SAFETY CRASH DATA GUIDANCE

WHY WAS THIS GUIDE DEVELOPED?

To guide Transportation Professionals in building a complete crash data set using the most recent crash data available for a specific project or location, as required in FDOT's manuals for various safety analyses.

WHO IS THE INTENDED AUDIENCE?

Transportation Planners and Engineers, including FDOT Staff, Partnering Agencies, and Consultants who download and review crash data to perform safety analyses.

WHAT IS THE INTENDED USE OF THE GUIDE?

Apply this process when a safety analysis is needed on any project or location on the State Highway System. The process can also be applied to the off-system roadway network.

WHICH AGENCIES ARE RESPONSIBLE FOR THE RECOMMENDED DATABASES?

- Crash Data:
  - Signal Four Analytics (Signal Four) - GeoPlan Center, University of Florida
  - State Safety Office Geographic Information System (SSOGis) - State Safety Office, FDOT
- Crash Reports:
  - Signal Four Analytics - Florida Highway Safety and Motor Vehicles (FLHSMV)

04.17.2023

CRASH DATA PROCESS

1 DOWNLOAD DATA

Obtain access to the Crash Data and Crash Reports
- Signal Four – FDOT Project Manager to request New User Access*
- SSOGis– Publicly available

When downloading crash data, consider:
- Data years required
- Injury Severity
- On- or Off- State Highway System

2 CLEAN DATA

Remove crashes based on the following characteristics:
- Occurred outside the project limits
- Occurred in parking lots or outside of the study limits' influence area

Recode "blank" and "non-traffic fatality" crash severities to "No Injury."
Recode any miscoded / uncoded crash types (e.g., "left-turn", "angle", "head-on", "unknown", "other") based upon reviews of crash reports.

4 SAFETY ANALYSIS

Begin safety analysis with clean dataset:
Determine the level of analysis required for evaluation based on available data

3 SUMMARIZE DATA

Summarize clean dataset in a spreadsheet tool
Identify crash patterns and trends (e.g., by year, month, day, time, crash type, injury levels)

CLICK NEXT

* Staff with a valid FDOT email have access to the databases, watch the trainings for additional guidance on requesting access (e.g., AARF)

GETTING STARTED: AVAILABLE DATA

FIND THE PATH THROUGH THE FOLLOWING QUESTIONS

WHEN TO PULL CRASH DATA?

- When you are performing safety analysis as required by FDOT manuals and guidelines, or otherwise evaluating historical crash patterns and trends to make safety related recommendations.

WHEN TO PULL CRASH REPORTS?

- When verification of crash data attributes and greater understanding of the cause and result of a crash is needed.
- When information from the crash narrative and/or the collision diagram is needed.

HOW IS ACCESS TO THE CRASH DATABASES OBTAINED?

- Coordinate with your FDOT Project Manager to request access to Signal Four - Event Analysis.
- Note that the **Signal Four** - Florida Traffic Safety Dashboard and **SSOGis** are publicly available and no login information is required.

WHAT IS THE DIFFERENCE BETWEEN A SHORT AND LONG-FORM CRASH REPORT?

LONG-FORM CRASH REPORT PER F.S.316.066

- Completed by law enforcement when any of the following are met:
  - The crash resulted in death of, personal injury to, or any indication of complaints of pain or discomfort by any of the parties or passengers involved in the crash.
  - A driver leaves the scene of a crash resulting in property damage without providing information and/or rendering aid.
  - An involved road user was under the influence of alcohol or drugs.
  - The crash required an involved vehicle to be removed by a wrecker.
  - The crash involved a commercial motor vehicle.
- Contains a collision diagram and narrative.

SHORT-FORM CRASH REPORT

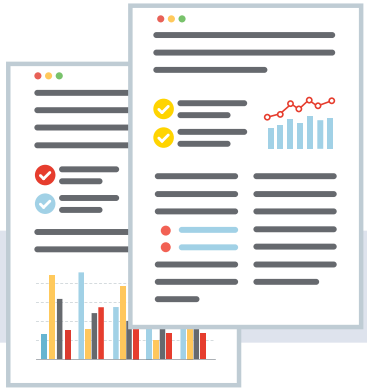
- Completed by law enforcement for crashes not meeting the long-form conditions.
- A collision diagram and narrative are not required.
- Note that driver exchange information is not included in the crash databases.

WHICH CRASH DATA SOURCES SHOULD BE USED?

- Signal Four should be used to download crash data within the study limits.
- The Florida Highway Safety and Motor Vehicles (FLHSMV) is the official repository of crash records for the State of Florida.

WHAT ARE THE DIFFERENCES BETWEEN THE TWO CRASH DATABASES?

- Signal Four receives the crash records from the FLHSMV, including short and long-form crash reports on all public roadways. The database have different timeliness, geolocation processes, and data features based on the crash severity.
- Signal Four - Event Analysis is restricted to authorized users; refer to the **Available Data** section of this Guide for more information on obtaining access. **Signal Four** - Florida Traffic Safety Dashboard and **SSOGis** are publicly available.



QUESTION/DATABASE	SIGNAL FOUR	SSOGis
WHICH CRASH RECORDS ARE INCLUDED?	Short and long-form crashes for all public roadways on and off State Highway System.	Long-form crashes for all public roadways on and off State Highway System.
HOW OFTEN IS THE DATABASE UPDATED?	Nightly	Weekly*
HOW LONG DOES IT TAKE FOR A CRASH TO BE AVAILABLE IN THE DATABASE?**	All crashes severity levels are available within one day of receipt from the FLHSMV. It can take up to 100 days from the date of the crash for fatal and serious injury crashes to be available in the database.	It can take up to 110 days from the date of the crash for fatal and serious injury crashes to be location verified and available in the database. All other crashes are location verified and available in the database within 10 months after annual data is finalized by the FLHSMV.
HOW ARE CRASHES GEOLOCATED?	It can take up to 110 days from the date of the crash for fatal and serious injury crashes to be location verified and available in the database. All other crashes are location verified and available in the database within 10 months after annual data is finalized by the FLHSMV.	Crash locations are taken from Signal Four.
IS ROADWAY CHARACTERISTICS INVENTORY (RCI) DATA INCLUDED IN THE DATASET?	Yes	Yes
ARE FLAGS FOR THE STRATEGIC HIGHWAY SAFETY PLAN (SHSP) EMPHASIS AREAS INCLUDED IN THE DATASET?	Yes	Yes
DATABASE OUTPUTS		Crash data extracts in .csv and GIS shapefile formats.
CRASH REPORTS	Yes	No
DATABASE ACCESS	The download of crash data records through the Event Analysis feature is restricted to authorized users. The Florida Traffic Safety Dashboard is open to the public.	Open to the public.
OTHER INFORMATION	Unmapped crashes will show on the table export.	Does not include non-geolocated crash records received from the FLHSMV.

** Not regularly following the completion of a verified year.*

***Refer to the **Crash Record Processing Timeline** for additional details on when to anticipate a crash record to be reflected in each database.*

1 DOWNLOAD DATA

HOW DO YOU ACCESS CRASH DATA?

Signal Four data is accessed through **Signal Four Analytics**. To download crash records, authorized users are required to log in to access the Event Analysis feature. Crash records can be downloaded through a variety of query options. These include geographic boundaries (District, MPO, County, City, custom area), specific streets or intersections, enforcement reporting agencies, or by crash attributes (e.g., severity, light conditions, pedestrians, age, etc.). An overview of Signal Four Analytics is provided **here**.

SSOGis data is accessed through the **Web Application**. Users can identify the study limits to download crash data by drawing a geographic boundary or by entering the corresponding State Road Roadway ID and milepost. Authorized Signal Four users are not required to download data from SSOGis since Signal Four is the single source of crash data for completing any FDOT safety analyses.

