Safety Analysis Methods and Preliminary Gap Analysis Report

Prepared by:
UC Berkeley Safe Transportation Research and Education Center (SafeTREC)
Jill Cooper, Offer Grembek, SangHyouk Oum, Afsaneh Yavari, Hadi Soueidan

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1. Introduction

As identified in the Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America's Surface Transportation Act (FAST Act), the Federal Highway Administration (FHWA) requires that, as part of its state Highway Safety Improvement Program (HSIP), "a State shall have in place a safety data system that can be used to perform analyses supporting the strategic and performance-based goals in the Strategic Highway Safety Plan (SHSP) and HSIP". FHWA's guidance describes the data and "capabilities a State's safety data system should have in order to support analyses and evaluations"[1] including:

1. Types of roadways;
2. Types of data;
3. Geolocation of safety data to a common roadway base map;
4. Analysis and evaluation capabilities; and
5. The Fundamental Data Elements (FDE) subset of Model Inventory of Roadway Elements (MIRE).

"States shall have access to a complete collection of the MIRE FDE on all public roads by September 30, 2026" to be compliant.[2] To move ahead toward being compliance, the California Department of Transportation (Caltrans) contracted with the University of California, Berkeley (UCB) Safe Transportation Research and Education Center (SafeTREC) in March 2020 to:

1. Convene a stakeholder group to conduct a pilot study related to data governance and gap analysis;
2. Draft a data governance charter;
3. Conduct a safety data gap analysis.
4. Draft a pilot data collection and data integration strategic plan; and
5. Develop and deliver training.

This report summarizes progress and findings with regard to:

1) stakeholder recruitment,
2) data collection and survey methodology,
3) safety analysis methods and
4) safety data gap analysis.

[1] Vandervalk, A., D. Snyder, J.K. Hajek. (2017, July). Guide for State Department of Transportation Safety Data Business Planning (FHWA-SA-17-047). Washington, DC: Federal Highway Administration, Office of Safety. https://safety.fhwa.dot.gov/rsdp/downloads/fhwasa17047.pdf

[2] 23 CFR § 924.11 – Implementation. https://www.law.cornell.edu/cfr/text/23/924.11

2. Stakeholder Recruitment

Agencies were contacted in Spring 2020 and were asked to join a stakeholder team of city, county, regional, and Tribal agencies to participate in a survey about MIRE FDE data governance, data integration, data collection methods, and data gaps. Local agencies include city and county representatives and regional agencies include Metropolitan Planning Organizations (MPOs) and Regional Transportation Planning Agencies (RTPAs). The Federal Highway Administration (FHWA) and the California Traffic Records Coordinating Committee (TRCC) were invited to participate as stakeholder agencies but were not surveyed because they do not collect MIRE FDE data.

Survey data would be collected to:

1. Provide input to a gap analysis report, cost analysis, and data quality control plan; and
2. Provide insight into safety analysis conducted and desired.

Later in the project, the stakeholder group will participate in the establishment of a draft plan for collection and sharing of MIRE FDE.

To form the stakeholder group, SafeTREC conducted multi-pronged outreach to recruit participants, including outreach to:

1. Respondents of the 2017 survey distributed to develop the high-level MIRE FDE strategic plan;
2. Caltrans' District Local Assistance Engineers who informed city, county, and regional agencies in their districts of the project;
3. Participants in the 2018 FHWA Business Data Peer Exchange;
4. Tribal agencies; and
5. Agencies throughout the State in order to maximize diversity of recruitment of stakeholders in terms of geography, type, and size of agency.

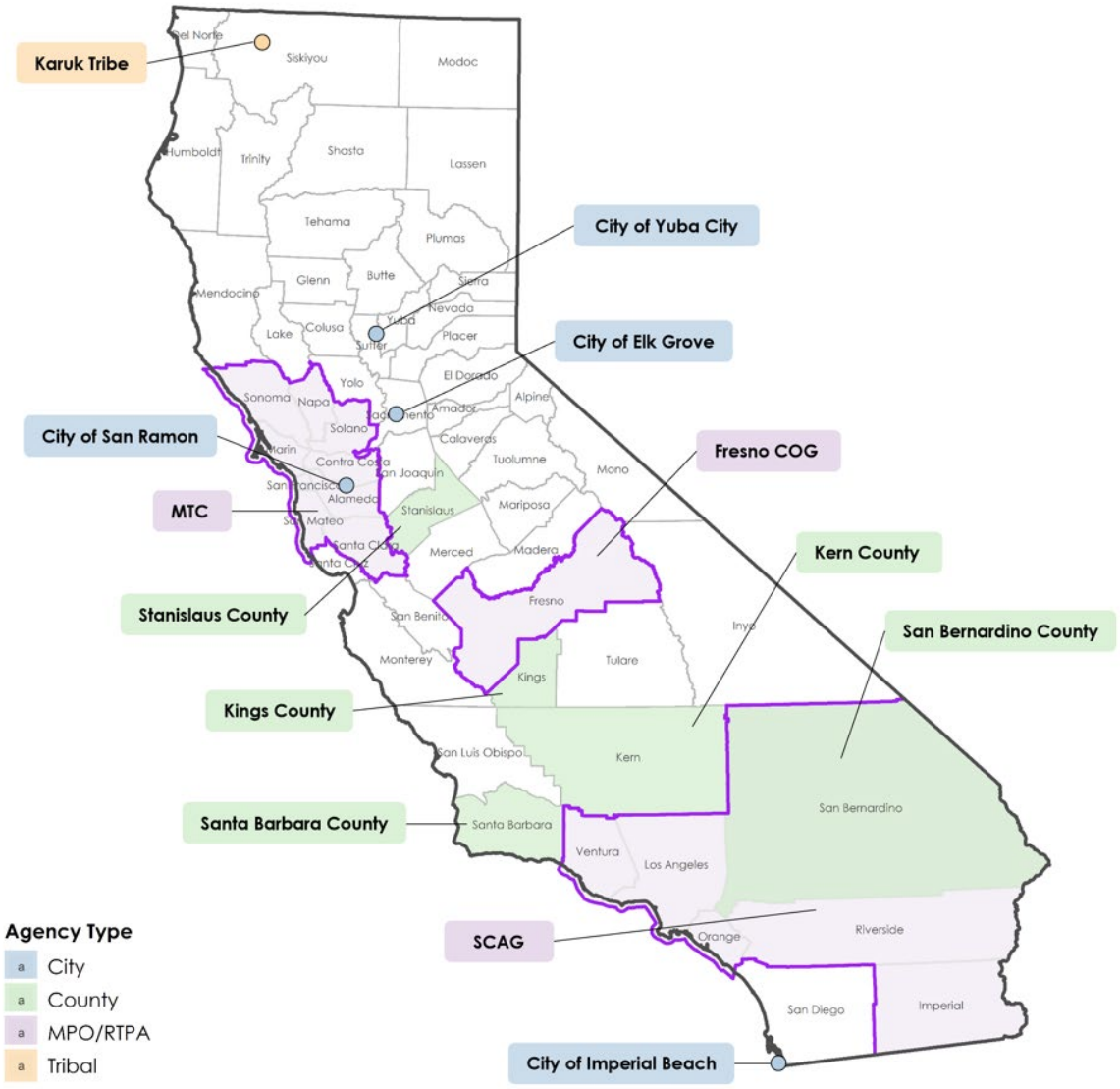
The initial group of stakeholders consisted of members across the state from Tribes, MPOs (Metropolitan Planning Organization)/RTPAs (Regional Transportation Planning Agency), Counties, Cities and Caltrans. An initial group of 24 agencies agreed to be stakeholders. After that, there was some attrition from stakeholders due to the Covid-19 pandemic, which started around the onset of the project, and wildfires in California, which stretched resources of many communities. A total of 13 agencies completed the survey: 4 cities, 5 counties, 3 MPOs/RTPAs and 1 Tribal agency. (See Table 1)

Table 1. Stakeholder agencies as of June 2021

City	County	MPO/RTPA	Tribal	State/Federal
City of Elk Grove	San Bernardino County	Southern California Association of Governments (SCAG)	Karuk	Federal Highway Administration (FHWA)
City of Yuba City	Kern County	Metropolitan Transportation Commission (MTC)		California Traffic Records Coordinating Committee (TRCC)
City of Imperial Beach	Kings County	Fresno Council of Governments (Fresno COG)		
City of San Ramon	Stanislaus County			
	Santa Barbara County			

However, even with the attrition, we were able to maintain good diversity in geographic distribution, as well as in agency size and type. Figure 1 shows the geographical spread and the agency types represented by the current stakeholder group.

