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California's Freeway Service Patrol Program: Management Information System Annual Report Fiscal Year 2019-20

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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 2019, there were fourteen participating FSP Programs operating in California, deploying 338 tow trucks and covering over 1,806 (centerline) 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 2019-2020. 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 2019-20

Prepared for the California Department of Transportation

Traffic Operations Division

Prepared by

Institute of Transportation Studies
University of California at Berkeley

Final Report, September 26, 2021

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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 FSP trucks patrolling their beats find congestion-causing incidents and clear them quickly. Second, tow truck 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 Data & Performance Summary*

The bulk of the data used to develop the measures contained in this report were obtained directly from each FSP program. Each FSP assist 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 somewhat different formats.

The following points summarize the primary outputs of the FSP programs into the statewide Management Information System (MIS) databases for fiscal year 2019-20**:**

(1) In fiscal year 2019-20, the roving tow trucks of the FSP program provided over 670,000 assists on California's highway system. This is approximately 0.6 percent (%) increase over the previous year. Over 40% of total statewide assists were provided by the Los Angeles County FSP program. The next largest was the San Francisco Bay area's FSP program which provided about 13% of total statewide assists, followed by San Diego's FSP program over 12% of the statewide assists.

(2) The estimated benefit/cost ratios for FSP programs ranged from 2-to-1 (for the San Joaquin County FSP program) to 9-to-1 for Los Angeles, Riverside and San Bernardino Counties. The statewide average B/C ratio was 7-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 statewide FSP in 2019-20 was about 12 minutes, although the time spent on an individual assist can vary quite widely.

(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 2019-20 the state's fourteen FSP programs operated 206 (the same as in the previous fiscal year) beats with 338 trucks during the PM peak period covering over 1,800 centerline freeway miles. Together they provided over 785,000 total truck hours of service. On average, California's FSP trucks in FY 2019-20 supplied almost one assist for every hour of service (0.85 assists per tow truck-hour). These assists were primarily given to automobiles and vans, which constituted 63 percent of all assists. The three most common types of motorist's assists provided were for assistance with flat tires (15.4%), vehicle collisions (15.1%), and mechanical problems including electrical problems and overheated vehicles (14.4%).

(5) The number of FSP trucks and truck hours the state and its partner agencies can deploy is determined by funding availability. In FY 2019-20, the state allocated about $25.2 million to the locally run FSP programs and another $7.8 million to CHP for field supervisors, monitoring and training activities. The local transportation agency partners that run each program are required to provide 25 percent matching funds. In FY 2019-20, the local partner transportation agencies provided over $20.5 million in matching funds – over a 80 percent match. Some of the smaller FSP programs did not surpass the 25 percent local match requirement. The Los Angeles County program had the highest proportion of local match funding (107%). All matching funds are used by the contributing local transportation agencies for their own FSP operations.

Table 1 displays a program level summary of the FSP data and selected FSP program performance measures. Table 2 provides a summary of FSP overall program costs and funding allocation information. Table 3 lists additional environmental benefits attributable to the California FSP program such as motorist delay savings, fuel savings and mobile source emission reductions.

Table 1: Statewide FSP Service Summary (Combined Weekday and Weekend Service)

Caltrans District	County or Region	Number of Weekday Beats	Number of Peak Period Trucks	Weekday Center-line Miles	Total Truck Hours	Total FSP Assists	Average Assist Duration (min.)	Average Assist Rate [1]	Average B/C Ratio
3	Sacramento / Yolo	18	18	143	29,886	31,609	8.7	1.06	7.0
3	Placer	3	3	25	4,428	2,885	12.8	0.65	4.0
3	El Dorado	1	1	11	1,342	1,075	10.9	0.80	3.0
4	Bay Area Counties	27	66	428	135,684	88,998	10.1	0.66	6.0
5	Monterey	4	4	59	6,144	1,788	16.6	0.29	6.0
5	Santa Cruz	2	2	16	3,750	1,127	15.9	0.30	5.0
5	Santa Barbara	5	3	23	3,660	786	13.2	0.21	3.0
6	Fresno	4	4	30	5,000	3,947	10.1	0.79	4.0
7	Los Angeles	39	123	474	319,222	279,823	15.4	0.88	9.0
8	Riverside	12	26	136	47,330	49,064	9.9	1.04	9.0
8	San Bernardino	8	17	84	44,136	64,940	9.9	1.47	9.0
10	San Joaquin	5	5	26	10,926	3,327	15.1	0.30	2.0
11	San Diego	30	30	221	82,846	85,569	14.8	1.03	4.0
12	Orange	48	36	132	90,896	56,374	15.9	0.62	6.0
Total or Average		**206**	**338**	**1,806**	**785,250**	**671,312**	**12.3**	**0.85**	**7.0**

Notes: 1 – Assist Rate = Total Assists divided by Total Truck Hours.

Table 2: Statewide FSP Annual Funding Summary (Combined Weekday and Weekend Service)

Caltrans District	County or Region	Regular State FSP Funds ($)	Percent of Regular State FSP Funds	SB-1 Funds ($)	Percent of SB-1 Funds	Local Match Funds ($)	Percent of Local Match Funds	CHP Allocation ($)	Percent of CHP Allocation
3	Sacramento & Yolo	1,174,859	4.7%	580,426	4.8%	748,000	3.7%	319,334	4.1%
3	Placer	254,981	1.0%	125,966	1.0%	100,584	0.5%	69,305	0.9%
3	El Dorado	111,406	0.4%	0	0.0%	37,807	0.2%	30,281	0.4%
4	Bay Area Counties	5,999,385	23.8%	2,964,072	24.4%	4,013,414	19.6%	1,479,929	19.1%
5	Monterey	241,767	1.0%	121,121	1.0%	60,469	0.3%	0	0.0%
5	Santa Cruz	160,974	0.6%	79,525	0.7%	75,140	0.4%	0	0.0%
5	Santa Barbara	100,000	0.4%	0	0.0%	25,658	0.1%	0	0.0%
6	Fresno	360,361	1.4%	0	0.0%	96,185	0.5%	115,705	1.5%
7	Los Angeles	8,203,655	32.6%	4,053,278	33.3%	8,736,336	42.7%	2,670,999	34.5%
8	Riverside	1,591,464	6.3%	786,232	6.5%	1,451,986	7.1%	864,645	11.2%
8	San Bernardino	1,484,167	5.9%	733,232	6.0%	1,002,818	4.9%	515,571	6.7%
10	San Joaquin	491,524	2.0%	242,822	2.0%	190,506	0.9%	133,599	1.7%
11	San Diego	2,532,051	10.1%	1,250,957	10.3%	679,199	3.3%	783,654	10.1%
12	Orange	2,472,405	9.8%	1,221,526	10.0%	3,234,845	15.8%	766,978	9.9%
Total or Average		**25,179,000**	**100.0%**	**12,159,155**	**100.0%**	**32,709,881**	**100.0%**	**7,750,000**	**100.0%**

Table 3: Statewide FSP Annual Delay, Fuel and Emission Saving Summary (Combined Weekday and Weekend Service)

Caltrans District And County (or Region)	Total Vehicle Delay Savings (veh-hr)	Total Fuel Savings (gallons)	Total ROG Reductions (kg)	Total CO Reductions (kg)	Total NOx Reductions (kg)	Total PM10 Reductions (kg)	Total CO2 Reductions (kg)	Total N2O Reductions (kg)	Total CH4 Reductions (kg)
3-Sacramento & Yolo	405,208	696,553	16.2	202.6	48.6	2.4	6,129,670	93.8	254.1
3-Placer	45,856	78,827	1.8	22.9	5.5	0.3	693,674	10.6	28.8
3-El Dorado	9,174	15,771	0.4	4.6	1.1	0.1	138,783	2.1	5.8
4-Bay Area	2,069,176	3,556,913	82.8	1,034.6	248.3	12.4	31,300,835	479.0	1,297.3
5-Monterey	57,712	99,207	2.3	28.9	6.9	0.3	873,023	13.4	36.2
5-Santa Cruz	35,532	61,079	1.4	17.8	4.3	0.2	537,497	8.2	22.3
5-Santa Barbara	21,002	36,103	0.8	10.5	2.5	0.1	317,704	4.9	13.2
6-Fresno	47,095	80,957	1.9	23.5	5.7	0.3	712,422	10.9	29.5
7-Los Angeles	5,175,845	8,897,277	207.0	2,587.9	621.1	31.1	78,296,040	1,198.2	3,245.2
8-Riverside	766,673	1,317,910	30.7	383.3	92.0	4.6	11,597,611	177.5	480.7
8-San Bernardino	684,158	1,176,067	27.4	342.1	82.1	4.1	10,349,388	158.4	429.0
10-San Joaquin	46,801	80,450	1.9	23.4	5.6	0.3	707,964	10.8	29.3
11-San Diego	480,640	826,220	19.2	240.3	57.7	2.9	7,270,734	111.3	301.4
12-Orange	1,032,549	1,774,952	41.3	516.3	123.9	6.2	15,619,580	239.0	647.4
Statewide	**10,877,421**	**18,698,287**	**435.1**	**5,438.7**	**1,305.3**	**65.3**	**164,544,924**	**2,518.0**	**6,819.9**

1.3 *Summary of Recommendations*

FSP Assist Data Collection Procedures

Caltrans Headquarters, FSP agency partners and CHP should continue working to keep current with best practices for data management technologies and for monitoring the activities of the FSP tow providers. With Wi-Fi/Bluetooth/cell phone technical advancements, new and very affordable GPS enabled data collection systems are readily available. These technologies help to enable the FSP management teams (local agencies and CHP) to monitor the activity of the FSP tow providers in real time, and ease the tasks of preparing FSP performance reports.

The majority of the FSP programs have migrated to using customized applications with laptop, iPad or some other portable device for collecting FSP assist data. Sacramento's FSP program was one of the first programs to automate this process. Sacramento County developed and has been using *FSPTrack* for several years now. *FSPTrack* is a Google Android application with server support that enables FSP managers to monitor FSP tow truck activity. *FSPTrack* also allows FSP tow truck drivers to log incidents via the Android app which is uploaded to a database on a server, thus making the FSP assist data available to FSP management in near real time. Orange County (OCTA) and the Bay Area FSP program managed by MTC have an advanced FSP management system called *LATA-Trax*.

A few of the FSP programs (Los Angeles MTA, Santa Barbara SBCAG, San Diego SANDAG and Fresno COG) are still using manual paper-form based FSP assist data collection technologies. The Los Angeles MTA and San Diego SANDAG FSP program managers are looking into electronic data collection options. Appendix B contains additional information on the FSP data management systems currently being used to collect and manage the California FSP assist data.

It is recommended that Caltrans Headquarters continue to work with the FSP managers in their efforts as they update their data management practices and as they make changes to the FSP assist data that is being collected by the FSP tow truck drivers/providers. One recent concern that has been raised is "How is it tracked when multiple FSP tow trucks respond to a single incident?" Do these multiple FSP responses to a single incident result in an over reporting of incidents (i.e., duplicate incident records) in the FSP tracking databases? The over-reporting of freeway incidents could result in an over-reporting of FSP delay savings.