HOW DO YOU PULL CRASH REPORTS?

Use the unique crash numbers to find the related crash reports. The crash reports can be obtained from Signal Four by selecting the desired boundary and years of evaluation. Staff with a valid FDOT email address have automatic access to the Signal Four system and will require prior authorization to access the crash reports (AARF).

Refer to the **Step 2: Clean Data** of this Guide for the relevant fields to identify the unique crash reports identifier.

HOW DO YOU DEFINE THE PROJECT LIMITS TO DOWNLOAD CRASH DATA?

For an **intersection** safety study, the recommended minimum length to download crash data is 0.1 miles, with the middle of the intersection at the center of this measurement. Where turn lanes exceed the recommended minimum length, the distance selected to download crash data should be updated to include the turn lane extent for all approaches.

For a **segment** safety study, the recommended minimum length is 0.2 miles. However, limits should be adapted to the study area and the specific roadway characteristics that need to be evaluated as part of the study. In addition, if the beginning and ending points of the study segment are intersections, the turn lane extents for all approaches should be included.

SHOULD PRACTITIONERS WAIT TO DOWNLOAD CRASH DATA FOR A SAFETY STUDY UNTIL CAR ONLINE ANNUAL CRASH DATA IS VERIFIED?

- For discrete analyses at specific intersection(s) or corridor(s) on any public road (state or local), it is recommended to use a timely representation of the latest crash trends and patterns (e.g., up to the day before from when the crash records are downloaded).
- For non-discrete areawide analyses (e.g., County, District, Statewide) focused on the State Highway System (SHS), it is recommended to use the latest five (5) full calendar years of available crash data.

HOW MANY YEARS OF CRASH DATA SHOULD BE DOWNLOADED?

- It is recommended to pull the last five (5) full calendar years of data as well as the current year up to the day before the crash data is available. For example, if data is being pulled on 4/17/2023, data should be pulled from 1/1/2018 – 4/16/2023. The current year crash data (1/1/2023 - 4/16/2023) is typically used by transportation professionals to verify crash trends and patterns.
- Note that Signal Four will contain crashes that are 60 days or older from the crash report submission date.
- When downloading crash data, use at least five (5) full calendar years under consistent site conditions. If five (5) full calendar years of crash data under consistent site conditions are not available, consider using a minimum of three (3) years. Some site conditions to consider when determining the years for evaluation include recent reconstruction, or major roadway/intersection changes completed within the last five years that may have influenced crash patterns (e.g., 2 to 4 lane widening, signalization).
- Five (5) years of crashes are recommended to be obtained in order to apply the Highway Safety Manual, Part C: Predictive Method. The HSM defines 1 to 3 years of crashes as “short-term” and notes that using averages in the predictive method from short-term periods may give misleading estimates and create problems associated with regression-to-the-mean bias. Please refer to guidance provided in the corresponding functional unit’s manual (PD&E, FDM, TEM, etc.).

For additional background on timeliness of crash data, the following two pages provide an overview of the anticipated timeline to process a crash based on its severity. The first timeline covers crashes that did not report a fatality nor a serious injury, and the second timeline describes crashes that did report fatalities and/or serious injuries.

CRASH DATA PROCESSING TIMELINE

WHAT HAPPENS BETWEEN A CRASH OCCURRENCE AND A DATABASE CRASH RECORD?

CRASH OCCURRENCE – 100 DAYS

- Initial reporting within 10 days
  - Privacy regulations expire 60 days after initial report
- Final reporting within 90 days

FLHSMV PROCESSING – 13 MONTHS

- Annual crash data window – up to 100 days after December 31
- Cleaning of annual crash data – 7 to 10 months

FDOT (SIGNAL FOUR & SSOGis) – 10 MONTHS

- Location verification is completed within 10 months after FLHSMV finalizes annual crash data

KABCO SCALE		FLORIDA TRAFFIC CRASH REPORT (FTCR) INJURY LEVEL	FDOT SCALE
K	FATAL	FATAL	FATAL
A	SERIOUS	INCAPACITATING	SERIOUS
B	MODERATE INJURY	NON-INCAPACITATING	NON-SERIOUS
C	MINOR INJURY	POSSIBLE	POSSIBLE
O	PROPERTY DAMAGE ONLY	NONE	NONE

04.17.2023

CRASH DATA PROCESSING TIMELINE

FLHSMV FLORIDA HIGHWAY SAFETY AND MOTOR VEHICLES — ANNUAL CRASH DATA

FDOT — PROCESSING

BEGINNING OF CALENDAR YEAR FOR CRASH RECORD

JAN. 1, 2020

DEC. 31, 2020

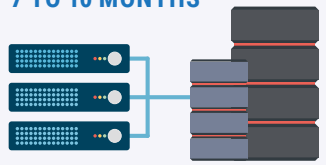
END OF CALENDAR YEAR FOR CRASH RECORDS

FLHSMV ALLOWS **100 DAYS** TO RECEIVE CRASH DATA FROM ENFORCEMENT AGENCIES FROM DECEMBER 31, 2018

APR. 10, 2021

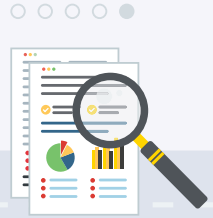
OCT. 29, 2021

FLHSMV FINALIZES THE DATA FOR ALL CRASH SEVERITY LEVELS WITHIN **7 TO 10 MONTHS**



VERIFIES LOCATION WITHIN **10 MONTHS** FOR ALL CRASH SEVERITIES AFTER **FLHSMV** FINALIZES THE ANNUAL DATA

OCT. 2021



SIGNAL FOUR – UPDATED WITHIN **24 HOURS** OF CRASH OCCURRENCE, MANUAL LOCATION VERIFICATION NOT PERFORMED SYSTEMATICALLY

FATAL AND SERIOUS INJURY CRASHES REPORTING TIMELINE

WHAT HAPPENS BETWEEN A **FATAL** OR A **SERIOUS INJURY** CRASH OCCURRENCE AND A DATABASE CRASH RECORD?

CRASH OCCURRENCE – 100 DAYS

- Initial reporting within 10 days
  - Privacy regulations expire 60 days after initial report
- Final reporting within 90 days

FLHSMV PROCESSING – 100 DAYS

- Same as crash occurrence timeline

FDOT (SIGNAL FOUR & SSOGis) – 110 DAYS

- Receives crash records from FLHSMV – 100 days
- SSO Location + severity verification – 10 days

KABCO SCALE		FLORIDA TRAFFIC CRASH REPORT (FTCR) INJURY LEVEL	FDOT SCALE
K	FATAL	FATAL	FATAL
A	SERIOUS	INCAPACITATING	SERIOUS
B	MODERATE INJURY	NON-INCAPACITATING	NON-SERIOUS
C	MINOR INJURY	POSSIBLE	POSSIBLE
O	PROPERTY DAMAGE ONLY	NONE	NONE

04.17.2023

FATAL AND SERIOUS INJURY CRASHES REPORTING TIMELINE

FLHSMV FLORIDA HIGHWAY SAFETY AND MOTOR VEHICLES — FATAL + SERIOUS INJURY INVESTIGATION

FDOT — PROCESSING

FATAL CRASH ON **APR. 3, 2020**

APR. 13, 2020
INITIAL CRASH REPORT **10 DAYS**

PRIVACY PROTECTION EXPIRES **60 DAYS**

JUN. 12, 2020

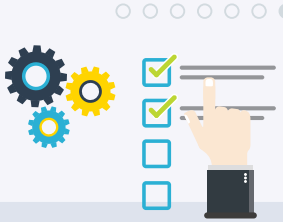
JUL. 2, 2020
FINAL REPORT **90 DAYS**

RECEIVES F+SI RECORDS AFTER UP TO **100 DAYS** FROM THE CRASH DATE

JUL. 12, 2020

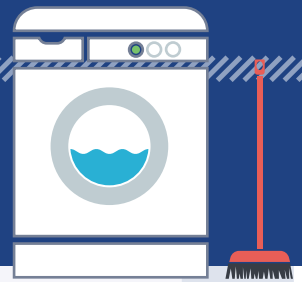
JUL. 22, 2020
VERIFIES LOCATION + SEVERITY WITHIN **10 DAYS**

REPORT TO DISTRICTS FOR **FATAL** CRASH INVESTIGATIONS



SIGNAL FOUR – UPDATED WITHIN **24 HOURS** OF CRASH OCCURRENCE, MANUAL LOCATION VERIFICATION NOT PERFORMED SYSTEMATICALLY

2 CLEAN DATA



HOW IS DATA CLEANED?

