PSAP Screening Tool Frequently Asked Questions

Texas Pedestrian Safety Action Plan (PSAP)

June 2023

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1 How to use the PSAP Screening Tool

The Texas Pedestrian Safety Action Plan uses historic crashes and analysis of roadway characteristics to provide both historic crash analysis (targeted analysis) and indications of where future crashes may occur (potential risk from systemic crash analysis). For more information on overall PSAP methodology, please refer to the "Other Frequently Asked Questions" section below and contact bikeped@txdot.gov for other questions.

The PSAP Screening Tool was primarily built to investigate locations with a history of pedestrian crashes or potential risk of pedestrian crashes and provide suggested countermeasures to mitigate future pedestrian crashes.

The PSAP Screening Tool has four main sections, all of which are highlighted and labelled in Figure 1-1:

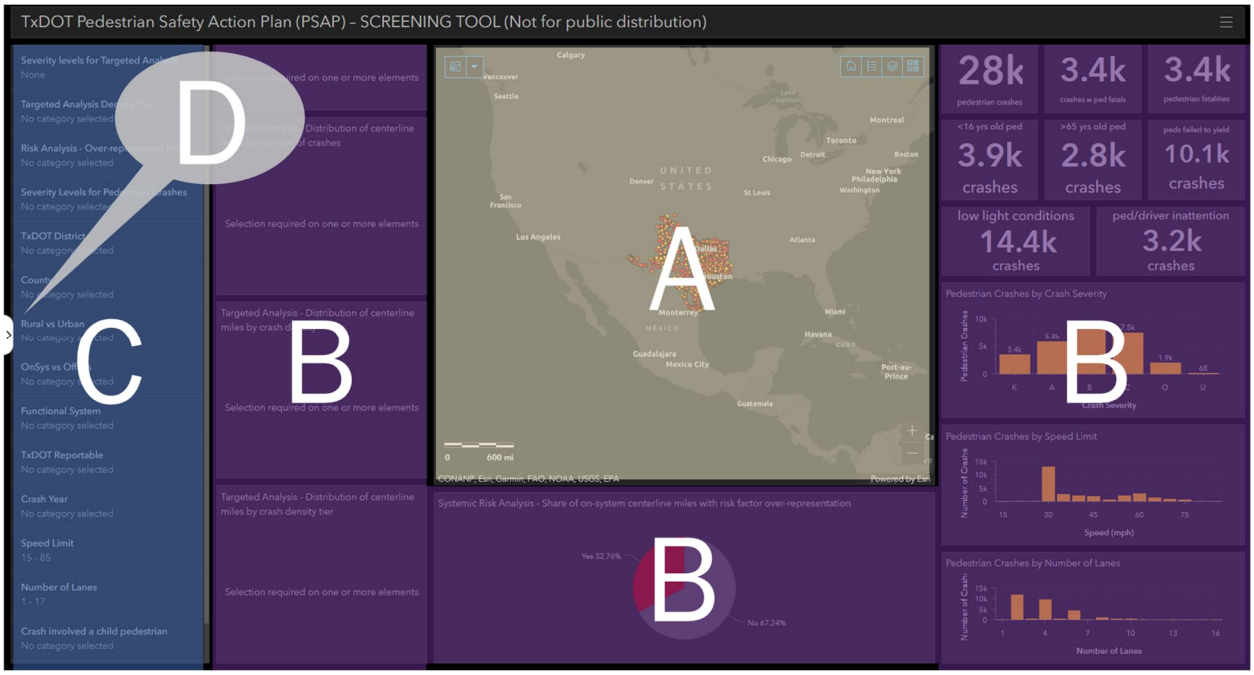
A. **Map interface**: this is where the user can zoom and pan throughout Texas to identify locations of interest.

B. **Summary statistics**: these are summary statistics that are calculated based on the map extent and the user's selection of filters from the filter/selector panel.

C. **Filter/selector panel**: these controls allow the user to choose which crash points and which links to show on the map and in the summary statistics.

D. **Pull-out sidebar**: This sidebar contains some basic instructions, a link to this document, links to the study's main page, and an email address to which users can send comments.

