

# Strategic Risk-Based Safety Assessment

Attachment #1

City of Spokane Valley

## Strategic Risk-Based Safety Assessment

Date: April 9, 2018

Crash Data Time Period: 2012-2016

Developed using the FHWA *Systemic Safety Project Selection Tool*

Spokane Valley Department of Community & Public Works

Economic Development Division



## Executive Summary

The City of Spokane Valley (the City) is committed to reducing fatal and serious injury crashes within its transportation network. [Target Zero: Washington State Strategic Highway Safety Plan](#) provides a data-driven approach to achieving this goal using the Federal Highway Administration’s (FHWA) [Systemic Safety Project Selection Tool](#). This Assessment follows this approach in order to identify projects that will reduce fatal and serious injury crashes, using WSDOT-provided crash data covering a five-year time span. This analysis follows five steps, yielding the following results for each step:

1. Classify fatal and serious crashes by crash type and assign priority levels to each type.

Priority	Definition	Crash Types
Priority 1	30% or more of fatal/serious injury crashes	Hit Pedestrian or Bicyclist
Priority 2	10% to 30% of fatal/serious injury crashes	Angle Excessive Speed Hit Fixed Object

2. Identify roadway characteristics associated with high priority crashes.

Priority	Crash Type	Roadway Characteristics
Priority 1	Hit Pedestrian or Bicyclist	<ul style="list-style-type: none"> <li>• Intersection-related location</li> <li>• 35 mile-per-hour posted speed limit</li> <li>• More than 10,000 average daily traffic (ADT)</li> <li>• Principal Arterial functional classification</li> </ul>
Priority 2	Angle Collisions	<ul style="list-style-type: none"> <li>• Intersection-related location</li> <li>• 35 mile-per-hour posted speed limit</li> <li>• More than 10,000 average daily traffic (ADT)</li> <li>• Principal Arterial functional classification</li> </ul>
Priority 2	Excessive Speed Collisions	<ul style="list-style-type: none"> <li>• Intersection-related location</li> <li>• 35 mile-per-hour posted speed limit</li> <li>• Less than 10,000 ADT</li> <li>• Minor Arterial functional classification</li> </ul>
Priority 2	Hit Fixed Object Collisions	<ul style="list-style-type: none"> <li>• 35 mile-per-hour posted speed limit</li> <li>• Less than 10,000 ADT</li> <li>• Minor Arterial functional classification</li> <li>• Dark conditions</li> </ul>

3. Identify locations within the City transportation network that have these characteristics.  
The top ten locations are as follows:

#	Street	Intersecting Street	#	Street	Intersecting Street
1	Sprague Ave.	Sullivan Rd.	6	Sprague Ave.	Appleway Blvd.
2	Sprague Ave.	Pines Rd.	7	Sullivan	Trent Rd.
3	Sprague Ave.	Argonne/Mullan Rd.	8	Pines	Trent Rd.
4	Sprague Ave.	Evergreen Rd.	9	Pines	SR27
5	Appleway Blvd.	Barker Rd.	10	Argonne	Dishman Mica Rd.

4. Identify treatment options for these locations.

<b>Crash Type</b>	<b>Countermeasure</b>	<b>CMF</b>
Hit Pedestrian or Bicyclist	3-inch retroreflective sheeting on signal backplates	.85
	Increase visibility of stop signs poles	.725
	Install separated shared-use path	.55
	Install roundabout	.56
Angle Collision	3-inch retroreflective sheeting on signal backplates	.85
	Increase visibility of stop sign and MPH sign poles	.725
	Install roundabout	.818
Excessive Speeding	3-inch retroreflective sheeting on signal backplates	.85
	Increase visibility of stop sign and MPH sign poles	.725
	Install Roundabout	.818
Hit Fixed Object, Dark Conditions	Increase visibility of stop sign MPH sign poles	.725

5. Prioritize projects.

Comparing the prioritized list of locations and treatments to existing City projects led to selection of the following projects for near-term implementation:

<b>Location</b>	<b>Priority</b>	<b>Treatment</b>	<b>Cost</b>
Priority 1 signalized intersections: 20 locations citywide	1	Install 3" retroreflective borders on traffic signal backplates	\$180,000
All Priority 1 and 2 corridors: 600 Locations citywide	1 and 2	Increase visibility of stop sign posts and 35 MPH signs posts	\$78,000
Barker Road Safety Improvements	2	Add Shared use path, curb and gutter, and Two-way Center Turn Lane	\$2,300,000
Sprague and Barker Intersection Improvement	2	Install roundabout, curb and gutter, sidewalks, bike facilities and crosswalks	\$800,000

Finally, selected projects will be developed through preliminary engineering, obtaining funding, carrying out any necessary right-of-way acquisition, and constructing the final project.

In summary, this process identified key roadway characteristics associated with fatal and serious injury crashes occurring in the City. After identifying locations with a high likelihood for such crashes, the process identified appropriate treatments for these locations. The resulting project list provides the City with a path forward for proactively addressing future fatal and serious injury crashes throughout the City's transportation network.

## Introduction

The City of Spokane Valley (the City) is committed to reducing fatal and serious injury crashes within its transportation network. [Target Zero: Washington State Strategic Highway Safety Plan](#) provides a data-driven approach to achieving this goal through established priorities and strategies, including guidance on using the Federal Highway Administration's (FHWA) [Systemic Safety Project Selection Tool](#). Following the methodology set forward in the *Target Zero* plan guides the City toward reducing fatalities and serious injury crashes through a proven approach.

### *Reasons for Conducting Data Analysis*

Using the recommended, standardized methods of data analysis allows the City to efficiently direct resources towards efforts that create the greatest reduction of the most severe crash types. Using Washington State Department of Transportation's (WSDOT) crash data allows the City to efficiently sort crash types and locations, identify trends, select the most effective treatments, and undertake a logical approach to addressing the most critical locations and behaviors in the transportation network.

### *Target Zero: Washington's Strategic Highway Safety Plan*

*Target Zero* provides a guidebook to carrying out this data-driven process. By identifying priorities, creating common goals, developing a common language, and offering a menu of solutions, the Plan helps identify the unique risks in our community and the most effective strategies for addressing them.

## Methodology

WSDOT provided data for this analysis for the dates January 1, 2012 through December 31, 2016, with data derived from accident reports provided by the Washington State Patrol.

This analysis seeks to identify trends in fatal and serious crashes and then propose solutions. In achieving this goal, the analysis follows five steps:

1. Classify fatal and serious crashes by crash type, and assign priority levels to each type,
2. Identify roadway characteristics associated with high priority crash types,
3. Identify locations within the City transportation network that have these characteristics,
4. Identify treatments for these locations, and
5. Prioritize projects.

### Step 1: Classify Crashes by Type and Assigning Priorities

In this step, WSDOT-provided data was sorted by crash type. Each crash type was then assigned a priority level, based on examples and approaches recommended in *Target Zero*. Based on this guidance, the selected priority levels are as follows:

- **Priority Level 1:** Contributing factors involved in 30% or more of fatal or serious injury crashes.
- **Priority Level 2:** Contributing factors involved in 10% to 30% of fatality or serious injury crashes.
- **Priority Level 3:** Contributing factors involved in all other fatality or serious injury crashes.

**Table 1** quantifies the City’s crash types and compared to the same accident types in Washington State overall and indicate priority levels for each crash type. Priority 1 and 2 crash types have been highlighted. See Appendix for all 2012-2016 data provided by WSDOT.

