists on California's highway system (604,000 of which were on Caltrans sponsored Beats). This is about a 4.4% percent decrease over the previous year. Over 46 percent of total statewide assists were provided by the Los Angeles FSP program in that county, while the next largest program, covering the nine counties of the San Francisco Bay Area, provided roughly 22 percent of total statewide assists.

(2) The estimated benefit/cost ratios for FSP programs ranged from 2.2-to-1 for Monterey to 17.1-to-1 for Riverside. The statewide average B/C ratio was 6.3-to-1.

(3) Once a driver spots an incident, they are instructed to work for up to 10 to 15 minutes to get the stranded vehicle moving or provide a tow to a safe location. The average assist duration for the state FSP in 2004/05 was between 12 and 13 minutes.

(4) The speed at which FSP locates and clears incidents is determined in part by the number of FSP trucks patrolling a stretch of road and the amount and type of traffic on that road. In FY 2004/05 the State's ten FSP programs operated 125 Caltrans sponsored Beats with

315 trucks (during the PM peak period) over 1,500 centerline freeway miles. Together they provided 690,000 total truck hours of service. On average, California's FSP trucks in FY 2004/05 supplied almost one assist for every hour of service an FSP truck provided (0.87 assists per truck-hour). These assists were primarily given to automobiles and vans, which constituted 72 percent of all assists. The two most common types of assists given were for flat tires (18%) and mechanical problems (17%).

(5) The number of FSP trucks and truck hours the state and its partner agencies can deploy is determined by funding availability. In FY 2004/05, the state allocated about **$18.0 million** to the ten locally run FSP programs and another **$3.2 million** to the CHP for field supervisors and training activities. The local transportation agency partners that run each program are required to provide 25 percent matching funds. In FY 2004/05, the local partner transportation agencies provided **$_____ million** in matching funds—a ___ percent match. The bulk of this match is supplied by the Los Angeles program, which provided **$___million**—a ____ percent match. All matching funds are used by the contributing local transportation agencies for their own FSP operations.

Table 1 provides a more detailed summary of the data and performance measures contained within this report. Figure 1 is a map showing the location of the FSP program districts.

Table 1: Statewide FSP Program Summary (Combined Weekday and Weekend Service on Caltrans Sponsored Beats)

District	Area	# of Beats	# of Trucks	Center - line Miles	Truck Hours	Total Assists	Avg. Assist Duration (min.)	Assist Rate[1]	B/C Ratio[2]	State FSP Funds ($)	% of State FSP Funds	Local Match Funds ($)	% of Local Match Funds	CHP Allocation ($)	% of CHP Allocation
3	Sacramento / Yolo	17	17	149	27,073	26,834	12.00	0.99	6.1	$850,782	4.7%	$635,000	3.7%	$245,777	7.7%
4	Bay Area	31	72	456	146,880	134,861	10.38	0.92	3.6	$4,793,928	26.7%	$4,063,867	23.7%	$789,789	24.7%
5Sc	Santa Cruz	2	2	16	3,438	2,700	11.13	0.79	16.1	$144,053	0.8%	$114,000	0.7%	$18,486	0.6%
5M	Monterey	2	2	26	3,812	4,179	15.71	1.10	2.2	$169,073	0.9%	$45,629	0.3%	$0	0.0%
6	Fresno	4	4	25	4,000	1,807	10.60	0.45	1.6	$234,800	1.3%	$58,700	0.3%	$59,375	1.9%
7	Los Angeles	39	144	407	353,264	281,268	14.30	0.80	6.4	$6,097,736	34.0%	$10,250,241	59.9%	$1,237,487	38.7%
8	Riverside	5	13	43	23,529	32,542	10.00	1.38	17.1	$1,071,368	6.0%	$267,842	1.6%	$252,456	7.9%
10	San Joaquin	1	3	16	6,089	4,599	12.10	0.76	4.6	$334,718	1.9%	$83,680	0.5%	$0	0.0%
11	San Diego	7	26	203	52,000	47,673	9.77	0.92	6.4	$2,121,420	11.8%	$530,355	3.1%	$241,501	7.5%
12	Orange	17	32	168	70,168	68,233	10.14	0.97	8.7	$2,130,248	11.9%	1,072,790	6.3%	$355,128	11.1%
Total / Average		**125**	**315**	**1,511**	**690,252**	**604,697**	**12.23**	**0.88**	**6.3**	**$17,948,125**	**100.0%**	**$17,122,104**	**100.0%**	**$ 3,200,000**	**100.0%**

(1) Assist Rate = Total Assists divided by Total Truck Hours.

(2) B/C Ratios were calculated for the 2004/05 Fiscal Year.

(3) District 6 was allocated $365,675 State FSP Funds.

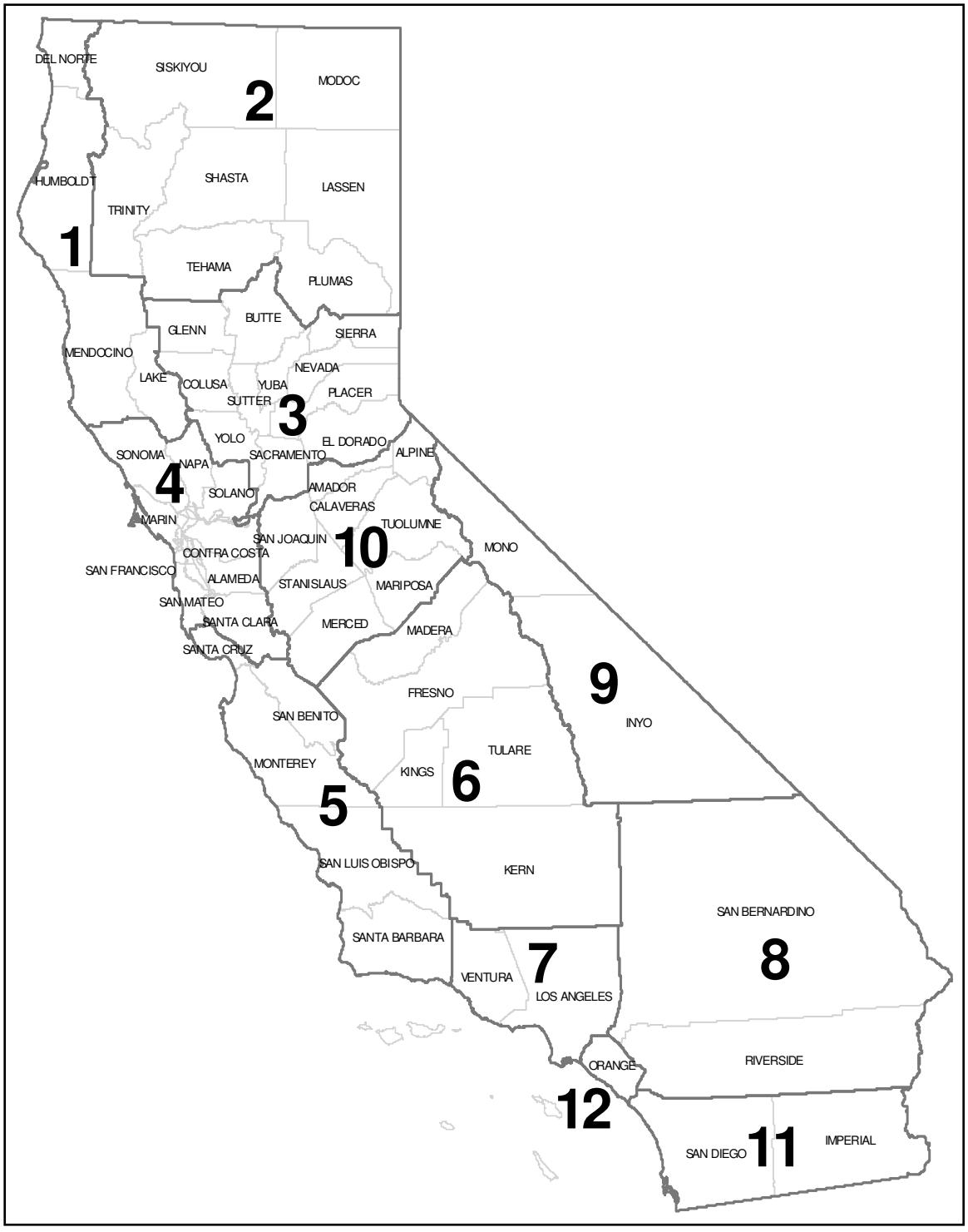

Figure 1: California Department of Transportation District Map

1.3 *Recommendation Summary*

As a result of the experience gained from developing the MIS databases and the associated Annual Report, the following recommendations have been made to improve the data collection and reporting practices of California's FSP programs. Some of these recommendations are already being practiced by some of the FSP districts. However standardization across all FSP districts would substantially reduce the costs, complexity, and time requirements of FSP reporting.

Reiterated Recommendations from previous reports:

1) Develop a consistent set of statewide data coding categories for each of the 5 categories reported; Problem Types, Vehicle Types, Locations of Obstructions, Who Found Obstruction and Tow To Locations

2) Store all FSP assist data and program records across all districts in a common electronic form. (e.g. Microsoft Access)

3) Implement Scantron data collection methods in those programs that currently do not employ an equivalent alternative.

4) Migrate to a more reliable data coding media and reader technology for the collection of assist data. If this is not possible, use another data entry verification technique to ensure the entered data is both accurate and error free.

5) Develop a consistent, statewide policy for recording non-vehicle assists.