Figure 1-1: Screening tool layout and parts



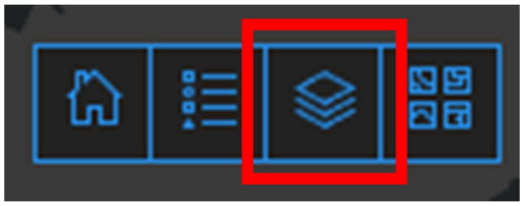
Parts A, B and C of the screening tool are interconnected and affect each other. For example, if the user wants to focus on just Travis County, she can use the County selector in Section C on the left and pick "Travis." This will update the map in Section A to show only crashes and links in Travis County. Furthermore, it will update the summary statistics in Section B to reflect the totals for Travis County.

1.1 Interacting with the screening tool

1.1.1 The layer selector

On the top right corner of the map, there are four icons which the user can interact with. The third icon (highlighted in Figure 1-2) can be used to select which layers are visible on the map.

Figure 1-2: Icon used to select visible layers



The layers available for the user to toggle on and off include:

PSAP Analysis layers:

- Crash points
- Crash heatmap
- Systemic analysis
- Targeted analysis – Number of crashes
- Targeted analysis – Crash density
- Targeted analysis – Crash density tier

Extra layers:

- Transit stops
- TxDOT projects

Filters/Selectors:

Not all filters/selectors affect all the layers listed. Table 1-1 illustrates which layers are affected by each of the filters/selectors.

Table 1-1: How filters/selectors affect the screening tool's layers

Filter/Selector	Crash Points	Systemic Risk Analysis	Targeted Analysis
Severity levels for targeted analysis			✓
Targeted analysis density tier			✓
Risk analysis – potential risk		✓	
TxDOT District	✓	✓	✓
County	✓	✓	✓
Rural vs urban	✓	✓	✓
On system vs off system	✓	✓	✓
Functional system	✓	✓	✓
TxDOT reportable	✓		

Crash year	✓		
Speed limit	✓	✓	✓
Number of lanes	✓	✓	✓
Crash involved a child pedestrian	✓		
Crash involved a senior pedestrian	✓		

By toggling layers on and off and using the filters/selectors on the left-hand side of the screen, the user can explore the three main sections of the results produced throughout the PSAP's analyses:

- Crash points
- Systemic risk analysis
- Targeted analysis

1.1.2 Pop-up windows

When layers are visible, clicking on a particular point or link will make a pop-up window appear. This pop-up will contain valuable information regarding the specific point or link that was clicked on. The pop-up window for crash points, as seen in Figure 1-3, contains the Crash ID, the Route ID on which the crash occurred, and the DFO marker (distance from origin along the route) on which the crash occurred, alongside other valuable information. For the systemic risk analysis, the pop-up window, as seen in Figure 1-4, contains information about the Route ID, the link's starting and ending DFO values, and whether the link is classified as having potential risk, among other valuable link-level information. Finally, the pop-up windows for the targeted analysis, as seen in Figure 1-5, contain information about the Route IDs and DFOs as well as information regarding the number of crashes, crash density and the crash density tier for the specified link.

It is also worth noting that the pop-up windows for the systemic risk and targeted analyses also include information regarding each link's countermeasures.

