Collision Data Analysis

**METRICS**
Operations and safety performance

**ANALYSES**
Site-specific engineering investigations & recommendations

**DESIGNATED ROUTES**
Safe routes to school/transit planning

**PLACEMAKING**
Preserving safety of walkable communities and connections

**CONNECTIVITY**
Corridor or network planning efforts

**GRANT FUNDING**
Statewide or regional ranking of project priority
Collision Data Analysis

Statewide Integrated Traffic Records System (SWITRS)

SWITRS

TIMS

Hot-Spot Safety Analysis

Systemic Safety Analysis
Collision Data Analysis

- Operated jointly by Safe Transportation Research & Education Center (SafeTREC) at UC Berkeley and California Office of Traffic Safety (OTS)
Collision Data Analysis

SWITRS

TIMS

Hot-Spot Safety Analysis

Systemic Safety Analysis

Transportation Injury Mapping System

SWITRS Query & Map
A basic tool for accessing fatal or injury collisions from the California Statewide Integrated Traffic Records System (SWITRS).

SWITRS GIS Map
The Geographic Information Systems (GIS) offers an interactive map with capability of multiple tasks including Rank by Intersection, Collision Diagram, etc.

Collision Diagram
The Collision Diagram tool allows users to generate an interactive collision diagram. The Collision Diagram is accessible through SWITRS GIS Map.

ATP Maps & Summary Data
Utilize multiple collision maps to find pedestrian and bicycle collisions hot spot and generate data summaries within specified project and/or community limits.

Motorcycle Collision Map
Provide a simple means to explore motorcycle collisions in California by selected county and/or city.

SRTS Map Viewer
Provide a pedestrian and bicycle collision map within half mile radius of public schools in California.
Collision Data Analysis

SWITRS

TIMS

Hot-Spot Safety Analysis

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Transportation Injury Mapping System

1. Please specify data and location
   - Date: 01/01/2013 to 12/31/2017
   - County: Orange
   - City: Huntington Beach, Valencia, La Habra, La Palma

2. (OPTIONAL) Narrow down your results by adding specific factors to the query.
   - Collision factors: All factors selected
     - Day of Week, Month, Time, Weather, Type of Collision, Collision Severity, PDO Intersection, Alcohol Involved, State Highway
   - Party factors: All factors selected
     - Party Type, At Fault, Party Gender, Party Age
   - Victim factors: All factors selected
     - Victim Role, Victim Gender, Victim Age, Victim Degree of Injury, Victim Seating Position, Victim Safety Equipment

Show Results
Collision Data Analysis

SWITRS
TIMS
Hot-Spot Safety Analysis
Systemic Safety Analysis

Collisions per 1/8 Mile, 2017
- Fatality or Sev. Injury
- Other Collisions
  - 5-9
  - 10-14
  - 15-19
  - 20-24
  - 25-30
Collision Data Analysis

SWITRS
TIMS
Hot-Spot Safety Analysis
Systemic Safety Analysis

Bike/Ped Collisions on Euclid Ave, 2012-16
- Fatal/Severe-Injury Collisions
- Less Severe Collisions

Density of Collisions:

- 0 every 1,000 ft
- 1 every 1,000 ft
- 2 every 1,000 ft
- 3 every 1,000 ft
- 4 every 1,000 ft
- 5 every 1,000 ft
- 6 every 1,000 ft
- 7 every 1,000 ft
- 8 every 1,000 ft
- 9 every 1,000 ft

Legend:
- Red
- Pink
- Purple
- Blue

0 0.25 0.5 1 Miles
Part B: Narrative Questions

Question #3

QUESTION #3
POTENTIAL FOR REDUCING THE NUMBER AND/OR RATE OF PEDESTRIAN AND BICYCLIST FATALITIES AND INJURIES, INCLUDING THE IDENTIFICATION OF SAFETY HAZARDS FOR PEDESTRIANS AND BICYCLISTS. (0-25 POINTS)

A. Describe project location’s history of pedestrian and bicycle collisions resulting in fatalities and injuries to non-motorized users, which this project will mitigate. (12 points max)

Applicants are encouraged to use the new UC Berkeley SafeTREC TIMS tool which was specifically designed for the ATP to produce these documents in an efficient manner. Applicants will access to alternative collision data tools and training can utilize their choice of methods/tools. Applicants must respond to question 1 or 2, and have the option to respond to both.