6) Record, at a minimum, the following fields for each and every FSP Assist Record:

- District
- Beat
- Assist Date
- Arrival Time
- Departure Time
- Problem Type
- Vehicle Type
- Vehicle Location on Roadway (e.g. in-traffic-lane, shoulder, on-ramp)
- Tow To
- How vehicle was found

7) Split the "Other/Unknown/Blank" Problem Type category into two categories. The categories would be "Other" and "Unknown/Blank".

8) Insert into every blank assist description field a value that indicates that the field was intentionally left blank versus a data entry omission.

9) For District 12, request that their assist be recorded in one (1) assist record instead of spread over 2-3 records. Currently each complete assist is recorded by the district in an arrival record, a departure record and sometimes an "ENRT' record. These records needed to be programmatically combined to make a single assist record.

New recommendations:

1) More thorough data validation procedures should be developed and employed: The assist data collected and compiled in the MIS database should be validated to insure that unreported assists (and/or over-reported) are not biasing the reported totals and summary statistics. The quarterly and annual assists should be compared to District supplied quarterly and annual totals as part of this validation process. Graphs and tables showing daily, weekly, and/or monthly assists summed by Beat and by District should be visually inspected to reduce the likelihood that there are missing periods in the data (e.g. days). Furthermore, statistical out-of-bound range checks should be developed and employed to flag beats/days that have unusually low (or high) number of assists.

2) Caltrans (Headquarters and Districts) should continue to research and aggressively migrate toward using GPS-enabled PDA's to automate the FSP assist data collection procedures or an equivalent computer based method of automated data collection – i.e. data that is directly entered by the tow-truck operator at the time of the assist via a laptop computer or hand-held PDA type device.

3) Districts should all use the same PDA's (hardware and software) to insure data compatibility and consistency, and to reduce implementation costs (e.g. reduce the costs and the need for custom software for each District).

Section 2: Introduction

2.1 *Background*

The FSP program is a free motorist assistance service using contracted tow trucks that patrol designated routes on congested urban California freeways. Typically the FSP operates Monday through Friday during peak commute hours. In some cases, the FSP operates during the midday and on weekends/holidays in areas where significant off-peak congestion is anticipated.

The goal of the FSP is to maximize the efficiency of the freeway transportation system. The FSP is a traffic congestion management tool that strategically addresses non-recurring traffic problems by quickly finding and removing disabled/stranded vehicles or roadway obstructions from the freeway system. Deployment of FSP trucks is driven by congestion windows and traffic patterns in major metropolitan areas.

The rapid removal of freeway obstructions has a positive effect on traffic conditions by reducing incident durations and removal of other obstructions that directly contribute to non-recurrent congestion. In fiscal year 2004/05, the FSP program provided approximately 618,000 assists in nine Caltrans districts (which includes ten FSP programs).

Because the traffic conditions of the state's freeway system and the demand for its services are constantly changing, it is necessary for the FSP program to respond to these changing and increasing needs for traffic mitigation. This report seeks to centralize and summarize the information available to state and local agencies managing the FSP programs so that resources are distributed within the various statewide FSP operations in the most efficient and cost-effective manner possible. The database constructed for this project was used to generate a series of indicators that measured and compared the performance of each FSP program. The following provides an overview of the scope of work for this project:

2.2 *Project Scope*

The project scope included FSP assist data collection, database design and programming, calculate summary statistics for reporting purposes using the FSP assist database and report generation. The project objectives were accomplished in four phases:

1) Develop FSP 2004/05 Management Information System (MIS) databases
2) Produce FSP 2004/05 California Local Program Report
3) Produce FSP 2004/05 California Statewide MIS Program Report
4) Make Recommendations for Future Data Collection Policies, Procedures and Report Content.

Each phase is described in more detail in the following sections.

2.2.1 Develop FSP 2004/05 MIS Databases

The development of the FSP MIS databases consisted of the following sub-tasks:

1) Solicit and Collect the 2004/05 FSP program Data from each of the FSP Program Districts.

2) Analyze the Data for consistency and accuracy. Clean the data as necessary to correct any inconsistencies and/or inaccuracies.

3) Compile the cleaned data into a set of sub-databases, with each database containing the data for an individual FSP district program.

2.2.2 Produce FSP 2004/05 California Local Program Report

The development of the FSP 2004/05 California Local Program Report consisted of the following sub-tasks:

1) Generate database queries to compile each district's program data into summary tables that will identify how each program is performing in the customer defined set of performance areas.

2) Format the resulting set of tables and graphs so they are consistent in format and easily understandable.

3) Load the formatted tables and graphs into the report with the content of each table or graph identified by the section heading. This report will not contain any text or State summary data. It will only contain summarized district FSP program data.

2.2.3 Produce FSP 2004/05 California Statewide MIS Program Report

The development of the FSP 2004/05 California Statewide MIS Program Report consisted of the following sub-tasks:

1) Generate database queries for the statewide database to compile FSP Program data into summary tables that will identify how FSP State program is performing in the customer defined set of performance areas.

2) Format the resulting set of tables and graphs so they are consistent in format and easily understandable.

3) Use the format of the FSP 2003/04 MIS annual report as a template for the FSP 2004/05 report. Create the shell of the FSP 2004/05 report.

4) Add all relevant text and tables from the FSP 2003/04 report. There is no need to recreate information that has already been created and will stay the same from yearly report to yearly report.

5) Load the formatted state summary tables and graphs into the report with the content of each table or graph identified by the caption heading.

6) Fill in all the report information that is unique to the FSP 2004/05 Fiscal Year.

2.2.4 Make Recommendations for Improving FSP Program Reporting

The development of recommendations to improve the California FSP Program's data collection, storage and reporting consisted of the following sub-tasks:

1) Take notes when collecting and compiling the received FSP data. The notes should contain references to problems and inconsistencies with the received FSP data.

2) Compile those notes into a complete set of meaningful recommendations that will help the state and local FSP Program representatives collect process and report FSP data that is both accurate and consistent across all programs.

Section 3: FSP Data Compilation Methodology

3.1 *FSP MIS Development Methodology*

The integrated Statewide MIS database was created to combine the FSP assist data from each of the California FSP programs into one single database. The data was provided by the ten local FSP programs and their associated, partner agencies. Since each program independently collects and stores their FSP assist data, the format of each of the program's datasets varies tremendously in data completeness, data coding consistency, data recording accuracy and in consistent compatible formats. The Recommendations section in this report provides a description of some of the more serious problems with the collected data and recommendations on how to improve the quality of the data.

Each local program's raw data was cleaned, standardized and combined into a single, unified database. In the final databases there are almost 618,000 records for the fiscal year 2004/05. They are stored in and manipulated using Microsoft Access. Each FSP program's dataset is stored in its own database file. The local program queries and reports can be run from the associated program's database file. The following sections provide the statewide summary tables and graphs based on this final database. The Trucks and Centerline Miles Excel file includes information such as the Total Number of Trucks, Total Truck Hours, Centerline Miles of each beat, and the number of beats in each district's program.

3.2 *FSP Evaluation Methodology*

The effectiveness of the FSP Program is assessed by calculating the annual benefit/cost (B/C) ratio of each FSP beat. First the annual savings in incident delay, fuel consumption and air pollutant emissions due to FSP service are calculated based on the number of assists, beat geometries and traffic volumes. The savings are then translated into benefits using monetary values for delay ($10/hr) and fuel consumption ($2/gal). The costs include the annual capital, operating and administrative costs for providing FSP service. The FSP evaluation methodology has been incorporated into an Excel spreadsheet. Input data requirements consist of beat geometries (number of lanes, presence of shoulders), traffic volumes, and the number and characteristics of FSP assists.

Section 4: FSP Performance Summary

4.1 *Statewide Total Assists by Fiscal Year*

Table 2 shows that the annual statewide total assists decreased by approximately -4.4% (647,754 to 619,494) from FY 2003/04 to 2004/05. This is shown graphically in Figure 2.

Table 2: Total Assists and Annual Change by FY

Fiscal Year	Total Assists	Annual Change (%)
91/92	152,526	0.0%
92/93	295,613	93.8%
93/94	452,018	52.9%
94/95	448,170	-0.9%
95/96	540,874	20.7%
96/97	587,941	8.7%
97/98	583,699	-0.7%
98/99	568,276	-2.6%
99/00	625,090	10.0%
00/01	631,161	1.0%
01/02	643,607	2.0%
02/03	651,710	1.3%
03/04	647,754	-0.6%
04/05	619,494	-4.4%