Performance Based Management Practices

Additionally, there are concerns about efficiencies in the allocation of FSP tow trucks to FSP beats, the currently assigned FSP hours of operation, and levels of FSP service being provided. Basically, the questions boil down to: 1) How many FSP tow trucks should we have? 2) Where should the tow truck be? And, 3) When should they be operating?

To address these concerns and to improve the FSP program's performance, a method should be developed that compares the allocation of FSP tow trucks (and truck-hours) to the need for FSP service. The need for FSP service could be measured using other freeway utilization & performance indicators such as freeway corridor vehicle miles of travel (VMT), vehicle hours of travel (VHT), vehicle hours of delay, and accident/incident rates. These indicators provide the means for comparisons between the demand for FSP services and the supply of FSP resources,

which would facilitate FSP managers to allocate FSP resources in proportion to the demand for FSP service. The method of matching FSP service to the need for tow assistance should be temporal as well as geographical – that is it should provide information on FSP operating hours (and number of tow trucks required by time of day) as well as showing how the required number of tow trucks varies by freeway segments. This tool could also be utilized to identify freeway segments where new FSP service would most probably be cost effective.

When implementing changes to FSP service, the effects of these changes on the performance of the FSP program should be closely monitored to assure that the changes (improvements) to the FSP program actually deliver the expected increases in performance. This need for follow through and performance monitoring holds true whether the changes to FSP service is extending FSP hours of operation, new weekend or midday FSP service, increases or reductions to the number of FSP tow trucks on a beat or FSP service on a new beat. Tracking FSP performance metrics using "Before and After" techniques and/or by the use of control groups needs to accompany implementing changes in FSP service otherwise it cannot be shown that the expected gains in FSP performance are actually realized (in the real world) as forecasted in planning exercises.

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, FSP operates Monday through Friday during peak commute hours. In heavily congested freeway corridors, FSP service is provided during the midday and on weekends/holidays in addition to the weekday peak period service.

The goal of FSP is to maximize the efficiency of the freeway transportation system. 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 2019-20, the FSP program provided over 670,000 assists from the fourteen FSP programs across nine of the twelve Caltrans districts.

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.

2.2 *The FSP Program Adaptations to the COVID-19 Pandemic*

California initiated a "shelter in place" mandate mid-March 2020 in response to the COVID-19 pandemic. During the first part of the shelter in place mandate, overall freeway traffic volumes dropped by 20-25% (or more), and freeway congestion all but disappeared. Many Californians were left without work. Likewise, California's county sales tax revenues declined significantly with the COVID-19 restrictions on retail establishments, tourist attractions, restaurants, hotels, and sporting events.

When the COVID pandemic hit the Bay Area, the characteristic AM and PM traffic peaks ceased to exist due to motorists not travelling for traditional work activities. To match the traffic being distributed throughout the day, the Bay Area FSP program also distributed its service throughout the day by breaking each beat into two shifts – Shift A from 6:00 AM to 12:30 PM and Shift B from 12:30 PM to 7:00 PM. For example, if a beat had 4 trucks, 2 trucks would run from 6:00 AM to 12:30 pm and the other two trucks would run from 12:30 PM to 7:00 PM. Due to the modification, the drivers were allowed a 30-minute lunch break and were required to sanitize their

trucks after every shift. The Bay Area FSP program modified their towing services plan for two reasons: 1) with no traffic peaks, we decided that we could spread the service over the entire day in order to match the traffic patterns, and 2) by having each truck/driver have one shift per day it would be easier to sanitize the trucks and would reduce the number of times that the drivers were switching trucks and going into out of their tow yards, thus minimizing human contact. This COVID modified service was in place from March 23 to May 29, 2020.

To reduce costs to address the revenue shortfall experienced by their agency (because of the COVID-19 shelter in place mandate) and because of the reduced demand for travel and the associated decline in freeway congestion, the Los Angeles Metro FSP Program elected to cut some of their FSP services. For the first eight months of FY 2019-20 (before the COVID-19 shelter in place mandate), Los Angeles Metro operated 123 peak period and 44 midday tow trucks on weekdays and 43 tow-trucks on weekends. Starting April 1, 2020, Los Angeles Metro reduced their weekday peak period FSP services by 45 tow trucks (from 123 tow-trucks to 78 tow-trucks). Another FSP service cut was initiated May 1, 2020 (and remained in effect for the last two months of FY 2019-20) – five midday tow trucks were removed from service (from 44 tow trucks to 39 tow trucks), and four weekend tow-trucks were removed (from 43 to 39 tow-trucks).

Orange County (OCTA) developed three reduction-level plans in the event that reductions were deemed appropriate. OCTA monitored assist activity daily and saw no significant declines in assist levels. All other FSP programs retained their pre-COVID levels of FSP service throughout the COVID-19 shelter in place portion of the 2019-20 fiscal year.

Additionally, San Luis Obispo Council of Governments initiated FSP service on one beat in San Luis Obispo County on March 13, 2020, right before the Governor's shelter in place mandate was implemented. As such, the San Luis County FSP program was not included in this FY 2019-20 performance evaluation and annual report. FSP service was initiated on a second beat on August 3, 2020 (in FY 2020-21), and the San Luis Obispo FSP program will be included in the FY 2020-21 FSP performance evaluation and annual report.

2.3 *Project Scope*

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

1) Develop FSP 2019-20 Management Information System (MIS) databases
2) Produce FSP 2019-20 California Local Program Report(s)
3) Produce FSP 2019-20 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.

2.3.1 Develop FSP 2019-20 MIS Databases

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

1) Solicit and collect the 2019-20 FSP program data from each of the FSP Programs.

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 databases, with each database containing the data for individual FSP programs.

2.3.2 Produce FSP 2019-20 California Local Program Report

The development of the FSP 2019-20 California Local Program Report consisted of the following sub-tasks:

1) Compile each local 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 FSP program data.

2.3.3 Produce FSP 2019-20 California Statewide MIS Program Report

The development of the FSP 2019-20 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 the FSP statewide 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 previous FSP MIS annual report as a template for the FSP 2019-20 report. Create the shell of the FSP 2019-20 report.
4) Add all relevant text and tables from the previous FSP annual 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 2019-20 Fiscal Year.

2.3.4 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*

Each local program's raw data was cleaned, and standardized. In the final databases there are over 670,000 records for the fiscal year 2019-20. They are stored in and manipulated using Microsoft Excel. Each FSP program's dataset is stored in its own database file. The following sections provide the statewide summary tables and graphs based on these final databases.

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 ($22.80/vehicle-hour) and fuel consumption ($3.37/gallon).

The value of time for motorists was derived from value of time parameters from the Caltrans Office of State Planning, Economic Analysis Branch website. The website's travel time and vehicle operation cost parameters are in units of "2016 Current Dollar Value"

- Auto/Truck Composite (Weighted-Average) = $18.95 (dollars per person hour)
- Average Peak Vehicle Occupancy Rate = 1.20 persons per vehicle

The resulting $22.80 per vehicle-hour cost parameter used in the FSP performance evaluation was derived from combining the ($18.95 /person-hour) and the (1.20 persons/vehicle).

The California statewide annual average fuel costs of $3.37/gallon of gasoline for FY 2019-20 was estimated from weekly California statewide average prices are compiled by the U.S. Department of Energy's Energy Information Administration (EIA) from a telephone survey that includes a sample of 38 California gasoline stations. These stations were sampled with a likelihood equal to the company's proportional size to the total annual volume of gasoline, by grade, sold in California.

The annual FSP program 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.

In response to the COVID-19 pandemic, the California COVID-19 "shelter in place" plan was initiated mid-March 2020 and remained in effect throughout the remaining four months of the Caltrans FY 2019-20. Overall travel (i.e., traffic volumes) and freeway congestion were at an all-time low During the start of the "shelter in place" mandate and did not represent normal operations for the Caltrans FSP program and other incident response programs. For these reasons, the FSP B/C ratios (for FY 2019-20) were estimated using the July 1, 2019 – February 28, 2020 time period (the first 8 months of the FY 2019-20 fiscal year). All other FSP assist totals and statistics were estimated using the full 12 months of FSP assist data.

Section 4: FSP Performance Summary

4.1 *Statewide Total Assists by Fiscal Year*

Table 4 shows that the annual statewide total assists increased by about 0.6% (from 686,211 in FY 2017-18 to 690,116 in FY 2019-20). This is shown graphically in Figure 1.

Table 4: Total Assists and Annual Change by Fiscal Year

Fiscal Year	Total Assists	Annual Change (percent)	Fiscal Year	Total Assists	Annual Change (percent)
1991-92	152,526	0.0%	2010-11	655,686	1.0%
1992-93	295,613	93.8%	2011-12	672,472	2.6%
1993-94	452,018	52.9%	2012-13	651,315	-3.1%
1994-95	448,170	-0.9%	2013-14	651,441	0.0%
1995-96	540,874	20.7%	2014-15	666,686	2.3%
1996-97	587,941	8.7%	2015-16	682,424	2.4%
1997-98	583,699	-0.7%	2016-17	673,350	-1.3%
1998-99	568,276	-2.6%	2017-18	686,211	1.9%
1999-00	625,090	10.0%	2018-19	690,116	0.6%
2000-01	631,161	1.0%	2019-20	671,312	-2.7%
2001-02	643,607	2.0%			
2002-03	651,710	1.3%			
2003-04	646,749	-0.8%			
2004-05	618,440	-4.4%			
2005-06	669,895	8.3%			
2006-07	666,612	-0.5%			
2007-08	668,142	0.2%			
2008-09	638,880	-4.4%			
2009-10	649,155	1.6%			