Figure 1: Geographical location of stakeholder committee members (June 2021)



It is important to note that this is a small pilot group of agencies. The data provides a snapshot of MIRE FDE data collection and analysis among city, county, regional, and Tribal agencies in California, but generalizations to the entire state cannot be made.

3. Overview of Data Collection for Safety Analysis Methods and Gap Analysis

To obtain data from city, county, regional, and Tribal agencies, SafeTREC surveyed stakeholder agency members to:

1. Inquire about safety analysis methods and data needs (both MIRE FDE and non-MIRE FDE); and
2. Conduct a gap analysis of existing data in comparison with MIRE FDE.

To collect this data, SafeTREC developed and disseminated a survey to obtain information on how agencies collect, integrate, and govern the MIRE FDE, what additional data elements should be gathered to do safety analysis, and what the data gaps are. (See Survey in Appendix A)

3.1 Methodology

To develop the survey, we used the MIRE FDE as the basis for querying stakeholders about which elements they collect. To develop questions for the survey, we examined the 2017 MIRE Fundamental Data Elements (FDE) Collection Plan Survey Request, the Statewide Asset Data Collection and Management: Survey of Practice, and the FHWA Safety Data Business Planning Peer Exchange Report. We then adapted these questions and added others to meet the desired outcomes of this project. The survey development process was iterative. The project team received feedback from Caltrans throughout the development process and revised as necessary.

The survey was developed in Microsoft Excel and distributed in Spring 2020. Since we required stakeholders to input large tables of data in their survey, Excel was the most user-friendly of the options considered. Stakeholders were asked to upload their surveys and other relevant documentation (e.g., data dictionaries) to Berkeley Box folders unique to each of their agencies. They could also share the folder with other members of their agency for collaboration in completing the survey.

The survey outline consists of the following categories:

Introduction
A. Overview of Roadway Infrastructure Data for all public roads
B. MIRE FDE -- Part 1
    Table 1 - Paved Roads - Functional Class (FC) 1-6
    Table 2 - Paved Roads - FC 7
    Table 3 - Unpaved Roads
C. MIRE FDE -- Part 2
D. Additional Data and Recommendations (e.g., Barriers; Perspectives on collecting and storing MIRE FDE) and Supporting Data
E. Safety Analysis

To view the survey instrument, see Appendix A.

The primary data for the gap analysis was contained in the tabs for:

B. MIRE FDE Part 1 and
E. Safety Analysis.

For each of the MIRE FDE tabs for Tables 1-3, the MIRE FDE for Roadway Segment, Intersection, and Interchange/Ramp was listed and agencies were asked

a) if they collect that particular data;
b) if their data is consistent with the MIRE FDE definition;
c) if the data is collected for the entire network or just part of it;
d) if they have a lot of missing values;
e) how the data is stored; and
f) if they share the data with others.

3.2 Pilot Survey

In order to refine the survey for clarity and scope, a pilot survey was distributed to a subset of three (3) stakeholders. Their responses and feedback were collected from follow-up phone interviews to edit and complete the final version of the survey. For a range of perspectives, the selected agencies varied in agency type, jurisdiction size and geographical location. The selected agencies were Karuk Tribe, Southern California Association of Governments (SCAG) and Kern County. (See Appendix B for full report.)

4. Results

Results from the Safety Data Gap Analysis (Section 4.1) and the Safety Analysis Methods (Section 4.2) are summarized below.

4.1 Safety Data Gap Analysis

The safety data gap analysis report is based on input from the stakeholder group. UCB SafeTREC analyzed survey results and summarized the data.

4.1.1 Survey response clarifications

After reviewing the initial survey responses, several clarifications were made to the survey results in order to more accurately summarize the information received from stakeholders. The following clarifications were made to exclude non-relevant or misleading responses from the table summaries and are described in further detail in the subsequent sections.

1. Exclusion of Identifier, Descriptive or Calculable FDEs;
2. Exclusion of "No" data collection category responses by MPO/RTPAs; and
3. Exclusion of responses to the follow-up questions when no data is collected.

4.1.1.1. Exclusion of Identifier, Descriptive or Calculable FDEs

The MIRE FDEs contain a number of elements that are used for identification and descriptive purposes, such as the unique identifiers for the beginning and endpoints of the segments and ramps. These elements can be considered passive elements that do not require extraneous data collection efforts. They can be generated automatically by either collecting them in order to collect other elements of the roadway segment, intersection or ramp, or calculating them from GIS street or intersection data (e.g. through Caltrans LRS).

Although an agency may not have collected the elements, using the response rates for these elements would be misleading compared to the other FDEs that require specific data collection. The identifier, descriptive, and calculable elements that were excluded from the analysis are as follows in Table 2 below:

Table 2. Identifier, descriptive, and calculable elements excluded from gap analysis

Roadway Segment	**Intersection**	**Interchange/Ramp**
Segment Identifier (12)	Unique Junction Identifier (110)	Unique Interchange Identifier (168)
Route Number (8)	Location Identifier for Road 1 Crossing Point (112)	Location Identifier for Roadway at Beginning Ramp Terminal (187)
Route/Street Name (9)	Location Identifier for Road 2 Crossing Point (113)	Location Identifier for Roadway at Ending Ramp Terminal (191)
Begin Point Segment Descriptor (10)	Unique Approach Identifier (129)	Ramp Length (177)
End Point Segment Descriptor (11)		
Segment Length (13)		

4.1.1.2. Exclusion of "No" data collection category responses from MPOs/RTPAs

The MPOs/RTPAs provide a regional resource for their localities within their boundaries, but do not own or maintain the roadways. The exact role of an MPO/RPTA may vary:

- They may simply acquire and aggregate data from local city or county agencies and not collect any data of their own. This was reported to be the case for Coachella Valley Association of Governments (CVAG).
- They may aggregate city or county agency data, but also collect supplemental data, such as MTC through the MySidewalk system.
- They may acquire and aggregate data from city or county agencies for a portion of roadways in the region. SCAG stated they only collect data for FC 1-6; therefore,

their response regarding data collection for Table 2 (FC 7) were all "No". However, the local city or county agencies within their jurisdiction are likely to collect some of the elements and would give a more complete picture of data availability.

Given these different roles, a "No" response in regard to data collection from an MPO/RPTA does not mean that those data elements are not collected; it may mean that the responsibility lies with the individual city or county agencies. As a result, we excluded "No" responses from MPOs/RTPAs from the summary results to prevent the creation of a false negative picture of MIRE FDE data collection.

On the other hand, MPO/RTPAs that responded "Yes" to collecting data were included in the summary results.

Overall, two "No" responses for each element in Table 1 (FC 1-6) and Table 2 (FC 7) were excluded from the summary analyses.

4.1.1.3. Exclusion of responses to the follow-up questions when no data is collected

When agencies answered "No" to whether they collected data for any individual FDE, their responses to the additional follow-up questions were excluded from the summary analyses. Since the follow-up questions were about the data that was collected, keeping responses from agencies that did not collect data was misleading.

4.1.2 Discussion of Gap Analysis Results

SafeTREC conducted a safety data gap analysis based on the survey results after completing the data clarifications (Sections 4.1.1.1-4.1.1.3).

The goals of the gap analysis are to:

1) summarize the results across the different infrastructure types;
2) summarize the results within each infrastructure type; and
3) provide general observations regarding the responses and impacts for statewide data collection.