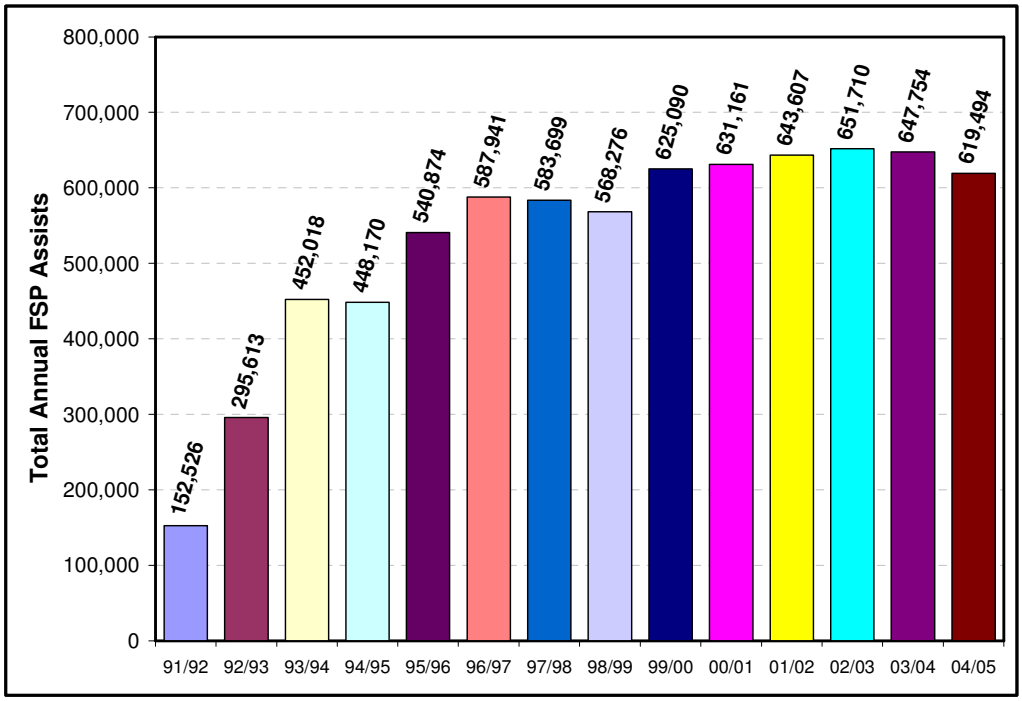

Figure 2: Bar Chart – Total Assists by Fiscal Year

4.2 *Benefit/Cost Ratios for District FSP Programs*

Table 3: B/C Ratio for Each FSP Program

District	Name	Annual B/C Ratio
3	Sacramento / Yolo	6.1
4	Bay Area	3.6
5Sc	Santa Cruz	16.1
5M	Monterey	2.2
6	Fresno	1.6
7	Los Angeles	6.4
8	Riverside	17.1
10	San Joaquin	4.6
11	San Diego	6.4
12	Orange County	8.7
Statewide		6.3

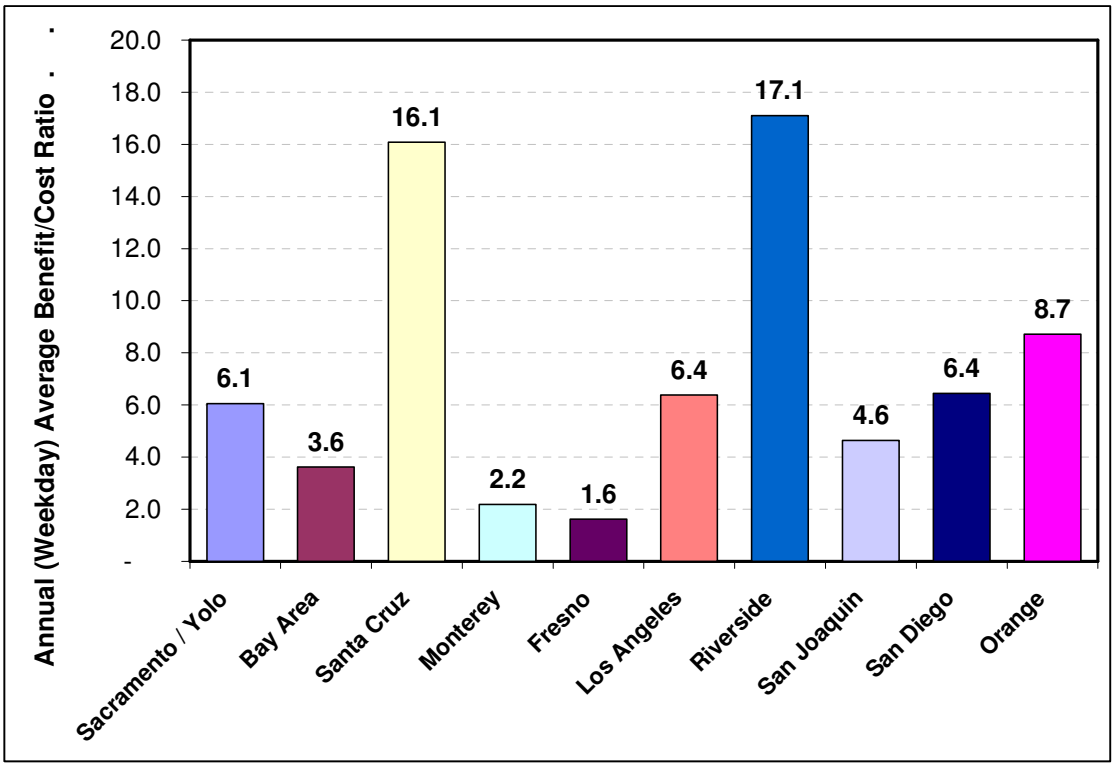

Figure 3: Bar Chart of FSP Benefit/Cost Ratios By District

4.3 *Statewide FSP Total Assists by Quarter & District*

Table 4: Total Assists by Quarter & District

		Jul 04 - Sep 04	Oct 04 - Dec 04	Jan 05 - Mar 05	Apr 05 - Jun 05		
District	**Name**	**Qtr 3**	**Qtr 4**	**Qtr 1**	**Qtr 2**	**Total Assists**	**%**
3	Sacramento/ Yolo	8,717	6,256	6,400	6,204	27,577	4.5%
4	Bay Area	37,667	33,300	32,943	34,971	138,882	22.5%
5M	Monterey	756	736	1,181	1,506	4,179	0.7%
5SC	Santa Cruz	653	653	644	750	2,700	0.4%
6	Fresno	509	462	392	444	1,807	0.3%
7	Los Angeles	78,916	63,942	69,760	77,004	289,623	46.9%
8	Riverside	9,118	7,831	7,464	8,129	32,542	5.3%
10	San Joaquin	1,246	994	1,127	1,232	4,599	0.7%
11	San Diego	13,141	11,927	10,740	11,866	47,673	7.7%
12	Orange	20,328	11,318	15,643	22,623	69,912	11.3%
Total Assists		**171,051**	**137,420**	**146,294**	**164,730**	**619,494**	**100.0%**
% of Total Assists		**27.7%**	**22.2%**	**23.6%**	**26.6%**	**100.0%**	

Note: Quarterly assists are the sum of the FSP assists in the 2004/05 MIS database weighted to match District supplied totals. Thus, the reported quarterly total assists might be biased if a higher than average proportions of missing data appear in any given quarter.

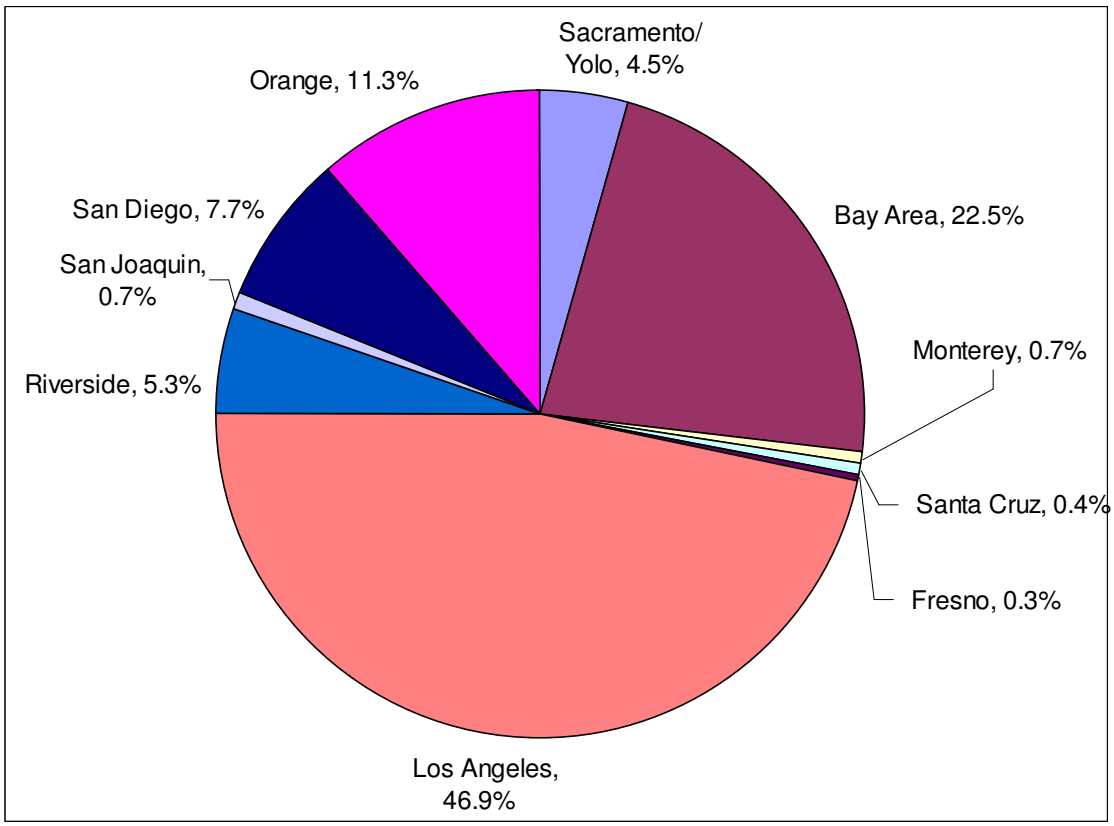

Figure 4: Pie Chart of Total Assists by District

4.4 *Statewide FSP Total Assists by Problem Type*

Table 5: Total Assists by Problem Type

Problem Type	Total Assists	%
Abandoned	46,399	7.5%
Accident	75,210	12.1%
Debris Removal	19,641	3.2%
Electrical Problem	17,324	2.8%
Flat Tire	110,598	17.9%
Mechanical Problem	104,738	16.9%
Other/Unknown/ Blank	122,064	19.7%
Out of Gas	60,525	9.8%
Over Heated	32,973	5.3%
Blank	30,021	4.8%
Total Assists	**619,494**	**100.0%**

Note: The "Other/Unknown/Blank" category includes the count of assist records with the problem type field left blank as well as records with problem types that do not match any of the standardized problem type categories listed in the table above.