Figure 1-3: Crash point pop-up window

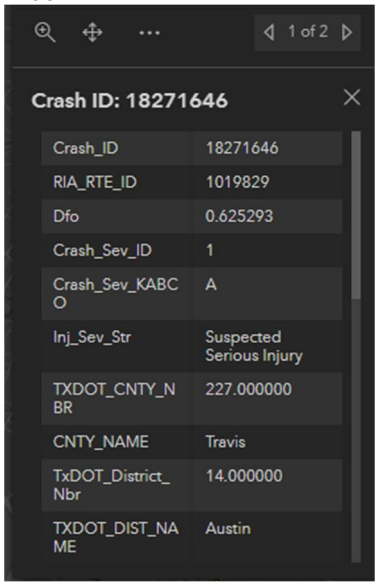


Figure 1-4: Risk analysis pop-up window

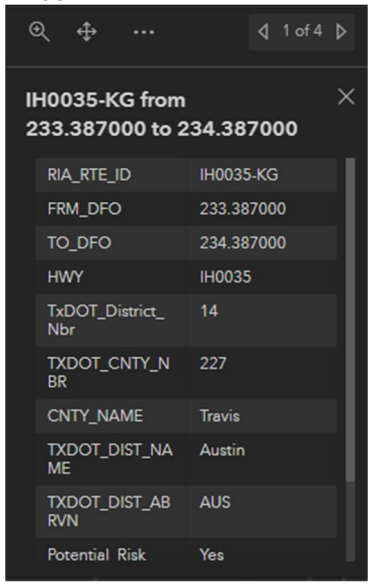
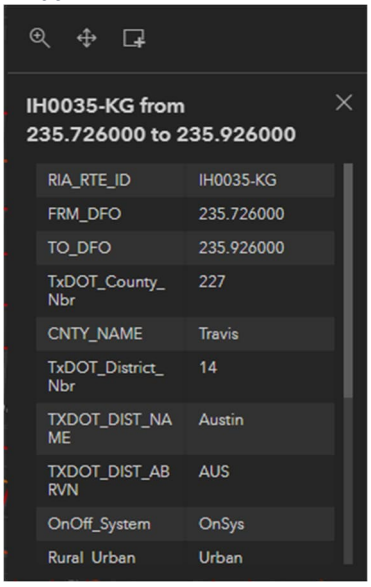


Figure 1-5: Targeted analysis pop-up window



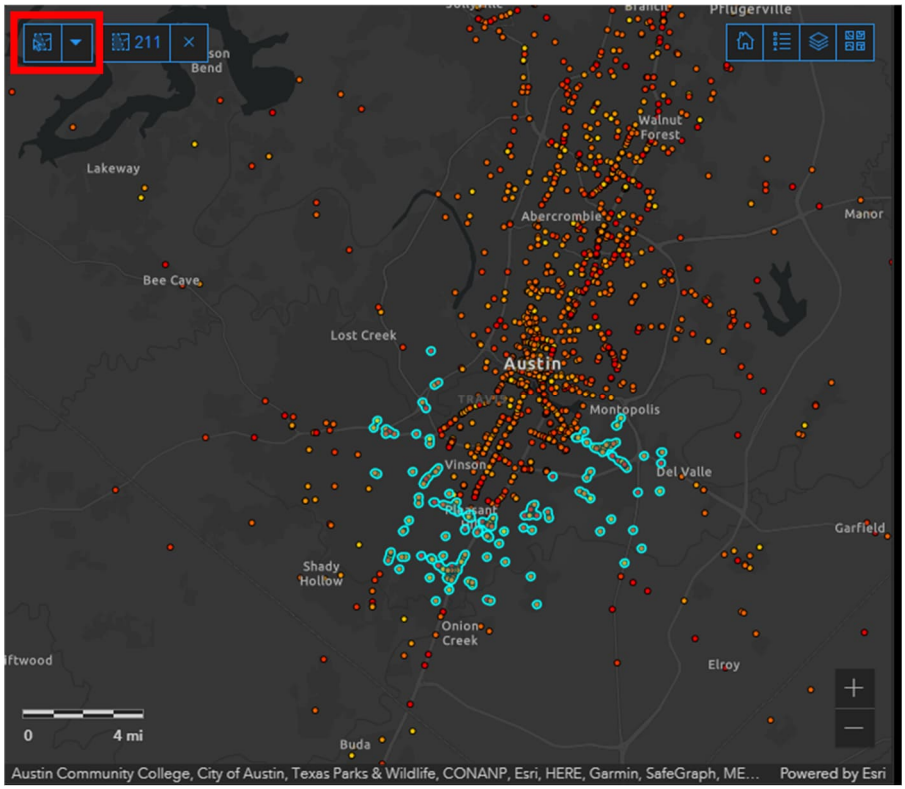
1.1.3 Manual selections

On the top-left portion of the map, the user will find the manual selection tool. By clicking on the down-pointed arrow (highlighted in Figure 1-6), the user will be allowed to choose one of multiple ways to perform manual selections:

- **Point**: use the mouse cursor to select points or links near one specific point
- **Rectangle**: use the mouse to draw a rectangle on the map and select all points or links within it
- **Circle**: use the mouse to draw a circle on the map and select all points or links within it
- **Lasso**: use the mouse to free-hand draw any shape and select all points or links within it
- **Line**: use the mouse to free-hand draw any line and select all points or links that intersect it

Selecting points and links this way will refresh all of the summary statistics and graphs, making them reflect values that only consider the points or links selected by the user.