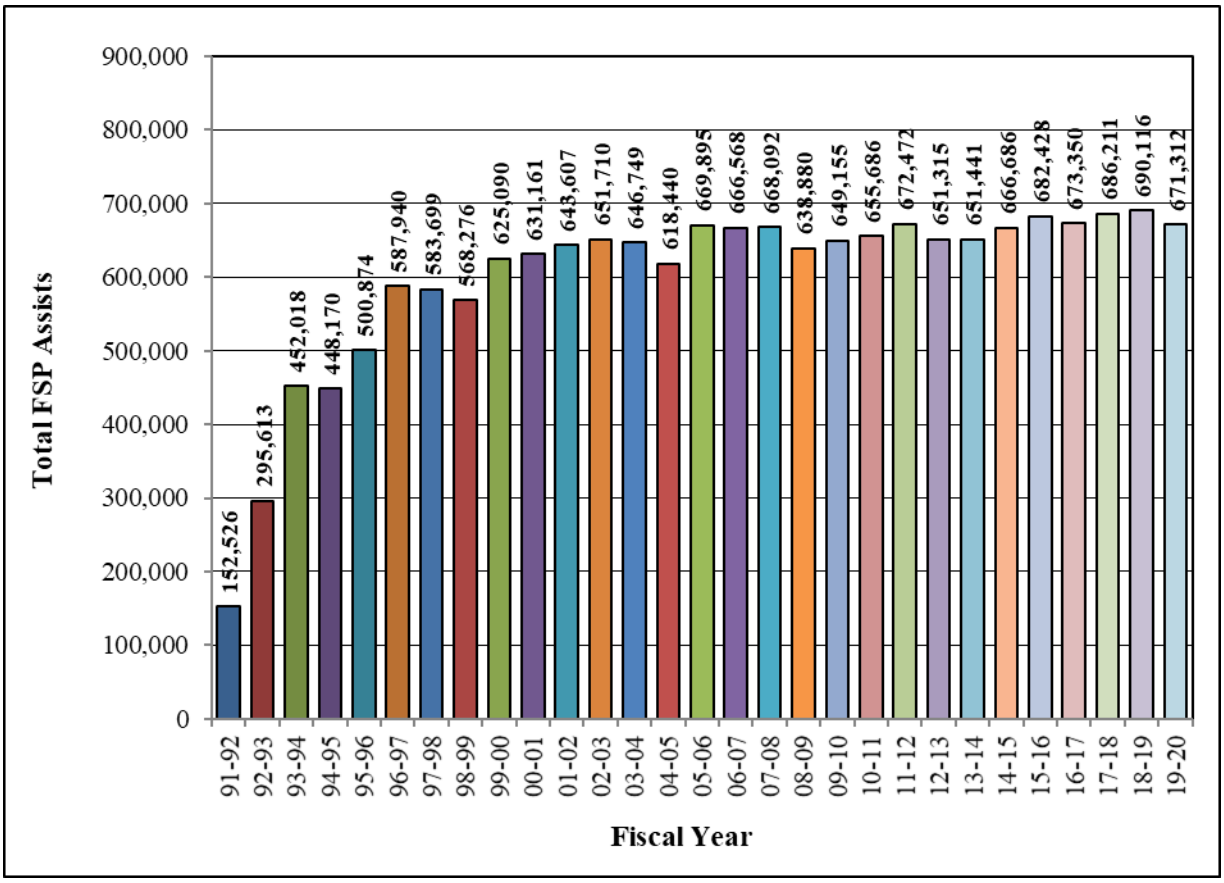

Figure 1: Bar Chart – Total FSP Assists by Fiscal Year

4.2 *Benefit/Cost Ratios for FSP Programs*

Table 5: B/C Ratio for Each FSP Program *

Caltrans District	Counties or Region	Peak Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday (Pk+Md) B/C Ratio	Weekend B/C Ratio	Annual (Total) B/C Ratio
3	Sacramento / Yolo	7.0	-	7.0	4.0	7.0
3	Placer	4.0	-	4.0	-	4.0
3	El Dorado	3.0	-	3.0	-	3.0
4	Bay Area Counties	6.0	3.0	6.0	1.0	6.0
5	Monterey	6.0	-	6.0	5.0	6.0
5	Santa Cruz	5.0	-	5.0	6.0	5.0
5	Santa Barbara	3.0	-	3.0	-	3.0
6	Fresno	4.0	-	4.0	-	4.0
7	Los Angeles	9.0	8.0	9.0	5.0	9.0
8	Riverside	9.0	-	9.0	-	9.0
8	San Bernardino	10.0	4.0	9.0	8.0	9.0
10	San Joaquin	3.0	-	3.0	2.0	2.0
11	San Diego	5.0	1.0	4.0	3.0	4.0
12	Orange	6.0	7.0	6.0	5.0	6.0
	Statewide	**8.0**	**6.0**	**7.0**	**5.0**	**7.0**

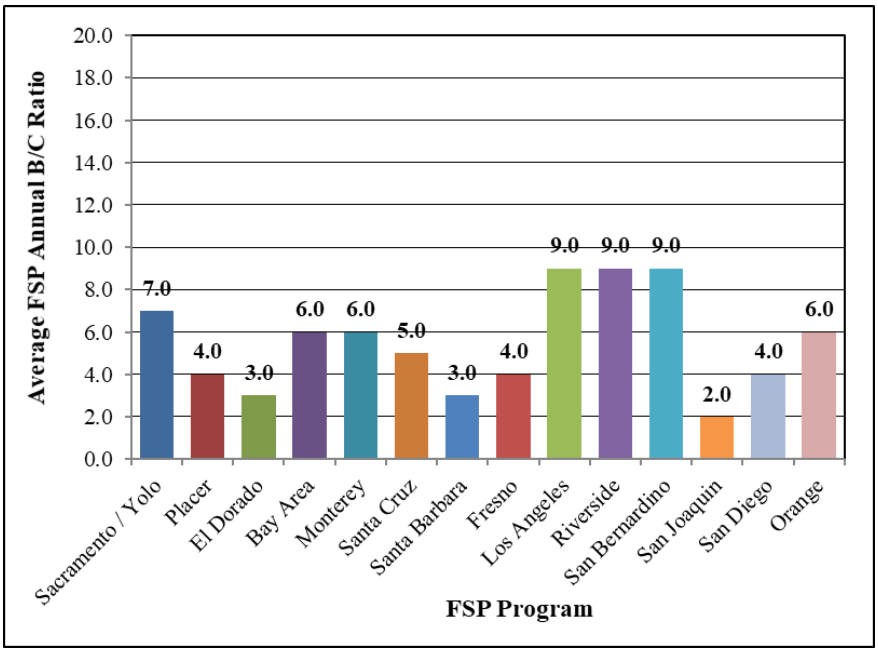

Figure 2: Bar Chart of FSP Benefit/Cost Ratios by Program *

* For FY 2019-20, the FSP B/C ratios were estimated using the July 1 2019 – February 28 2020 data (the first eight months of the fiscal year), due to the COVID-19 "shelter in place" mandate initiated mid-March 2020.

4.3 *Statewide FSP Total Assists by Quarter & Program*

Table 6: Total Assists by Quarter & Program

		Jul 19 - Sep 19	Oct 19 - Dec 19	Jan 20 - Mar 20	Apr 20 - Jun 20		
Caltrans District	**County or Region**	**Quarter 3**	**Quarter 4**	**Quarter 1**	**Quarter 2**	**Total Assists**	**Percent**
3	Sac & Yolo	8,929	7,512	8,127	7,041	31,609	4.7%
3	Placer	816	807	679	583	2,885	0.4%
3	El Dorado	325	309	249	192	1,075	0.2%
4	Bay Area	26,529	22,962	22,006	17,501	88,998	13.3%
5	Monterey	789	382	320	297	1,788	0.3%
5	Santa Cruz	349	282	201	296	1,127	0.2%
5	Santa Barbara	226	219	193	149	786	0.1%
6	Fresno	1,268	1,133	898	648	3,947	0.6%
7	Los Angeles	83,178	70,608	68,111	57,926	279,823	41.7%
8	Riverside	12,282	10,022	12,055	14,705	49,064	7.3%
8	San Bernardino	16,903	13,076	16,328	18,633	64,940	9.7%
10	San Joaquin	873	811	790	853	3,327	0.5%
11	San Diego	23,159	19,903	20,946	21,561	85,569	12.7%
12	Orange	13,404	12,214	13,402	17,354	56,374	8.4%
Total Assists		**189,029**	**160,240**	**164,305**	**157,739**	**671,312**	**100.0%**
% of Total Assists		**28.2%**	**23.9%**	**24.5%**	**23.5%**		**100.0%**

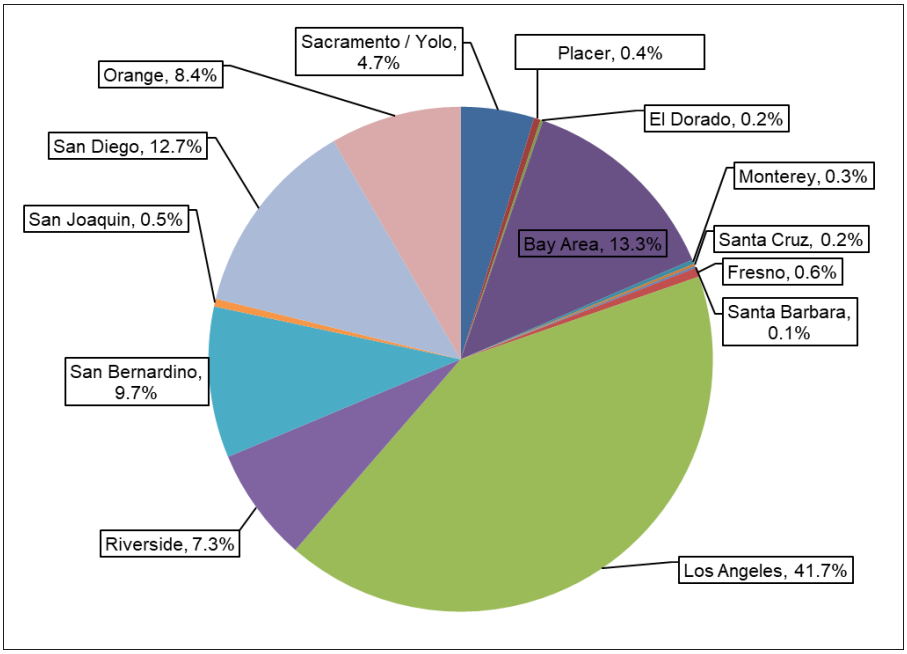

Figure 3: Pie Chart of Total Assists by Program

4.4 *Statewide FSP Total Assists by Problem Type*

Table 7: Total Assists by Problem Type

Problem Type	Total Assists	Percent
Abandoned	25,993	3.9%
Accident	101,431	15.1%
Debris Removed	20,766	3.1%
Flat Tire	103,203	15.4%
Mechanical Problems	108,232	16.1%
Other*	227,191	33.8%
Out of Gas	54,834	8.2%
Over Heated	29,662	4.4%
Total Assists	**671,312**	**100.0%**

* "Other" includes the assist records for refused service, informational assistance, unable to locate, drive off, service en-route, and/or incidents with too little information.