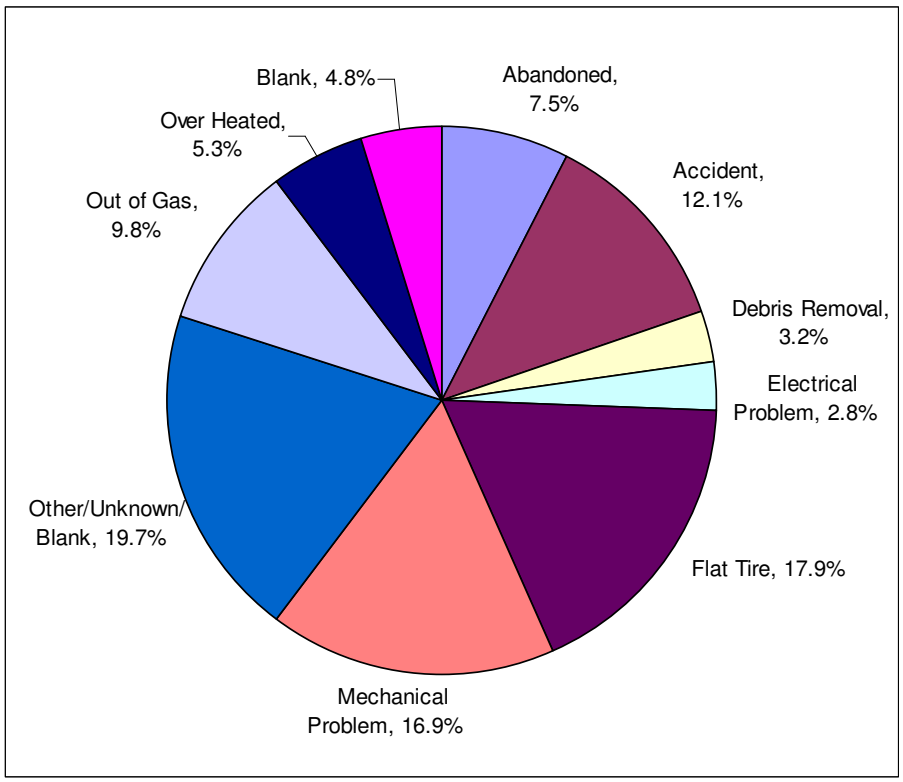

Figure 5: Pie Chart of Total Assists by Problem Type

4.5 *Statewide FSP Total Assists by Problem Type & District*

Table 6: Total Assists by Problem Type & District

District	Name	Abandoned	Accident	Debris Removal	Electrical Problem	Flat Tire	Mechanical Problem	Other/ Unknown/ Blank	Out of Gas	Over Heated	Blank	Total Assists
3	Sacramento / Yolo	3,729	4,175	629	830	5,170	6,157	2,797	2,967	1,122	0	27,577
4	Bay Area	17,105	11,800	6,923	2,407	22,988	21,727	36,931	13,504	5,492	25	138,882
5M	Monterey	1,471	228	0	157	634	734	185	641	114	15	4,179
5SC	Santa Cruz	301	371	235	9	163	370	963	180	107	0	2,700
6	Fresno	345	194	49	12	210	592	211	180	12	0	1,807
7	Los Angeles	14,238	41,542	6,173	10,174	56,205	54,681	32,941	28,773	18,817	26,079	289,623
8	Riverside	2,288	3,160	1,261	941	4,548	5,906	10,293	2,453	1,692	0	32,542
10	San Joaquin	407	333	179	98	796	912	1,031	386	381	10	4,599
11	San Diego	8,312	3,867	836	1,315	8,342	11,504	5,207	5,810	2,480	0	47,673
12	Orange	3,220	6,627	2,778	1,012	10,299	1,314	35,827	6,924	1,911	0	69,912
Total Assists		**51,418**	**72,297**	**19,063**	**16,955**	**109,354**	**103,897**	**126,386**	**61,820**	**32,128**	**26,129**	**619,494**
Avg %		**8.3%**	**11.7%**	**3.1%**	**2.7%**	**17.7%**	**16.8%**	**20.4%**	**10.0%**	**5.2%**	**4.2%**	**100.0%**

Table 7: Total Assists by Problem Type & District (in Percent)

District	Name	Abandoned	Accident	Debris Removal	Electrical Problem	Flat Tire	Mechanical Problem	Other/ Unknown/ Blank	Out of Gas	Over Heated	Blank	Total
3	Sacramento / Yolo	13.5%	15.1%	2.3%	3.0%	18.7%	22.3%	10.1%	10.8%	4.1%	0.0%	100.0%
4	Bay Area	12.3%	8.5%	5.0%	1.7%	16.6%	15.6%	26.6%	9.7%	4.0%	0.0%	100.0%
5M	Monterey	35.2%	5.5%	0.0%	3.8%	15.2%	17.6%	4.4%	15.3%	2.7%	0.4%	100.0%
5SC	Santa Cruz	11.2%	13.7%	8.7%	0.3%	6.0%	13.7%	35.7%	6.7%	4.0%	0.0%	100.0%
6	Fresno	19.1%	10.7%	2.7%	0.7%	11.6%	32.8%	11.7%	10.0%	0.7%	0.0%	100.0%
7	Los Angeles	4.9%	14.3%	2.1%	3.5%	19.4%	18.9%	11.4%	9.9%	6.5%	9.0%	100.0%
8	Riverside	7.0%	9.7%	3.9%	2.9%	14.0%	18.1%	31.6%	7.5%	5.2%	0.0%	100.0%
10	San Joaquin	8.9%	7.2%	3.9%	2.1%	17.3%	19.8%	22.4%	8.4%	8.3%	0.2%	100.0%
11	San Diego	17.4%	8.1%	1.8%	2.8%	17.5%	24.1%	10.9%	12.2%	5.2%	0.0%	100.0%
12	Orange	4.6%	9.5%	4.0%	1.4%	14.7%	1.9%	51.2%	9.9%	2.7%	0.0%	100.0%
Avg %		**8.3%**	**11.7%**	**3.1%**	**2.7%**	**17.7%**	**16.8%**	**20.4%**	**10.0%**	**5.2%**	**4.2%**	**100.0%**

4.6 *Statewide FSP Total Assists by Vehicle Type*

Table 8: Total Assists by Vehicle Type

Vehicle Type	Total Assists	%
Auto/Van	391,438	63.2%
Big Rig	10,308	1.7%
Other / Unknown	91,030	14.7%
Pickup	57,750	9.3%
Trucks < 1 Ton	48,559	7.8%
Trucks > 1 Ton	16,339	2.6%
Blank	4,070	0.7%
Total Assists	**619,494**	**100.0%**