1. For applications using the TIMS ATP tool, attach the following:
   a. Collision Heat-map of the area surrounding the project limits - demonstrating the relative collision history of the project limits in relation to the overall jurisdiction/communities collision history
   b. Project Area Collision Map - identifying the past crash locations within the project limits
   c. Collision Summaries and collision lists/reports - demonstrating collision trends, collision types, and collision details
   d. For a Combined I/NI project - If the NI project area is different than the infrastructure portion, the applicant may attach NI related heat-maps, etc in Attachment J

Combine the various maps/summaries into one PDF file and attach it in the field below.
Collision Data Analysis

- SWITRS
- TIMS

Hot-Spot Safety Analysis

Systemic Safety Analysis

Hot-Spot Countermeasures

- Pedestrian Safety Islands
- Road Diet
- Curb Extension
- Traffic Circle
Systemic Safety Analysis

- FHWA: “Involves widely-implemented improvements based on high-risk roadway features correlated with specific severe crash types.”
  - Crash potential rather than crash history
  - Similar to a regression analysis that predicts where collisions are likely to occur based on roadway characteristics

- More comprehensive

- Helps local agencies:
  - Broaden their traffic safety efforts
  - Consider risk
  - Develop strategies for low-cost improvements
  - Compensate for insufficient data due to low population or density
Collision Data Analysis

- Identify a problem based on system-wide data (not necessary a problem that “clusters” in a handful of sites around the study area).

- Identify roadway characteristics / risk factors causing system-wide problems.

- Deploy one or more low-cost countermeasures to address the underlying circumstances contributing to crashes.
## Collision Data Analysis

### SWITRS

### TIMS

### Hot-Spot Safety Analysis

### Systemic Safety Analysis

**Total # of Fatal/Severe Crashes**

<table>
<thead>
<tr>
<th>Category</th>
<th>Total #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection</td>
<td>144</td>
</tr>
<tr>
<td>Unsignalized intersection</td>
<td>54</td>
</tr>
<tr>
<td>All-way stop</td>
<td>3</td>
</tr>
<tr>
<td>2-way stop or yield</td>
<td>51</td>
</tr>
<tr>
<td>Signalized intersection</td>
<td>90</td>
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<tr>
<td>Roadway segment</td>
<td>105</td>
</tr>
<tr>
<td>Major arterial</td>
<td>48</td>
</tr>
<tr>
<td>25 mph posted speed</td>
<td>0</td>
</tr>
<tr>
<td>30-35 mph posted speed</td>
<td>12</td>
</tr>
<tr>
<td>40-50 mph posted speed</td>
<td>32</td>
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<tr>
<td>55 mph posted speed</td>
<td>4</td>
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<tr>
<td>Secondary arterial</td>
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<td>25 mph posted speed</td>
<td>1</td>
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<tr>
<td>30-35 mph posted speed</td>
<td>9</td>
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<tr>
<td>40-50 mph posted speed</td>
<td>13</td>
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<tr>
<td>Collector street</td>
<td>10</td>
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<tr>
<td>25 mph posted speed</td>
<td>5</td>
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<tr>
<td>30-35 mph posted speed</td>
<td>5</td>
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<td>40 mph posted speed</td>
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<td>30-35 mph posted speed</td>
<td>6</td>
</tr>
<tr>
<td>40-50 mph posted speed</td>
<td>0</td>
</tr>
</tbody>
</table>

**Total # of Fatal/Severe Crashes:** 249

**Emphasis Area**

<table>
<thead>
<tr>
<th>Category</th>
<th>Total #</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggressive or Hazardous Driving</td>
<td>51</td>
<td>20.5%</td>
</tr>
<tr>
<td>Improper Turning</td>
<td>31</td>
<td>12.4%</td>
</tr>
<tr>
<td>Drug and Alcohol-Related</td>
<td>26</td>
<td>10.4%</td>
</tr>
<tr>
<td>Pedestrian Crashes</td>
<td>77</td>
<td>30.9%</td>
</tr>
<tr>
<td>Bicycle Crashes</td>
<td>13</td>
<td>5.2%</td>
</tr>
<tr>
<td>Broadside Crashes</td>
<td>66</td>
<td>26.5%</td>
</tr>
<tr>
<td>Fixed Object Crashes</td>
<td>35</td>
<td>14.1%</td>
</tr>
<tr>
<td>Traffic Signals and Signs</td>
<td>31</td>
<td>12.4%</td>
</tr>
<tr>
<td>Night Time or Low Lighting-Related</td>
<td>133</td>
<td>53.4%</td>
</tr>
<tr>
<td>Head-on, Sideswipe, and Rear-End Crashes</td>
<td>54</td>
<td>21.7%</td>
</tr>
</tbody>
</table>