Remove crashes that occurred outside of the project limits. For safety analysis purposes, the project limits are based on the influence area of the intersection or segment, as discussed in **Step 1: Download Data** of this Guide.

- Use GIS and/or the crash-specific roadway ID and milepost to determine if a crash occurred outside the influence area.
- Remove crashes that occurred in parking lots or outside of the influence area.
- Re-code crash severities of "blank", and "non-traffic fatality" to "No Injury".

WHY DOES CRASH SEVERITY NEED TO BE RECODED?

A crash severity level is coded as a zero when person-level injury data was not reported. A crash severity level is coded as a non-traffic fatality when the only injury reported in the crash is a fatal not related to traffic (e.g., heart attack). Accurate information about the crash severity avoids gaps during the Crash Data Summarization and patterns and trends identification.

WHEN ARE CRASH REPORTS REVIEW NEEDED?

To verify crash types are coded correctly, review crash reports for all or specific crash types. It may be relevant to review crash reports when:

- The study includes a review of crash reports.
- The study includes a collision diagram; crash location is key to develop these diagrams (e.g., midblock pedestrian crash).
- The study focuses on specific crash types; a review of crash reports will verify crash types are accurately coded.
- The study requires a deeper understanding of crash patterns.

OUTSIDE OF PROJECT LIMITS/NON-PUBLIC ROADWAYS

	DATASET COLUMN HEADER	REMOVE CRASHES WITH VALUES
SIGNAL FOUR	ROAD_SYSTEM_IDENTIFIER	"Forest road", "Private Roadway", and "Parking Lot"

PROPERTY DAMAGE ONLY (PDO) CRASH

DATASET COLUMN HEADER		RE-CODE FROM	RE-CODE TO
SIGNAL FOUR	S4_CRASH_SEVERITY_ DETAIL	"blank" or "Non-Traffic Fatality"	"No Injury"

If crash types need to be updated following a review of crash reports, use the following data column headers to recode crash types:

SIGNAL FOUR
S4_CRASH_TYPE_SIMPLIFIED
S4_CRASH_TYPE
TYPE_OF_IMPACT
S4_IS_PEDESTRIAN_INVOLVED
S4_IS_BICYCLIST_INVOLVED

WHEN AND HOW TO RECODE CRASH TYPES IN THE DATASET?

- Recode any miscoded / uncoded crash types (e.g., "left-turn", "angle", "head-on", "unknown", other) based upon reviews of crash reports.

3 SUMMARIZE DATA

HOW SHOULD CRASH DATA BE SUMMARIZED?

Summarize crash data in text, tabular, and graphical forms to convey critical trends experienced in the historical crash data. The following table shows examples of common crash data attributes using the Crash Event data downloaded in **Step 1: Download Data**. Additional summary types may be helpful for non-motorist and alternative crash data downloads. Consider coordinating with your Project Manager to determine which crash data attributes would benefit the study's purpose & need and intended audience.

CRASHES BY YEAR AND SEVERITY

CRASH ATTRIBUTES

- Annual Crash Frequency and Crash Severity

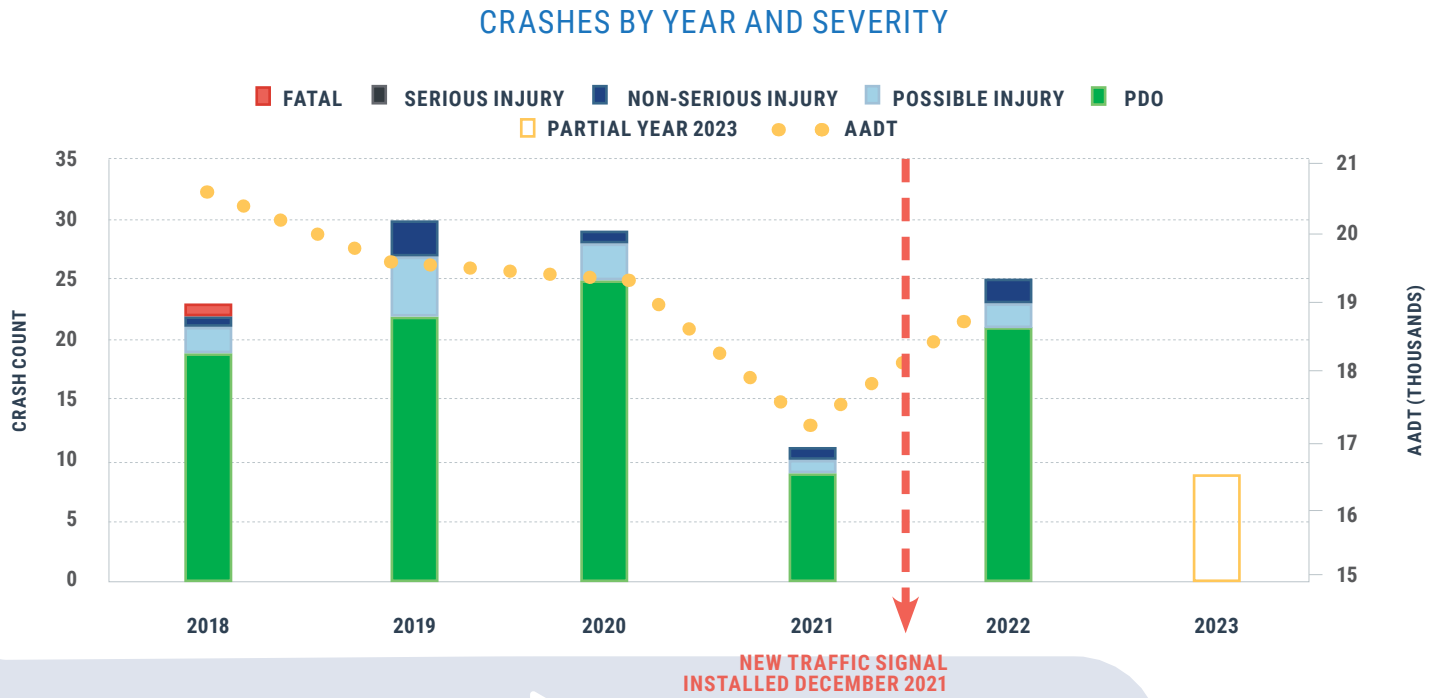
WHY?

- To identify general crash trends by year.
- To compare reported crashes by year to available historical AADTs.
- Compare crash data with previous yearly crash counts after a recently completed project impacting the study influence area.
- The yearly crash breakdown provides context to identify trends within the study period.

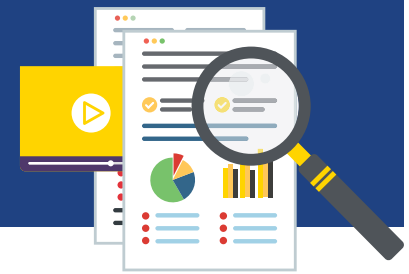
Note: Consider including the severity breakdown as part of the histograms when generating these summaries.