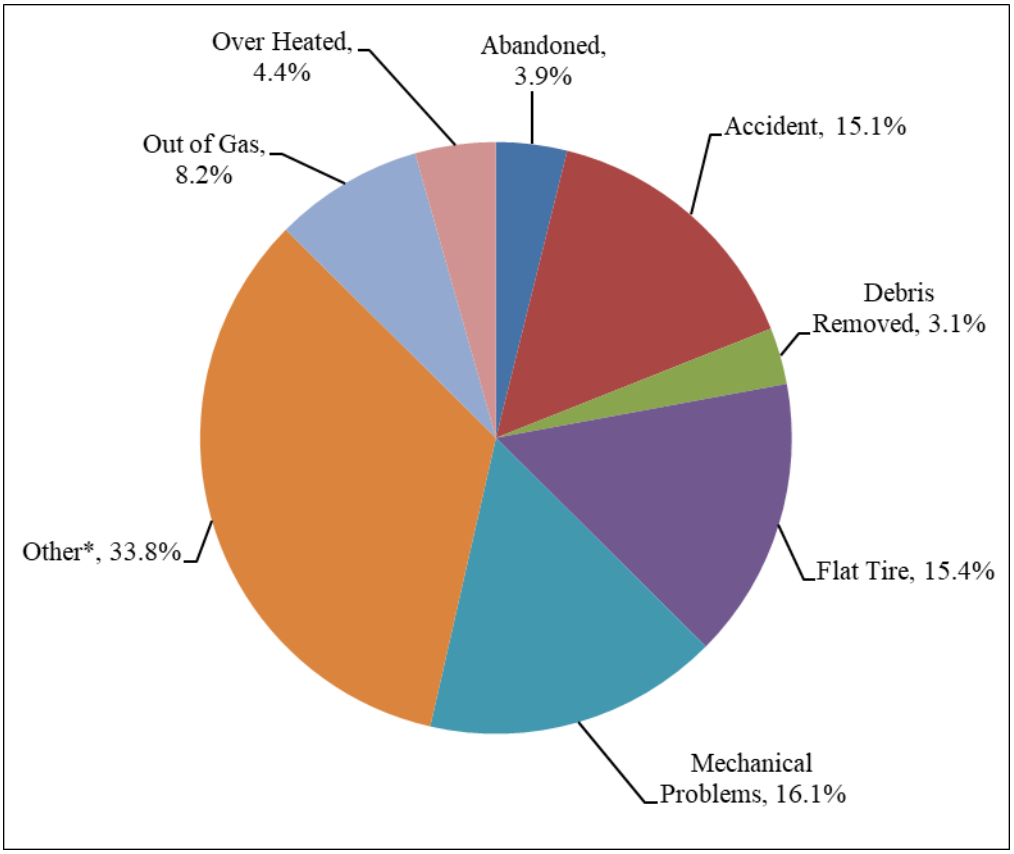

Figure 4: Pie Chart of Total Assists by Problem Type

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

Table 8: Total Assists by Problem Type & Program

Caltrans District	Counties or Region	Abandoned	Accident	Debris Removed	Flat Tire	Mechanical Problems	Other*	Out of Gas	Over Heated	Total Assists
3	Sac & Yolo	1,350	11,804	1,080	5,242	5,835	3,306	2,239	753	31,609
3	Placer	309	676	64	571	677	294	230	64	2,885
3	El Dorado	114	141	23	173	299	193	94	38	1,075
4	Bay Area	5,368	11,953	1,817	17,681	20,109	20,939	6,701	4,430	88,998
5	Monterey	113	443	312	194	248	316	125	37	1,788
5	Santa Cruz	112	173	79	131	214	256	99	64	1,127
5	Santa Barbara	60	83	31	157	147	111	127	71	786
6	Fresno	389	1,218	47	437	1,021	88	740	7	3,947
7	Los Angeles	5,368	52,609	4,749	42,496	41,039	96,580	22,207	14,775	279,823
8	Riverside	2,061	4,064	2,660	6,763	7,639	20,618	3,088	2,171	49,064
8	San Bernardino	3,729	5,725	3,154	8,461	9,026	28,559	3,820	2,466	64,940
10	San Joaquin	369	504	47	853	868	277	298	111	3,327
11	San Diego	4,994	5,445	2,073	11,847	11,395	37,135	9,331	3,349	85,569
12	Orange	1,658	6,594	4,630	8,197	9,715	18,519	5,735	1,326	56,374
Total Assists		**25,993**	**101,431**	**20,766**	**103,203**	**108,232**	**227,191**	**54,834**	**29,662**	**671,312**
Average %		**3.9%**	**15.1%**	**3.1%**	**15.4%**	**16.1%**	**33.8%**	**8.2%**	**4.4%**	**100.0%**

* "Other" includes assist records for refused service, informational assistance, unable to locate, drive off, service en-route, and/or incidents with too little information.

Table 9: Total Assists by Problem Type & Program (in Percent)

Caltrans District	Counties or Region	Abandoned	Accident	Debris Removed	Flat Tire	Mechanical Problems	Other*	Out of Gas	Over Heated	Total Assists (percent)
3	Sac & Yolo	4.3%	37.3%	3.4%	16.6%	18.5%	10.5%	7.1%	2.4%	4.7%
3	Placer	10.7%	23.4%	2.2%	19.8%	23.5%	10.2%	8.0%	2.2%	0.4%
3	El Dorado	10.6%	13.1%	2.1%	16.1%	27.8%	18.0%	8.7%	3.5%	0.2%
4	Bay Area	6.0%	13.4%	2.0%	19.9%	22.6%	23.5%	7.5%	5.0%	13.3%
5	Monterey	6.3%	24.8%	17.4%	10.9%	13.9%	17.7%	7.0%	2.1%	0.3%
5	Santa Cruz	7.6%	10.5%	3.9%	20.0%	18.7%	14.1%	16.2%	9.0%	0.2%
5	Santa Barbara	9.9%	15.3%	7.0%	11.6%	19.0%	22.7%	8.8%	5.7%	0.1%
6	Fresno	9.8%	30.9%	1.2%	11.1%	25.9%	2.2%	18.7%	0.2%	0.6%
7	Los Angeles	1.9%	18.8%	1.7%	15.2%	14.7%	34.5%	7.9%	5.3%	41.7%
8	Riverside	4.2%	8.3%	5.4%	13.8%	15.6%	42.0%	6.3%	4.4%	7.3%
8	San Bernardino	5.7%	8.8%	4.9%	13.0%	13.9%	44.0%	5.9%	3.8%	9.7%
10	San Joaquin	11.1%	15.1%	1.4%	25.6%	26.1%	8.3%	9.0%	3.3%	0.5%
11	San Diego	5.8%	6.4%	2.4%	13.8%	13.3%	43.4%	10.9%	3.9%	12.7%
12	Orange	2.9%	11.7%	8.2%	14.5%	17.2%	32.9%	10.2%	2.4%	8.4%
Average %		**3.9%**	**15.1%**	**3.1%**	**15.4%**	**16.1%**	**33.8%**	**8.2%**	**4.4%**	**100.0%**

4.6 *Statewide FSP Total Assists by Vehicle Type*

Table 10: Total Assists by Vehicle Type

Vehicle Type	Total Assists	Percent
Auto / Van	426,181	63.5%
Big Rig	44,713	6.7%
Other / Unknown	44,296	6.6%
SUV / Pickup	137,349	20.5%
Trucks	18,773	2.8%
Total Assists	**671,312**	**100.0%**

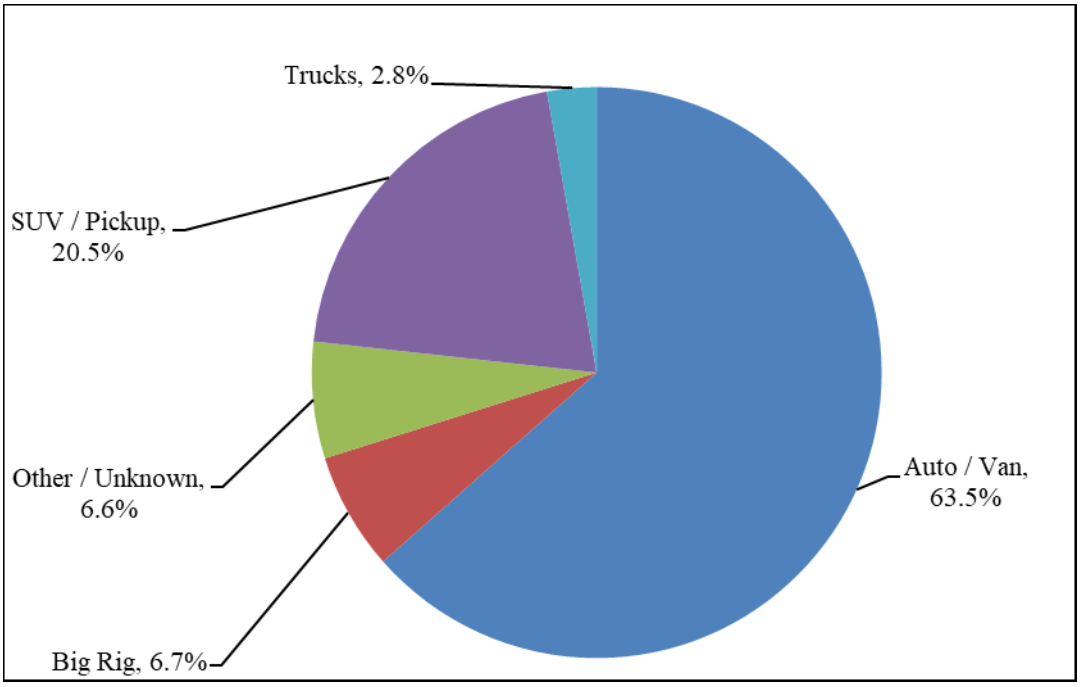

Figure 5: Pie Chart of Total Assists by Vehicle Type

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

Table 11: Total Assists by Vehicle Type & Program

Caltrans District	Counties or Region	Auto / Van	Big Rig	Other / Unknown	SUV / Pickup	Trucks	Total Assists
3	Sac & Yolo	17,760	456	3,316	9,474	603	31,609
3	Placer	1,487	100	199	1,037	62	2,885
3	El Dorado	471	16	77	437	74	1,075
4	Bay Area	63,027	214	9,084	12,616	4,057	88,998
5	Monterey	1,090	33	393	221	51	1,788
5	Santa Cruz	783	14	144	151	35	1,127
5	Santa Barbara	153	43	77	396	117	786
6	Fresno	2,974	46	102	796	28	3,947
7	Los Angeles	202,752	12,991	13,400	45,612	5,068	279,823
8	Riverside	24,005	10,129	3,160	8,330	3,440	49,064
8	San Bernardino	31,737	17,065	3,687	9,215	3,236	64,940
10	San Joaquin	2,166	27	134	935	65	3,327
11	San Diego	45,063	1,637	6,202	31,478	1,189	85,569
12	Orange	32,712	1,942	4,321	16,652	747	56,374
Total Assists		**426,181**	**44,713**	**44,296**	**137,349**	**18,773**	**671,312**
Average %		**63.5%**	**6.7%**	**6.6%**	**20.5%**	**2.8%**	**100.0%**

Table 12: The Percent of Total Assists by Vehicle Type & Program

Caltrans District	Counties or Region	Auto / Van	Big Rig	Other / Unknown	SUV / Pickup	Trucks	Total Assists
3	Sac & Yolo	56.2%	1.4%	10.5%	30.0%	1.9%	4.7%
3	Placer	51.5%	3.5%	6.9%	35.9%	2.1%	0.4%
3	El Dorado	43.8%	1.5%	7.2%	40.7%	6.9%	0.2%
4	Bay Area	70.8%	0.2%	10.2%	14.2%	4.6%	13.3%
5	Monterey	61.0%	1.8%	22.0%	12.4%	2.9%	0.3%
5	Santa Cruz	69.5%	1.2%	12.8%	13.4%	3.1%	0.2%
5	Santa Barbara	19.5%	5.5%	9.7%	50.4%	14.9%	0.1%
6	Fresno	75.4%	1.2%	2.6%	20.2%	0.7%	0.6%
7	Los Angeles	72.5%	4.6%	4.8%	16.3%	1.8%	41.7%
8	Riverside	48.9%	20.6%	6.4%	17.0%	7.0%	7.3%
8	San Bernardino	48.9%	26.3%	5.7%	14.2%	5.0%	9.7%
10	San Joaquin	65.1%	0.8%	4.0%	28.1%	2.0%	0.5%
11	San Diego	52.7%	1.9%	7.2%	36.8%	1.4%	12.7%
12	Orange	58.0%	3.4%	7.7%	29.5%	1.3%	8.4%
Average %		**63.5%**	**6.7%**	**6.6%**	**20.5%**	**2.8%**	**100.0%**