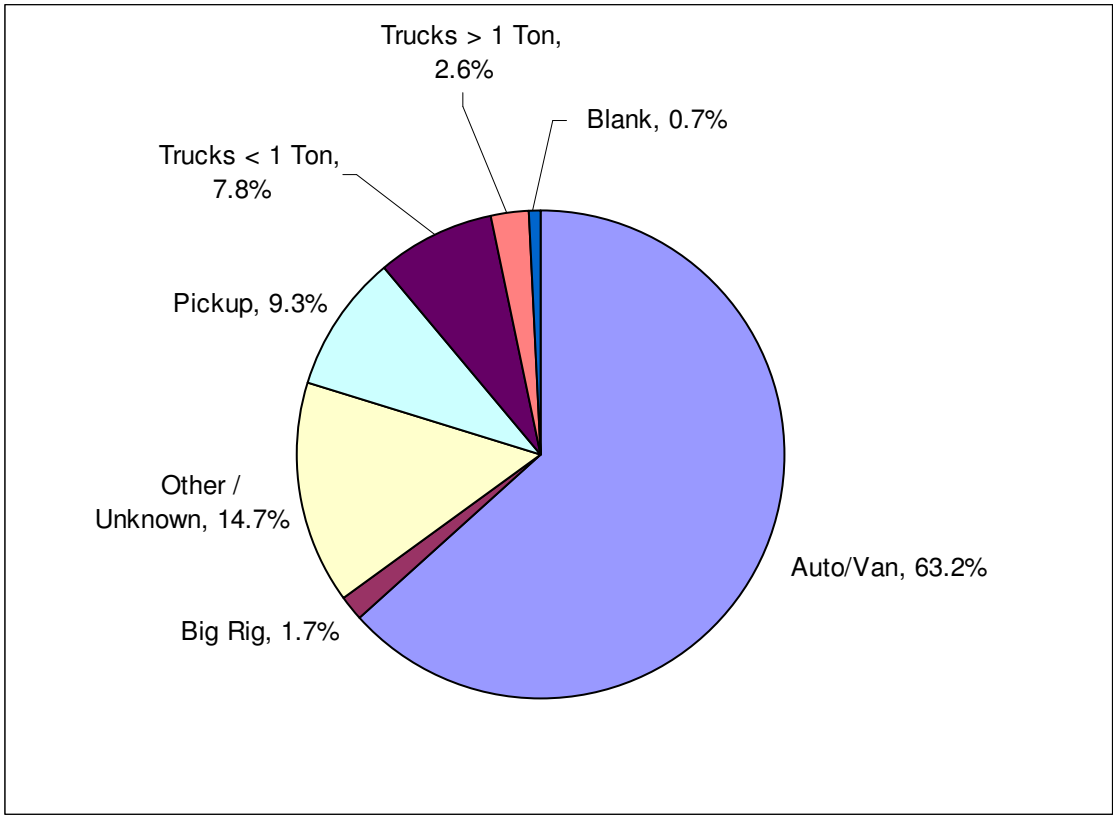

Figure 6: Pie Chart of Total Assists by Vehicle Type

4.7 *Statewide FSP Total Assists by Vehicle Type & District*

Table 9: Total Assists by Vehicle Type & District

District	Name	Auto/Van	Big Rig	Other/ Unknown	Pickup	Trucks < 1 Ton	Trucks > 1 Ton	Blank	Total Assists
3	Sacramento / Yolo	18,896	147	1,557	5,260	1,051	666	1	27,577
4	Bay Area	99,309	3,738	1,542	24,878	1,723	4,160	3,532	138,882
5M	Monterey	3,051	21	25	992	61	29	-	4,179
5SC	Santa Cruz	1,671	291	31	354	6	107	240	2,700
6	Fresno	1,568	1	34	171	-	-	34	1,807
7	Los Angeles	212,626	1,730	12,962	9,643	43,459	9,148	55	289,623
8	Riverside	17,368	4,080	2,263	6,817	539	1,443	33	32,542
10	San Joaquin	2,852	22	524	902	47	76	176	4,599
11	San Diego	34,098	278	2,180	8,734	1,673	710	-	47,673
12	Orange			69,912					69,912
Total Assists		**391,438**	**10,308**	**91,031**	**57,750**	**48,559**	**16,339**	**4,071**	**619,494**
	Avg %	**63.2%**	**1.7%**	**14.7%**	**9.3%**	**7.8%**	**2.6%**	**0.7%**	**100.0%**

Note: District 12 did not provide any Vehicle Type data. Therefore, the Vehicle Types for all the assists were categorized as "Unknown".

Table 10: The % of Total Assists by Vehicle Type & District

District	Name	Auto/Van	Big Rig	Other/ Unknown	Pickup	Trucks < 1 Ton	Trucks > 1 Ton	Blank	Total
3	Sacramento / Yolo	68.5%	0.5%	5.6%	19.1%	3.8%	2.4%	0.0%	100.0%
4	Bay Area	71.5%	2.7%	1.1%	17.9%	1.2%	3.0%	2.5%	100.0%
5M	Monterey	72.1%	0.9%	1.1%	23.4%	1.3%	1.3%	0.0%	100.0%
5SC	Santa Cruz	61.9%	10.8%	1.2%	13.1%	0.2%	4.0%	8.9%	100.0%
6	Fresno	86.8%	0.1%	1.9%	9.5%	0.0%	0.0%	1.9%	100.0%
7	Los Angeles	73.4%	0.6%	4.5%	3.3%	15.0%	3.2%	0.0%	100.0%
8	Riverside	53.4%	12.5%	7.0%	20.9%	1.7%	4.4%	0.1%	100.0%
10	San Joaquin	62.0%	0.5%	11.4%	19.6%	1.0%	1.6%	3.8%	100.0%
11	San Diego	71.5%	0.6%	4.6%	18.3%	3.5%	1.5%	0.0%	100.0%
12	Orange	N/A	N/A	100.0%	N/A	N/A	N/A	N/A	100.0%
Avg %		**63.2%**	**1.7%**	**14.7%**	**9.3%**	**7.9%**	**2.6%**	**0.7%**	100.0%

4.8 *Statewide FSP Total Assists by Vehicle Location*

Table 11: Total Assists by Vehicle Location

Vehicle Location	Total Assists	%
In Freeway Lane	51,090	8.2%
Left Shoulder	26,423	4.3%
Other / Blank	74,104	12.0%
Ramp / Connector	41,281	6.7%
Right Shoulder	421,320	68.0%
Unable to Locate	5,276	0.9%
Total Assists	**619,494**	**100.0%**

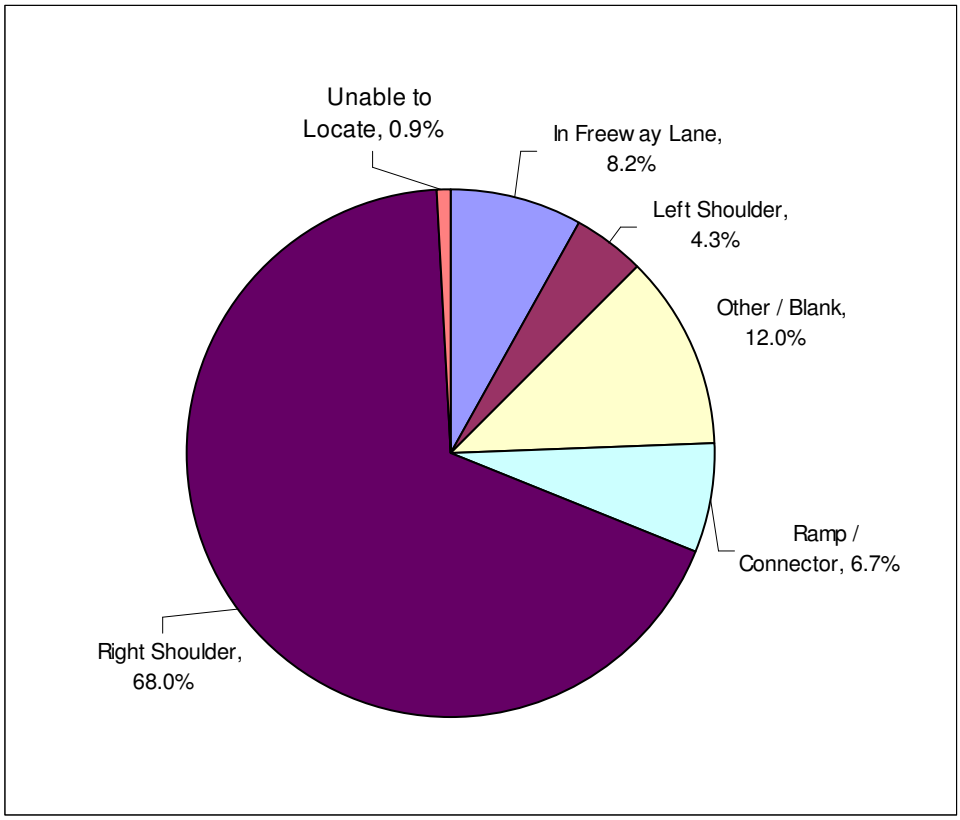

Figure 7: Pie Chart of Total Assists by Vehicle Location

4.9 *Statewide FSP Total Assists by Vehicle Location & District*

Table 12: Total Assists by Vehicle Location & District

District	Name	In Freeway Lane	Left Shoulder	Other/ Unknown/ Blank	Ramp/ Connector	Right Shoulder	Unable to Locate	Total Assists
3	Sacramento / Yolo	3,401	2,145	572	1,420	19,528	511	27,577
4	Bay Area	11,527	7,432	-	13,201	106,644	78	138,882
5M	Monterey	189	296	118	217	3,360	-	4,179
5SC	Santa Cruz	528	133	-	169	1,867	2	2,700
6	Fresno	63	65	60	188	1,430	-	1,807
7	Los Angeles	29,824	9,522	2,658	18,058	225,664	3,899	289,623
8	Riverside	2,656	1,390	591	3,693	23,444	768	32,542
10	San Joaquin	147	441	193	574	3,226	17	4,599
11	San Diego	2,755	4,999	-	3,762	36,157	-	47,673
12	Orange	N/A	N/A	69,912	N/A	N/A	N/A	69,912
Total Assists		**51,090**	**26,423**	**74,104**	**41,281**	**421,320**	**5,275**	**619,494**
Avg %		**8.2%**	**4.3%**	**12.0%**	**6.7%**	**68.0%**	**0.9%**	**100.0%**

Note: District 12 did not provide any Vehicle Location data. Therefore, the Vehicle Locations for all the assists were categorized as "Blank".

Table 13: The % of Total Assists by Vehicle Location & District

District	Name	In Freeway Lane	Left Shoulder	Other/ Unknown/ Blank	Ramp/ Connector	Right Shoulder	Unable to Locate	Total
3	Sacramento / Yolo	12.3%	7.8%	2.1%	5.2%	70.8%	1.9%	100.0%
4	Bay Area	8.3%	5.4%	0.0%	9.5%	76.8%	0.1%	100.0%
5M	Monterey	4.5%	7.1%	2.8%	5.2%	80.4%	0.0%	100.0%
5SC	Santa Cruz	19.6%	4.9%	0.0%	6.3%	69.2%	0.1%	100.0%
6	Fresno	3.5%	3.6%	3.3%	10.4%	79.1%	0.0%	100.0%
7	Los Angeles	10.3%	3.3%	0.9%	6.2%	77.9%	1.3%	100.0%
8	Riverside	8.2%	4.3%	1.8%	11.3%	72.0%	2.4%	100.0%
10	San Joaquin	3.2%	9.6%	4.2%	12.5%	70.2%	0.4%	100.0%
11	San Diego	5.8%	10.5%	0.0%	7.9%	75.8%	0.0%	100.0%
12	Orange	N/A	N/A	100.0%	N/A	N/A	N/A	N/A
Avg %		**8.3%**	**4.2%**	**12.0%**	**6.7%**	**68.0%**	**0.9%**	**100.0%**

4.10 *Statewide FSP Average Assist Duration by District*

Table 14: The Average Assist Duration by District

District	Name	Average Duration (minutes)
3	Sacramento / Yolo	12.0
4	Bay Area	10.4
5M	Monterey	15.7
5SC	Santa Cruz	11.1
6	Fresno	10.6
7	Los Angeles	14.3
8	Riverside	10.0
10	San Joaquin	12.1
11	San Diego	9.8
12	Orange	10.1
Weighted Avg. Duration		**12.2**

Note:

- Only records with assist durations that were greater than zero minutes (not negative) and less than 120 minutes were included in the average duration calculations. The reason for this range restriction was that assist durations outside of this range were considered erroneous, resulting from start/end time data entry errors.