The five types of infrastructure that agencies were surveyed about included:

1) Roadway Segment: Paved Roads (Functional Classification, FC, 1 through 6);
2) Intersection: Paved Roads (FC 1 through 6);
3) Interchange/Ramps: Paved Roads (FC 1 through 6);
4) Roadway Segment: Paved Roads (FC 7); and
5) Roadway Segment: Unpaved Roads

In this analysis, a review of the TSN and HPMS databases was also performed to find out if they include the required FDEs.

4.1.2.1. Survey questions

Below is a list of questions from the MIRE FDE initial survey, specifically from Part 1 of the survey which pertains directly to MIRE FDE elements. Each MIRE FDE and number related to MIRE 2.0 are listed. (See Appendix A for the entire survey.)

1. Do you collect? (Yes/No/Unsure)
   1.1. If "No", do you plan to collect? (Yes/No/Unsure)
2. Is your data consistent with MIRE FDE?
3. Description of the data
4. Purpose of the data
5. Who owns the data?
6. How is the data collected?
7. Is the data collected for the entire network or just part of it?
8. Do you have a lot of missing values? (Yes/No)
9. What method/technology do you use to collect the data?
10. How is the data stored?
    10.1. Do you save the raw data or only processed data?
11. How often do you update the data?
12. Do you have plans to change your data collection method/technology? If Yes, when do you plan to change it?"
13. Who do you share the data with?
    13.1. What method do you use to share the data?

4.2.2.2. Summary Tables

Table 3 below provides a high-level summary of the results of the survey across all stakeholders for all survey questions about collection of MIRE FDEs.

Table 3: Summary of Agency Responses, by Percentage (%)

Category	% of MIRE FDE Elements Collected (Q1)	% of Collected MIRE FDE Elements Consistent with MIRE 2.0 Data Definitions (Q2)	% of Collected MIRE FDE Elements that Cover Entire Network (Q7)	% of Collected MIRE FDE Elements with a lot of Missing Values. (Q8)	% of Collected Elements that are Shared with Others (Q13)
All Categories FC 1-6, FC 7, and Unpaved	41	58	47	14	49
Paved Roads FC 1-6: Roadway Segment (12 Elements)	49	63	51	14	52
Paved Roads FC 1-6: Intersection (4 Elements)	34	73	40	47	40
Paved Roads FC 1-6: Interchange/ Ramp (7 Elements)	9	29	29	0	29
Paved Roads FC 7: Roadway Segment (6 Elements)	67	75	61	13	64
Unpaved Roads: Roadway Segment (2 Elements)	35	44	56	0	67

Table 4: Range of Data Consistent with MIRE, by Percentage (%)

Category	High % for individual elements consistent with MIRE data	Low % for individual elements consistent with MIRE data
Paved Roads FC 1-6: Roadway Segment (12 Elements)	AADT Year, Type of Government Ownership - 71% (7)	Access Control - 33% (3)
Paved Roads FC 1-6: Intersection (4 Elements)	AADT, AADT Year - 100% (4)	Intersection/Junction Geometry - 33% (3)
Paved Roads FC 1-6: Interchange/Ramp (7 Elements)	Functional Class, Type of Governmental Ownership - 33% (3)	Interchange Type - 0% (1)
Paved Roads FC 7: Roadway Segment (6 Elements)	Number of Through Lanes - 100% (6)	Rural/Urban Designation - 60% (5)
Unpaved Roads: Roadway Segment (2 Elements)	Functional Class - 50% (4)	Type of Governmental Ownership - 40% (5)

Table 5: Summary of Agency Response for FC 1-6 Roadway Segment Elements, by Percentage (%)

Element	% of MIRE FDE Elements Collected (Q1)	% of Collected MIRE FDE Elements with a lot of Missing Values (Q8)	% of Collected Elements that are Shared with Others (Q13)	% of Collected MIRE FDE Elements Consistent with MIRE 2.0 Data Definitions (Q2)
Surface Type*(24)	82	9	45	56
Functional Class*(19)	82	0	55	67
AADT Year (82)	64	45	36	71
Number of Through Lanes* (32)	55	0	18	67
Annual Average Daily Traffic (AADT)* (81)	55	27	36	67
Type of Government Ownership* (4)	64	0	36	71
One/Two-Way Operations (93)	45	0	18	60
Federal-aid/ Route Type (21, 22)	27	0	9	67
Rural/Urban Designation* (20)	27	0	9	67
Access Control (23)	27	0	0	33
Median Type (55)	18	0	9	50
Direction of Inventory (18)	45	0	36	60
Averages (For Elements Shared with FC 7) *	**61**	**6**	**33**	**66**

* Functional class, surface type, type of governmental ownership, number of through lanes, AADT, and rural/urban designation

Table 6: Summary of Agency Response for FC 7 Roadway Segment Elements, by Percentage (%)

Element	% of MIRE FDE Elements Collected (Q1)	% of Collected MIRE FDE Elements with a lot of Missing Values (Q8)	% of Collected Elements that are Shared with Others (Q13)	% of Collected MIRE FDE Elements Consistent with MIRE 2.0 Data Definitions (Q2)
Surface Type (24)	100	9	64	64
Functional Class (19)	82	0	64	78
Type of Government Ownership (4)	82	0	36	67
Number of Through Lanes (32)	55	0	27	100
Annual Average Daily Traffic (AADT) (81)	45	36	27	80
Rural/Urban Designation (20)	36	0	18	75
Averages	**67**	**8**	**39**	**77**

Table 7: Summary of Agency Response for FC 1 - 6 Intersection Elements, by Percentage (%)

Element	% Of MIRE FDE Elements Collected (Q1)	% Of Collected MIRE FDE Elements with a lot of Missing Values (Q8)	% Of Collected Elements that are Shared with Others (Q13)	% Of Collected MIRE FDE Elements Consistent with MIRE 2.0 Data Definitions (Q2)
Intersection/Junction Geometry (116)	27	9	9	33
Intersection/Junction Traffic Control (121)	36	9	9	50
AADT (81) [for Each Intersecting Road]	36	18	18	100
AADT Year (82) [for Each Intersecting Road]	36	27	18	100
Averages	**34**	**16**	**14**	**71**

4.1.3 Key takeaways across the different infrastructure types

- Intersection FDEs are not frequently collected (relevant to Paved Roads FC1-6 only). 34% of the non-identifier FDEs are collected. This is consistent across jurisdiction types (e.g., cities, counties, MPOs/RTPAs, Tribal) (Table 3). One agency suggested reason is that traffic models are used to design streets or contractors are used and recorded as an as-built plan, but are not directly incorporated into a database.

- Interchange/Ramp FDEs are rarely collected (relevant to Paved Roads FC1-6 only). 9% of the non-identifier FDEs are collected (Table 3).

- 49% of roadway elements for Paved Roads FC 1-6 were collected, whereas 67% of roadway elements were collected for Paved Roads FC 7 and 35% were collected for Unpaved Roads (Table 3). Note that in the six elements shared between FC 1-6 and FC 7 (Functional class, surface type, type of governmental ownership, number of through lanes, AADT, and rural/urban designation), the percentage of each collected were 61% (Table 5) and 67% (Table 6) respectively. Stakeholder agencies are likely able to collect higher percentages for FC 7 due to the ease of collection and consistency of values across the roadway networks.

- 44% to 75% of collected data elements were consistent with MIRE definitions for all categories of elements except interchange/ramps (29%) (Table 3).

- On average, agencies reported more consistent collection of FDEs (Q1), more collected elements with data definitions consistent with MIRE 2.0 (Q2), higher percentages of elements that covered the entire network (Q7), a higher percentage of collected elements that are shared with others (Q13) and a lower percentage of collected elements with a lot of missing values (Q8) on paved roads FC 7 compared to paved roads, FC 1-6 (Table 3).