**Table 1: Analysis of WSDOT Crash data (2012-2016)**

Overall Numbers	Fatal/Serious Crashes		Total Crashes		Priority Level
	City of Spokane Valley	City-owned streets Statewide	City of Spokane Valley	City-owned streets Statewide	
Total	102 (100%)	4,746 (100%)	4,940 (100%)	283,887 (100%)	
Fatal Crashes	22 (21.6%)	647 (13.6%)	22 (0.4%)	647 (0.2%)	
Drinking/Drug Related Crashes	22 (21.6%)	694 (14.6%)	350 (7.1%)	13,080 (4.6%)	2
<b>By Primary Collision Type</b>					
Angle: T or Left Turn	27 (26.4%)	1,338 (24%)	1,810 (36.7%)	92,820 (32.7%)	2
<b>Angle (T)</b>	19 (18.6%)	721 (15.2%)	1,411 (28.6%)	68,322 (24.1%)	2
<b>Angle (Left Turn)</b>	8 (7.8%)	417 (8.8%)	399 (8.1%)	24,498 (8.6%)	3
Hit Pedestrian or Pedalcyclist	32 (31.4%)	1,787 (37.7%)	211 (4.3%)	13,870 (4.9%)	1
<b>Hit Pedestrian</b>	25 (24.5%)	1,310 (27.6%)	109 (2.2%)	7,939 (2.8%)	2
<b>Hit Pedalcyclist</b>	7 (6.9%)	477 (10.1%)	102 (2.1%)	5,931 (2.1%)	3
Hit Fixed Object	19 (18.6%)	830 (17.5%)	622 (12.6%)	30,366 (10.7%)	2
Rearend	9 (8.8%)	257 (5.4%)	1,317 (26.7%)	74,029 (26.1%)	3
Overturn	8 (7.8%)	204 (4.3%)	56 (1.1%)	1,908 (0.7%)	3
<b>By Light Condition</b>					
Daylight	50 (49.0%)	2,612 (55.0%)	3,496 (70.8%)	193,054 (68.0%)	1
Dark – No Street Lights	10 (9.8%)	211 (4.4%)	195 (3.9%)	6,584 (2.3%)	3
<b>By Fixed Object (First Object Struck)</b>					
Fallen Tree/Stump	5 (26.3%)	168 (20.2%)	61 (9.8%)	4,812 (13.8%)	2
Utility Pole	3 (15.8%)	113 (13.6%)	78 (12.5%)	3,044 (10.0%)	2
Fence	2 (10.5%)	53 (6.4%)	134 (21.5%)	3,443 (11.3%)	2
<b>By Junction Relationship</b>					
Intersection-Related	52 (51.0%)	2,426 (51.1%)	2,862 (57.9%)	154,646 (54.5%)	1
Non-Intersection-Related	44 (43.1%)	1,947 (41.0%)	97,948 (34.5%)	1,426 (28.9%)	1
Driveway-Related	6 (5.9%)	373 (7.9%)	652 (13.2%)	31,293 (11.0%)	3
<b>By Posted Speed Per Driver</b>					
25	15 (11.9%)	1,324 (22.2%)	1,017 (12.5%)	109,506 (25.0%)	2
35	85 (67.5%)	2,221 (37.2%)	6,130 (75.3%)	160,188 (36.6%)	1
50	14 (11.1%)	80 (1.3%)	380 (4.7%)	2,750 (0.6%)	2

**Table 1 - Analysis of WSDOT Crash data (2012-2016) - Continued**

Overall Numbers	Fatal/Serious Crashes		Total Crashes		Priority Level
	City of Spokane Valley	City-owned streets Statewide	City of Spokane Valley	City-owned streets Statewide	
<b>By Driver Contributing Circumstance</b>					
Exceeding Safe/Stated Speed	24 (23.7%)	923 (11.1%)	549 (5.2%)	25,828 (4.5%)	2
Under Influence of Alcohol/Drugs	19 (10.6%)	714 (8.6%)	351 (3.3%)	14,185 (2.5%)	2
Failing to Yield	14 (7.8%)	649 (7.8%)	1,173 (11.2%)	62,407 (10.8%)	3
Disregard Signal	7 (3.9%)	210 (2.5%)	349 (3.3%)	11,275 (2.0%)	3
Following Too Close	3 (1.7%)	98 (1.2%)	953 (9.1%)	33,879 (5.9%)	3
<b>By Pedestrian Contributing Circumstances</b>					
Inattention / Distraction	6 (18.8%)	184 (11.5%)	17 (13.0%)	969 (10.8%)	2
Failing to Yield	5 (15.6%)	250 (15.6%)	21 (16.0%)	945 (10.5%)	2
Under Influence of Alcohol / Drugs	3 (9.4%)	97 (6.0%)	6 (4.6%)	336 (3.7%)	3
<b>By Pedalcyclist Contributing Circumstances</b>					
Failing to Yield	2 (28.6%)	71 (12.9%)	26 (21.3%)	764 (11.8%)	2
Inattention / Distraction	2 (28.6%)	84 (15.2%)	20 (16.4%)	834 (12.9%)	2
Disregard Signal	1 (14.3%)	25 (4.5%)	8 (6.6%)	195 (3.0%)	2
Headlight Violation	1 (14.3%)	13 (2.4%)	4 (3.3%)	103 (1.6%)	2
<b>By Facility Use (Pedestrians)</b>					
Roadway	12 (41.4%)	594 (55.4%)	48 (39.3%)	2,317 (26.5%)	1
Marked Crosswalk	7 (24.1%)	546 (17.6%)	35 (28.7%)	4,193 (47.9%)	2
Unmarked Crosswalk	6 (20.7%)	134 (12.0%)	24 (19.7%)	1,014 (11.6%)	2
<b>By Facility Use (Pedalcyclist)</b>					
Roadway	4 (57.1%)	259 (53.4%)	34 (33.3%)	2,446 (40.6%)	1
Designated Bike Route	1 (14.3%)	80 (16.5%)	7 (6.9%)	952 (15.8%)	3
Marked Crosswalk	1 (14.3%)	41 (8.5%)	15 (14.7%)	1,008 (16.7%)	2
Shoulder	1 (14.3%)	32 (6.6%)	7 (6.9%)	317 (5.3%)	2
Sidewalk	0 (0.0%)	35 (7.2%)	25 (24.5%)	690 (11.5%)	3
Unmarked Crosswalk	0 (0.0%)	25 (5.2%)	12 (11.8%)	453 (7.5%)	3

## Step 2: Identifying Roadway Characteristics

In addition to the data above, this analysis also evaluates the relationship between different crash characteristics and the functional classifications and traffic volumes for the City’s transportation network.

Traffic volume ranges are based on FHWA and the National Association of City Transportation Officials (NACTO) recommended thresholds for different roadway reconfigurations. Streets with less than 3,000 ADT per day, and particularly those with less than 1,500 vehicles per day, are considered by NACTO to be good candidates for neighborhood traffic calming treatments to reduce the impacts of cut-through commuter traffic from nearby arterials. Similarly, FHWA identifies local and residential collector streets as great candidates for most traffic calming measures such as vertical deflection and street width reduction.