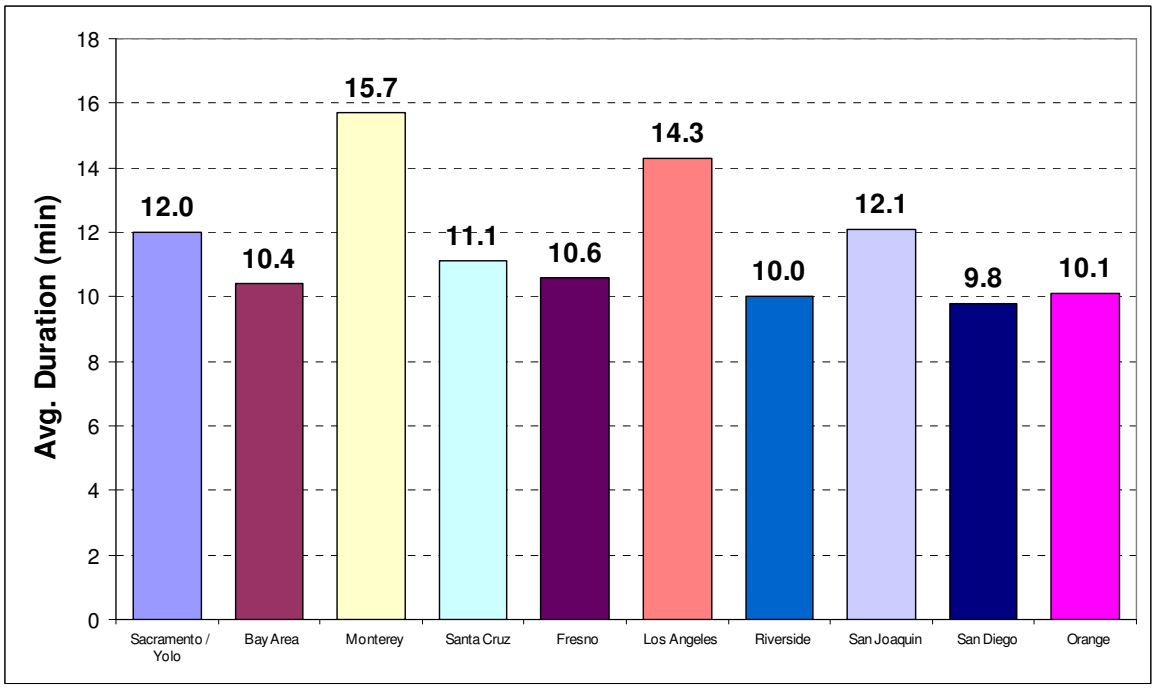

Figure 8: Bar Chart of Average Assist Duration by District

4.11 *Statewide FSP Average Assist Duration by Problem Type & District*

Table 15: The Average Assist Duration by Problem Type & District

District	Name	Abandoned	Accident	Debris Removal	Electrical Problem	Flat Tire	Mechanical Problem	Other/ Unknown	Out of Gas	Over Heated	Blank 1	Average Duration
3	Sacramento / Yolo	5.6	19.9	5.7	13.1	13.0	14.3	6.7	7.9	12.3	0.0	12.0
4	Bay Area	4.1	18.1	11.3	12.6	13.9	17.4	5.0	7.7	11.9	8.0	10.4
5M	Monterey				13.9	16.5	20.0	19.6	9.2	15.2	19.3	15.7
5SC	Santa Cruz	5.1	21.9	11.7	11.3	14.1	16.4	6.8	8.7	10.7	0.0	11.1
6	Fresno	3.4	16.3	5.0	17.7	13.2	14.6	7.5	7.0	8.3	0.0	10.6
7	Los Angeles	7.9	19.7	9.6	17.6	16.8	19.4	8.8	11.6	16.2	7.3	14.3
8	Riverside	5.5	13.5	6.1	17.4	13.9	16.0	4.5	9.0	13.3	8.6	10.0
10	San Joaquin	5.4	18.0	3.8	18.5	14.0	19.1	5.7	8.1	15.8	18.5	12.1
11	San Diego	5.5	14.2	9.0	11.6	12.0	12.0	5.7	7.9	10.8	0.0	9.8
12	Orange	4.4	10.9	7.5	9.8	13.5	8.6	10.7	6.3	8.4	0.0	10.1
Weighted Avg. Duration		**6.1**	**17.5**	**9.2**	**14.9**	**15.0**	**16.7**	**7.6**	**9.5**	**13.5**	**5.9**	**12.2**

(1) The values in the "Blank" duration column were a result of durations being calculated for assists where the "Problem Type" field in the assist record was left blank.

Note:

- Only records with assist durations that were greater than zero minutes (not negative) and less than 120 minutes were included in the average duration calculations. The reason for this range restriction was that assist durations outside of this range were considered erroneous, resulting from start/end time data entry errors.

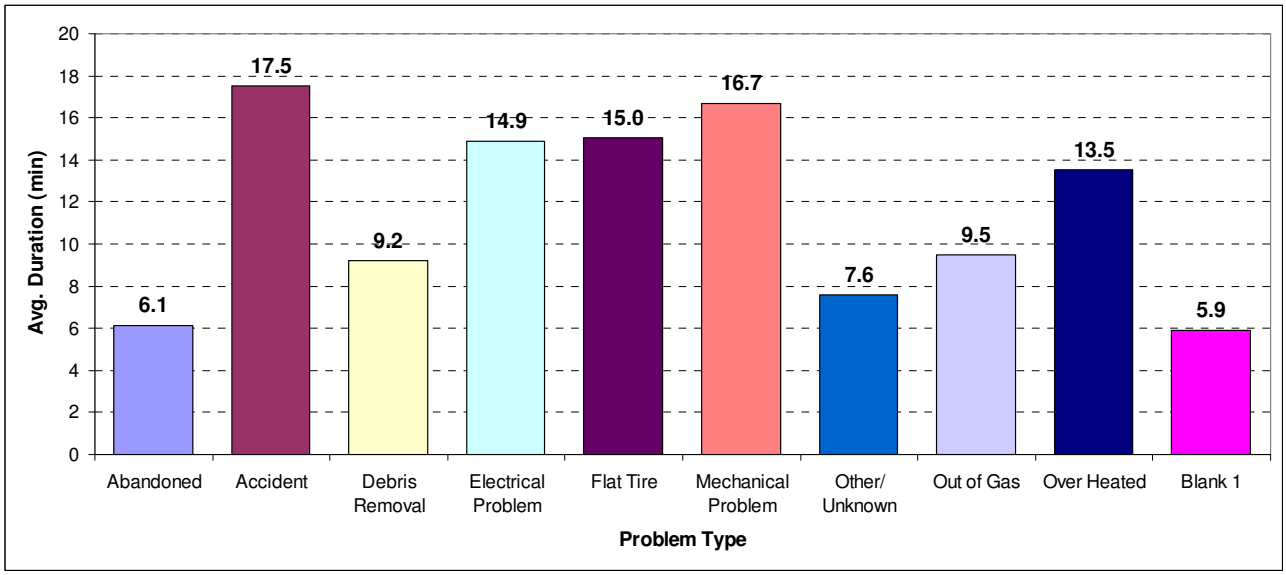

Figure 9: Bar Chart of Average Assist Duration by Problem Type and District

4.12 *Statewide FSP Average Assist Duration by Vehicle Type & District*

Table 16: The Average Assist Duration by Vehicle Type & District

District	Name	Auto/Van	Big Rig	Other	Pickup	Trucks < 1 Ton	Trucks > 1 Ton	Blank	Average Duration
3	Sacramento / Yolo	11.5	8.8	10.1	10.7	7.0	6.3		11.7
4	Bay Area	10.8	8.0	9.6	9.7	10.7	9.0	7.3	10.4
5M	Monterey	15.8	11.5	14.0	15.8	15.4	11.1		15.7
5SC	Santa Cruz	12.2	6.1	13.1	12.1	9.0	11.4	8.1	11.1
6	Fresno	10.7	14.0	8.4	11.1	0.0	0.0	7.9	10.6
7	Los Angeles	15.4	12.4	11.0	13.9	13.9	12.8	15.5	14.3
8	Riverside	11.3	6.7	7.4	10.0	10.1	8.0	8.6	10.0
10	San Joaquin	12.8	16.0	11.8	11.8	9.0	12.5	4.5	12.1
11	San Diego	9.9	11.7	9.6	9.5	8.7	9.1	0.0	9.8
12	Orange	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.1
Weighted Avg. Duration		**11.8**	**9.5**	**9.1**	**10.7**	**10.6**	**9.6**	**9.4**	**12.2**

(1) The values in the "Blank" Duration column were a result of durations being calculated for assists where the "Vehicle Type" field in the assist record was left blank.