Figure 1-6: Manual selection of crash points using the "lasso" tool



Sections 1.2, 1.3 and 1.4 discuss how results for each of the three main analyses can be viewed in the screening tool.

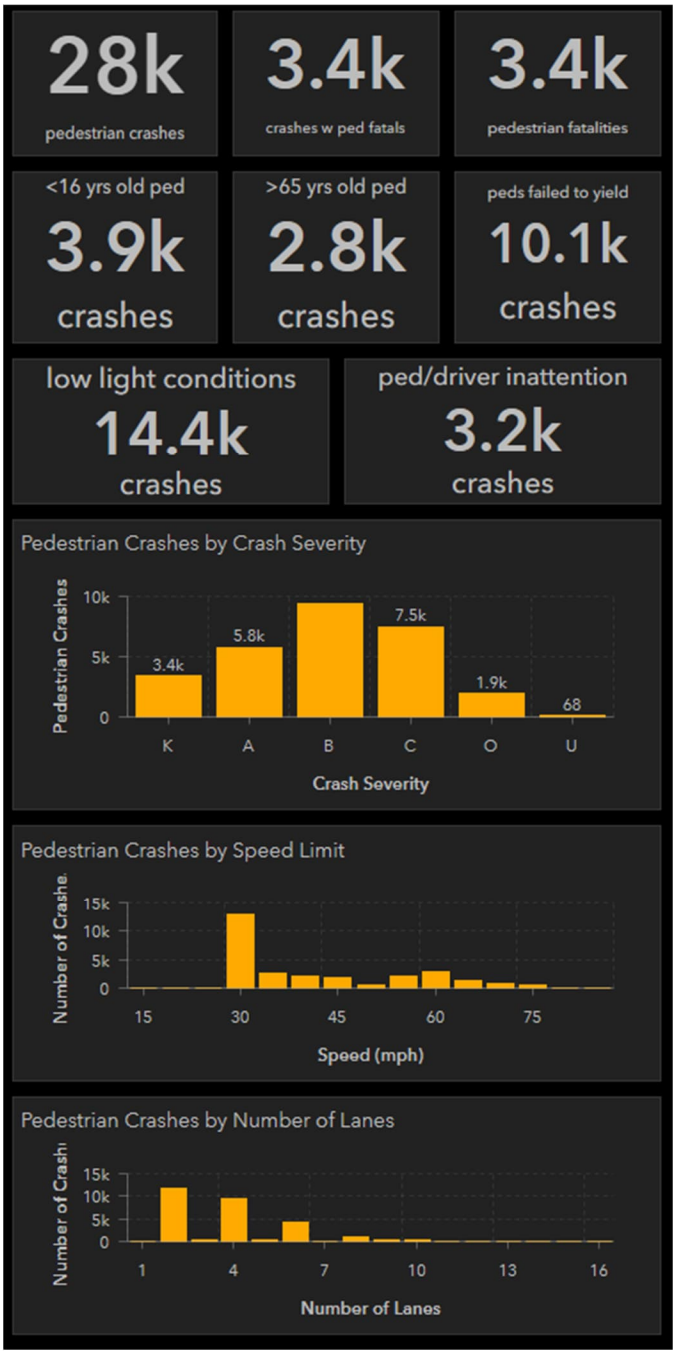
1.2 Crash locations and crash-related summaries

If the user turns on the Crash Points layer, she can explore the locations of all the crashes used in the PSAP's analyses. The summary statistics and graphs that refer to the Crash Point data are on the right-hand side of the screen (illustrated in Figure 1-7). The summaries contain the following information:

- Number of pedestrian crashes
- Number of crashes that involved a pedestrian fatality
- Total number of pedestrian fatalities
- Number of crashes that involved younger (16 years old or younger) pedestrians
- Number of crashes that involved older (65 years old or older) pedestrians
- Number of crashes that involved "pedestrian failed to yield right-of-way to vehicle" as either a contributing factor or a potential contributing factor
- Number of crashes that occurred in low light or dim conditions
- Number of crashes that involved either pedestrian or driver inattention (according to the contributing factors and the potential contributing factors)
- Graph of the number of pedestrian crashes by crash severity
- Graph of the number of pedestrian crashes by speed limit
- Graph of the number of pedestrian crashes by number of lanes

If the user wants to focus on a specific area or type of crash, she can use the filters/selectors from the left-hand side of the screen. Doing so will automatically update all the summary statistics on the right-hand side of the screen.