Streets with less than 10,000 ADT are considered by FHWA to be “great” candidates for a lane reconfiguration from a four-lane into a three-lane cross-section with a center turn lane for the purpose of increasing safety for all users. Streets with 10,000 ADT to 20,000 ADT are considered “good” candidates for this conversion, but require extra attention to intersection configuration and signal timing. For streets with greater than 20,000 ADT, FHWA recommends a complete feasibility study for the corridor to specifically address queue lengths, signal retiming, and intersection reconfiguration as necessary. **Table 2**

**Table 2: Combined City and State Data, 2012-2016 - Crashes by City Street Characteristics**

	<i>City Fatal/Serious Injury</i>	<i>All Crashes</i>	<i>Priority</i>
<b>By Hierarchy</b>			
Unclassified	0	11 (0.2%)	3
Local	10 (9.9%)	855 (17.4%)	3
Collector	4 (4.0%)	247 (5.0%)	3
Minor Arterial	35 (34.7%)	1,266 (25.8%)	1
Principal Arterial	52 (51.5%)	2,522 (51.5%)	1
<b>By Traffic Volume</b>			
ADT Unavailable*	10 (9.9%)	543 (11.1%)	3
Less than 3,000 ADT	6 (5.9%)	263 (5.4%)	3
3,000 – 10,000 ADT	28 (27.7%)	1,141 (23.3%)	2
10,000 – 20,000 ADT	23 (22.8%)	1,261 (25.7%)	2
Above 20,000 ADT	34 (33.7%)	1,693 (34.5%)	1
*All local streets			

Sorting the crash data identifies the most prevalent collision types and their associated characteristics. The contributing characteristics were then prioritized using the crash-tree diagram method recommended in the *System Safety Project Selection Tool*.

Following the established priority level criteria, the different collision types were categorized as follows:



**Priority Level 1:** Contributing factors involved in 30% or more of fatal or serious injury crashes.

- **Hit Vulnerable Roadway Users – Pedestrians & Pedalcyclists: 31.4%**

**Priority Level 2:** Contributing factors involved in 10% to 30% of fatality or serious injury crashes.

- **Angle Collisions: 26.4%**
- **Excessive Speed: 23.7%**
- **Hit Fixed Object: 18.6%**

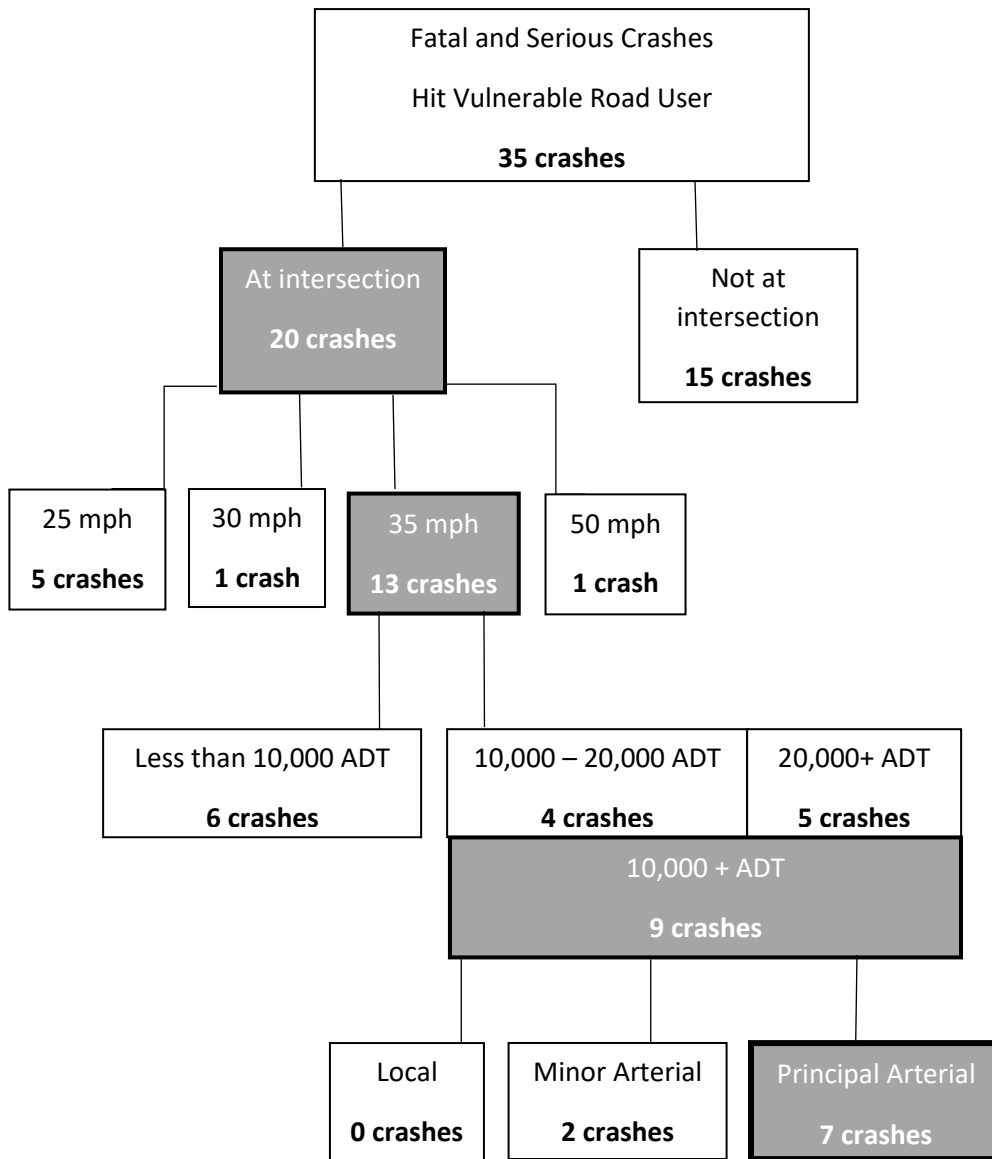
**Priority Level 3:** Contributing factors involved in all other fatality or serious injury crashes.

- Common collision types that can be addressed to improve roadway safety for all users. These include **Rear-end** and **Overturn** collision types.