4.8 *Statewide FSP Total Assists by Vehicle Location*

Table 13: Total Assists by Vehicle Location

Vehicle Location	Total Assists	Percent
In Lane	69,353	10.3%
On Left Shoulder	23,943	3.6%
On Right Shoulder	492,751	73.4%
Other	18,165	2.7%
Ramp / Connector	30,038	4.5%
Unable to Locate	37,064	5.5%
Total Assists	**671,313**	**100.0%**

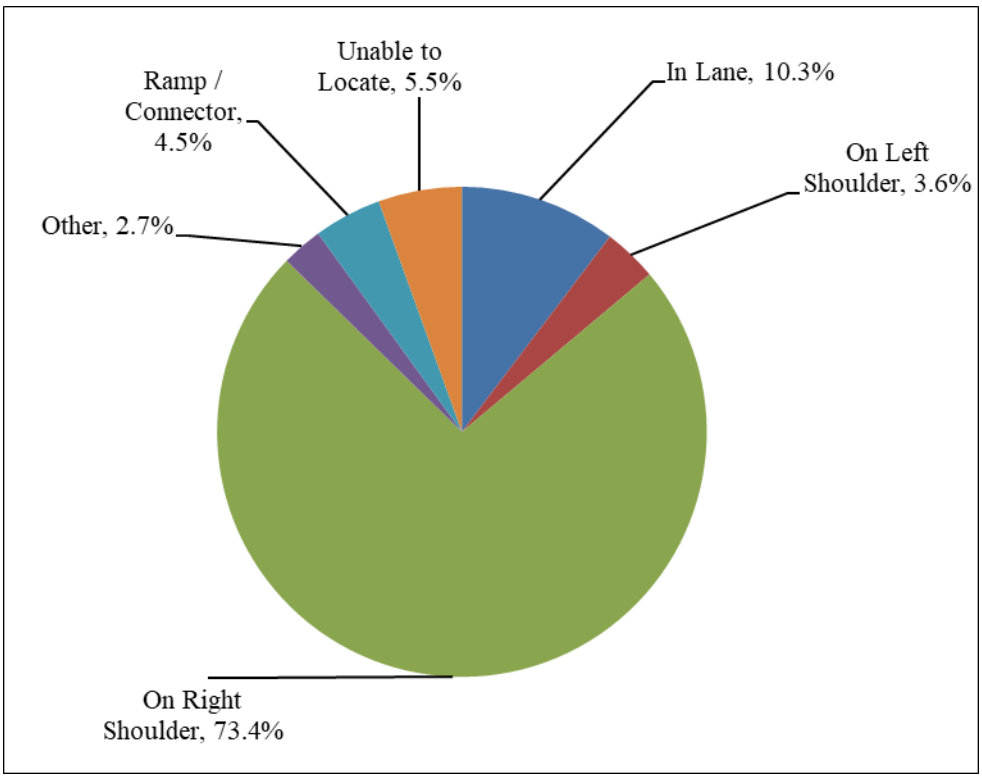

Figure 6: Pie Chart of Total Assists by Vehicle Location

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

Table 14: Total Assists by Vehicle Location & Program

Caltrans District	Counties or Region	In Lane	On Left Shoulder	On Right Shoulder	Other	Ramp / Connector	Unable to Locate	Total Assists
3	Sac & Yolo	3,704	2,690	20,509	2,265	2,419	22	31,609
3	Placer	145	263	2,119	83	275	0	2,885
3	El Dorado	30	68	816	21	140	0	1,075
4	Bay Area	4,342	747	49,543	0	1,546	32,820	88,998
5	Monterey	542	214	936	13	80	3	1,788
5	Santa Cruz	208	62	700	9	105	43	1,127
5	Santa Barbara	174	269	171	172	0	0	786
6	Fresno	539	354	2,757	0	296	2	3,947
7	Los Angeles	28,136	6,979	215,532	14,504	11,076	3,595	279,823
8	Riverside	8,371	2,189	38,504	0	0	0	49,064
8	San Bernardino	11,414	2,786	50,741	0	0	0	64,941
10	San Joaquin	125	484	2,511	16	188	3	3,327
11	San Diego	4,555	4,971	62,909	1,056	11,502	576	85,569
12	Orange	7,068	1,867	45,002	26	2,411	0	56,374
Total Assists		**69,353**	**23,943**	**492,751**	**18,165**	**30,038**	**37,064**	**671,313**
Average %		**10.3%**	**3.6%**	**73.4%**	**2.7%**	**4.5%**	**5.5%**	**100.0%**

Table 15: The Percent of Total Assists by Vehicle Location & Program

Caltrans District	Counties or Region	In Lane	On Left Shoulder	On Right Shoulder	Other	Ramp / Connector	Unable to Locate	Total Assists
3	Sac & Yolo	11.7%	8.5%	64.9%	7.2%	7.7%	0.1%	4.7%
3	Placer	5.0%	9.1%	73.4%	2.9%	9.5%	0.0%	0.4%
3	El Dorado	2.8%	6.3%	75.9%	2.0%	13.0%	0.0%	0.2%
4	Bay Area	4.9%	0.8%	55.7%	0.0%	1.7%	36.9%	13.3%
5	Monterey	30.3%	12.0%	52.3%	0.7%	4.5%	0.2%	0.3%
5	Santa Cruz	18.4%	5.5%	62.1%	0.8%	9.3%	3.8%	0.2%
5	Santa Barbara	22.2%	34.2%	21.8%	21.8%	0.0%	0.0%	0.1%
6	Fresno	13.6%	9.0%	69.9%	0.0%	7.5%	0.0%	0.6%
7	Los Angeles	10.1%	2.5%	77.0%	5.2%	4.0%	1.3%	41.7%
8	Riverside	17.1%	4.5%	78.5%	0.0%	0.0%	0.0%	7.3%
8	San Bernardino	17.6%	4.3%	78.1%	0.0%	0.0%	0.0%	9.7%
10	San Joaquin	3.8%	14.5%	75.5%	0.5%	5.7%	0.1%	0.5%
11	San Diego	5.3%	5.8%	73.5%	1.2%	13.4%	0.7%	12.7%
12	Orange	12.5%	3.3%	79.8%	0.0%	4.3%	0.0%	8.4%
Average %		**10.3%**	**3.6%**	**73.4%**	**2.7%**	**4.5%**	**5.5%**	**100.0%**

4.10 *Statewide FSP Average Assist Duration by Program*

Table 16: The Average Assist Duration by Program

Caltrans District	Counties or Region	Average Duration (minutes)
3	Sac & Yolo	8.7
3	Placer	12.8
3	El Dorado	10.9
4	Bay Area	10.1
5	Monterey	16.6
5	Santa Cruz	15.9
5	Santa Barbara	13.2
6	Fresno	10.1
7	Los Angeles	15.4
8	Riverside	9.9
8	San Bernardino	9.9
10	San Joaquin	15.1
11	San Diego	8.4
12	Orange	15.9
Average Duration		**12.3**

Note: Only records with assist durations greater than zero minutes were included in average duration calculations.

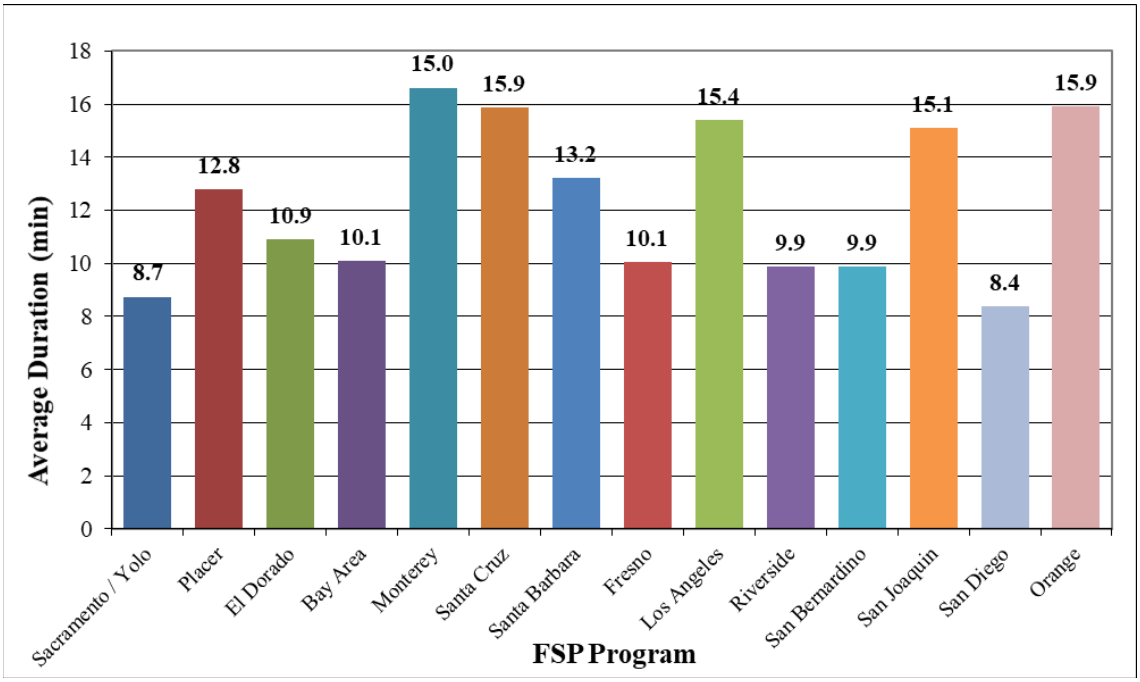

Figure 7: Bar Chart of Average Assist Duration by Program

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

Table 17: The Average Assist Duration by Problem Type & Program

Caltrans District	Counties or Region	Abandoned	Accident	Debris Removed	Flat Tire	Mechanical Problems	Other*	Out of Gas	Over Heated	Average Duration
3	Sac & Yolo	4.8	8.4	2.9	11.3	12.3	4.3	7.1	9.6	8.7
3	Placer	3.7	17.5	9.9	14.5	16.0	4.5	8.8	10.3	12.8
3	El Dorado	5.2	12.0	4.6	14.0	14.5	6.3	9.6	14.0	10.9
4	Bay Area	5.6	13.2	8.1	11.4	13.3	5.8	6.7	10.7	10.1
5	Monterey	6.8	28.5	8.3	16.3	18.9	12.3	11.5	14.6	16.6
5	Santa Cruz	8.2	28.1	13.0	18.3	20.3	9.0	10.5	15.9	15.9
5	Santa Barbara	9.1	20.1	9.3	16.4	13.9	11.9	9.6	10.4	13.2
6	Fresno	4.6	16.4	8.7	8.9	8.3	7.6	5.9	10.0	10.1
7	Los Angeles	8.9	23.9	10.6	17.8	18.9	9.3	12.4	16.2	15.4
8	Riverside	6.2	13.6	5.8	15.7	16.7	5.3	9.2	13.9	9.9
8	San Bernardino	6.1	8.4	5.3	12.3	12.2	4.3	8.9	11.0	7.0
10	San Joaquin	5.5	19.8	5.3	17.9	18.5	7.3	10.0	14.9	15.1
11	San Diego	5.0	12.6	6.1	13.8	13.6	5.0	7.8	11.0	8.4
12	Orange	12.2	14.5	11.8	19.7	25.3	12.0	12.9	15.8	15.9
Average Duration		**6.6**	**18.2**	**8.3**	**15.4**	**16.6**	**7.4**	**10.2**	**14.0**	**12.3**

Note:

- Only records with assist durations greater than zero minutes were included in the average duration calculations.
- The "Other*" category includes the assist records for refused service, informational assistance, unable to locate, drive off, service en route, and/or incidents with too little information.