EXAMPLE

One hundred twenty-seven crashes occurred during the study period, with 23 in 2018, 30 in 2019, 29 in 2020, 11 in 2021, 25 in 2022, and 9 in 2023 (partial year through April 16, 2023).



3 SUMMARIZE DATA (continued)



CRASHES BY MONTH

CRASH ATTRIBUTES

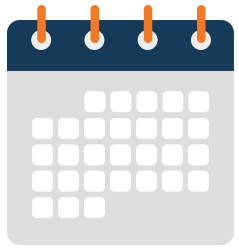
- Monthly Crash Frequency and Crash Severity

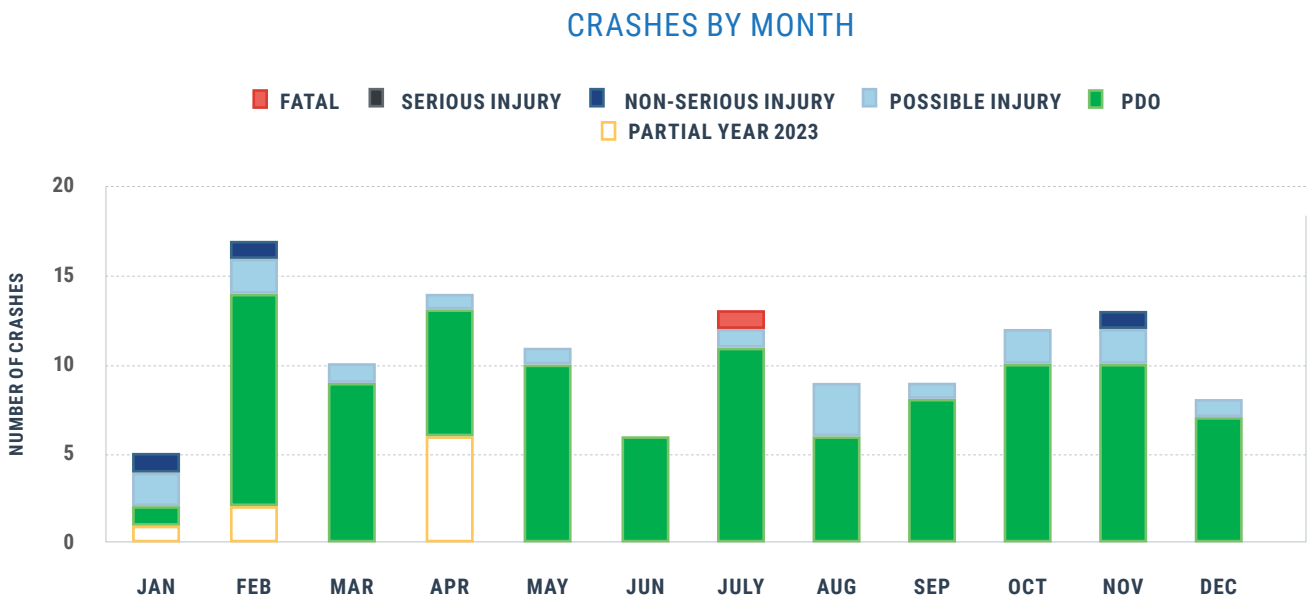
WHY?

- To identify crash peak months for total crashes over the study period (5 full years plus partial year) and potentially target seasonal improvements.

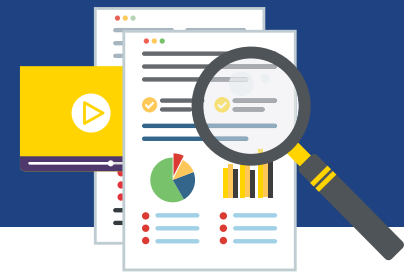
Note: Use partial year crash data for monthly trend evaluation with caution as it can create a biased comparison since crashes will be missing in the dataset (refer to **Step 1: Download Data** of this Guide for a timeline on when crashes become available).

When using partial year crash data, highlight or accentuate the applicable months as shown in the example.





3 SUMMARIZE DATA (continued)



CRASHES BY DAY OF WEEK AND SEVERITY

CRASH ATTRIBUTES

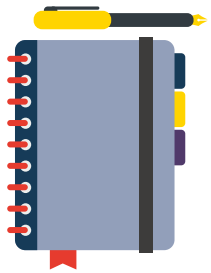
- Day of Week and Crash Severity

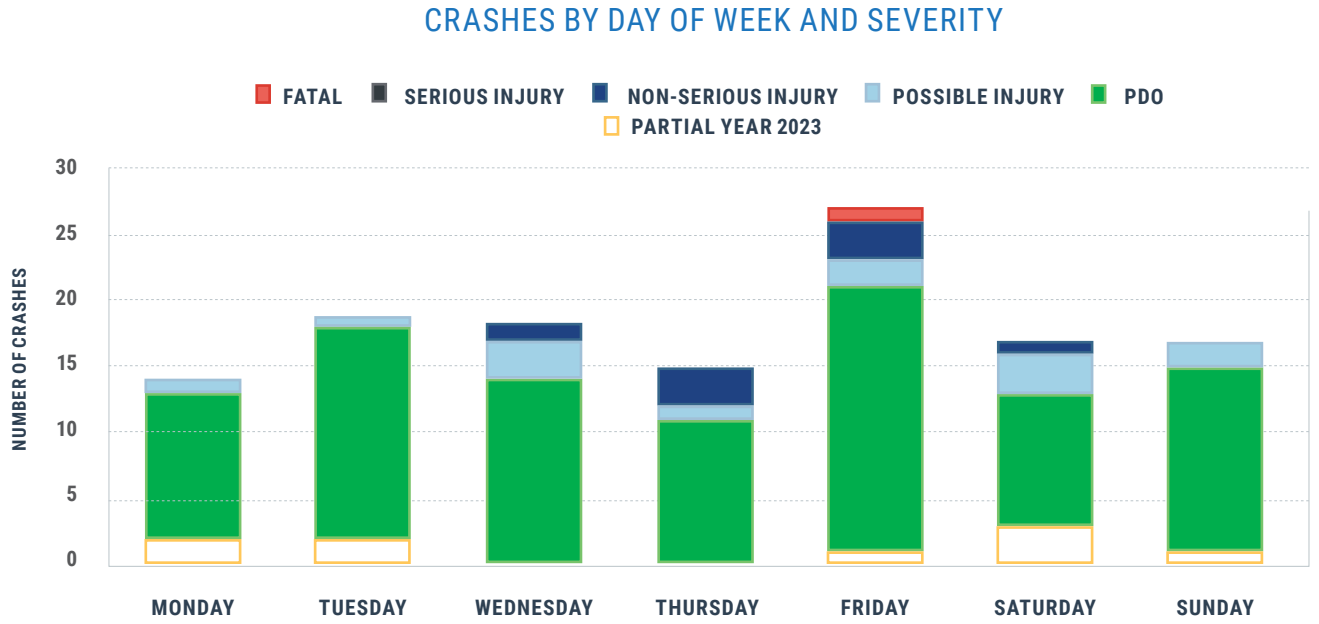
WHY?

- To identify peak days for total crashes over the study period (5 full years plus partial year) to target improvements by day of the week (e.g., changing timing plans: weekday vs. weekend) and education and enforcement campaigns.

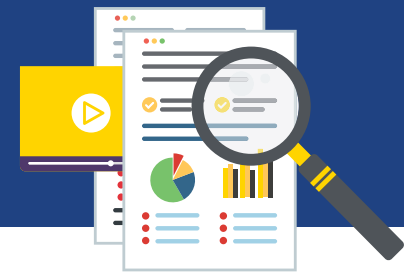
Note: Use partial year crash data for daily trend evaluation with caution as it can create a biased comparison since crashes will be missing in the dataset (refer to **Step 1: Download Data** of this Guide for a timeline on when crashes become available).