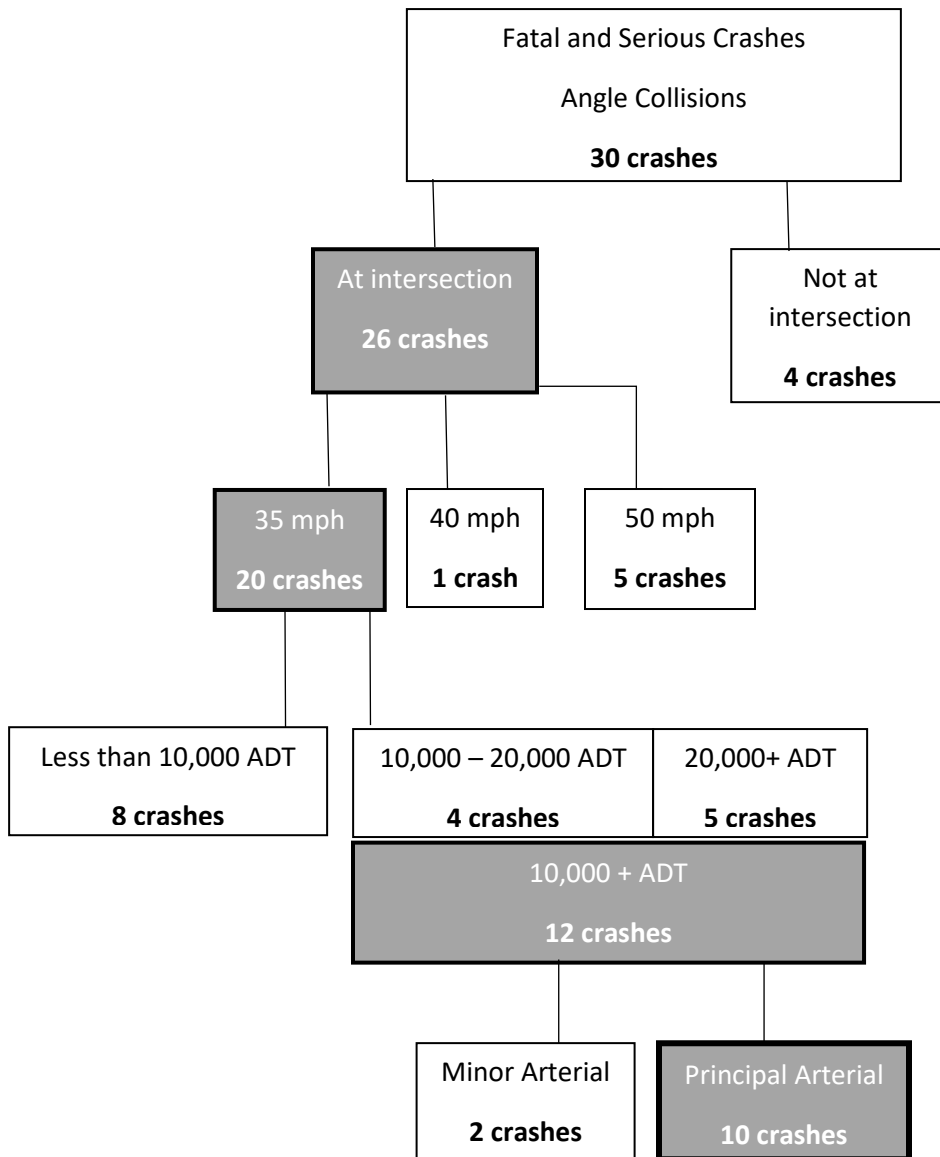
Due to the prevalence of Priority 1 and 2 collisions in fatal and serious injury collisions, the remainder of this assessment focuses on crashes in these priority levels. Selected priority collision types focus on crash types that can be addressed through engineering solutions. Crashes addressed primarily through education and enforcement campaigns, such as driving under the influence of alcohol or drugs, are not assessed here, as they will be primarily addressed by partner agencies. This assessment does not address crash types associated with baseline conditions such as roadway-surface type, weather condition, or roadway grade and curvature, which are all consistent throughout the City's roadway network.

Evaluating Tables 1, 2, and 3 simultaneously in with tree-diagrams help to isolate the crash characteristics across the various priority levels. Refer to **Diagrams 1-4**.

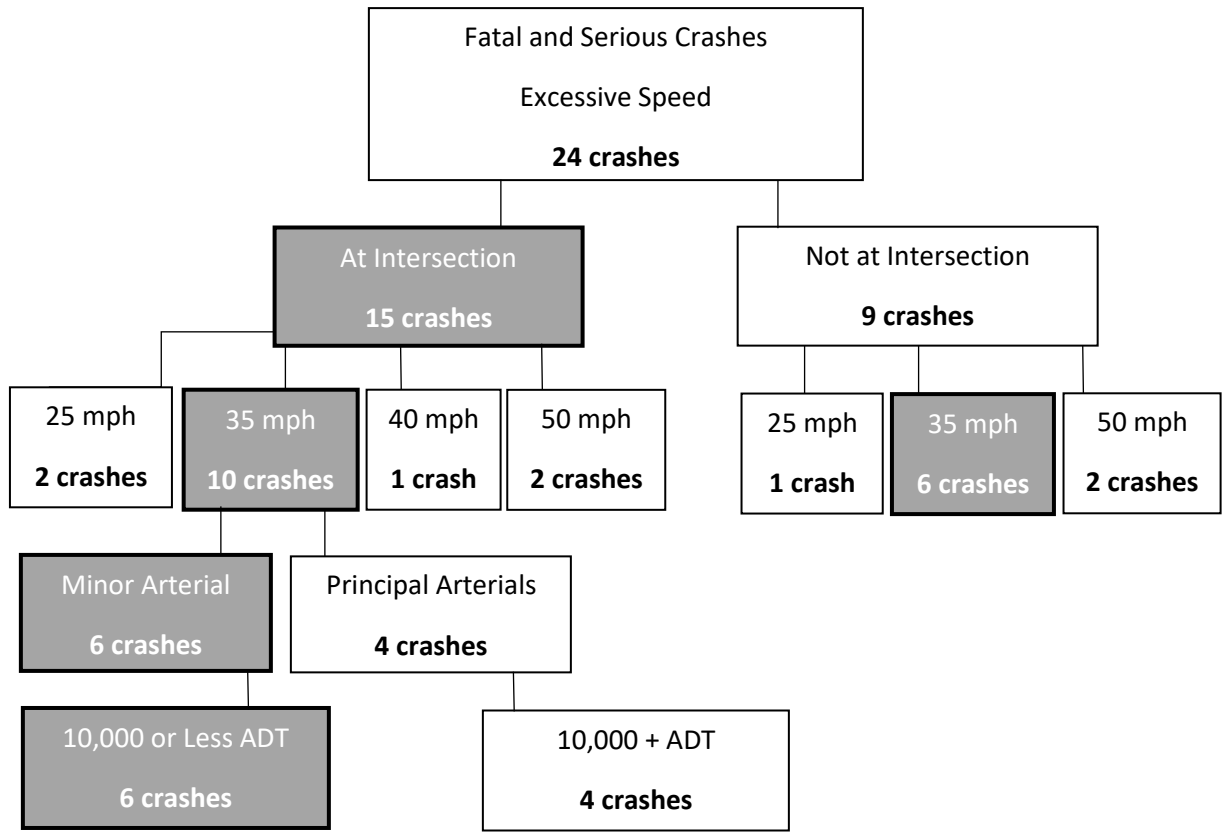
**Diagram 1 - Priority Level 1 Crash Type: Hit Vulnerable Road User**



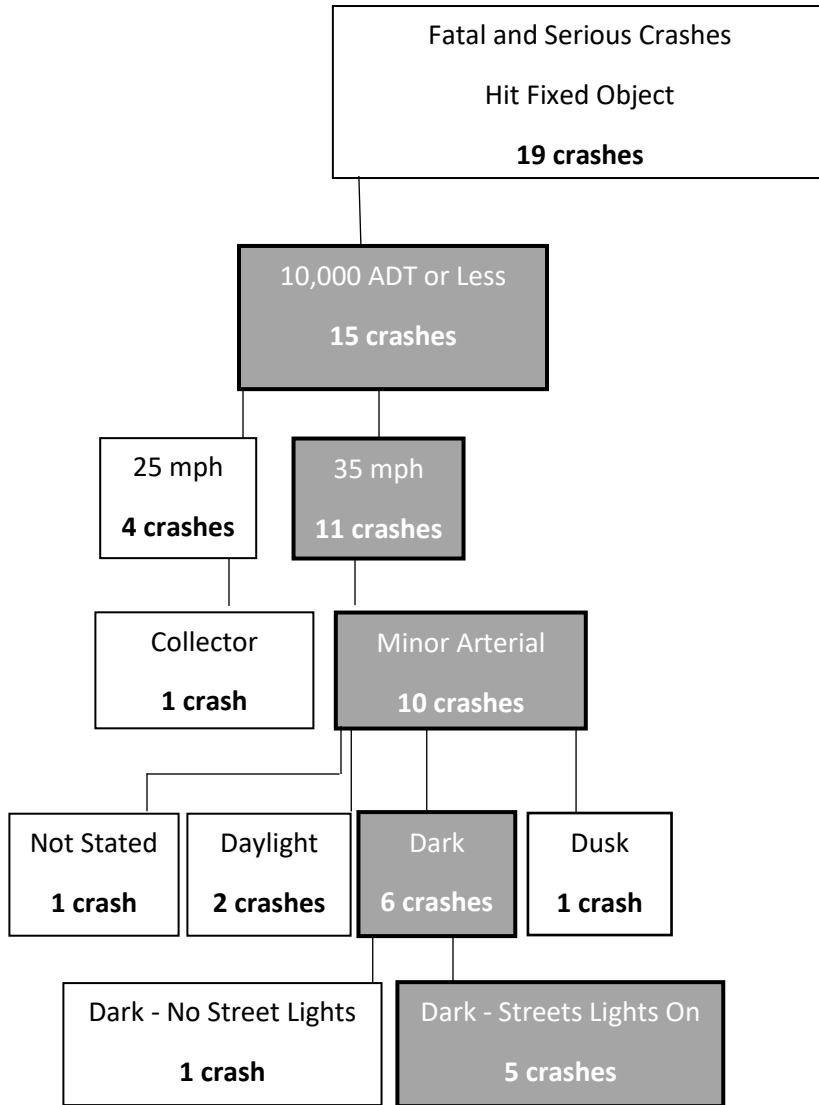
**Diagram 2 - Priority Level 2 Crash Type: Angle Collision**