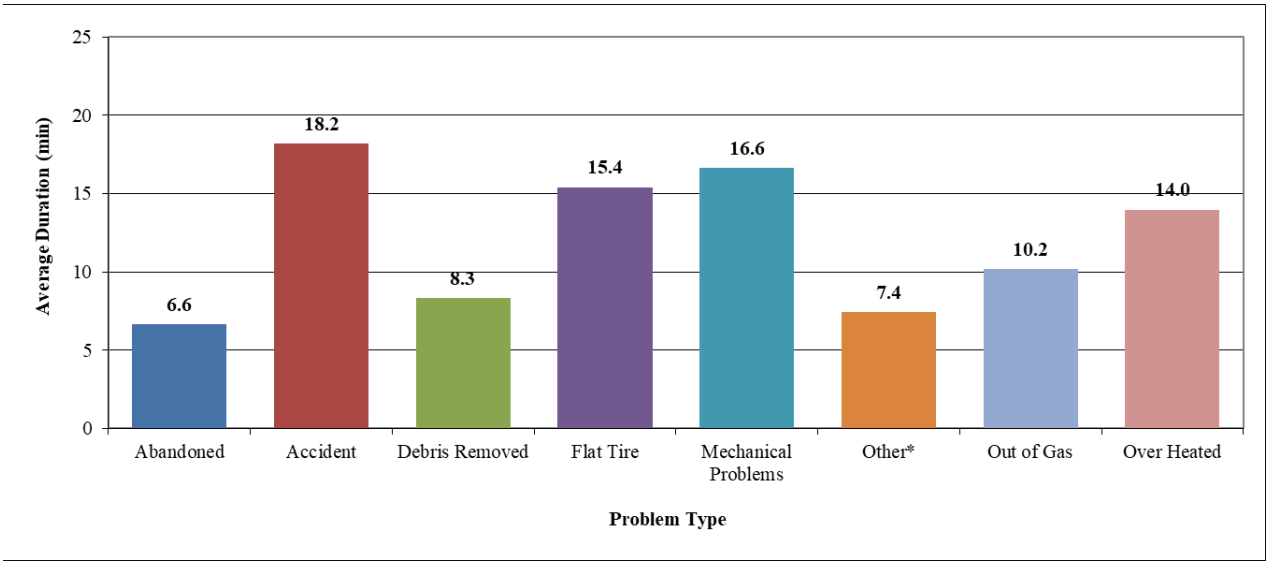

Figure 8: Bar Chart of Average Assist Duration by Problem Type and Program

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

Table 18: The Average Assist Duration by Vehicle Type & Program

Caltrans District	Counties or Region	Auto / Van	Big Rig	Other / Unknown	SUV / Pickup	Trucks	Average Duration
3	Sac & Yolo	9.3	9.9	5.9	8.6	9.6	8.7
3	Placer	13.0	11.3	11.9	12.7	15.1	12.8
3	El Dorado	12.0	10.1	7.9	10.2	12.0	10.9
4	Bay Area	10.2	15.9	10.4	9.2	9.5	10.1
5	Monterey	18.2	26.5	11.0	17.1	17.8	16.6
5	Santa Cruz	16.0	21.9	14.2	16.2	16.5	15.9
5	Santa Barbara	16.7	7.7	10.5	13.2	12.4	13.2
6	Fresno	8.9	8.9	8.8	9.1	10.2	10.1
7	Los Angeles	16.0	12.6	12.5	14.4	N/A	15.4
8	Riverside	11.6	7.2	6.6	10.2	7.9	9.9
8	San Bernardino	8.0	5.7	5.6	6.9	6.4	7.0
10	San Joaquin	15.0	17.5	15.0	15.1	17.7	15.1
11	San Diego	8.9	8.2	6.2	6.5	6.6	8.4
12	Orange	16.5	11.5	12.4	16.3	13.3	15.9
Average Duration		**13.3**	**8.5**	**9.7**	**11.1**	**6.2**	**12.3**

Note: Only records with assist durations greater than zero minutes were included in average duration calculations.

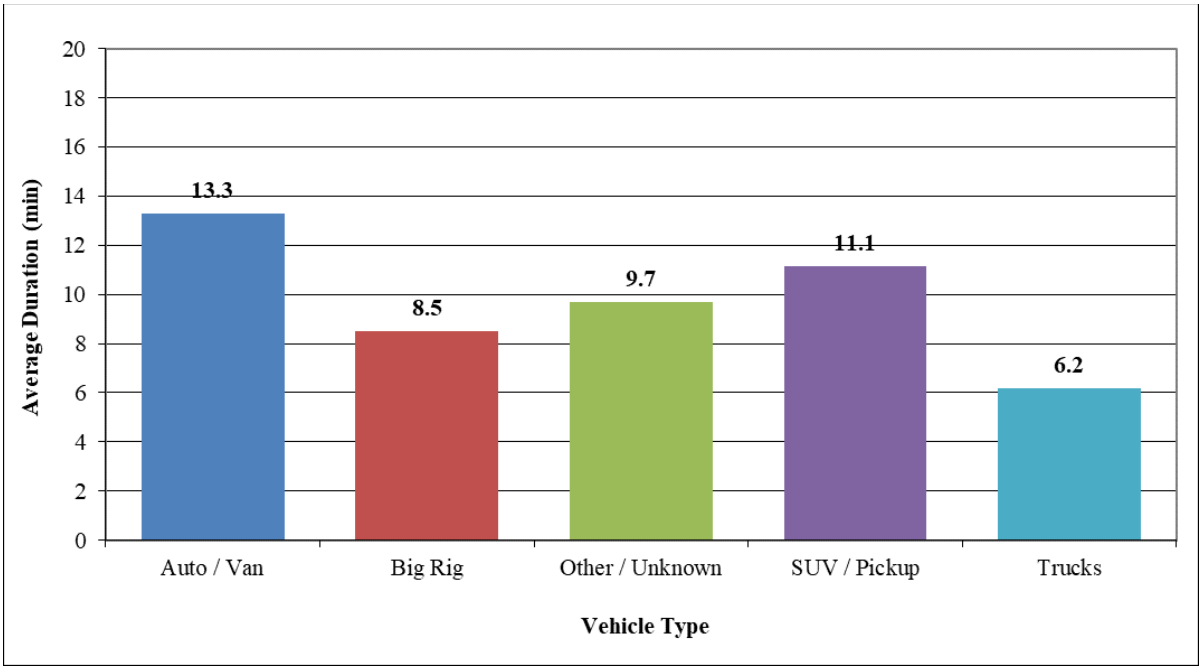

Figure 9: Bar Chart of Average Assist Duration by Vehicle Type

4.13 *Statewide FSP Average Assist Rate by Program*

Table 19: The Average Assist Rate by Program

Caltrans District	Counties or Region	Annual Assists	Annual Truck-Hours	Assist Rate
3	Sac & Yolo	29,886	31,609	1.06
3	Placer	4,428	2,885	0.65
3	El Dorado	1,342	1,075	0.80
4	Bay Area	135,684	88,998	0.66
5	Monterey	6,144	1,788	0.29
5	Santa Cruz	3,750	1,127	0.30
5	Santa Barbara	3,660	786	0.21
6	Fresno	5,000	3,947	0.79
7	Los Angeles	319,222	279,823	0.88
8	Riverside	47,330	49,064	1.04
8	San Bernardino	44,136	64,940	1.47
10	San Joaquin	10,926	3,327	0.30
11	San Diego	82,846	85,569	1.03
12	Orange	90,896	56,374	0.62
Statewide		**785,250**	**671,312**	**0.85**

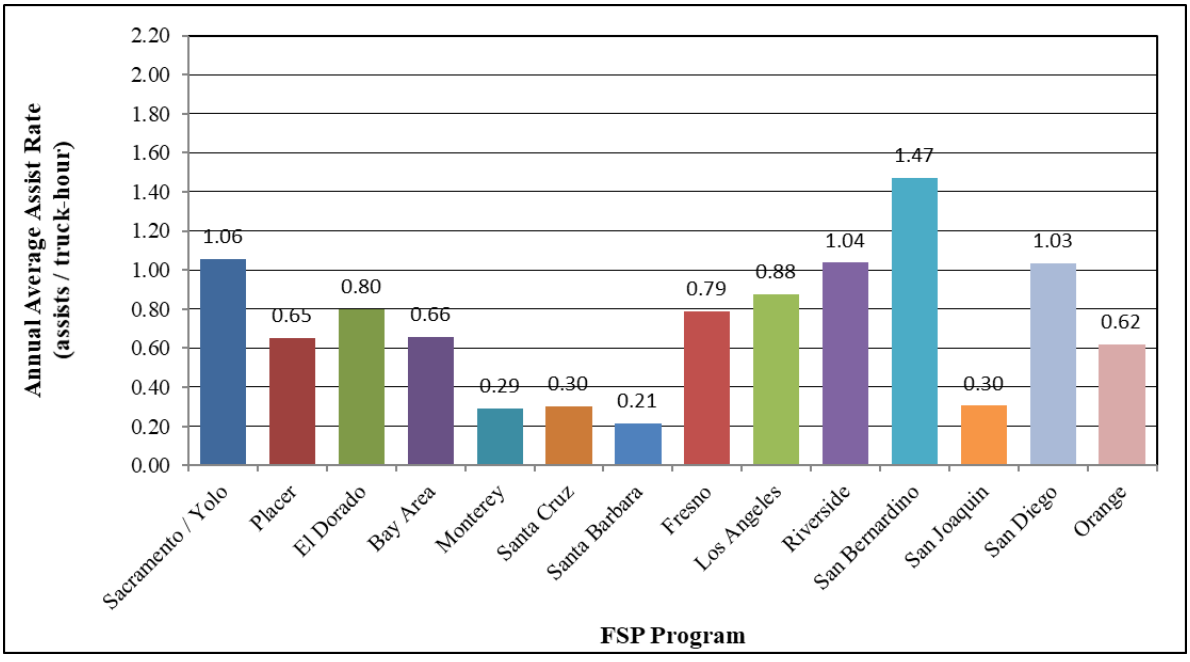

Figure 10: Bar Chart of Average Weekday Assist Rate by Program

Section 5: Statewide Reporting Procedures

This section reports on the FSP assist reporting procedures that were agreed upon by the FSP partner agencies in the 2004/05 FSP review and annual meeting. The statewide motorist aid committee recommended reporting procedures are listed first, and followed by observed data discrepancies.

5.1 *Consistent Assist Record set of Description Fields*

At a minimum, the following fields for each and every FSP Assist Record are required.