- Data sharing is most common for FC 7 paved roads (64%) and unpaved roads (67%) compared to lower values for intersection (40%), ramps (29%) and FC1-6 paved roads (52%) (Table 3).

- AADT and AADT Year for both paved roadway segments and intersections were usually collected for only part of the network and had many missing values relative to other elements in their respective infrastructure types. This is the opposite of all other FDEs on paved roadways. Only a single agency collected AADT for the entire network for FC1-6 and FC 7 roadway segments. It is unknown whether the AADT data in this sample is based on actual counts or estimated/calculated data. (Tables 5, 6, & 7)

4.1.4. Key Takeaways by Infrastructure Type

Roadway segments, intersections and interchanges/ramps were the infrastructure types subset by Paved Roads (Functional Class 1-6), Paved Roads (Functional Class 7), and

Unpaved Roads. The following sections provide further details to supplement the key takeaways.

4.1.4.1. Roadway Segments

Paved Roads FC 1-6

Data collection efforts:

- Surface type and functional classification were the most commonly collected roadway segment FDEs with 82% of agencies collecting both FDEs (Table 5).
- Median type was the least commonly collected roadway segment FDE. Only 18% (Table 5) of agencies collected the FDE in this category.
- All elements besides rural/urban designation that were collected by less than 50% of agencies (Table 8) are unique to paved roads FC 1-6 compared to paved roads FC 7.

These findings were not unexpected since surface type and functional classification are established elements used primarily for pavement management, maintenance, and asset management. The infrequently collected elements may not be integral to the specific needs of the city, county, or Tribal agencies and, therefore, were not typically maintained. However, collecting these elements in the future may be beneficial for more advanced safety analysis modeling.

Table 8. Paved roads FC 1-6 roadway segment FDEs by percent of agencies collecting them

Less than 50%	Over 50%	Over 80%
One/Two-Way Operations (45%)	Type of Government Ownership (64%)	Surface Type (82%)
Direction of Inventory (45%)	AADT Year (64%)	Functional Class (82%)
Federal-aid / Route Type (27%)	AADT (55%)	
Rural/Urban Designation (27%)	Number of Through Lanes (55%)	
Access Control (27%)		
Median Type (18%)		

Approximately 63% of collected elements were consistent with MIRE definitions while 51% of the collected elements were collected for the entire roadway network. AADT and AADT Year were the least likely elements to be collected for the entire roadway network, perhaps due to how frequently the data can change (Tables 3, & 5).

Paved Roads FC 7

Data collection efforts:

- Surface type was collected by 100% of agencies for Paved Roads FC 7 (Table 6) and is the only non-identifier element in the entire survey that was reported to be collected by 100% of agencies. This could be attributed to the fact that agencies collect surface type once over a long period of time, or possibly surface type were assumed by default to be Asphalt Concrete (AC).
- Rural/urban designation was the lowest percentage (36%) element collected by agencies on FC 1-6.
- Elements collected for both Paved Roads FC 7 and Paved Roads FC 1-6 were collected at similar percentages, but typically slightly higher for FC-7. The percentages for the in common elements shown in Tables 7 and 8 are as follow for FC-7 compared to FC 1-6:
    - Surface type (100% vs 82%)
    - Functional class (82% vs 82%)
    - Number of through lanes (55% vs 55%)
    - AADT (45% vs 55%)
    - Type of governmental ownership (82% vs 64%)
    - Rural/urban designation (36% vs 27%)

Table 9. Paved roads FC 7 roadway segment FDEs by percent of agencies collecting the data

Less than 50%	Over 50%	Over 80%
AADT (45%)	Number of Through Lanes (55%)	Surface Type (100%)
Rural/Urban Designation (36%)		Functional Class (82%)
		Type of Government Ownership (82%)

75% of collected elements were consistent with MIRE definitions while 61% of the collected elements were collected for the entire roadway network (Table 3).

Unpaved Roads

The overall percentage of elements collected for unpaved roadway segments were very low with only 35% (Table 3) of the MIRE FDE elements collected. Given the lack of data collection, there is not much to be inferred from the other survey questions for unpaved roadways.

4.1.4.2. Intersections

Intersection FDEs were collected by 34% of agencies (Table 3) with no individual element being collected by more than 40% (Table 10) of agencies.

Table 10. Paved roads FC 1-6 Intersection FDEs by % of agencies collecting the data

Less than 50%	Over 50%	Over 80%
Intersection/Junction Geometry (27%)		
Intersection/Junction Traffic Control (36%)		
AADT (36%) [for Each Intersecting Road]		
AADT Year (36%) [for Each Intersecting Road]		

73% of collected elements were consistent with MIRE definitions while 40% of the collected elements were collected for the entire roadway network (Table 3). However, intersection elements had a very high percentage of collected elements with missing values (47%) compared to all the other infrastructure types (<15%) (Table 3).

4.1.4.3. Interchange/Ramp

Interchange/ramp data were collected very rarely. As shown in Table 3, only 9% of interchange/ramp data elements were collected which is the lowest percentage out of all the infrastructure categories. This finding may be attributed to most city or county agencies not collecting interchange/ramp data because they may not have these roadway types in their jurisdiction.

4.1.5 MIRE FDE Compliance Non-State and State

When reviewing the survey results, it is important to take into consideration the ability of a city, county, regional, or Tribal agency - with a MIRE FDE compliant street network - to translate and directly integrate into a statewide LRS. For example, if a city agency uses a road crossing street name-based descriptor for their beginning and end points of roadway segments, but the statewide LRS uses a mile measurement value, the different choices would incur inconsistencies. Even if an agency uses a mile measurement value, if they are not using the statewide LRS, the values will not necessarily represent the same locations on the LRS. Task 3 will further explore the relationship between city, county, regional, Tribal, and statewide data and develop a data integration plan that considers different data collection scenarios.

4.1.6 Data Management and Data Governance

Additional survey results that are not directly related to the MIRE FDE gap and safety methods analysis were collected from the stakeholders. Agencies were asked about their centerline miles, as well as questions about data governance and management, such as:

- What do you see as barriers for collecting MIRE FDE data in your jurisdiction?

- In your opinion where should the database of MIRE FDE be housed?
- What are your recommendations for developing a coordinated statewide program to collect and manage asset data?
- Does your jurisdiction have written documentation on the data listed in Tables 1, 2, 3?
- Would you be willing to share any of your existing data with Caltrans to assist with development of the pilot plan? (Yes/No/Other)
- How is data stored?

This additional data helps build a better understanding of the stakeholder perspectives on issues related to the MIRE FDE planning, data collection, and data management. Below is a summary of responses categorized by city, county, and MPO/RTPA.

Cities:
Stakeholders from city agencies reported that the main barrier for collecting MIRE FDE data reported by cities was lack of resources. One city indicated that MIRE FDE data should be housed at Caltrans, with other two cities indicating that it should be housed at their jurisdictions. Agencies indicated that grant funds would be needed to participate in coordinated statewide data collection and management in order to compensate for lack of resources. One use for funds would be to hire consultants to offset pressure on city employees. All three cities who responded reported that they are willing to share data with Caltrans to assist with the development of the pilot MIRE FDE plan.

Counties:
Stakeholders from county agencies reported that lack of resources is the main barrier to collecting MIRE FDE data, with one county elaborating that the amount of data that is part of the MIRE FDE makes it cumbersome and costly to collect and maintain. Four of the five counties reported that MIRE FDE data should be housed at Caltrans and that they are willing to share data with Caltrans to assist with development of the pilot MIRE FDE plan. Counties' recommendations for a statewide data collection program ranged from coordination between neighboring agencies to the use of proven methods for accurate data collection.