When using partial year crash data, highlight or accentuate the applicable months as shown in the example.





3 SUMMARIZE DATA (continued)



CRASHES BY TIME OF DAY AND SEVERITY

CRASH ATTRIBUTES

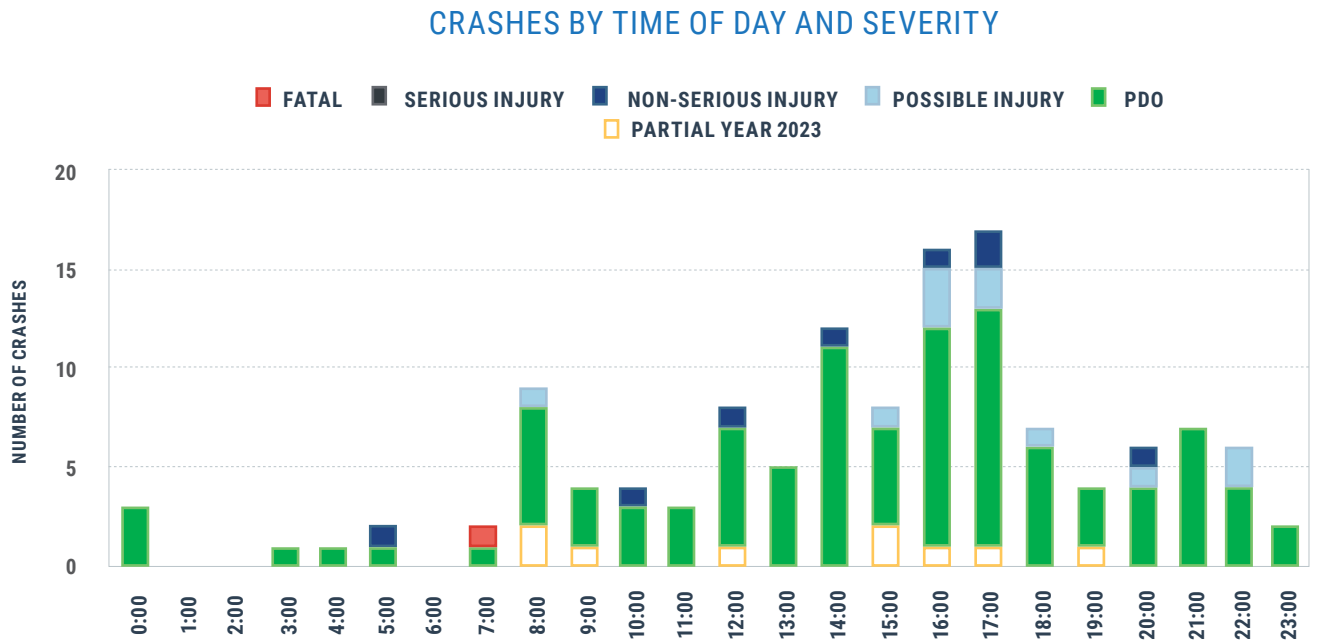
- Time of Day and Crash Severity

WHY?

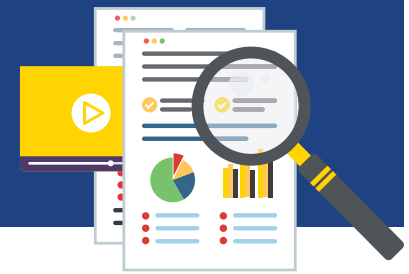
- To identify potential causes of issues (e.g., inadequate lighting) and common trend variations.
- To identify peak crash period(s).
- To identify the study team's preferred timeframe to conduct field observations.

Note: Use partial year crash data for hourly trend evaluation with caution as it can create a biased comparison since crashes will be missing in the dataset (refer to **Step 1: Download Data** of this Guide for a timeline on when crashes become available).

When using partial year crash data, highlight or accentuate the applicable months as shown in the example.



3 SUMMARIZE DATA (continued)



CRASHES BY TYPE AND SEVERITY

CRASH ATTRIBUTES

- Crash Type

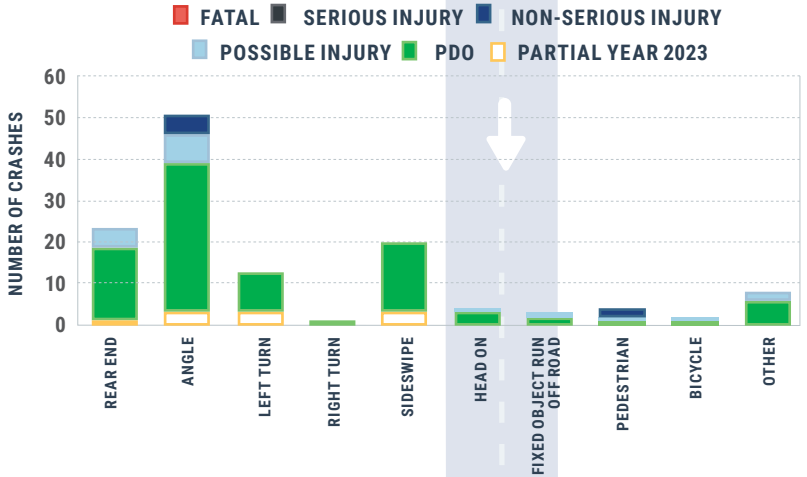
WHY?

- To identify safety countermeasures using leading crash types and safety analysis methods.
- Include crash type with crash severity data to pinpoint the concentration of higher injury severity.
- To document implementation of specific improvements (e.g., the FDOT Traffic Engineering Manual Section 3.2.2 (4) allows the consideration of a protected left-turn phase when left-turn crashes exceed six per year.)

EXAMPLE

Angle (48 or 36 percent), sideswipe (23 or 18 percent), and left-turn (22 or 16 percent) crashes are the highest frequency crash types.

- The 2022 FDOT TEM Section 3.2.2 (4) states a protected-only mode may be considered if "A protected/permissive mode is currently in use and the number of left-turn angle crashes caused by left-turn drivers on this approach exceeds six per year."
- The highest 12-month period for left-turn crashes occurred from January to December 2020, with six eastbound left-turn crashes and three westbound left-turn crashes. These crashes occurred before installing protected/permissive phasing in December 2021.
- While the number of left-turn crashes reported in a 12-month period no longer exceeds the TEM minimum, it is recommended to monitor the left-turn crash trends in the next 12 months to determine if a protected left-turn phase should be implemented.



CRASH ATTRIBUTES

- Crash Severity

WHY?

Provide insight into intersection risk and help identify expected trend variations using other crash attributes.

- Between January 1, 2018, and April 16, 2023, twenty-one injury crashes resulted in 31 possible or non-serious injuries and one serious injury; zero fatal crashes were reported. Fatal and injury crashes accounted for 19% of crashes. One-hundred and five crashes were property damage only (PDO), accounting for 81% of all crashes.

If fatalities have been reported, understanding the potential roadway characteristics and drive behavior contributing factors can help identify potential countermeasures.

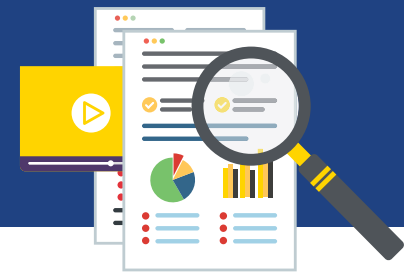
If fatalities have been reported, it is recommended to review the Fatal Crash Reviews completed by the FDOT Districts to confirm if safety improvements were identified.

If a fatal crash has occurred, it is helpful to provide a summary, as shown below.

EXAMPLE

The fatal crash (898007650) occurred on July 14, 2018, when a pedestrian was struck by a vehicle heading westbound through the intersection. The pedestrian was crossing the west leg in the marked crosswalk. No DUIs were reported. The crash occurred during daytime, under clear weather and dry roadway surface conditions. The pedestrian was identified at fault for crossing in front of oncoming traffic.