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

5.2 *Data Coding and Categories*

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.

5.2.1 Vehicle Type

Table 20: Standardized Vehicle Type Category

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

5.2.2 Problem Type

Table 21: 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 En-Route
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

5.2.3 Vehicle Location Category

Table 22: 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

5.2.4 "Towed To" Location

Table 23: Standardized "Towed To" Location Category

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

5.2.5 Vehicle Found Category

Table 24: Standardized Found Category

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

5.3 *Data Entry Errors*

During the processing of the FSP 2019-20 assist data, occasional random 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. Many of the FSP Arrival and FSP Departure 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. These errors have become less frequent over the years as automated data management techniques have become more common.

5.4 *Reporting of "Other/Unknown/Blank" Problem Type*

The Problem Type category "Other/Unknown/Blank" 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. The Problem Type category could be split into "Other" and "Unknown" for more accurate FSP Assist reporting.

5.5 *FSP Data Collection Reporting Categories by FSP Program*

The FY 2019-20 FSP assist data were visually inspected to determine the FSP assist data categories used by the FSP programs. All FSP programs collect the assist data for the following required FSP assist data categories:

- FSP Program
- Beat
- Assist Date
- Arrival Time
- Departure Time

There are some minor differences between the FSP programs for the FSP Assist data categories that describe the type of problem, FSP service provided, the vehicle's location and vehicle type. FSP assist data reporting categories are summarized in Tables 24 through 28:

- Table 24: Vehicle Type
- Table 25: Problem Type
- Table 26: Vehicle Location on Road
- Table 27: Towed-to Location
- Table 28: How Vehicle Was Found

The Sacramento/Yolo County (STA) and the Placer County (PCTPA) FSP programs use the same reporting technology and procedures (i.e., the same system and app). Similarly, the Riverside County (RCTC) and the San Bernardino County (SBCTA) FSP programs use the same reporting technology and procedures. As such, the Sacramento County (STA) & Placer County (PCTPA) programs are represented in a single column in Tables 24-28, as are the Riverside County (RCTC) & San Bernardino County (SBCTA) FSP programs.

Table 25: "Vehicle Type" Category

Vehicle Type	D-03 Sacramento & Placer Counties	D-03 El Dorado County	D-04 Bay Area Counties	D-05 Monterey County	D-05 Santa Cruz County	D-05 Santa Barbara County	D-06 Fresno County	D-07 Los Angeles County	D-08 Riverside & San Bernardino Counties	D-10 San Joaquin County	D-11 San Diego County	D-12 Orange County
Motorcycle	●	●	●	●	●	●	n/a	●	●	●	●	●
Auto	●	●	●	●	●	●	n/a	●	●	●	●	●
Van		●		●	●		n/a	●	●	●	●	●
SUV	●	●					n/a				●	●
Pickup Truck	●	●	●	●	●	●	n/a	●	●	●	●	●
Truck – LTE 1 Ton	●		●			●	n/a	●	●	●	●	●
Truck – Over 1 Ton	●		●			●	n/a	●	●	●		
RV / Motorhome	●						n/a					●
Bus							n/a					●
Big Rig			●	●	●	●	n/a	●	●	●	●	●
No Assist Oversize		●					n/a	●	●	●	●	
Other / Unknown		●	●	●	●	●	n/a	●	●	●	●	●
Debris				●	●		n/a		●	●		●

Notes:

All FSP Programs track "Debris Removal" as a category in the "Vehicle Problem" question.
D-11 San Diego County and D-12 Orange County only have one truck category – "Box Truck".

Table 26: "Problem Type" Category

Problem Type	D-03 Sacramento & Placer Counties	D-03 El Dorado County	D-04 Bay Area Counties	D-05 Monterey County	D-05 Santa Cruz County	D-05 Santa Barbara County	D-06 Fresno County	D-07 Los Angeles County	D-08 Riverside & San Bernardino Counties	D-10 San Joaquin County	D-11 San Diego County	D-12 Orange County
Abandoned	●	●	●	●	●	●	n/a	●	●	●	●	●
Accident	●	●	●	●	●	●	n/a	●	●	●	●	●
Debris Removal	●	●	●	●	●	●	n/a	●	●	●	●	●
Dead Battery / Electrical	●	●	●	●	●		n/a	●	●	●	●	●
Drove Off			●	●	●		n/a				●	
Fire		●		●	●	●	n/a	●	●	●	●	
Flat Tire	●	●	●	●	●	●	n/a	●	●	●	●	●
Help En-route / Private Assistance			●	●	●		n/a				●	
Info				●	●		n/a		●	●		●
Locked Out	●	●		●	●		n/a	●	●	●	●	
Mechanical	●	●	●	●	●	●	n/a	●	●	●	●	●
Other	●	●	●	●	●	●	n/a	●				
Out of Gas	●	●	●	●	●	●	n/a	●	●	●	●	●
Over Heat	●	●	●	●	●	●	n/a	●	●	●	●	●
Refused Service	●		●	●	●		n/a				●	●
Unable to Locate			●	●	●		n/a		●	●		●

Notes:

The "Refused Service" category includes the "None – Service Not Needed" and "No Service Provided" categories.

Table 27: "Vehicle Location" Category

Vehicle Location	D-03 Sacramento & Placer Counties	D-03 El Dorado County	D-04 Bay Area Counties	D-05 Monterey County	D-05 Santa Cruz County	D-05 Santa Barbara County	D-06 Fresno County	D-07 Los Angeles County	D-08 Riverside & San Bernardino Counties	D-10 San Joaquin County	D-11 San Diego County	D-12 Orange County
Freeway Lane(s)	●	●	●	●	●	●	n/a	●	●	●	●	●
Left Shoulder	●	●	●	●	●	●	n/a	●	●	●	●	●
Right Shoulder	●	●	●	●	●	●	n/a	●	●	●	●	●
Ramp / Connector	●	●	●	●	●	●	n/a	●	●	●	●	●
Other	●	●		●	●	●	n/a	●	●	●	●	●
Unable to Locate	●			●	●	●	n/a	●	●		●	●

Notes:

D-07 Los Angeles County and D-12 Orange County had separate category for "Center Median".

Table 28: "Towed To" Location or "Did You Tow" Category

Did You Tow Categories	D-03 Sacramento & Placer Counties	D-03 El Dorado County	D-04 Bay Area Counties	D-05 Monterey County	D-05 Santa Cruz County	D-05 Santa Barbara County	D-06 Fresno County	D-07 Los Angeles County	D-08 Riverside & San Bernardino Counties	D-10 San Joaquin County	D-11 San Diego County	D-12 Orange County
No Tow		●	●	●		●	n/a	●	●	●	●	●
Off Fwy Or Drop Zone	●	●	●	●	●	●	n/a	●	●	●	●	●
Pushed			●		●		n/a		●	●	●	
Shoulder						●	n/a	●	●	●	●	●
Other Location		●		●	●	●	n/a					
Unknown							n/a					

Notes:

D-05 Monterey County and D-05 Santa Cruz County tracked "Towed To" by individual drop zone locations.

Table 29: "Vehicle Found" or "How Found" Category

How Found Categories	D-03 Sacramento & Placer Counties	D-03 El Dorado County	D-04 Bay Area Counties	D-05 Monterey County	D-05 Santa Cruz County	D-05 Santa Barbara County	D-06 Fresno County	D-07 Los Angeles County	D-08 Riverside & San Bernardino Counties	D-10 San Joaquin County	D-11 San Diego County	D-12 Orange County
CHP	●	●	n/a	●	●	●	n/a	●	●	●	●	n/a
FSP – Found by You	●	●	n/a	●	●	●	n/a	●	●	●	●	n/a
Other	●		n/a	●	●		n/a	●				n/a
Partner Assist	●	●	n/a				n/a					n/a
Revisit	●		n/a				n/a					n/a

Notes:

D-04 Bay Area Counties and D12 Orange County do not collect "How Found" Information.

Appendix A

FSP Beat Benefit/Cost Ratio Summaries (Fiscal Year 2019-20 Analysis)

For FY 2019-20, the FSP B/C ratios were estimated using the July 1 2019 – February 28 2020 data (the first eight months of the fiscal year), due to the COVID-19 "shelter in place" mandate initiated mid-March 2020.

FSP Beat Benefit/Cost Ratio Summary **District 3: Sacramento & Yolo Counties**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
10	11.0	-	11.0	4.0	10.0
10A	1.0	-	1.0	-	1.0
106	12.0	-	12.0	-	12.0
108	7.0	-	7.0	-	7.0
108A	8.0	-	8.0	-	8.0
150	3.0	-	3.0	-	3.0
151	13.0	-	13.0	-	13.0
152	4.0	-	4.0	-	4.0
153	6.0	-	6.0	-	6.0
153A	10.0	-	10.0	-	10.0
181	6.0	-	6.0	-	6.0
182	3.0	-	3.0	-	3.0
182A	1.0	-	1.0	-	1.0
184	9.0	-	9.0	-	9.0
184A	10.0	-	10.0	-	10.0
191A	4.0	-	4.0	-	4.0
192	12.0	-	12.0	-	12.0
193	9.0	-	9.0	-	9.0
Average Benefit/Cost Ratio	**7.0**	**-**	**7.0**	**4.0**	**7.0**

FSP Beat Benefit/Cost Ratio Summary **District 3: Placer County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
265	5.0	-	5.0	-	5.0
281	3.0	-	3.0	-	3.0
281-A	4.0	-	4.0	-	4.0
Average Benefit/Cost Ratio	**4.0**	**-**	**4.0**	**-**	**4.0**

FSP Beat Benefit/Cost Ratio Summary **District 3: El Dorado County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
1	3.0	-	3.0	-	3.0
Average Benefit/Cost Ratio	**3.0**	**-**	**3.0**	**-**	**3.0**

FSP Beat Benefit/Cost Ratio Summary **District 4: Bay Area Counties**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
1	9.0	-	9.0	-	9.0
2	2.0	2.0	2.0	1.0	2.0
3	5.0	4.0	5.0	-	5.0
4	4.0	6.0	4.0	-	4.0
5	5.0	-	5.0	-	5.0
6	7.0	-	8.0	-	8.0
8	6.0	-	6.0	-	6.0
9	6.0	-	6.0	-	6.0
10	11.0	2.0	9.0	-	9.0
11	3.0	2.0	3.0	-	3.0
12	11.0	-	11.0	-	11.0
13	6.0	-	6.0	-	6.0
14	3.0	1.0	3.0	-	3.0
15	5.0	-	5.0	-	5.0
19	6.0	-	6.0	-	6.0
20	2.0	-	2.0	-	2.0
21	17.0	-	17.0	-	17.0
22	9.0	-	9.0	-	9.0
23	12.0	-	12.0	-	12.0
25	7.0	-	7.0	-	7.0
26	5.0	-	5.0	-	5.0
27	3.0	-	3.0	-	3.0
29	4.0	1.0	4.0	-	4.0
31	1.0	-	1.0	-	1.0
32	11.0	-	11.0	1.0	11.0
33	1.0	-	1.0	-	1.0
34	4.0	-	4.0	0.0	4.0
Average Benefit/Cost Ratio	**6.0**	**3.0**	**6.0**	**1.0**	**6.0**