Note:

- Only records with assist durations that were greater than zero minutes (not negative) and less than 120 minutes were included in the average duration calculations. The reason for this range restriction was that assist durations outside of this range were considered erroneous, resulting from start/end time data entry errors.
- District 12 did not provide any Vehicle Type data. Therefore, the Vehicle Type for all assists was categorized as "Blank".

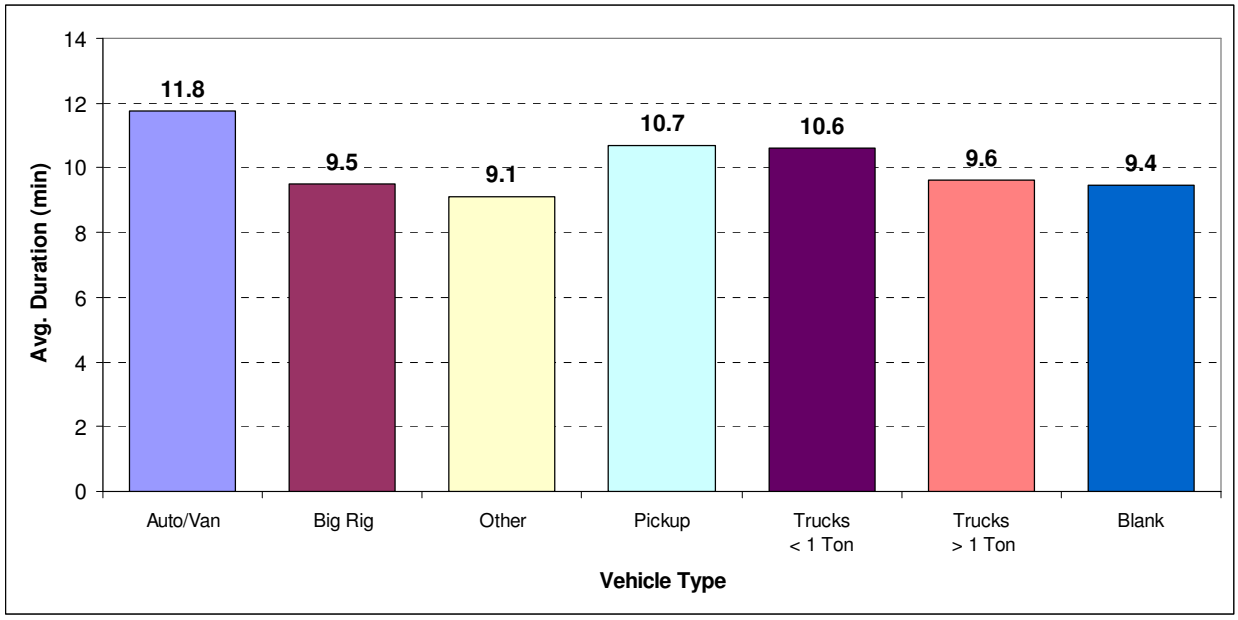

Figure 10: Bar Chart of Average Assist Duration by Vehicle Type

4.13 *Statewide FSP Average Assist Rate by District*

Table 17: The Average (Weekday) Assist Rate by District

District	Name	Weekday Annual Assists	Weekday Annual Truck-Hours	Weekday Assist Rate
3	Sacramento/Yolo	26,834	27,073	0.99
4	Bay Area	131,060	142,500	0.92
5Sc	Santa Cruz	2,378	3,000	0.79
5M	Monterey	3,708	3,396	1.09
6	Fresno	1,807	4,500	0.40
7	Los Angeles	254,524	334,128	0.76
8	Riverside	32,542	23,529	1.38
10	San Joaquin	3,820	5,760	0.66
11	San Diego	47,673	52,000	0.92
12	Orange County	68,233	70,168	0.97
State-wide		**572,580**	**666,053**	**0.86**

Notes: District 3 totals do not include Beat 281.
District 4 totals do not include Beats 6A, 10A, and 11A.
District 7 totals do not include Beats 8 and 42.
District 12 totals do not include Beat 15.

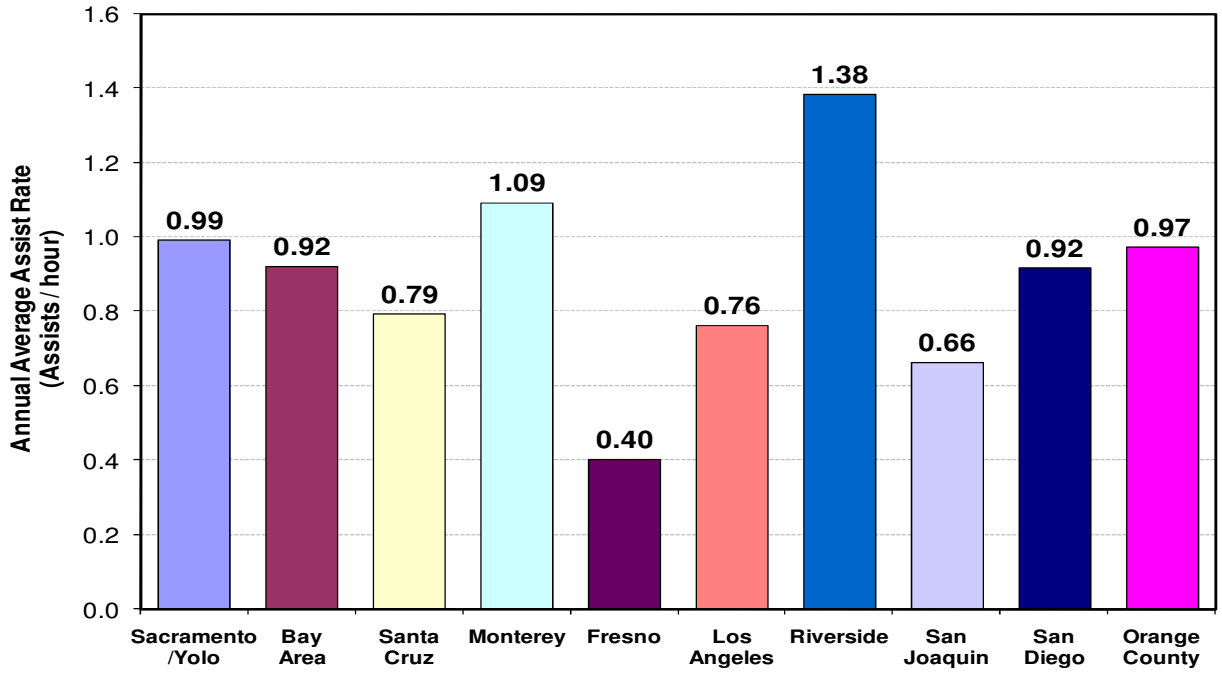

Figure 11: Bar Chart of Average Weekday Assist Rate by District

Section 5: Statewide FSP Data Categories

5.1 *FSP Data Reporting Categories*

The following tables and notes show the reported FSP assist descriptive coding categories and how they were combined into one set of standardized categories for local and statewide statistical analysis and reporting purposes.

5.1.1 Problem Type Category

Table 18: Problem Type Category Summary

Problem Type	D3	D4/D5s	D5m	D6	D7	D8	D10	D11	D12
Out of Gas	√	√	√	√	√	√	√	√	√
Electrical Problem	√	√ (5)	√ (5)	√	√	√	√	√	√
Debris Removal	√	√ (6)	√	√	√	√	√	√	√
Over Heated	√	√	√	√	√	√	√	√	√
Mechanical Problem	√	√	√	√	√	√	√	√	√
Flat Tire	√	√	√	√	√	√	√	√	√
Accident	√	√ (3)	√ (4)	√	√ (2)	√	√	√	√ (8)
Abandoned	√	√	√ (7)	√	√	√	√	√	√
Other/Unknown (1)	√	√	√	√	√	√	√	√	√

Notes:

(1) Across all districts, besides the standardized Problem Types, subsets of the following non-standardized Problem Types were used. For the purposes of compiling statistics for this report these Problem Types were counted in the "Other" Problem Type category: "Vehicle Fire", "Locked Out", "INFOM", "Unable to Locate", "Refused FSP Service", "Cancelled Assignment", "Drive-Off", "Help Enroute", "Provided Transportation", "Direct Traffic - 1184", "Disabled Vehicle - 1126", "dispatched by CHP", "Tow Truck Req. - 1185", "A", "Q", "Assisted Another Driver", "Service Refused", "Info/Assist", "Private Assistance" and "Removed per CHP/Motorist".

(2) Include "Rollover" in "Accident".

(3) Include "Traffic Collision" in "Accident".

(4) Include "Ambulance – 1141, 79" in "Accident".

(5) Include "Battery" and "Dead Battery" in "Electrical".

(6) Include "In-lane Hazard" in "Debris Removal".

(7) Include "Tagged Vehicle – 1124" in "Abandoned"

(8) The problem code of "H" is where the FSP driver assisted the CHP with an Accident. Assists with this code were counted in the Problem Type category of "Accident".

√ = Data available

N/A = Data not available

5.1.2 Vehicle Type Category

Table 19: Vehicle Type Category Summary

Vehicle Type	D3	D4/D5s	D5m	D6	D7	D8	D10	D11	D12[6]
Auto/Van [1]	√	√	√	√	√	√	√	√	N/A
Pickup	√	√	√	√	√	√	√	√	N/A
Truck < 1 ton	√	√	√	√	√	√ [5]	√	√	N/A
Truck > 1 ton	√	√	√	√	√	√ [8]	√	√	N/A
Big Rig	√ [3]	√	√	√	√ [3]	√	√	√ [3,7]	N/A
Other	√ [2]	√ [2]	√ [2]	√ [2,4]	√ [2]	√ [9]	√	√ [2]	N/A

Notes:

(1) Combine "Auto" and "Van" types together.