3 SUMMARIZE DATA (continued)



CRASHES BY LIGHTING CONDITION AND SEVERITY

CRASH ATTRIBUTES

- Lighting Conditions and Crash Severity

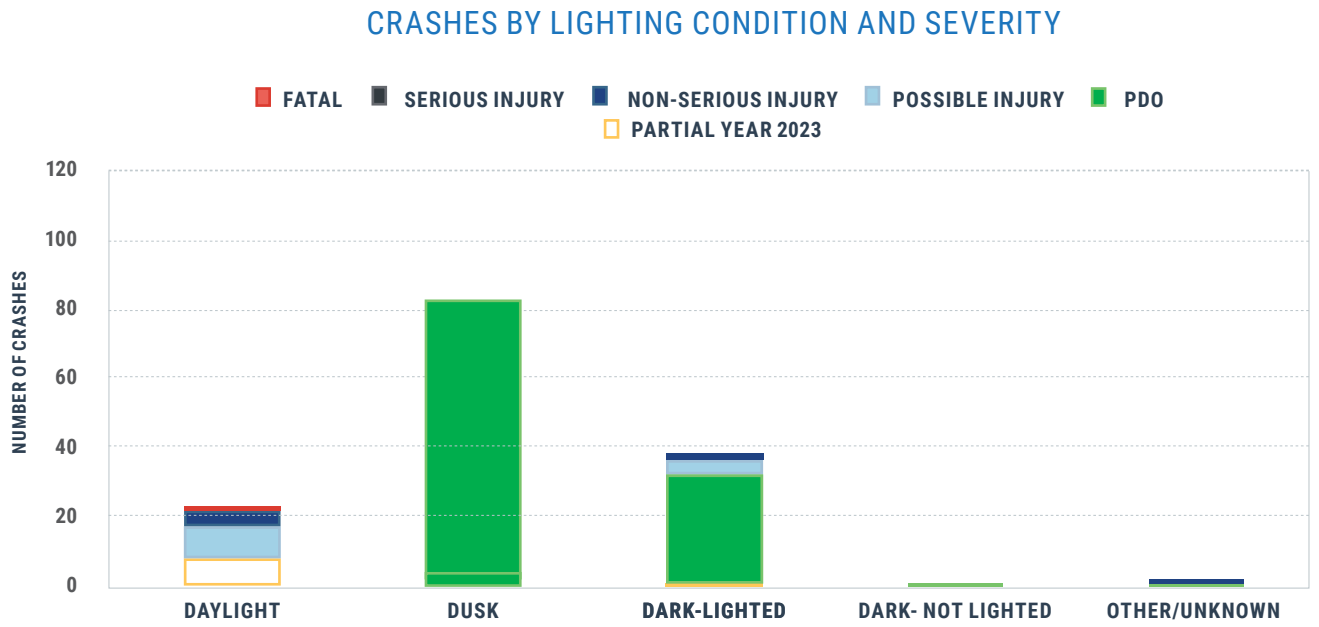
WHY?

If the percentage of nighttime crashes is over the county, district, or statewide averages, it may lead to further improvements (e.g., pedestrian lighting at signalized intersections).

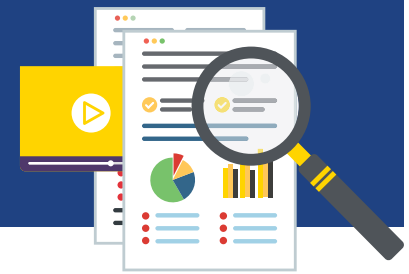
EXAMPLE

Suppose thirty-seven crashes, or 30%, occurred during nighttime conditions, equal to a statewide or district-wide average of 30%. The number of nighttime crashes remained consistent throughout the study period. Roadway lighting is present along the north side. A roadway light pole is located on all four study intersection corners. All lighting fixtures were operational during the field reviews.

Note: Engineering judgment should be used when there is a low number of crashes at the project location (e.g., 1 of 2, or (50%), reported crashes occurred during nighttime).



3 SUMMARIZE DATA (continued)



CRASHES BY PAVEMENT CONDITION AND SEVERITY

CRASH ATTRIBUTES

- Pavement Conditions and Crash Severity

WHY?

Identify further improvement considerations (e.g., milling or applying high friction surface treatment on arterials) if results exceed the current county, district, or statewide averages.

EXAMPLE

Suppose thirty-eight crashes, or 33%, occurred under wet pavement conditions, higher than a district-wide average of 15%. Review the most recent skid report for the location to determine the need for potential pavement quality improvements. In addition, conduct a field review to determine if any water is ponding or if there is potential for ponding at likely low points within the pavement, which can contribute to the number of wet pavement-related crashes. Lastly, evaluate the applicability and potential safety benefit of implementing High Friction Surface Treatments (HFST) within the approach or intersection.

CRASHES BY DRIVER INFORMATION

CRASH ATTRIBUTES

- Driver Information

WHY?

Identify locations to target education and enforcement campaigns (e.g., frequent DUI reporting).

EXAMPLE

The angle crash (890746580) involving two passenger vehicles occurred on September 3, 2018. Vehicle 1 was making an eastbound left turn. Vehicle 2 was heading southbound through the intersection. Vehicle 2 collided with the left side of Vehicle 1 as both vehicles entered the intersection. The driver of Vehicle 2 reported a BAC of 0.175. The right-rear passenger of Vehicle 1 experienced non-serious injuries due to the crash. The crash occurred under Dark-Lighted conditions, clear weather, and dry roadway surface conditions.

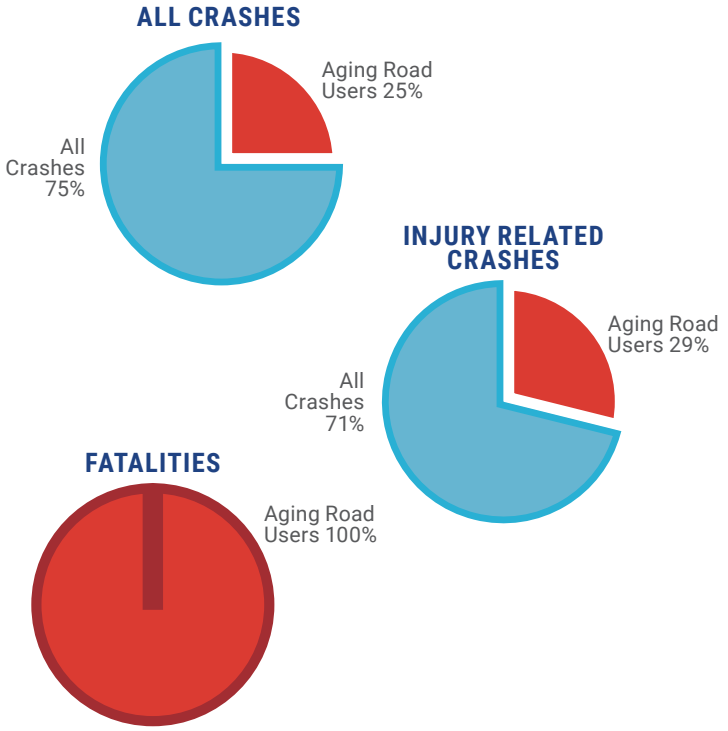
WHY?

Evaluate specific age ranges within the safety study.

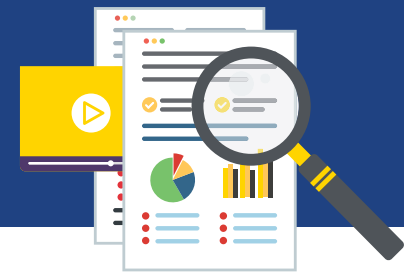
EXAMPLE

Identify targeted safety improvements.