MPOs/RTPAs:
MPO/RTPA stakeholders reported that the main barriers to collecting MIRE FDE data was the lack of interagency agreements, and the difficulty in development interagency agreements and multi-agency planning efforts. One MPO indicated lack of available AADT on the local city or county level, and the difficulty of collecting it. One MPO and one RTPA asserted that MIRE FDE data should be housed at MPOs/RTPAs. Recommendations for statewide data collection revolved around data sharing between agencies, establishing a transportation asset management program/software within local city or county agencies, and augmenting the MIRE FDE requirement to the LRSP through HSIP. Two of the four MPOs/RTPAs reported that they are not willing to share their data with Caltrans or would need agreement from city or county agencies to do so. The decision to share data is a data governance issue that may be the

responsibility of others in the agency or in local city or county agencies, and not the purview of the stakeholder representative.

Tribal:
The Tribal agency attributed the main barrier to lack of resources and lack and difficulty in development interagency agreements. The main recommendation for statewide data collection is providing resources, as well as easy-to-use software to collect MIRE FDE data.

Additional Information:

Some stakeholders provided additional supporting roadway data they collected ranging from bike lane data for active transportation planning to pavement conditions data for pavement management. This supporting data was mainly collected and stored in-house.

How data is stored:
The survey question regarding how the data is stored presented results that are not easily quantifiable given the range of responses and likely should have been a single narrative response not an element-by-element question. Most agencies are likely to use one or more database systems and would not separate individual elements into different databases. Some elements may only be present in one of the databases, but those are probably special exceptions. The one clear difference in the responses is the presence or absence of StreetSaver software. StreetSaver was the most commonly named software while other responses were more general such as in-house database, Database GUI, Excel, Computer Files, Web Map, and GIS Database.

Note that even if there is a system that collects city, county, regional or Tribal data, there will likely be difficulty getting this data into a statewide system. This refers to the issues related to a portal for a statewide database and the ability of non-state agencies to transfer their data to it. Stakeholders reported storing data in the following ways:

- StreetSaver
- In-house database
- PAVER Software
- TransCAD network
- Database GUI
- GIS Software
- Excel
- Web map

4.2 Safety Analysis Methods

In the "Table E. Safety Analysis" segment of the survey, stakeholders were asked about the methods they use for safety analysis, and the data needed for this analysis. They were also asked to identify data they would like to collect, as well as desired methods

of analyses. The data they identified includes MIRE FDE, other MIRE, and non-MIRE data. Traffic safety data has three components:

1. Crashes
2. Inventory of Roadway elements
3. Volumes

All these components enable safety analysis supporting Federal Highway Administration (FHWA) and Caltrans safety goals. MIRE includes the "Inventory of Roadway Elements" and "Volumes" portions of traffic safety data.

It is worth noting that when agencies were asked in the survey to indicate the purpose of collecting the MIRE FDEs, none of the agencies indicated the goal of conducting safety analysis. Some agencies responded that they collect the data for "planning purposes," but we do not know if safety is part of that. One agency indicated that they collect AADT data for "planning/safety" purposes. We will follow up on this issue in Task 3.

4.2.1 Results of Safety Analysis Methods

While 13 agencies submitted data for the gap analysis, a total of 14 agencies replied to the questions about safety analysis. Table 11 lists the questions and summarizes stakeholders' responses to this segment of the survey. A discussion of the responses follows the table.

Table 11 Summary of Responses to "Safety Analysis Methods" Segment of Survey

#	Question	Responses	
1	**Does your jurisdiction conduct safety analyses?***	**Yes**	**No**
		9	3
2	**Indicate type of safety analyses that are conducted**** (Drop down menu for responses provided)	**# of Responses**	
	Systemic safety analysis	4	
	Hot spot safety analysis	4	
	Corridor safety analysis	3	
	Pedestrian and bicycle safety analysis	5	
3	**What safety analyses does your agency/jurisdiction wish to perform in the future?** (Drop down menu for responses provided)	**# of Responded**	**Overall Rank**
	Systemic safety analysis	11	1
	Hot spot safety analysis	10	2

	Corridor safety analysis	10	2
	Pedestrian and bicycle safety analysis	11	2
4	**What additional roadway data elements not listed in MIRE FDE would you like to collect in the future to accomplish these safety analyses?**		
	Lane, median, and shoulder width; speed data; horizontal and vertical alignment of road; crash statistics; ADA ramp, curb and gutter; sidewalk gaps; pavement marking, traffic sign, and traffic signal; traffic signal timing; street; Intersection density (number of intersections divided by segment length); presence of bike facility; agency information (such as regional EMS/EMT services)		
5	**Will you have any training needs for MIRE FDE data for its: (check all that apply)** (Drop down menu for responses provided)	**# of Agencies Responded**	
	Collection	4	
	Integration	4	
	Analysis	5	
	Data Governance	5	

* 2 left blank
** May add to more than 14

Additional supporting information is provided below for each survey question.

Question 1: Does your jurisdiction conduct safety analyses?
Of the responding agencies, 75% (Yes-9; No-3) reported that they conduct safety analyses.

Question 2: Indicate type of safety analyses that are conducted

- Systemic safety analysis
    - Types of analyses included:
        - Systemic Safety Analysis Report Program (SSARP)
        - Cycle 9 HSIP Systemic Application (for Flashing Beacons)
        - Local Roadway Safety Plan (LRSP)
- Hot spot safety analysis
    - Types of analyses included:
        - Annual ranking of collision rates based on facility type
        - HSIP Application (for Roundabout)
        - Data from TIMS, SWITRS, FARS and HPMS used in analyses
        - In-house GIS analyses with Crossroads crash data

- Corridor safety analysis
    - Types of analyses included:
        - Data from TIMS, SWITRS, FARS and HPMS used in analyses.
        - SSARP and High Injury Network (at county level)
- Pedestrian and bicycle safety analysis
    - Types of analyses included:
        - Safe Routes to School
        - Pedestrian and bicycle safety analysis through UC-Berkeley Tech Transfer and SafeTREC
        - In-house GIS analyses
        - Data from TIMS, SWITRS, FARS, Crossroads, and HPMS used in analyses
        - Some agencies host community workshops
- Other
    - Types of analyses included:
        - Complaint-based traffic investigations
        - Countywide Safety Performance Function (SPF)
        - Using the Highway Safety Manual (HSM) predictive model to perform network screening

The most common analyses type falls under the pedestrian/bicycle safety analyses (5 agencies), followed by systemic analysis (4 agencies) and hotspot analysis (4 agencies). The important insight from this is that there does not seem to be a single type of analysis that is consistently done across all jurisdictions. This may mean that all these analysis types require a noticeable effort to execute and there is no "low hanging fruit" in conducting such analyses.

Few stakeholders responding to the survey reported applying for SSARP or LRSP funds. These grant programs may be of use to agencies in collecting various MIRE FDE data. Additional grant programs that may be available for MIRE FDE data collection and maintenance are funds from HSIP and the California Office of Traffic Safety (Traffic Records funding). In general, it will be important to study the barriers to applying to such programs which provide funding for safety analysis.

Question 3: What safety analyses does your agency/jurisdiction wish to perform in the future?

Agencies were asked to rank the safety analyses that their agency wishes to perform in the future from highest priority (1) to lowest priority (5). Even Though there were the same number of agencies that wished to perform the Systemic and Pedestrian/Bicycle Safety Analysis, they did not rank them the same. Therefore, the overall rank for each of the analyses was different.

In addition to the drop-down menu provided, agencies answered an open-ended question about the types of safety analyses they wish to conduct:

- New facility analysis using the HSM methodologies

- Video analysis for near misses/conflicts (Transoft Solutions, or similar) https://safety.transoftsolutions.com/trafxsafe-connect/ /
- LRSP
- Establish a region wide safety database through MySidewalk that allows MTC and its local city or county jurisdictions to perform safety analysis

There seems to be strong agreement that all four analysis types (spot, corridor, systemic, and pedestrian/bicycle) are of interest to the responding agencies. This is reassuring since it demonstrates that these agencies can see the value of such analyses, which jointly, provide a good coverage of safety analysis options.