**Diagram 3 - Priority Level 2 Crash Type: Excessive Speed**



**Diagram 4 - Priority Level 2 Crash Type: Hit Fixed Object**



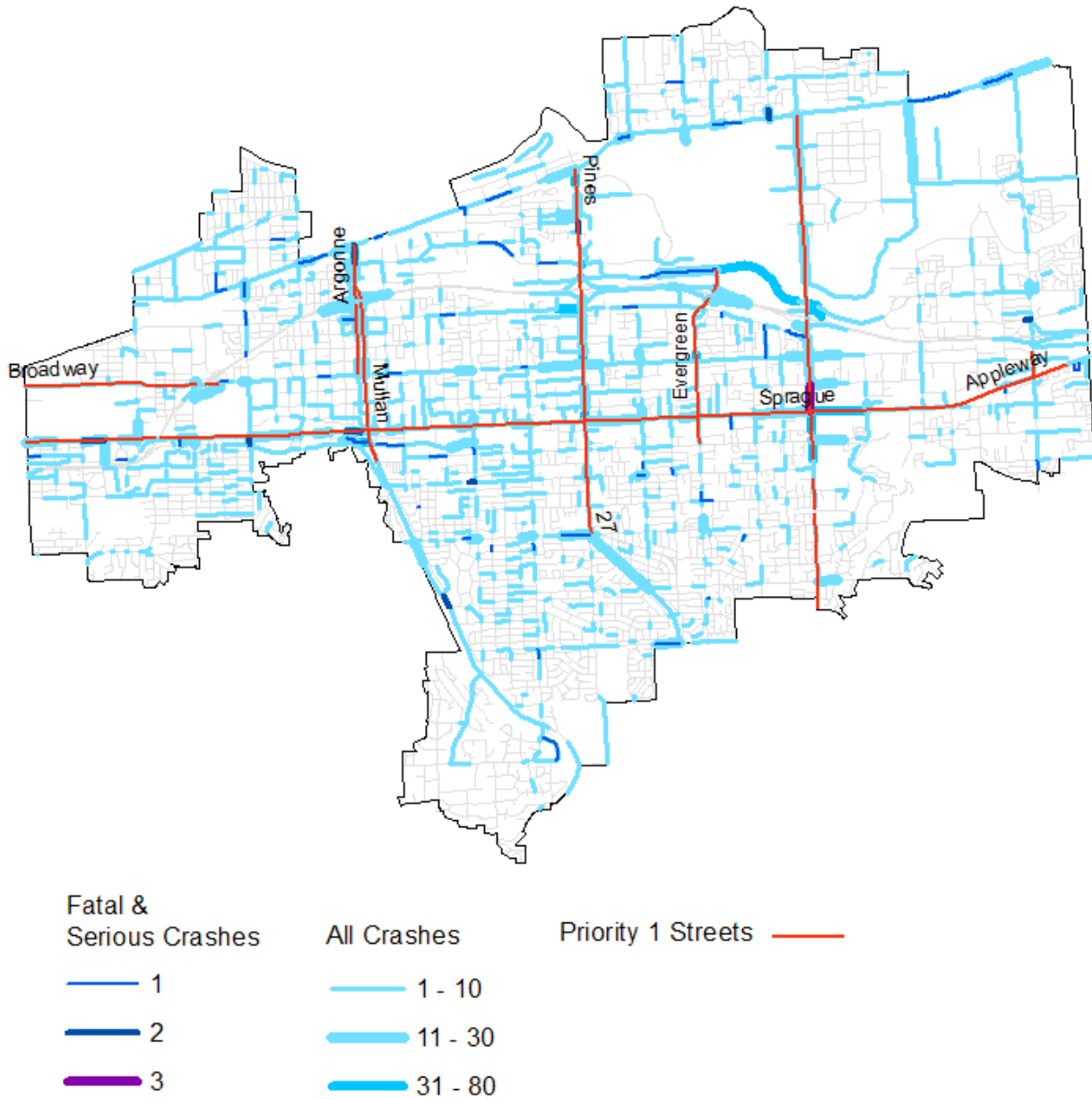
Based on the crash tree diagrams above, the following characteristics are identified for each priority crash type.

- **Priority Level 1:** Contributing factors involved in 30% or more of fatal or serious injury crashes.
  - **Hit Vulnerable Roadway Users – Pedestrians & Pedalcyclists: 31.4%**
    - Intersection-related locations,
    - 35 mile-per-hour posted speed limits,
    - More than 10,000 average daily traffic, and
    - Principal arterials.
  
- **Priority Level 2:** Contributing factors involved in 10% to 30% of fatality or serious injury crashes.
  - **Angle Collisions: 26.4%**
    - Intersection-related locations,
    - 35 mile-per-hour posted speed limits,
    - More than 10,000 average daily traffic, and
    - Principal arterials.
  - **Excessive Speed: 23.7%**
    - Intersection-related locations,
    - Minor arterials,
    - 35 mile-per-hour posted speed limits, and
    - Less than 10,000 average daily traffic.
  - **Hit Fixed Object: 18.6%**
    - Minor arterials,
    - 35 mile-per-hour posted speed limits,
    - Less than 10,000 average daily traffic, and
    - Dark conditions.

### Step 3: Identify Priority Locations

After determining the priority factors, the next step is to identify the locations that exhibit the priority characteristics, allowing selection of the appropriate treatment for each location. **Map 1** identifies City streets with Priority 1 characteristics.

**Map 1: Streets with Priority 1 Characteristics**



Based on the identification of these roadways, **Table 3** identifies the top priority locations. The list is sorted in order of priority with higher volume corridors first:

- Intersections with other Priority 1 corridors, sorted by volume
- Priority 1 corridor intersections with all other streets, organized by class and volume

Highlighted rows indicate locations selected for upcoming safety projects. These projects were selected for near-term implementation by searching for overlaps with previously-identified safety projects that are already at some stage of design, with anticipated or secured funding, and listed in Spokane Valley’s Six-Year Transportation Improvement Program. Projects for future rounds of implementation will be selected and developed starting at the top of the lists shown below.