- The juvenile (ages 19 and under) pedestrian and bicyclist crash history within a two-mile radius of the school included two pedestrian crashes and one bicycle crash. All three pedestrian and bicycle crashes resulted in injuries.
- Three crashes (2%) involving teen drivers (ages 15-19) occurred during the study period.
- Five crashes (4%) involving aging road users (age 65+) occurred during the study period.



3 SUMMARIZE DATA (continued)



COLLISION DIAGRAM

- To verify the crash type and direction of travel when reviewing crash data for project-specific improvement identification. Collision diagrams can convey this information.
- Determine crash type using the first harmful event, vehicle maneuver codes, vehicle travel directions, and impact areas for each crash record. Signal Four uses an automated process to assess crash types based on those fields. Refer to **Step 2: Clean Data** of this Guide for detailed information on crash type interpretation.
- Apply these definitions to crash data from CAR Online and SSOGis. Add the crash types together after identifying each data source type to obtain the crash type totals for the study site.

CRASHES BY LOCATION

CRASH ATTRIBUTES

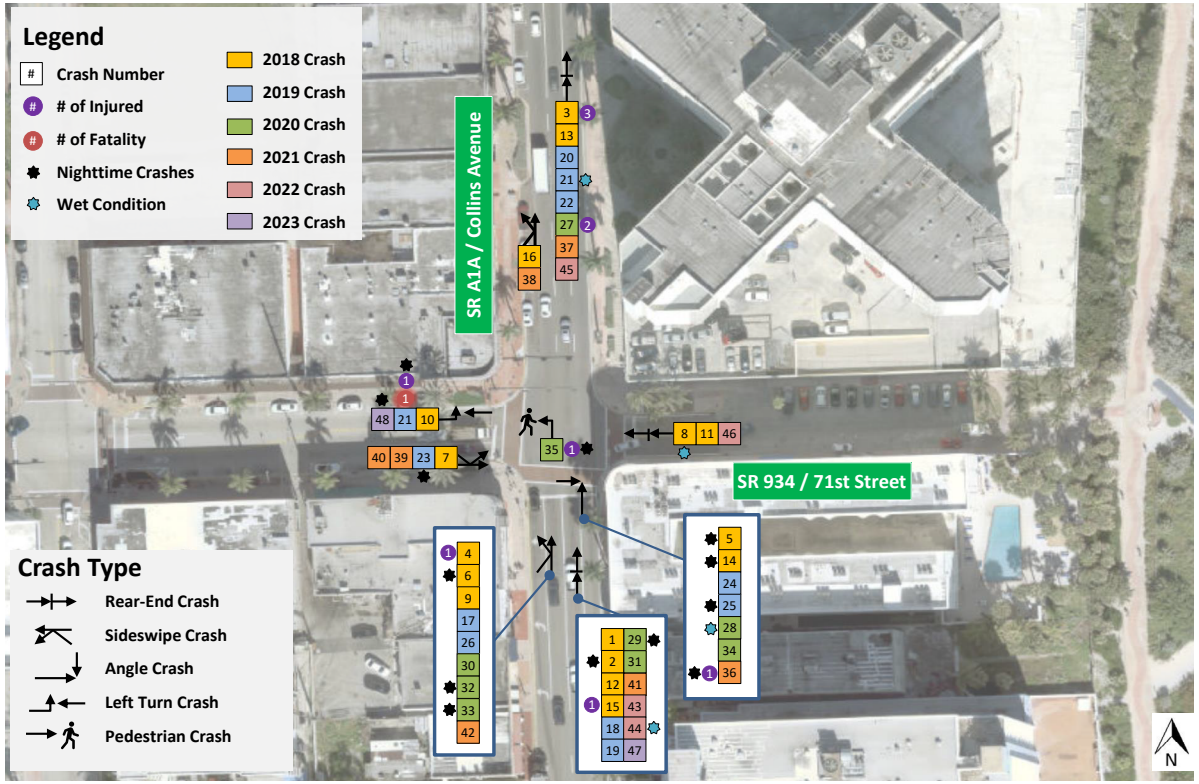
- Crash Location

WHY?

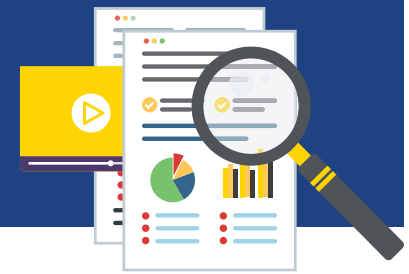
Produce crash location maps.

Using crash report diagrams and narratives, develop a collision diagram when exact crash locations are needed.

- Example diagrams as described by the Manual on Uniform Traffic Studies (MUTS) can be found **here** for condition diagram (750-020-04), collision summary (750-020-05k), and collision diagram (750-020-05i and 750-020-05j).



3 SUMMARIZE DATA (continued)



CRASHES BY ADDITIONAL CONSIDERATIONS

CRASH ATTRIBUTES

- Additional Considerations

WHY?

- Driver Behavior (e.g., distraction, action, condition).
- Find target audiences for behavioral safety campaigns using demographic information of drivers or all occupants. Note that the crash level extract is limited to Driver 1 and Driver 2 information.
- Determine geolocations to target safety campaigns using zip code information of drivers involved in crashes.

CRASHES BY SHSP EMPHASIS AREA

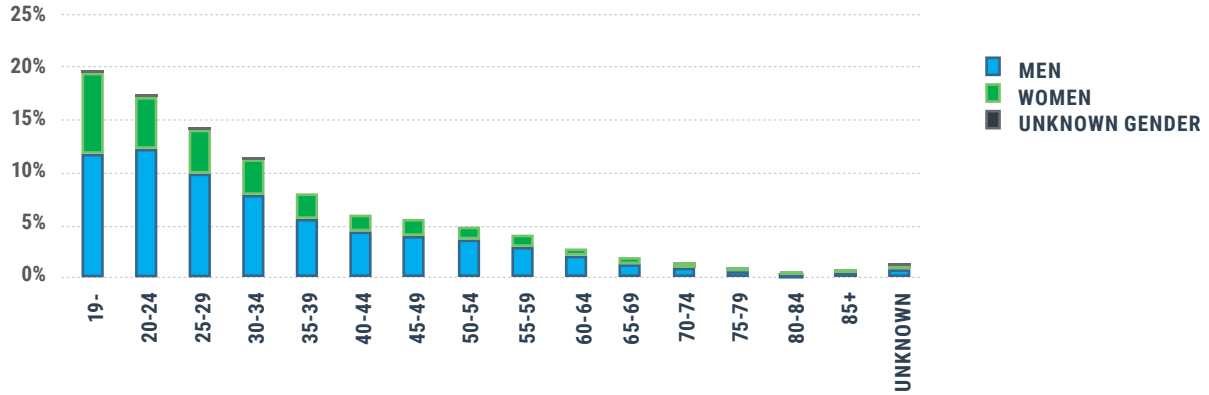
CRASH ATTRIBUTES

- Strategic Highway Safety Plan (SHSP) Emphasis Areas

WHY?

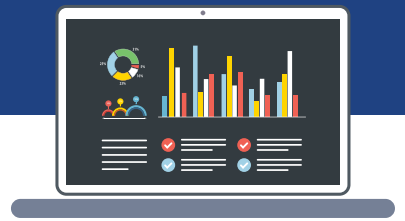
- If alternative funding sources are possible, review the SHSP and identify relevant areas where the crashes may warrant safety funding requests.
- The SHSP Emphasis Area definitions can be found at the end of the latest SHSP. The Emphasis Area definitions only apply to fatal and serious injury crashes. A single crash can fall under multiple Emphasis Areas; as such, the total of Emphasis Area crashes for a given site will likely be greater than the total number of fatal and serious injury crashes.
- The SSOGis and Signal Four systems provide additional information on crashes associated with the SHSP Emphasis areas.