(2) Include "Motorcycle" and “MCYCLE” in "Other".

(3) Include “No Assist” and "No Assist Due to Oversize" in "Big Rig"

(4) Include "Bus” and “MTFHME" in "Other"

(5) Include "L" in "Trucks < 1 Ton"

(6) There was no vehicle classification data available for District 12

(7) “Semi” = “Big Rig”

(8) Include "T" in "Trucks > 1 Ton"

(9) Include "M", “O” and “N” in "Other"

√ = Data available

N/A = Data not available

5.1.3 Vehicle Location Category

Table 20: Condensed Disabled Vehicle Location Category Summary

Disabled Vehicle Location	D3	D4/D5s	D5m	D6	D7	D8	D10	D11	D12[4]
In Freeway Lane	√	√	√	√	√ [3]	√	√	√	N/A
Ramp/Connector	√	√	√	√	√	√	√	√	N/A
Other [1]	√	√ [6]	√ [6]	√	√	√	√	√	N/A
Right Shoulder	√	√	√	√	√	√	√	√	N/A
Left Shoulder	√	√	√	√ [5]	√ [5]	√	√	√	N/A
Unable to Locate	√				√ [2]	√	√		N/A

Notes:

(1) Assist records with the Vehicle Location field left blank were included in “Other”

(2) Include "Check Call Box" in "Unable to Locate"

(3) Include "In HOV Lane" in "In Freeway Lane"

(4) Disabled Vehicle Location data was not collected by District 12.

(5) Include "Center Median" and “CNT DIV” in "Left Shoulder"

(6) Include "In Gore Area" in "Other"

(7) Blank values in this table indicate no assist records reported this value

√ = Data available

N/A = Data not available

5.1.4 Towed To Location Category

Table 21: Towed To Location Category Summary

Towed to Location	D3	D4/D5s	D5m	D6	D7	D8	D10	D11	D12[3]
Shoulder	√ [7]	√	√ [7]	√	√	√ [8]	√ [7]	√ [7]	N/A
Off Freeway	√ [6]	√ [1,6]	√	√	√	√	√	√	N/A
No Tow	√	√		√	√	√	√	√	N/A
Other [4]	√	√		√					N/A

Notes:

(1) Include “Towed” in “Off Freeway”.

(2) District 10 only provided monthly summary tables.

(3) Towed To Location data was not collected by District 12.

(4) Assist records with the Towed To field left blank were included in “Other”

(5) Include "Right Shoulder" in "Shoulder".

(6) Include "Drop Zone" and “Drop Location” in "Off Freeway".

(7) Include "Pushed" in "Shoulder"

(8) Include "S" and “P” in "Shoulder"

(9) Blank values in this table indicate no assist records reported this value

N/A = Data not available

√ = Data Available

5.1.5 Vehicle Found Category

Table 22: Vehicle Found Category Summary

Found Category	D3	D4/D5s	D5m	D6	D7	D8	D10	D11	D12[(2)]
Dispatched by CHP/Caltrans	√	√	√	√	√	√	√	√	N/A
Found by You/Driver	√	√	√[(1)]	√	√	√	√	√[(4)]	N/A
Other	√[(3)]				√		√		

Notes:

(1) Include "Driver" in "Found by You/Driver"

(2) Vehicle Found data was not collected by District 12.

(3) Include "Partner Assist" in "Other"

(4) Include "FSP" in "Found by You/Driver"

(5) Blank values in this table indicate no assist records reported this value

√ = Data available

N/A = Data not available

Section 6: Statewide Reporting Recommendations

This section reports on the challenges encountered during the process of cleaning, processing and formatting the assist data for the FSP MIS databases and report. The following sections contain several recommendations based on these challenges.

6.1 *All Districts – Consistent Assist Record set of Description Fields*

Across the majority of FSP districts not all of the requested assist data fields were recorded and reported. Too often only a subset of what was required was provided. At a minimum, the following fields for each and every FSP Assist Record are required.

- District
- Beat
- Assist Date
- Arrival Time
- Departure Time
- Problem Type
- Vehicle Type
- Vehicle Location on Road
- Tow To
- How vehicle was found

Recommendation: Require each of the FSP Program representatives to verify values for ALL the fields listed above are included in each individual assist record. The possible formats and values for the fields are either apparent or listed in the next recommendation.

6.2 *All Districts - Data Coding and Categories*

The FSP Programs essentially have been implemented this suggestion from the FSP 0102 MIS report and are using codes from a standardized set of assist description codes. However, some FSP programs are reporting assist information using the entire set of codes, while others are only using a subset of the codes. The California FSP assist statistical analysis would be much more informative if all FSP programs used the granularity of the whole list of assist description codes as shown in the following tables.

Recommendation: Have each of the FSP Programs make all the assist description codes available to the FSP staff when filling out the assist Scantron forms, logs and/or entering the assist data into the electronic recording media.

Based on an agreement of the FSP technical committee, the standardized motorist assist description codes used to process the FSP program assist data is shown in the tables in the following sections. These codes should be used by each FSP program.

6.2.1 Problem Type

Table 23: Standardized Problem Type Category

Code	Problem Type
1	Abandoned
2	Accident
3	Debris Removal
4	Drive Off
5	Electrical Problem
6	Flat Tire
7	Help Enroute
8	Locked Out
9	Mechanical Problem
10	Other
11	Out of Gas
12	Over Heated
13	Refuse Service
14	Rollover
15	Unable to Locate
16	Vehicle Fire

6.2.2 Vehicle Type

Table 24: Standardized Vehicle Type Category

Code	Vehicle Type
1	Auto
2	Motorcycle
3	Van / SUV
4	Pickup / Truck
5	Big Rig
6	Other

6.2.3 Vehicle Location Category

Table 25: Standardized Disabled Vehicle Location Category

Code	Disabled Vehicle Location
1	In Freeway Lane
2	Left Shoulder
3	Other
4	Ramp/Connector
5	Right Shoulder
6	Unable to Locate

6.2.4 Towed To Location

Table 26: Standardized Towed to Location Category

Code	Towed to Location
1	Shoulder
2	Off Freeway
3	No Tow

6.2.5 Vehicle Found Category

Table 27: Standardized Found Category

Code	Found Category
1	Dispatched
2	Found by FSP Driver
3	Other

6.3 *All Districts - Data Entry Errors*

During the processing of the FSP 2004/05 assist data, data errors were encountered. The errors were in the beat IDs, dates, times and some descriptive code categories. The errors consisted of data entries that were not within the range of valid pre-defined values. For example, assist records had invalid assist dates and start times that were after the end times. The many of the time errors resulted in negative durations that could not be used in the calculation of the average assist durations. Upon review of these errors, it appears these problems are most likely the result of data entry errors. The data entry and validation process for all districts needs to be refined to find and correct these and other date, time and code entry errors.

Recommendation: Migration to a more reliable data coding media and reader technology.

For manually entered assist data, the entry fields should be preformatted and/or masked with the format of the intended entry values. The last method of data accuracy validation would be a manual scan the data for any errors. This can be done either with data sorting and/or a visual review of the data. Regardless of the method chosen, the goal is to record and report the most accurate and error free data as possible.

6.4 *All Districts – Reporting of "Other/Unknown/Blank" Problem Type*

The assist count in the Problem Type category of "Other/Unknown/Blank" is large. The category contains the count of not only the empty and unknown problem types but also the count of the problem types that do not easily fall in the condensed set of reported problem type categories. Combining these two different groupings of problem types takes information away from the data shown on the Problem Type statistical tables and graphs.

Recommendation: This recommendation comes in two (2) parts. First, each district needs to verify that every assist record has a Problem Type recorded. There seemed to be quite a few left blank either by mistake or uncertainty. Second, for future MIS reports this category should be separated into "Other" and "Blank/Unknown" categories. The "Other' category should contain a count of all assists that do not fall into one of the standardized Problem Categories, while the "Blank/Unknown" should contain a count of all assists for which there is no indication of what the assist's problem type was.

6.5 *All Districts – Blank Assist Description Code Fields*

Every set of assist data received had code description fields that were left blank. Most of the time, this was intentional because the field did not apply to the assist (i.e. "Vehicle Type" with a "Problem Type" of "Debris Removal"), however, it is unknown how many were unintentionally left blank.

Recommendation: Mark the fields with a code that indicates that this field is intentionally being left blank because it does not apply to this problem type. A code of "99" or "ZZ" could be used as the indicator.

6.6 *District 12 – Record Assists in One (1) Assist record*

Each assist was split into sets of 2-3 assist records. These sets of records included an Arrival record, a Departure record and sometimes an "ENRT" record. To process the data for this report, the corresponding assist Arrival and Departure records needed to be matched and combined to create a single assist record for each assist. The received FSP assist data records did not include the Vehicle Type, Vehicle Location, Found or Tow information.

The Beat #s were not included in the assist records. They needed to be determined by looking up the provided Unit # in a manually generated conversion table.

Recommendation: Encourage the District 12 representative to include ALL the information for each individual assist in One (1) assist record. Do not spread the information over 2-3 assist records. Also, request that the Beat, Vehicle Type, Vehicle Location, Found and Tow fields be added to each assist record.