**Table 3: Priority 1 Locations**

Priority 1 Street	Intersecting Street	Intersecting Street Priority	Intersecting Street Classification	Intersecting Street Volume
Sprague	Sullivan Rd.	Priority 1	Principal Arterial	41,007
Sprague	Pines Rd.	Priority 1	Principal Arterial	24,758
Sprague	Argonne/Mullan Rd.	Priority 1	Principal Arterial	20,269
Sprague	Evergreen Rd.	Priority 1	Principal Arterial	20,037
Appleway	Barker Rd.	Priority 1	Principal Arterial	15,037
Sprague	Appleway Blvd.	Priority 1	Principal Arterial	9,320
Sullivan	Trent	NA	Principal Arterial	19,877
Pines	Trent	NA	Principal Arterial	26,778
Pines	SR27	NA	Principal Arterial	16,179
Argonne	Dishman Mica	NA	Principal Arterial	24,510
Barker	Broadway	NA	Principal Arterial	909
Argonne	Trent	NA	Principal Arterial	26,048
Sullivan	Broadway	2	Minor Arterial	21,014
Sullivan	Indiana	NA	Minor Arterial	14,602
Sullivan	Mission	NA	Minor Arterial	5,697
Sullivan	16th	NA	Minor Arterial	4,596
Pines	Mission	2	Minor Arterial	10,334
Pines	Broadway	2	Minor Arterial	9,562
Pines	Mansfield	2	Minor Arterial	8,248
Pines	16th	NA	Minor Arterial	7,046
Pines	Indiana	2	Minor Arterial	5,123
Pines	Montgomery	2	Minor Arterial	3,256
Pines	8th	2	Minor Arterial	2,858
Pines	16th	NA	Minor Arterial	1,315
Argonne	Montgomery	NA	Minor Arterial	15,582
Argonne	Broadway	2	Minor Arterial	10,411
Argonne	Mission	2	Minor Arterial	7,315
Sprague	University	NA	Minor Arterial	16,704



Priority 1 Street	Intersecting Street	Intersecting Street Priority	Intersecting Street Classification	Intersecting Street Volume
Sprague	Fancher	NA	Minor Arterial	12,902
Sprague	Park	2	Minor Arterial	7,983
Sprague	Bowdish	NA	Minor Arterial	7,420
Sprague	McDonald	NA	Minor Arterial	6,555
Sprague	Thierman	NA	Minor Arterial	5,986
Sprague	Flora	NA	Minor Arterial	4,652
Sprague	Adams	NA	Minor Arterial	3,862
Evergreen	Indiana	2	Minor Arterial	14,602
Evergreen	Broadway	2	Minor Arterial	10,162
Evergreen	Mission	NA	Minor Arterial	4,735
Broadway	Fancher	NA	Minor Arterial	13,200
Broadway	Heacox	NA	Minor Arterial	3,639
Sullivan	4th	NA	Collector	5,593
Sullivan	Euclid	NA	Collector	4,051
Sullivan	24th	NA	Collector	2,192
Sullivan	Marietta	NA	Collector	NA
Sullivan	Valleyway	NA	Collector	NA
Pines	Mirabeau	NA	Collector	4,538
Pines	4th	NA	Collector	1,810
Pines	Cement	NA	Collector	1,633
Pines	Valleyway	NA	Collector	NA
Argonne	Knox	NA	Collector	3,461
Argonne	4th	NA	Collector	999
Argonne	Valleyway	NA	Collector	NA
Sprague Ave	Farr	NA	Collector	4,332
Sprague	Conklin	NA	Collector	7,291
Sprague	Vista	NA	Collector	2,783
Sprague	Herald	NA	Collector	715
Evergreen	4th	NA	Collector	2,291
Evergreen	Valleyway	NA	Collector	NA
Broadway	Thierman	NA	Collector	4,073
Broadway	Yardley	NA	Collector	819
Sullivan	11th	NA	Local	NA
Sullivan	12th	NA	Local	NA
Sullivan	13th	NA	Local	NA
Sullivan	14th	NA	Local	NA
Sullivan	19th	NA	Local	NA
Sullivan	20th	NA	Local	NA
Sullivan	22nd	NA	Local	NA

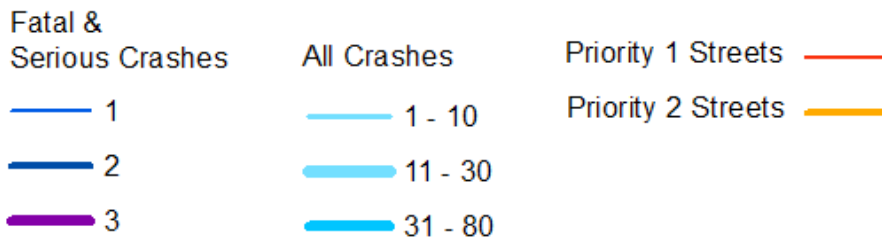
<b>Priority 1 Street</b>	<b>Intersecting Street</b>	<b>Intersecting Street Priority</b>	<b>Intersecting Street Classification</b>	<b>Intersecting Street Volume</b>
Sullivan	23rd	NA	Local	NA
Sullivan	24th	NA	Local	NA
Sullivan	26th	NA	Local	NA
Sullivan	27th	NA	Local	NA
Sullivan	2nd	NA	Local	NA
Sullivan	9th	NA	Local	NA
Sullivan	Century	NA	Local	NA
Sullivan	Fairview	NA	Local	NA
Sullivan	Flora Pit	NA	Local	NA
Sullivan	Kiernan	NA	Local	NA
Sullivan	Springfield	NA	Local	NA
Pines	10th	NA	Local	NA
Pines	12th	NA	Local	NA
Pines	14th	NA	Local	NA
Pines	1st	NA	Local	NA
Pines	3rd	NA	Local	NA
Pines	6th	NA	Local	NA
Pines	9th	NA	Local	NA
Pines	Alki	NA	Local	NA
Pines	Boone	NA	Local	NA
Pines	Buckeye	NA	Local	NA
Pines	Cataldo	NA	Local	NA
Pines	Desmet	NA	Local	NA
Pines	Grace	NA	Local	NA
Pines	Main	NA	Local	NA
Pines	Marietta	NA	Local	NA
Pines	Maxwell	NA	Local	NA
Pines	Nora	NA	Local	NA
Pines	Olive	NA	Local	NA
Pines	Pinecroft	NA	Local	NA
Pines	Riverside	NA	Local	NA
Pines	Saltese	NA	Local	NA
Pines	Sinto	NA	Local	NA
Argonne	Boone	NA	Local	NA
Argonne	Cataldo	NA	Local	NA
Argonne	Indiana	NA	Local	NA
Argonne	Knox	NA	Local	NA
Argonne	Main	NA	Local	NA
Argonne	Montgomery	NA	Local	NA