FSP Beat Benefit/Cost Ratio Summary **District 5: Monterey County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
5-M-1	5.0	-	5.0	4.0	5.0
5-M-2	8.0	-	8.0	7.0	8.0
5-M-3	1.0	-	1.0	-	1.0
5-M-4	8.0	-	8.0	-	8.0
Average Benefit/Cost Ratio	**6.0**	**-**	**6.0**	**5.0**	**6.0**

FSP Beat Benefit/Cost Ratio Summary **District 5: Santa Cruz County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
1	6.0	-	6.0	8.0	6.0
2	3.0	-	3.0	2.0	3.0
Average Benefit/Cost Ratio	**5.0**	**-**	**5.0**	**6.0**	**5.0**

FSP Beat Benefit/Cost Ratio Summary **District 5: Santa Barbara County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
1	2.0	-	2.0	-	2.0
2	2.0	-	2.0	-	2.0
3	6.0	-	6.0	-	6.0
4	7.0	-	7.0	-	7.0
5	1.0	-	1.0	-	1.0
Average Benefit/Cost Ratio	**3.0**	**-**	**3.0**	**-**	**3.0**

FSP Beat Benefit/Cost Ratio Summary **District 6: Fresno County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
1	6.0	-	6.0	-	6.0
2	2.0	-	2.0	-	2.0
3	3.0	-	3.0	-	3.0
4	3.0	-	3.0	-	3.0
Average Benefit/Cost Ratio	**4.0**	**-**	**4.0**	**-**	**4.0**

FSP Beat Benefit/Cost Ratio Summary **District 7: Los Angeles County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
1	15.0	17.0	15.0	2.0	14.0
2	16.0	20.0	17.0	6.0	16.0
3	6.0	6.0	6.0	13.0	7.0
4	4.0	6.0	5.0	4.0	5.0
5	7.0	7.0	7.0	7.0	7.0
6	14.0	14.0	14.0	13.0	14.0
7	9.0	8.0	8.0	18.0	9.0
8	7.0	8.0	7.0	2.0	7.0
9	6.0	8.0	6.0	5.0	6.0
10	6.0	6.0	6.0	3.0	5.0
11	10.0	8.0	10.0	3.0	9.0
12	6.0	6.0	6.0	4.0	6.0
13	10.0	8.0	9.0	10.0	9.0
14	14.0	4.0	12.0	4.0	11.0
16	8.0	7.0	8.0	6.0	8.0
17	7.0	8.0	7.0	8.0	7.0
18	14.0	11.0	13.0	2.0	12.0
19	16.0	11.0	15.0	7.0	15.0
20	8.0	10.0	8.0	1.0	8.0
21	6.0	6.0	6.0	3.0	5.0
23	15.0	8.0	13.0	2.0	11.0
24	6.0	0.0	5.0	0.0	4.0
27	17.0	7.0	15.0	6.0	14.0
28	5.0	11.0	6.0	3.0	6.0
29	11.0	4.0	9.0	2.0	8.0
30	14.0	7.0	13.0	1.0	12.0
31	6.0	2.0	5.0	3.0	5.0
33	4.0	0.0	4.0	0.0	3.0
34	12.0	5.0	11.0	0.0	9.0
36	3.0	0.0	3.0	0.0	3.0
37	9.0	6.0	9.0	2.0	8.0
38	7.0	4.0	6.0	2.0	6.0
39	8.0	5.0	8.0	3.0	7.0
40	12.0	15.0	13.0	2.0	10.0
41	11.0	22.0	13.0	7.0	13.0
42	4.0	2.0	3.0	9.0	4.0
43	11.0	11.0	11.0	8.0	11.0
50	7.0	4.0	7.0	3.0	6.0
51	11.0	9.0	11.0	8.0	11.0
Average Benefit/Cost Ratio	**9.0**	**8.0**	**9.0**	**5.0**	**9.0**

FSP Beat Benefit/Cost Ratio Summary **District 8: Riverside County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
1	5.0	-	5.0	-	5.0
2	12.0	-	12.0	-	12.0
4	14.0	-	14.0	-	14.0
7	10.0	-	10.0	-	10.0
8	10.0	-	10.0	-	10.0
18	11.0	-	11.0	-	11.0
19	6.0	-	6.0	-	6.0
20	7.0	-	7.0	-	7.0
25	11.0	-	11.0	-	11.0
26	7.0	-	7.0	-	7.0
34	5.0	-	5.0	-	5.0
35	9.0	-	9.0	-	9.0
Average Benefit/Cost Ratio	**9.0**	**-**	**9.0**	**-**	**9.0**

FSP Beat Benefit/Cost Ratio Summary **District 8: San Bernardino County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
5	4.0	-	4.0	-	4.0
9	15.0	-	15.0	6.0	13.0
10	10.0	-	10.0	9.0	10.0
11	11.0	7.0	10.0	-	10.0
14	10.0	-	10.0	-	10.0
23	-	-	-	9.0	9.0
29	11.0	-	11.0	11.0	11.0
31	7.0	2.0	6.0	-	6.0
Average Benefit/Cost Ratio	**10.0**	**4.0**	**9.0**	**8.0**	**9.0**

FSP Beat Benefit/Cost Ratio Summary **District 10: San Joaquin County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
603-14	4.0	-	4.0	2.0	4.0
603-15	1.0	-	1.0	2.0	1.0
662-6	2.0	-	2.0	-	2.0
662-25	3.0	-	3.0	-	3.0
662-502	2.0	-	2.0	-	2.0
Average Benefit/Cost Ratio	**2.0**	**-**	**2.0**	**2.0**	**2.0**

FSP Beat Benefit/Cost Ratio Summary **District 11: San Diego County**

Beat	Peak Period Weekday B/C Ratio	Midday Weekday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
951	4.0	-	4.0	-	4.0
501	3.0	1.0	3.0	1.0	2.0
502	5.0	-	5.0	-	5.0
851	5.0	0.0	3.0	2.0	3.0
852	8.0	-	8.0	-	8.0
541	2.0	0.0	1.0	3.0	2.0
125	9.0	-	9.0	-	9.0
941	6.0	1.0	4.0	1.0	4.0
163	2.0	0.0	2.0	1.0	1.0
801	9.0	0.0	6.0	4.0	5.0
802	7.0	-	7.0	-	7.0
503	2.0	0.0	2.0	1.0	1.0
504	7.0	5.0	6.0	4.0	6.0
505	7.0	4.0	6.0	6.0	6.0
853	3.0	2.0	2.0	-	2.0
151	8.0	1.0	6.0	5.0	6.0
152	7.0	-	7.0	-	7.0
153	4.0	0.0	3.0	2.0	3.0
521	1.0	-	1.0	-	1.0
522	1.0	-	1.0	-	1.0
781	3.0	1.0	2.0	7.0	3.0
782	-	5.0	5.0	-	5.0
100	7.0	-	7.0	-	7.0
200	4.0	-	4.0	-	4.0
300	4.0	-	4.0	-	4.0
400	7.0	-	7.0	-	7.0
500	10.0	-	10.0	-	10.0
600	3.0	-	3.0	-	3.0
700	2.0	-	2.0	-	2.0
800	10.0	-	10.0	-	10.0
Average Benefit/Cost Ratio	**5.0**	**1.0**	**4.0**	**3.0**	**4.0**

FSP Beat Benefit/Cost Ratio Summary — District 12: Orange County

Beat	Pk Pd Weekday B/C Ratio	Midday B/C Ratio	Weekday B/C Ratio	Weekend B/C Ratio	Combined B/C Ratio
220	6.0	-	6.0	-	6.0
221	10.0	-	10.0	-	10.0
222	13.0	-	13.0	-	13.0
223	-	3.0	3.0	-	3.0
224	-	4.0	4.0	-	4.0
225	-	-	-	10.0	10.0
401	-	17.0	17.0	-	17.0
402	-	6.0	6.0	-	6.0
405	9.0	-	9.0	-	9.0
406	12.0	-	12.0	-	12.0
407	5.0	-	5.0	-	5.0
408	8.0	-	8.0	-	8.0
409	4.0	-	4.0	-	4.0
410	0.0	-	0.0	-	0.0
411	5.0	-	5.0	-	5.0
500	-	3.0	3.0	-	3.0
501	7.0	-	7.0	-	7.0
502	1.0	-	1.0	-	1.0
503	5.0	-	5.0	-	5.0
504	7.0	-	7.0	-	7.0
505	6.0	-	6.0	-	6.0
506	5.0	-	5.0	-	5.0
507	9.0	-	9.0	-	9.0
508	15.0	-	15.0	-	15.0
509	5.0	-	5.0	-	5.0
510	4.0	-	4.0	-	4.0
511	-	-	-	5.0	5.0
512	-	-	-	2.0	2.0
513	-	10.0	10.0	-	10.0
550	-	3.0	3.0	-	3.0
551	2.0	-	2.0	-	2.0
552	4.0	-	4.0	-	4.0
553	10.0	-	10.0	-	10.0
554	2.0	-	2.0	-	2.0
555	-	4.0	4.0	-	4.0
570	3.0	-	3.0	-	3.0
571	5.0	-	5.0	-	5.0
572	2.0	-	2.0	-	2.0
573	3.0	2.0	3.0	-	3.0
910	5.0	-	5.0	-	5.0
911	7.0	-	7.0	-	7.0
912	9.0	-	9.0	-	9.0
913	8.0	-	8.0	-	8.0
914	3.0	-	3.0	-	3.0
915	2.0	-	2.0	-	2.0
916	2.0	-	2.0	-	2.0
920	12.0	13.0	12.0	-	12.0
922	-	-	-	2.0	2.0
Avg B/C Ratio	**6.0**	**7.0**	**6.0**	**5.0**	**6.0**

Appendix B

Current FSP Assist Data Collection & Management Technologies

FSP Program	Paper or Electronic Reporting	AVL Vehicle Tracking	Data Transfer Technology (Tow provider to Managing Agency)
Sac/Yolo STA	small business solution (mobile workforce management)	yes	electronic, real-time
Placer PCTPA	small business solution (mobile workforce management)	yes	electronic, real-time
El Dorado EDCTC	small business solution (mobile workforce management)	yes	electronic, real-time
Bay Area MTC	enterprise system	yes	electronic, real-time
Monterey TAMC	iPad mini with app (small business solution)	yes	electronic, twice daily (end of shift)
Santa Cruz SCCRTC	iPad mini with app (small business solution)	yes	electronic, twice daily (end of shift)
Santa Barbara SBCAG	paper form (with motorist survey)	no	paper, monthly
Fresno Fresno-COG	paper form	no	paper, monthly
Los Angeles LAMTA	paper (scantron)	no	paper, monthly
Riverside RCTC	small business solution (mobile workforce management)	yes	electronic, daily (end of shift)
San Bernardino SBCTA	small business solution (mobile workforce management)	yes	electronic, daily (end of shift)
San Joaquin SJCOG	small business solution (mobile workforce management)	no	electronic, daily
San Diego SANDAG	paper (scantron) & CHP data logs	no	electronic, real-time
Orange OCTA	enterprise system	yes	electronic, real-time