MOTOR OCCUPANTS WITHOUT A SEATBELT



PERCENTAGE OF CRASHES BY HOME COUNTY OF DRIVER 1

4 SAFETY ANALYSIS



WHAT SAFETY ANALYSIS METHOD SHOULD BE USED?

There are five methods approved to analyze a location's safety performance. The methods, in order of FDOT preference, are:

1. Excess expected average crash frequency with Empirical Bayes (EB) method adjustments [detailed background on this method can be found under the HSM Part C]
   a. Determine the expected crash frequency using a Safety Performance Function (SPF) weighted, using the EB method, with the observed crash frequency. Then, compare the resulting weighted crash frequency to the expected crash frequency to determine the difference between the two values.

2. Predicted average crash frequency using SPFs [detailed background on this method can be found under the HSM Part C]
   a. Use the difference between the observed crash frequency for the site and the predicted crash frequency based on the SPF with site-specific information.

3. Relative severity [detailed background on this method can be found under the HSM Part D]
   a. Assign an average monetary crash cost to each crash at a site and compare the total average crash cost for a site to the average crash cost for the reference population (e.g., state, district, and county). FDOT Design Manual (FDM) Chapter 122 provides Average Crash Costs by Facility Type (Table 122.6.1) and KABCO Crash Costs (Table 122.6.2). Use the current FDM for crash cost values.

4. Critical crash rate
   a. Calculate a critical crash rate for each site and compare it to the observed crash rate. Flag areas with an observed crash rate exceeding their critical crash rate for further investigation.

5. Qualitative analysis
   a. Review, evaluate, and describe the site based on engineering judgment and all available data (e.g., site characteristics, volumes, and comparison to similar locations).

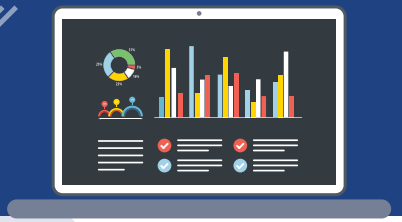
Sites with crash frequency, severity, or target crash types higher than the reference data may be considered priority sites for safety improvements.

WHEN SHOULD EACH SAFETY ANALYSIS METHOD BE USED?

Each method has different strengths, weaknesses, and data needs, as detailed in the following table. Only select qualitative safety analysis if performing a quantitative safety analysis cannot be done using available data and methods. A qualitative analysis should include a discussion of the available data and methods limitations and provide a qualitative safety judgment of the site.

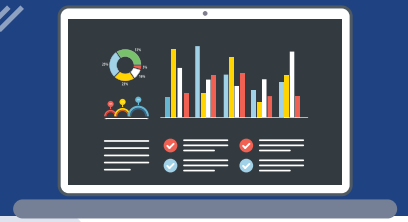
Methods one and two use Safety Performance Functions (SPFs). SPFs are available for various facility types and provide predicted crash frequency, sometimes separated by crash type and severity (PDO and Fatal & Injury). For existing facilities with available historical crash data under consistent site conditions, use the EB statistical method to determine the expected crash frequency for a site. Expected crash frequency can also be split up by crash type and severity. Find tools for and information on using SPFs calibrated for Florida on the **FDOT Safety Analysis Methods and Resources** webpage and the **FDOT Highway Safety Manual User Guide**, respectively.

4 SAFETY ANALYSIS (continued)



	SAFETY ANALYSIS METHOD	DATA NEEDS	STRENGTHS	WEAKNESSES	RESOURCES
1	Excess expected average crash frequency with Empirical Bayes (EB) method adjustment	• A minimum of five (5) years of crash data • Crashes by type, severity, and location • Calibrated SPF and overdispersion parameter • Traffic volume (AADT) • Roadway/intersection design elements	• Reliable and comprehensive • Accounts for regression to the mean • Accounts for volume • Accounts for design elements • Quantitative	• Data-intensive • Limited SPFs available for all conditions (e.g., midblock crosswalk where there are no non-motorist crashes)	• FDOT HSM Trainings • FDOT MUTS Chapter 5 and 6 Computer Based Training (CBTs) provide detailed guidance on data collection needs • FDOT MUTS Chapter 14 CBT provides detailed guidance on how to apply this method for lighting justification • FDOT ICE Training (SPICE) Modules 2.7.1 and 2.7.2 (coming Spring 2023)
2	Predicted average crash frequency using SPFs	• Traffic volume (AADT) • Calibrated SPF Roadway/intersection design elements	• Reliable and comprehensive • Accounts for volume • Accounts for design elements • Quantitative	• Data-intensive • Limited SPFs available for all conditions (e.g., Leading Pedestrian Interval implementation)	
3	Relative severity index	• Crashes by type • Crash frequency by facility type • Crash costs by facility type	• Low-effort • Considers facility type and crash severity • Quantitative	• Does not account for regression to the mean bias • May overemphasize locations with a small number of serious crashes; and • Does not account for traffic volumes	• FDOT FDM Chapter 122 • FDOT FDM Table 122.6.4 provides the HSM Crash Distribution for Florida
4	Critical crash rate	• Crash counts • Crash rates by facility type, district, or geographic area of interest • Traffic volume (AADT)	• Reduces the exaggerated effect of sites with low volumes • Considers variance in crash data • Can be applied to a specific crash type or severity • Quantitative	• Does not account for regression to the mean bias	• FDOT SSO Presentation Slides
5	Qualitative analysis	• Crashes by type • Site Characteristics • Traffic volume (AADT) • Comparison to similar locations	• Low-effort • Documents existing conditions • Qualitative	• Does not yield the necessary information to quantify expected safety benefits	• FSOT SSO Crash Data Guidance: Step 4

4 SAFETY ANALYSIS (continued)



WHICH FACILITY TYPES HAVE SPFS?

HSM 2010 CHAPTER	UNDIVIDED ROADWAY SEGMENTS	DIVIDED ROADWAY SEGMENTS	INTERSECTIONS					
			STOP CONTROL ON MINOR LEGS		SIGNALIZED		RESTRICTED CROSSING U-TURN [3] (RCUT)	ROUNDABOUT[3]
			3-LEG	4-LEG	3-LEG	4-LEG		
10. Rural Two-Lane Roads	√		√	√	√[3]	√		√
11. Rural Multi-Lane Highways[1]	√	√	√	√	√[3]	√	√	√
12. Urban and Suburban Arterials[2]	√	√	√	√	√	√	√	√

1. *Methodology available for four-lane divided and undivided. No methodology is currently available for six-lane rural highways.*
2. *Methodology available for two-, four-, and six-lane undivided arterials, four-, six-, and eight-lane divided arterials, three-, five, and seven-lane arterials with a center two-way left-turn lane, and one-way arterials with two, three, and four lanes.*
3. *Methodology only available in the SPICE tool.*
4. *Source: FDOT MUTS Table 5-1: Facility Types and Site Types Included in the HSM Predictive Method*

TRAFFIC SAFETY COALITIONS

Want to help Florida achieve our target of zero fatalities and serious injuries? Please see our **Strategic Highway Safety Plan**

The following traffic safety coalitions are resources to support the implementation of this plan, and could also help in the reduction of identified crash types through different safety analyses.

OCCUPANT PROTECTION SAFETY

floccupantprotection.com

MOTORCYCLE SAFETY

ridesmartflorida.com

TEEN DRIVER SAFETY

flteensafedriver.org

TRAFFIC RECORDS

fltrafficrecords.com

IMPAIRED DRIVING SAFETY

flimpaireddriving.com

PEDESTRIAN & BICYCLE SAFETY

alerttodayflorida.com

AGING ROAD USER SAFETY

safemobilityfl.com

Please visit **FDOT Safety Coalitions** for up to date information and links.