Priority 1 Street	Intersecting Street	Intersecting Street Priority	Intersecting Street Classification	Intersecting Street Volume
Argonne	Sinto	NA	Local	NA
Sprague Ave	S Carnahan Rd	NA	Local	NA
Sprague Ave	S Custer Rd	NA	Local	NA
Sprague Ave	S Progress Rd	NA	Local	NA
Sprague Ave	S Girard Rd	NA	Local	NA
Sprague Ave	N Mayhew Rd	NA	Local	NA
Sprague Ave	S Union Rd	NA	Local	NA
Sprague Ave	E Alki Ave	NA	Local	NA
Sprague Ave	S Best Rd	NA	Local	NA
Sprague Ave	S Dollar Rd	NA	Local	NA
Sprague Ave	N Clinton Rd	NA	Local	NA
Sprague Ave	N Long Rd	NA	Local	NA
Sprague Ave	S Blake Rd	NA	Local	NA
Sprague Ave	N Sunderland Rd	NA	Local	NA
Sprague Ave	N Moffitt Rd	NA	Local	NA
Sprague Ave	N Skipworth Rd	NA	Local	NA
Sprague Ave	N Corbin Rd	NA	Local	NA
Sprague Ave	S Bradley Rd	NA	Local	NA
Sprague Ave	S Willow Rd	NA	Local	NA
Sprague Ave	N Greenacres Rd	NA	Local	NA
Sprague Ave	E Cowley Ave	NA	Local	NA
Sprague Ave	S Howe Rd	NA	Local	NA
Sprague Ave	N Locust Rd	NA	Local	NA
Sprague Ave	N Michigan St	NA	Local	NA
Sprague Ave	N Blake Rd	NA	Local	NA
Sprague Ave	E Corbin Pl	NA	Local	NA
Sprague Ave	E 1st Ave	NA	Local	NA
Sprague Ave	N Dyer Rd	NA	Local	NA
Sprague Ave	S Tschirley Rd	NA	Local	NA
Sprague Ave	S Dearborn Rd	NA	Local	NA
Sprague Ave	N Balfour Rd	NA	Local	NA
Sprague Ave	N Raymond Rd	NA	Local	NA
Sprague Ave	S Dora St	NA	Local	NA
Sprague Ave	S Chronicle Rd	NA	Local	NA
Sprague Ave	S Elizabeth Rd	NA	Local	NA
Sprague Ave	N Walnut Rd	NA	Local	NA
Sprague Ave	S Robie Rd	NA	Local	NA
Sprague Ave	S Fox Rd	NA	Local	NA
Sprague Ave	N Gillis Rd	NA	Local	NA

<b>Priority 1 Street</b>	<b>Intersecting Street</b>	<b>Intersecting Street Priority</b>	<b>Intersecting Street Classification</b>	<b>Intersecting Street Volume</b>
Sprague Ave	S Dishman Rd	NA	Local	NA
Sprague Ave	N Tschirley Rd	NA	Local	NA
Sprague Ave	S Coleman Rd	NA	Local	NA
Sprague Ave	N Willow Rd	NA	Local	NA
Sprague Ave	N Perrine Rd	NA	Local	NA
Sprague Ave	N Bessie Rd	NA	Local	NA
Sprague Ave	N Bannen Rd	NA	Local	NA
Sprague Ave	N McCabe Rd	NA	Local	NA
Sprague Ave	N Progress Rd	NA	Local	NA
Sprague Ave	S Dartmouth Rd	NA	Local	NA
Sprague Ave	N Bolivar Rd	NA	Local	NA
Sprague Ave	N Houk Rd	NA	Local	NA
Sprague Ave	S McKinnon Rd	NA	Local	NA
Sprague Ave	S Houk Rd	NA	Local	NA
Sprague Ave	S Sargent Rd	NA	Local	NA
Sprague Ave	S Flora Rd	NA	Local	NA
Sprague Ave	S Steen Rd	NA	Local	NA
Evergreen	Mission Connection	NA	Local	NA
Evergreen	3rd	NA	Local	NA
Evergreen	Boone	NA	Local	NA
Evergreen	Cataldo	NA	Local	NA
Evergreen	Desmet	NA	Local	NA
Evergreen	Main	NA	Local	NA
Evergreen	Mallon	NA	Local	NA
Evergreen	Nixon	NA	Local	NA
Evergreen	Riverside	NA	Local	NA
Evergreen	Sharp	NA	Local	NA
Evergreen	Springfield	NA	Local	NA
Broadway	Carnahan	NA	Local	NA
Broadway	Dyer	NA	Local	NA
Broadway	Eastern	NA	Local	NA
Broadway	Howe	NA	Local	NA
Broadway	Lake	NA	Local	NA
Broadway	Stanley	NA	Local	NA
Barker	Alki	NA	Local	NA
Barker	Cowley	NA	Local	NA

After determining Priority 1 locations, the next step is to identify the locations that exhibit Priority 2 characteristics, allowing selection of the appropriate treatment for each location. **Map 2** identifies City streets with Priority 2 characteristics.

**Map 2: Streets with Priority 2 Characteristics**



Based on the identification of these roadways, **Table 4** ranks the Priority 2 locations. The list is sorted in order of priority with higher volume corridors first:

- Intersections with other Priority 2 corridors, sorted by volume
- Priority 2 corridor intersections with all other streets, sorted by class and volume

**Table 4: Priority 2 Locations**

Priority 2 Street	Intersecting Street	Intersecting Street Priority	Intersecting Street Classification	Intersecting Street Volume
Park	Broadway	2	Minor Arterial	9,295
Montgomery	Mansfield	2	Minor Arterial	8,248
Park	8th Ave.	2	Minor Arterial	5,206
Barker	Sprague	2	Minor Arterial	4,565
Broadway	Sullivan	1	Principal Arterial	46,037
Broadway	Pines	1	Principal Arterial	28,653
Broadway	Evergreen	1	Principal Arterial	21,692
Broadway	Argonne	1	Principal Arterial	12,563
Broadway	Mullan	1	Principal Arterial	12,358
Park	Sprague	1	Principal Arterial	22,414
Mission	Pines	1	Principal Arterial	37,943
Mission	Mullan	1	Principal Arterial	17,533
Mission	Argonne	1	Principal Arterial	16,574
Mansfield	Pines	1	Principal Arterial	18,428
8th Ave.	Sullivan	1	Principal Arterial	18184
8th Ave.	Pines	1	Principal Arterial	17895
Park	Trent	NA	Principal Arterial	24,055
Barker	Trent	NA	Principal Arterial	24,558
8th Ave.	Dishman Mica	NA	Principal Arterial	24510
Evergreen	Trent	NA	Principal Arterial	24909
Evergreen	32nd	NA	Principal Arterial	11295
Indiana	Pines	NA	Principal Arterial	37943
Flora	Trent	NA	Principal Arterial	24558
Broadway	University	NA	Minor Arterial	6,997
Broadway	McDonald	NA	Minor Arterial	6,262
Broadway	Bowdish	NA	Minor Arterial	5,980
Broadway	Adams	NA	Minor Arterial	1,936
Montgomery	Indiana	NA	Minor Arterial	12,514
Park	Rutter	NA	Minor Arterial	1,448
Park	Euclid	NA	Minor Arterial	1,073
Mission	University	NA	Minor Arterial	3,620
Mission	Bowdish	NA	Minor Arterial	3,131
8th Ave.	Evergreen	NA	Minor Arterial	14078