**Top Fatal & Severe Injury Collision Factors**

- Pedestrian Violation
- Unsafe Speed
- Traffic Signals & Signs
- Improper Turning
- Automobile ROW
- Driving or Bicycling Under the Inf.
- Pedestrian ROW

### Driver Crashes by Category

- Aggressive or Hazardous Driving: 51 (20.5%)
- Improper Turning: 31 (12.4%)
- Drug and Alcohol-Related: 26 (10.4%)
- Pedestrian Crashes: 77 (30.9%)
- Bicycle Crashes: 13 (5.2%)
- Broadside Crashes: 66 (26.5%)
- Fixed Object Crashes: 35 (14.1%)
- Traffic Signals and Signs: 31 (12.4%)
- Night Time or Low Lighting-Related: 133 (53.4%)
- Head-on, Sideswipe, and Rear-End Crashes: 54 (21.7%)
Collision Data Analysis

Systemic Safety Analysis

SWITRS
TIMS
Hot-Spot Safety Analysis

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Fatal & Severe Injury Rear-End Collisions, 2007-16
Other Rear-End Collisions, 2007-16
Traffic Signals

0 1 2 4 Miles
Collision Data Analysis

Systemic Countermeasures

**SWITRS**

**TIMS**

**Hot-Spot Safety Analysis**

**Systemic Safety Analysis**

- High-visibility crosswalks
- Mid-block crossings
- Speed feedback signs

*Figure 2C-1. Horizontal Alignment Signs and Plaques*
1 INTRODUCTION

These guidelines describe the policy and procedures for implementing the Systemic Safety Analysis Report Program (SSARP). The guidelines were developed in consultation with the Caltrans Systemic Safety Analysis Program (SSARP) Advisory Committee which includes representatives from:

- Federal Highway Administration (FHWA)
- California Department of Transportation (Caltrans)
- California Highway Patrol
- California State Association of Counties
- League of California Cities
- Regional Transportation Planning Agency
- Metropolitan Planning Organization
- Roadway Safety Coordinating Council

1.1 BACKGROUND

Systemic analysis is a proactive safety approach that focuses on addressing entire network-wide issues using a defined set of criteria. It builds on past findings and aggregates both crash frequency and severity characteristics, rather than lumping all conditions at one location through the traditional, incident-focused safety analysis methods. Systemic analysis recognizes that collisions are not isolated events but rather are part of a larger system. It identifies areas with high volumes where crash densities tend to be low and areas with low volumes where crash densities tend to be high. These areas are then combined into a single prioritized list to identify areas for improvement. Systemic analysis also examines the accessibility of intersections where high levels of collisions occur, including factors such as visibility, road conditions, and pedestrian facilities.

The following are examples of infrastructure improvement countermeasures identified through the systemic analysis approach:

- Signalized Intersections Countermeasures
  - Improve signal hardware: lenses, retro-reflective back-sheets, mounting, and number
  - Provide protected left-turn on-both-two-way-street
  - Improve flashing beacons: enhanced warning
  - Create directional median openings to allow (and regulate) left-turns and/or turns
  - Install pedestrian crossing signals
  - Install enhanced crossing facilities (e.g., signs, markings, rapid flashing beacons, curbs, etc.)

- Non-Signalized Intersection Countermeasures
  - Add intersection lighting
  - Install barrier lane or additional stop signs or other intersection management devices on signal
  - Install flashing beacons in advance warning
  - Create directional median openings to allow (and regulate) left-turns and/or turns
  - Install high-visibility (high-visibility reflectors or red lens)
  - Install enhanced pedestrian crossing features, e.g., signal, markings, rapid flashing beacons, curbs, etc.
### Benefits and Costs of Each Approach
*(when the analysis becomes an implementation strategy)*

<table>
<thead>
<tr>
<th></th>
<th>Unit Cost</th>
<th>Unit Effectiveness</th>
<th>Number of Locations</th>
<th>Implementation Timeframe</th>
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<tbody>
<tr>
<td><strong>Hot-Spot Safety</strong></td>
<td>High</td>
<td>High</td>
<td>Few</td>
<td>Long</td>
</tr>
<tr>
<td><strong>Treatments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Systemic Safety</strong></td>
<td>Low</td>
<td>Variable</td>
<td>Many</td>
<td>Short</td>
</tr>
<tr>
<td><strong>Treatments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Collision Data Analysis Approaches for Local Agencies

NaTMEC 2018 | June 11, 2018 | 8:30am

Griffin Kantz