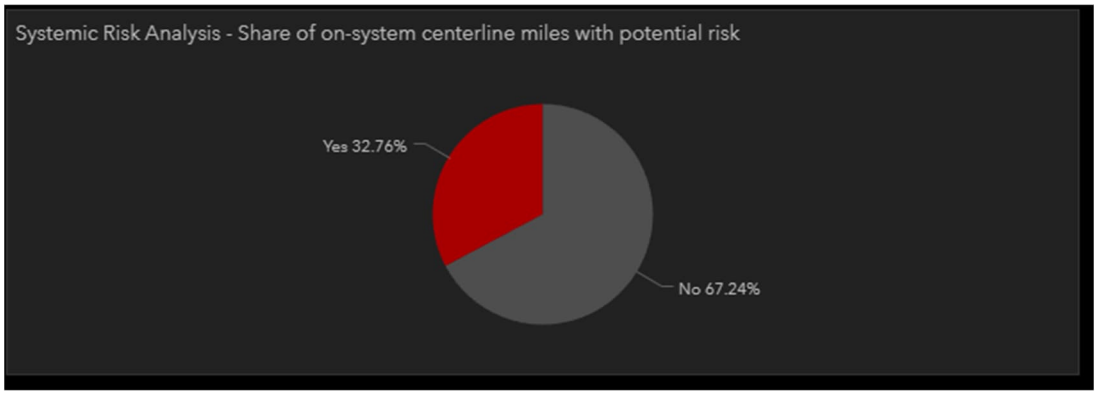
Figure 1-7: Summary Statistics for the Crash Points



1.3 Systemic crash analysis results

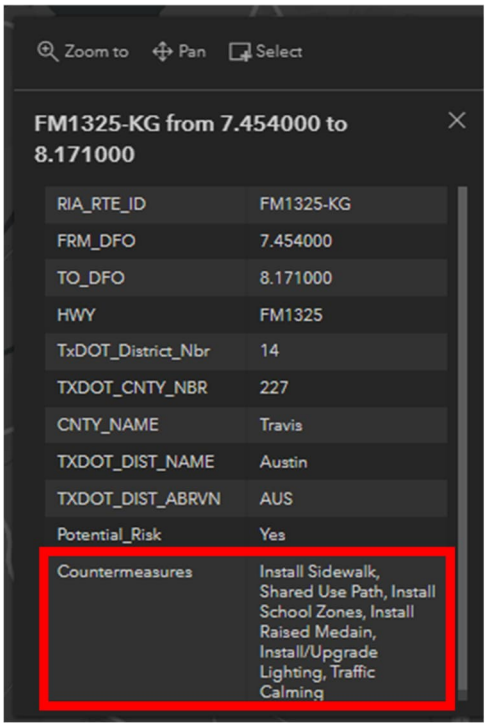
In addition to the map of the potential risk segments, the screening tool provides the user with a summary graph that illustrates the proportion of the filtered segments' centerline miles that are locations of potential pedestrian risk, see Figure 1-8.

Figure 1-8: Summary statistics for systemic risk analysis



The user can also investigate the countermeasures that were suggested for each road segment based on the results of the systemic risk analysis by clicking on a road segment viewing its pop-up window. An example of the pop-up window's appearance with the countermeasures section highlighted can be seen in Figure 1-9.

Figure 1-9: Systemic risk analysis pop-up screen with countermeasures



1.4 Targeted crash analysis results

The results of the targeted analysis are only visible once the user has chosen a specific severity level on the top-left corner of the screening tool, as seen in Figure 1-10. This is done so that the results from the multiple different versions of the targeted analysis (i.e., a set of crash severity levels such as all K crashes, all KA crashes, etc.) don't overlap and confuse the user.