Question 4: What additional roadway data elements not listed in MIRE FDE would you like to collect in the future to conduct safety analyses?
Agencies responded to this question by listing out a range of suggestions for additional elements to complement MIRE FDE data collection efforts. In order to synthesize their responses and provide added value for potential recommendations, we matched suggestions to specific MIRE elements. In addition, we included elements from previous pedestrian/bicycle analyses conducted by SafeTREC that were deemed to be valuable.

The suggested elements are grouped by infrastructure category with MIRE 2.0 number in parentheses below.

Roadway Segment
- Outside Through Lane Width (33)
- Inside Through Lane Width (34)
- Presence/Type of Bicycle Facility (41)
- Right Shoulder Type (44)
- Right Shoulder Total Width (45)
- Right Paved Shoulder Width (46)
- Left Shoulder Type (48)
- Left Shoulder Total Width (49)
- Left Paved Shoulder Width (50)
- Sidewalk Presence (52)
- Curb Presence (53)
- Curb Type (54)
- Median Width (56)
- Speed Limit (94)
- Roadway Lighting (102)

Intersection
- Intersection/Junction Lighting (123)

Intersection Leg
- Crosswalk Presence/Type (147)

Interchange/Ramp

- Interchange Lighting (173)

Horizontal Curve

- Curve Identifiers (193)
- Curve Feature Type (194)
- Horizontal Curve Degree or Radius (195)
- Horizontal Curve Length (196)
- Curve Superelevation (197)
- Horizontal Transition/Spiral Curve Presence (198)
- Horizontal Curve Intersection/Deflection Angle (199)
- Horizontal Curve Direction (200)

Vertical Grade

- Grade Identifiers and Linkage Elements (201)
- Vertical Alignment Feature Type (202)
- Percent of Gradient (203)
- Grade Length (204)
- Vertical Curve Length (205)

Additional roadway data elements not matching elements in MIRE that agencies also suggested to be included are: crash statistics, curb ramps, traffic signs (types and locations), pavement markings, agency information about EMS/EMT services, and ADA ramps.

Question 5: Will you have any training needs for MIRE FDE data?
Agencies identified the need for training on MIRE FDE data collection and analysis, e.g., safety analysis, to be conducted with the data. On the other hand, the need for training across the core lifecycle of MIRE FDE data efforts (collection; integration; analysis; and governance) does not seem to be overwhelming to local, regional, and Tribal agencies. It is not clear whether this is due to a robust capability across these domains, or an underestimation of the skill set that is needed to conduct this activity at a high level.

4.2.2 Summary and Conclusions of the Safety Methods Analysis

Most jurisdictions conduct safety analyses, which include pedestrian and bicycle related analyses. Often the analyses are funded through a combination of the Systemic Safety Analysis Report Program (SSARP), Local Road Safety Plan (LRSP), and Highway Safety Improvement Program (HSIP). These funding mechanisms may also be able to provide support to collect and maintain MIRE FDE on a wider scale. It may be important to consider creating guidelines in these funding programs to support MIRE FDE collection and maintenance, as well as quality control.

Local, regional, and Tribal agencies may also desire to collect data beyond the MIRE FDE and may need support to do so. For instance, some agencies have utilized UC Berkeley SafeTREC safety studies, such as the Complete Streets Safety Assessment

(CSSA) and Tribal Transportation Safety Assessment (TTSA) programs. Most of the training needs of agencies for MIRE FDE data are for data collection and analysis. Systemic and corridor analysis should be coupled with professional development in order to do these more routinely and may be included in MIRE FDE Training.

5. Next steps

This report summarizes the responses to a survey of the MIRE FDE agency stakeholders. The survey aimed to identify the MIRE FDE data their agencies collect, their methods of collection, and safety analysis they conduct or want to conduct.

The gap analysis confirmed that most stakeholder agencies do not collect or maintain many of the MIRE FDE. Relevant issues for the next phase of this project will be to explore where and how the MIRE FDE will be collected and maintained. Based on further data collection and planning in Task 3, decisions around collection and maintenance of the MIRE FDE will center around:

1. Whether to recommend that local, regional, and Tribal agencies will have their own MIRE FDE databases that can be shared statewide to lead to compliance with FHWA's mandate; or
2. Whether to recommend that local, regional, and Tribal agencies will have access to the TSNR in order to standardize data*; or
3. Whether local, regional, and Tribal agencies will have the ability to enter MIRE FDE-compliant data into the State's LRS; or
4. Whether local, regional, and Tribal agencies have the ability to apply for grant funds (SSARP, LSRP, HSIP, ATP, OTS) to collect and maintain MIRE FDE data; or
5. Whether to recommend, as local, regional, and Tribal agencies develop new data collection systems, that they should be compatible with State LRS.

*This planning is outside of the scope of this project, but may be important to consider for planning purposes.

Task 3 of this project will include working with Caltrans and stakeholders to conduct the following steps:

- Step 3.1. Investigate potentials for MIRE FDE data collection to be coordinated with other collection efforts.
- Step 3.2. Develop a pilot data collection and integration strategic plan, including a data quality management plan, to meet data analysis requirements.
- Step 3.3. Conduct a pilot cost analysis of collecting identified data on all public roads among stakeholder agencies.
- Step 3.4. Develop a pilot Data Quality Control Plan.
- Step 3.5. Create a plan for extending the pilot to the entire state.

6. Acknowledgements

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7. Appendices

A. MIRE FDE Survey (See Excel document)
B. MIRE FDE Pilot Survey Report
C. MIRE FDE Stakeholder survey Responses

Appendix A. MIRE FDE Survey

Model Inventory of Roadway Elements (MIRE) Fundamental Data Elements (FDE) Collection Plan Stakeholder Survey

Please note that in this survey, there are a total of 10 tabs to be completed.

Thank you for your interest in participating as a stakeholder in developing a pilot plan for collection, maintenance and sharing of the MIRE FDE. By participating as a stakeholder, your agency will have a role in developing data governance of the MIRE FDE and a head start in understanding how your agency's roadways safety data will meet MIRE FDE specifications.

The purpose of this survey is to obtain information on how your agency collects, integrates, and governs any of the MIRE 2.0 FDE, what additional data elements should be gathered to do safety analysis, and what the data gaps are. This information will help to conduct a gap analysis related to the MIRE FDE, develop a data dictionary, and develop a draft data governance charter.

We hope to receive your responses by **September 11, Friday**. Please upload your completed spreadsheet along with other relevant files to the Berkeley Box link provided in your email. Thank you!

Additional information on the MIRE FDE is available in the FHWA Guidance on State Safety Data Systems, https://safety.fhwa.dot.gov/legislationandpolicy/fast/ssds_guidance.cfm

If you have any questions, please contact Jill Cooper at SafeTREC (cooperj@berkeley.edu)

Please fill in the following details:

Date	
Name	
Agency/Organization	
Job Title	
Email	
Phone	

In this survey:

	Yellow shaded boxes indicate areas where you may provide information if applicable.
x	For multiple choice questions, please indicate your response with an 'x'.

Some questions may include examples, which you do not need to remove or change. These examples are non-exhaustive and do not represent all possible responses. Please complete all tabs of this spreadsheet to the best of your knowledge as a representative of your agency.

Survey Outline

A. Roadway Data
B. MIRE FDE -- Part 1
    Table 1 - Non-local Roads - Functional Class 1-6
    Table 2 - Local Paved Roads - Functional Class 7
    Table 3 - Unpaved Roads
C. MIRE FDE -- Part 2
D. Additional Data and Documentation
    Table 4 - Additional Roadway Data
E. Safety Analysis

Please proceed to the next tab, A. Roadway Data, after completing this sheet.

A. Roadway Infrastructure Data

1 Does your jurisdiction collect or maintain any roadway infrastructure and traffic volume data?

☐ Yes

☐ No If No, please skip questions 2-4 and prceed to tab C. MIRE FDE Part 2.

2 How many centerline miles of roadway does your jurisdiction cover? N/A if not available.

_____ miles

3 How many intersections does your jurisdiction cover? N/A if not available.

_____

4 How many of those intersections are signalized? N/A if not available.

_____

Please proceed to the next tab, B. MIRE FDE Part 1, after completing this sheet.

B. MIRE FDE Part 1

The MIRE FDE's are categorized by the functional classification and surface type which are listed in Tables 1, 2, and 3 in the following sheets.

MIRE FDEs and MIRE Numbers in parentheses are listed in the first column of each Table.

Table 1: 37 roadway segment, intersection, and interchange/ramp data elements for Non-local Paved Roads (Functional Class 1 to 6)

Table 2: 9 roadway segment elements for Local Paved Roads (Functional Class 7)

Table 3: 5 roadway segment elements for Local Unpaved Roads

Please proceed to the next tab, Table 1 - Non-local Paved Roads FC 1-6.

Table 1 - MIRE FDE required for Non-Local Paved Road (Functional Classification 1-6)

For Non-Local Paved Roads (Functional Classification 1-6):
Selecting the cells in the MIRE FDE (MIRE Number)* column will display a brief definition of each MIRE FDE.
Additional information on the FDE is available in the FHWA Guidance on State Safety Data Systems:
https://safety.fhwa.dot.gov/legislationandpolicy/fast/ssds_guidance.cfm

These FDEs provide information on roadway segments, intersections, and ramps and are based upon data needed to conduct sufficient review of a highway network using existing safety analysis methods.

MIRE FDE (MIRE Number)*	Do you collect? (Yes/No/Unsure)	If "No", do you plan to collect? (Yes/No/Unsure)	Is your data consistent with MIRE FDE definition? (Yes/No/Unsure)	Description of the data	Purpose of the data	Who owns the data?	How is the data collected?	Is the data collected for the entire network or just part of it?	Do you have a lot of missing values? (Yes/No)	What method/technology do you use to collect the data?	How is the data stored?	Do you save the raw data or only processed data?	How often do you update the data?	Do you have plans to change your data collection method/technology? If Yes, when do you plan to change it?	Who do you share the data with?	What method do you use to share the data?
AADT Year (80) - Example	Yes		Yes	Traffic Volume	For HPMS reporting	DOT	Consultant	Functional classification 1-6	Yes	Citywide model	In-house database	only processed data	Once a year	Starting next year, will have a consultant collect on street do a VMT.	PD, County DOT	County wide online system
Intersection/Junction Geometry (126) - Example	Yes		No	Lat, Long of each intersection	Safety Analysis	MPO	In-house	Complete for entire network	Yes	Satellite image	Excel	raw data	As needed	No	Planning Dept., MPO	Email, Internal shared drive
Access Control (22) - Example	No	No														
Number of Through Lanes - Example	Yes		Yes	City wide road data	Planning	Public Works	Purchased	Only arterials	No	Satellite	Software (e.g., Street Saver)	only processed data	Every two years	LIDAR by 2022	Fire Dept.	Internal Web portal, ARGIS Server
Roadway Segment																
Segment Identifier (12)																
Route Number (8)																
Route/Street Name (9)																
Federal Aid/ Route Type (21)																
Rural/Urban Designation (20)																
Surface Type (23)																
Begin Point Segment Descriptor (10)																
End Point Segment Descriptor (11)																
Segment Length (13)																
Direction of Inventory (18)																
Functional Class (19)																
Median Type (54)																
Access Control (22)																
One/Two-Way Operations (91)																
Number of Through Lanes (31)																
Annual Average Daily Traffic (AADT) (79)																
AADT Year (80)																
Type of Government Ownership (4)																
Intersection																
Unique Junction Identifier (120)																
Location Identifier for Road 1 Crossing Point (122)																
Location Identifier for Road 2 Crossing Point (123)																
Intersection/Junction Geometry (126)																
Intersection/Junction Traffic Control (131)																
AADT (79) [for Each Intersecting Road]																
AADT Year (80) [for Each Intersecting Road]																
Unique Approach Identifier (139)																
Interchange/Ramp																
Unique Interchange Identifier (178)																
Location Identifier for Roadway at Beginning Ramp Terminal (197)																
Location Identifier for Roadway at Ending Ramp Terminal (201)																
Ramp Length (187)																
Roadway Type at Beginning Ramp Terminal (195)																
Roadway Type at Ending Ramp Terminal (199)																
Interchange Type (182)																
Ramp AADT (191)																
Year of Ramp AADT (192)																
Functional Class (19)																
Type of Government Ownership (4)																

*See references:
- Model Inventory of Roadway Elements--MIRE, Version 1.0, Report No. FHWA-SA-10-018, October 2010, http://safety.fhwa.dot.gov/tools/data_tools/mireport/mirereport.pdf
- Model Inventory of Roadway Elements--MIRE 2.0, July 2017 - https://safety.fhwa.dot.gov/rsdp/downloads/fhwasa17048.pdf

Please proceed to the next Tab, Table 2, Local Paved Roads FC 7, after completing this sheet.

Table 2 - MIRE FDE required for Local Paved Roads (Functional Classification 7)

For Local Paved Roads (Functional Classification 7):
Selecting the cells in the MIRE FDE (MIRE Number)* column will display a brief definition of each MIRE FDE.
Additional information on the FDE is available in the FHWA Guidance on State Safety Data Systems:
https://safety.fhwa.dot.gov/legislationandpolicy/fast/ssds_guidance.cfm

MIRE FDE (MIRE Number)*	Do you collect? (Yes/No/Unsure)	If "No", do you plan to collect? (Yes/No/Unsure)	Is your data consistent with MIRE FDE definition? (Yes/No/Unsure)	Description of the data	Purpose of the data	Who owns the data?	How is the data collected?	Is the data collected for the entire network or just part of it?	Do you have a lot of missing values? (Yes/No)	What method/technology do you use to collect the data?	How is the data stored?	Do you save the raw data or only processed data?	How often do you update the data?	Do you have plans to change your data collection method/technology? If Yes, when do you plan to change it?	Who do you share the data with?	What method do you use to share the data?
AADT Year (79) - Example	Yes		Yes	Traffic Volume	For HPMS reporting	DOT	Consultant	Functional classification 1-6	Yes	Citywide model	In-house database	only processed data	Once a year	Starting next year, will have a consultant collect on-street do a VMT.	PD, County DOT	Countywide online system
Intersection/Junction Geometry (126) - Example	Yes		No	Lat, long of each intersection	Safety Analysis	MPO	In-house	Complete for entire network	Yes	Satellite image	Excel	raw data	As needed	No	Planning Dept., MPO	Email, internal shared drive
Access Control (22) - Example	No	No														
Number of Through Lanes - Example	Yes		Yes	Citywide road data	Planning	Public Works	Purchased	Only arterials	No	Satellite	Software (e.g., Street Saver)	only processed data	Every two years	LIDAR by 2022	Fire Dept.	Internal Web portal, ArcGIS Server
Roadway Segment																
Segment Identifier (12)																
Functional Class (19)																
Surface Type (23)																
Type of Governmental Ownership (4)																
Number of Through Lanes (31)																
Annual Average Daily Traffic (79)																
Begin Point Segment Descriptor (10)																
End Point Segment Descriptor (11)																
Rural/Urban Designation (20)																

*See references:
- Model Inventory of Roadway Elements–MIRE, Version 1.0, Report No. FHWA-SA-10-018, October 2010, http://safety.fhwa.dot.gov/tools/data_tools/mirereport/mirereport.pdf
- Model Inventory of Roadway Elements–MIRE 2.0, July 2017 : https://safety.fhwa.dot.gov/rsdp/downloads/fhwasa17048.pdf

Please proceed to the next tab, Table 3 - Unpaved Roads, after completing this sheet.