Once a severity has been chosen, the map and the summary graphs on the left portion of the screening tool (shown in Figure 1-11) will populate. These summaries include:

- Total centerline miles visible and/or selected
- Distribution of centerline miles according to the number of crashes on each link
- Distribution of centerline miles according to the link's crash density
- Distribution of centerline miles according to the link's crash density tier

Figure 1-10: Severity level selection for targeted analysis

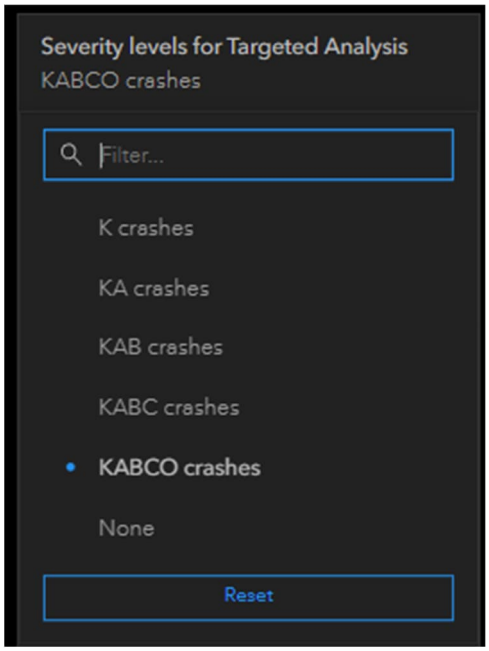
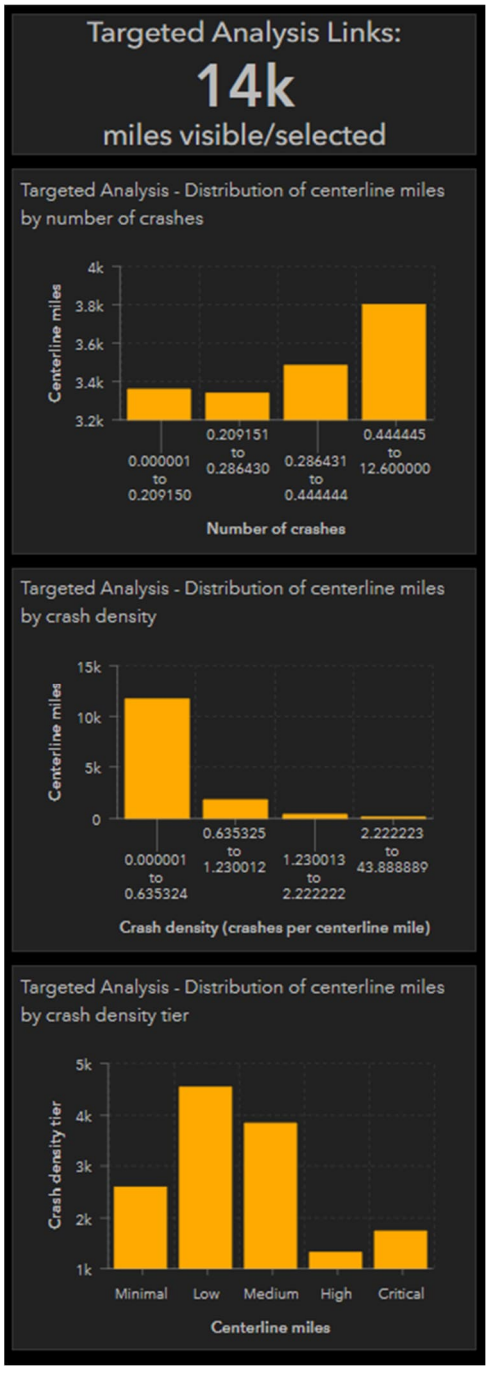
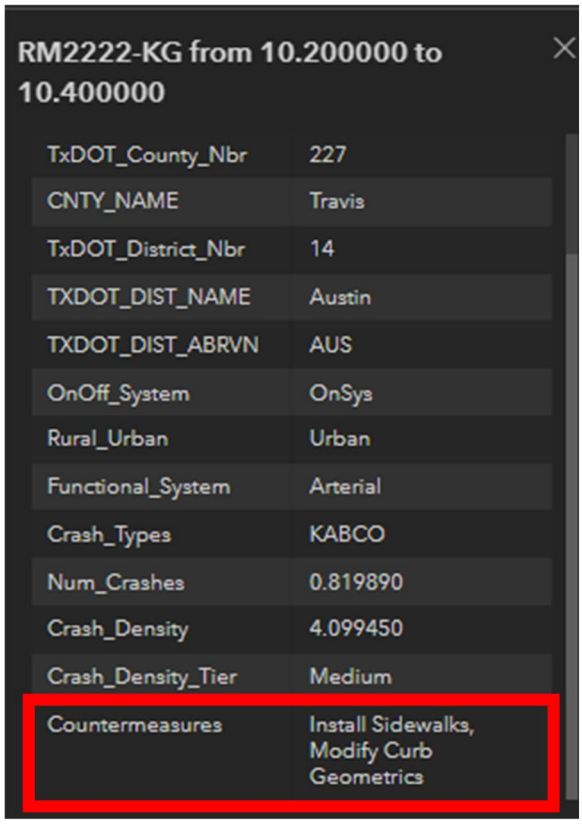


Figure 1-11: Summary statistics for targeted analysis



The user can also investigate the countermeasures that were suggested for each link based on the results of the targeted risk analysis by viewing its pop-up window. An example of how the pop-up screen looks with the countermeasures section highlighted can be seen in Figure 1-12.

Figure 1-12: Targeted Analysis pop-up screen with countermeasures



1.5 Finding pedestrian countermeasures

If the user wants to use the screening tool to specifically investigate countermeasures, she will have to do so by turning on either the systemic risk analysis layer or one of the three targeted analysis layers and click on individual links. The countermeasures will be listed at the very bottom of the pop-up windows, as shown in Figure 1-9 and Figure 1-12.

2 Other Frequently Asked Questions

2.1 Why does the systemic crash analysis not include intersection crashes?

Intersection crashes were excluded from the systemic analysis because a statewide intersection database featuring locations and detailed attribute information is not available. The systemic analysis identifies potential pedestrian crash risk by identifying those roadway attributes most common at locations where previous pedestrian crashes have occurred. It then identifies locations with the greatest concentrations of risk factors as potential risk segments. Without intersection attributes (i.e., traffic control device types, crosswalk presence, number of lanes entering/exiting, crossing distance, etc.), completing a systemic analysis that includes intersection crashes is not possible. However, by pairing the systemic risk analysis with a targeted analysis, focusing on previous crashes on both on- and off-system roads, TxDOT's PSAP is able to identify intersections with historic pedestrian crash concerns.

2.2 Why is off-system data not used in the systemic analysis?

Available statewide comprehensive off-system roadway dataset attributes are less accurate and frequently not available when compared to the on-system roadway data. Systemic analysis requires roadway attribute data to complete over-representation analyses and identify risk factors. TxDOT's PSAP was unable to complete an off-system systemic analysis due to this lack of attribute data.

2.3 How do the systemic analysis results identify segments with potential risk if there have been no pedestrian crashes along these segments?

Segments that have been identified as "potential risk" do not need to show a history of pedestrian crashes but these segments contain many of the characteristics of other similar segments that do have a history of pedestrian crashes. By focusing on the locations with characteristics in common with those where crashes have occurred, TxDOT and MPO staff can proactively program and fund improvements where potential pedestrian crash risk is highest in addition to reactively addressing locations where pedestrian crashes have already occurred.

2.4 For freeways with frontage roads, how does the PSAP analysis distinguish between frontage roads and main lanes?

Even though there were a handful of frontage road segments that were included in the Focus Facilities, there was not a reliable way to determine exactly where crashes occurred on frontage roads. More specifically, the crash data has an attribute that places the crash on a particular part of the roadway (Road Part ID = Service/Frontage Road) however it does not distinguish which frontage road it occurs on (north, east, south, or west of the main lanes) and cannot be matched to the TxDOT roadway inventory attribute that identifies frontage roads with the Roadbed ID.