C. MIRE FDE Part 2

5 What do you see as barriers for collecting MIRE FDE data in your jurisdiction? Check all that applies.

- ☐ Lack of interagency agreements, or difficulty in development interagency agreements
- ☐ Lack of resources
- ☐ Multi-agency planning efforts
- ☐ Others, please explain below:

6 In your opinion where should the database of MIRE FDE be housed?

- ☐ State (Caltrans)
- ☐ State (Other than Caltrans)
- ☐ Regional (MPOs)
- ☐ Countywide
- ☐ Local jurisdiction (Cities, Tribes, etc.)
- ☐ Others, explain where and why below:

7 What are your top three recommendations for other agencies developing a coordinated statewide program to collect and manage asset data?

1
2
3

8 Does your jurisdiction have written documentation on the data listed in Tables 1, 2, 3? If so, please list them below and upload any related documentation (standards, data quality management plan, procedures, dictionaries, collection plan, maintenance plan, data governance, etc.) onto the Berkeley Box link. It may be possible to get some of this data from any contracts you have with consultants. Feel free to insert more rows as necessary.

Documentation List

File Name	Description	Relevant MIRE Numbers

9 Would you be willing to share any of your existing data with Caltrans to assist with development of the pilot plan? (Yes/No/Other)

- [ ] Yes
- [ ] No
- [ ] Other. Please specify:

Please proceed to the next tab, Table 4 - Supporting Rdway Data, after completing this sheet.

Table 4 - Supporting Roadway Infrastructure Data (OPTIONAL)

If your jurisdiction collects additional roadway data not included in the MIRE FDE and would like to share with us, please complete the table below regarding the data currently collected in your jurisdiction (OPTIONAL). Feel free to insert more rows as necessary.

Please proceed to the next tab, D. Supporting Data, after completing this sheet.

Index No.	Data	Description of the data (Details and reference number, if available)	Purpose of the data	Who owns the data?	How is the data collected?	Is the data collected for the entire network or just part of it?	Do you have a lot of missing values? (Yes/No)	What method/technology do you use to collect the data?	How is the data stored?	Do you save the raw data or only processed data?	How often do you update the data?	Do you have plans to change your data collection method/technology? If Yes, when do you plan to change it?	Who do you share the data with?	What method do you use to share the data?
Example 1	Pedestrian volume	Traffic Volume	For HPMS reporting	DOT	Consultant	Functional classification 1-6	Yes	City-wide model	In-house database	only processed data	Once a year	Starting next year, will have a consultant collect onstreet do a VMT.	PD, County DOT	Countywide online system
Example 2	Bike lanes	Number of bike lanes	Safety Analysis	MPO	In-house	Complete for entire network	Yes	Satellite image	Excel	raw data	As needed	Not sure	Planning Dept., MPO	Email, internal shared drive
Example 3	Cross Slope	Slope of the roadway cross section	Safety Analysis	Public Works	Consultant	All local roads	No	As-Built Plans	In-house database	raw data	As needed	No	Planning Dept., MPO	Email, internal shared drive
Example 4	HOV Lanes	Number of lanes designated specifically to High Occupancy Vehicles, HPMS 50.	Planning	DOT	In-house	Only freeways	No	Satellite	Software (e.g., Street Saver)	raw data	Every two years	Yes, consultant by 2022	Planning Dept., MPO	Internal Web portal, ArcGIS Server
Example 5	Median Width	Width of the median at the widest section (HPMS Item#38)	Safety Analysis	Public Works	In-house	All arterials	No	As-Built Plans	In-house database	raw data	As needed	Yes, Utilizing consultant, by 2023	Fire Dept.	Email, internal shared drive
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69														

D. Supporting Data

10 Does your jurisdiction have written documentation on the data listed in Table 4? If so, please list them below and upload any related documentation (standards, data quality management plan, procedures, dictionaries, collection plan, maintenance plan, data governance, etc.) onto the Berkeley Box link. It may be possible to get some of this data from any contracts you have with consultants. Feel free to insert more rows as necessary.

Documentation List

File Name	Description

Please proceed to the next tab, **E. Safety Analysis**, after completing this sheet.

E. Safety Analysis

11 Does your jurisdiction conduct safety analyses?

- ☐ Yes
- ☐ No

If yes, please indicate what safety analyses and the method for each analysis. Provide two examples of recent analyses that you have done.

- ☐ Systemic safety analysis:
- ☐ Hot spot safety analysis:
- ☐ Corridor safety analysis:
- ☐ Pedestrian and bicycle safety analysis:
- ☐ Other (e.g. SPFs, Highway Safety Manual, AASHTOWare, Crossroads, etc.) - Please indicate what safety analysis and method of conducting below:

12 What safety analyses does your agency/jurisdiction wish to perform in the future? Please rank them from highest priority (1) to lowest priority (5).

- ☐ Systemic safety analysis
- ☐ Hot spot safety analysis
- ☐ Corridor safety analysis
- ☐ Pedestrian and bicycle safety analysis
- ☐ Other. Please indicate what safety analysis and method of conducting below:

13 What additional roadway data elements not listed in MIRE FDE would you like to collect in the future to accomplish these safety analyses?

14 Will you have any training needs for MIRE FDE data for its: (check all that apply)

- ☐ Collection, explain:
- ☐ Integration, explain:
- ☐ Analysis, explain:
- ☐ Data governance, explain:
- ☐ Other, explain:

Wrap-Up: Please use this space to provide any comments or additional information about your responses in any of the questions on this survey.

Once you have completed all tabs of this document, please upload this Excel spreadsheet, as well as all relevant documents from questions 8 and 10 to the Berkeley Box link.

Appendix B. MIRE FDE Pilot Survey Results Report

MIRE FDE Pilot Survey Results

Submitted by:
Janelle Lee
Jill Cooper
UCB SafeTREC

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Background Information

The goal of the stakeholder survey is to identify what MIRE FDE data is currently being collected and not collected from local, regional, and tribal agencies throughout California, as well as methods of data collection and safety analysis. The survey pertains to Task 2 in Agreement 50A0066 between Caltrans and UCB: *Conduct Safety Data Gap Analysis of Pilot Agencies*. In order to refine the stakeholders survey for clarity and scope, a pilot survey was distributed to a selection of agencies in the stakeholder group. This report will explain the distribution process of the pilot survey, relevant findings, and its impact on the final survey to be distributed to stakeholders.

Stakeholder Selection

Four agencies were initially selected for the pilot survey distribution. To obtain a range of perspectives, the selected agencies varied in agency type, jurisdiction size and geographical location. The selected agencies were Karuk Tribe, Southern California Association of Governments (SCAG) and Stanislaus County. Shortly after the pilot survey and instructions were disseminated among these agencies, a representative from Kern County reached out via email for updates on the project, and also agreed to complete and give feedback on the pilot survey.

Survey Responses

We received completed surveys from Karuk Tribe, SCAG and Kern County. The representative from Stanislaus County was unable to submit a complete pilot survey, but will still be participating in the general survey with other stakeholders. Our team reviewed the responses in the completed surveys and crafted questions to ask the stakeholders in feedback interviews.

Feedback Interviews

Feedback interviews with the stakeholders who completed the pilot survey were conducted via Zoom and were roughly 30 minutes each. Interview prompts were comprised of a number of general questions and a few site-specific questions, dependent on the data that each agency provided in the survey. General questions asked about the uploading process

on Box, which was required for stakeholders to submit their survey and relevant documentation, the clarity of specific questions in the survey and overall ease of navigation through the survey. Through the interviews, we were able to gain insight on the limitations of some survey options, which we had not gathered from looking at the survey responses.

Changes to Survey

One major change made to the survey was the "Unsure" option in Tables 1-3 on existing MIRE FDE data collection. Individual stakeholders may be unaware of every operation within their agency and distributing the survey to all the relevant parties in the organization may be too time-consuming for stakeholders. Additionally, while most situations can be categorized as a yes or no response, some may span multiple options, and this would allow them to give a more accurate response.

We also found that some agencies may overlook one of the tabs labelled "optional", which was not the intention, so we rearranged the order of some questions to divide the sections more clearly.

Next steps

The revised survey is projected to be ready for distribution to the rest of the stakeholder group by September, and we aim to convene all stakeholders in October, to review input and discuss next steps.