There are three suggested countermeasures that are related to frontage roads: frontage road study, Shared Use Path and sidewalk. Frontage road studies are a suggested countermeasure simply based on whether an urban interstate or freeway segment has 50% or more crashes assigned to the frontage road compared to the whole segment based on the Road Part ID crash attribute. Shared Use Paths and Sidewalks are suggested countermeasures for **frontage roads** even though they are assigned to the interstate/freeway mainlines. This is based on the assumption that most urban interstates and freeways have frontage roads.

2.5 How does the PSAP analysis distinguish from crashes involving 'unintended pedestrians' or construction workers?

TxDOT's PSAP analysis does not distinguish between crashes that involve unintended pedestrians or construction workers because crash data was not available for the full 5-year period used in this analysis to distinguish these types of pedestrian crashes at an aggregate, statewide level. Crash report narratives may

contain this information, but crash report narrative information is not available through C.R.I.S. Beginning in 2021, C.R.I.S. data extracts are available with an unintended pedestrian flag; however, the data was not included in the Texas PSAP as this flag was only available for the final year of the 5-year crash data set (2017-2021). With additional analysis, perhaps this flag can be used in future Texas PSAPs.

2.6 Why are shared use paths/sidewalks recommended for freeway sections?

Similar to what was described in Section 2.4, shared use paths and sidewalks are suggested countermeasures for frontage roads since it is assumed that most interstates and freeways have frontage roads, specifically in urban areas.

2.7 Why are sidewalks considered a 'risk factor'?

While it might seem counterintuitive, sidewalks were identified as a risk factor in some Districts because sidewalks are located where pedestrians are likely to be present. While there is increased risk exposure for pedestrians near a roadway where there is existing sidewalk, that doesn't mean that sidewalks are unsafe or should not be constructed. Sidewalk presence is one of many risk factors that were identified. Risk factors are roadway attributes that correlate with pedestrian crashes, but these roadway attributes do not necessarily cause or contribute to pedestrian crashes.

Providing a dedicated space for pedestrians to move about freely away from vehicles is a safer alternative than walking in the roadway. Indeed, research has shown installing sidewalks results in 65% fewer crashes compared to locations where no sidewalks were installed (see TxDOT's 2021 HSIP Guidelines).

2.8 How were certain roadway segments 'prioritized'?

The suggested countermeasures with specific logic/criteria were applied to all locations for the targeted analysis and for the systemic analysis regardless of the "potential risk" designation. Prioritization of these locations was based on input from TxDOT staff from multiple Divisions and Districts as well as TxDOT's Bicycle and Pedestrian Advisory Committee. It was decided that prioritization would be based upon locations with higher need, accumulation of KA crashes and disadvantaged socio-economic characteristics. Socio-economic conditions were according to the Social Vulnerability Index (SVI) created by the Centers for Disease Control. While there is no set standard for prioritizing segments, the approach used balances characteristics of safety performance and social vulnerability. More importantly, as the PSAP was performed at a statewide level, additional local investigation at specific locations will be required to ultimately program projects and apply for supplemental safety funding.

2.9 What are the next steps to improving the PSAP Screening Tool?

The PSAP Screening Tool was completed in June 2023; however, it will be periodically updated based on feedback received from TxDOT District staff and MPO partners. It is anticipated that suggestions for

improvement will arise as Districts use the tool to program HSIP funding and identify other improvements. Additionally, MPO partners are expected to use the tool to help inform their MPO Safety Plans.

Please feel free to email bikeped@txdot.gov with suggestions for improvement.

Some previously suggested ways to improve analysis results include the following:

- Incorporate PSAP analysis results (e.g., potential risk segments, targeted segments and suggested countermeasures) into the Microstrategy application within CRIS to streamline TxDOT staff workflows and analysis.
- Add a statewide pedestrian crash rate reference point into the dashboard charts to better understand relative significance. This improvement brings its own challenge - i.e., agreeing on how to measure pedestrian crash rates without a statewide or local dataset indicating pedestrian volumes.
- Add a school locations layer to the map for reference.
- Add planned or in-progress HSIP project locations to the map for reference.
- Add functionality for users to better understand current or active projects which already are investing in pedestrian infrastructure.
    - This may be accomplished by adding a TxDOT Project layer filter by project status and CSJs OR removing all active projects from the systemic risk analysis and targeted analysis results.
- Add functionality to filter crashes involving “unintended pedestrians” and construction workers (once data becomes available).