<b>Priority 2 Street</b>	<b>Intersecting Street</b>	<b>Intersecting Street Priority</b>	<b>Intersecting Street Classification</b>	<b>Intersecting Street Volume</b>
8th Ave.	University	NA	Minor Arterial	10746
8th Ave.	Carnahan	NA	Minor Arterial	7202
8th Ave.	McDonald	NA	Minor Arterial	6175
8th Ave.	Adams	NA	Minor Arterial	3000
8th Ave.	Carnahan	NA	Minor Arterial	649
8th Ave.	Bradley	NA	Minor Arterial	NA
Evergreen	16th	NA	Minor Arterial	4855
Evergreen	Wellesley	NA	Minor Arterial	4388
Evergreen	Evergreen	NA	Minor Arterial	2633
Indiana	Montgomery	NA	Minor Arterial	3256
Broadway	Conklin	NA	Collector	3,204
Broadway	Vista	NA	Collector	2,783
Broadway	Herald	NA	Collector	715
Park	Mission	NA	Collector	2,461
Park	Buckeye	NA	Collector	489
Park	4th	NA	Collector	329
Park	Valleyway	NA	Collector	NA
Mission	Herald	NA	Collector	433
<b>Barker</b>	<b>Euclid</b>	<b>NA</b>	<b>Collector</b>	<b>1,404</b>
Barker	8th	NA	Collector	NA
8th Ave.	Dickey	NA	Collector	2509
8th Ave.	Farr	NA	Collector	1523
8th Ave.	Herald	NA	Collector	1363
Evergreen	24th	NA	Collector	2555
Indiana	Mirabeau	NA	Collector	4538
Flora	Euclid		Collector	4051
Montgomery	Carlisle	NA	Local	NA
Montgomery	Van Marter	NA	Local	NA
Montgomery	Jackson	NA	Local	NA
Mansfield	Perrine	NA	Local	NA
Mansfield	Robie	NA	Local	NA
Mansfield	Wilbur	NA	Local	NA
Park	Marietta	NA	Local	NA
Park	Maxwell	NA	Local	NA
Park	Euclid	NA	Local	NA
Park	Montgomery	NA	Local	NA
Park	Park	NA	Local	NA
Park	Nora	NA	Local	NA
Park	Utah	NA	Local	NA

<b>Priority 2 Street</b>	<b>Intersecting Street</b>	<b>Intersecting Street Priority</b>	<b>Intersecting Street Classification</b>	<b>Intersecting Street Volume</b>
Park	Baldwin	NA	Local	NA
Park	Sharp	NA	Local	NA
Park	Fairview	NA	Local	NA
Park	Boone	NA	Local	NA
Park	3rd	NA	Local	NA
Park	Cataldo	NA	Local	NA
Park	Indiana	NA	Local	NA
Park	Carlisle	NA	Local	NA
Park	2nd	NA	Local	NA
Park	5th	NA	Local	NA
Park	Rutter	NA	Local	NA
Park	Spear	NA	Local	NA
Park	6th	NA	Local	NA
Park	Sinto	NA	Local	NA
Mission	Woodruff	NA	Local	NA
Mission	Farr	NA	Local	NA
Mission	Felts	NA	Local	NA
Mission	Union	NA	Local	NA
Mission	Bates	NA	Local	NA
Mission	Glenn	NA	Local	NA
Mission	Raymond	NA	Local	NA
Mission	University	NA	Local	NA
Mission	Bowdish	NA	Local	NA
Mission	Locust	NA	Local	NA
Mission	Willow	NA	Local	NA
Mission	Wilbur	NA	Local	NA
Mission	Oberlin	NA	Local	NA
Barker	Hattamer	NA	Local	NA
Barker	Bridgeport	NA	Local	NA
Barker	2 <sup>nd</sup> Ave.	NA	Local	NA
Barker	4 <sup>th</sup> Ave.	NA	Local	NA
8th Ave.	6 <sup>th</sup> Ave.	NA	Local	NA
8th Ave.	Bannen	NA	Local	NA
8th Ave.	Best	NA	Local	NA
8th Ave.	Blake	NA	Local	NA
8th Ave.	Bolivar	NA	Local	NA
8th Ave.	Bradley	NA	Local	NA
8th Ave.	Burns	NA	Local	NA
8th Ave.	Calvin	NA	Local	NA



<b>Priority 2 Street</b>	<b>Intersecting Street</b>	<b>Intersecting Street Priority</b>	<b>Intersecting Street Classification</b>	<b>Intersecting Street Volume</b>
8th Ave.	Chronicle	NA	Local	NA
8th Ave.	Coleman	NA	Local	NA
8th Ave.	Collins	NA	Local	NA
8th Ave.	Custer	NA	Local	NA
8th Ave.	Dearborn	NA	Local	NA
8th Ave.	Dishman	NA	Local	NA
8th Ave.	Dollar	NA	Local	NA
8th Ave.	Eastern	NA	Local	NA
8th Ave.	Elizabeth	NA	Local	NA
8th Ave.	Fancher	NA	Local	NA
8th Ave.	Farr	NA	Local	NA
8th Ave.	Felts	NA	Local	NA
8th Ave.	Girard	NA	Local	NA
8th Ave.	Herald	NA	Local	NA
8th Ave.	Houk	NA	Local	NA
8th Ave.	Mamer	NA	Local	NA
8th Ave.	Marcus	NA	Local	NA
8th Ave.	Marigold	NA	Local	NA
8th Ave.	Mayhew	NA	Local	NA
8th Ave.	McKinnon	NA	Local	NA
8th Ave.	Morrow	NA	Local	NA
8th Ave.	Oberlin	NA	Local	NA
8th Ave.	Progress	NA	Local	NA
8th Ave.	Raymond	NA	Local	NA
8th Ave.	Rees	NA	Local	NA
8th Ave.	St Charles	NA	Local	NA
8th Ave.	Sunderland	NA	Local	NA
8th Ave.	Thierman	NA	Local	NA
8th Ave.	Vercler	NA	Local	NA
8th Ave.	Virginia	NA	Local	NA
8th Ave.	Walnut	NA	Local	NA
8th Ave.	Warren	NA	Local	NA
8th Ave.	Wilbur	NA	Local	NA
8th Ave.	Willamette	NA	Local	NA
8th Ave.	Woodlawn	NA	Local	NA
8th Ave.	Woodruff	NA	Local	NA
Evergreen	Longfellow	NA	Local	NA
Evergreen	22nd	NA	Local	NA
Evergreen	21st	NA	Local	NA

<b>Priority 2 Street</b>	<b>Intersecting Street</b>	<b>Intersecting Street Priority</b>	<b>Intersecting Street Classification</b>	<b>Intersecting Street Volume</b>
Evergreen	Crown	NA	Local	NA
Evergreen	Rockwell	NA	Local	NA
Evergreen	Heroy	NA	Local	NA
Evergreen	30th	NA	Local	NA
Evergreen	Rich	NA	Local	NA
Evergreen	31 <sup>st</sup> Ave.	NA	Local	NA
Evergreen	18th Ave.	NA	Local	NA
Evergreen	20th Ave.	NA	Local	NA
Evergreen	23rd Ave.	NA	Local	NA
Evergreen	28th Ave.	NA	Local	NA
Evergreen	26th Ave.	NA	Local	NA
Evergreen	17th Ave.	NA	Local	NA
Evergreen	27th Ave.	NA	Local	NA
Evergreen	19th Ave.	NA	Local	NA
Sprague	Arties	NA	Local	NA
Sprague	Greenacres	NA	Local	NA
Sprague	Bow	NA	Local	NA
Sprague	Corbin	NA	Local	NA
Sprague	Tschirley	NA	Local	NA
Sprague	Long	NA	Local	NA
Sprague	Moen	NA	Local	NA
Sprague	Manifold	NA	Local	NA
Flora	Dalton	NA	Local	NA

## Step 4: Selection of Countermeasures

Following identification of locations, effective countermeasures are identified for each crash type and then applied to high-ranking locations, as shown in **Table 5**. Countermeasures are evaluated through FHWA’s Crash Modification Factors (CMF) clearinghouse. The CMF clearinghouse contains safety countermeasures and scores its effectiveness at reducing crashes. The CMF rating estimates the reduced frequency of crashes following the installation of the countermeasure. For example, if the CMF is 0.70, the amount of crashes would be expected to be 70% of the existing number of crashes.

**Table 5: Selected Countermeasures**

Crash Type	Countermeasure	CMF
Hit Pedestrian or Bicyclist	3-inch retroreflective sheeting on signal backplates	.85
	Install roundabout	.56
	Install shared-use path	.55
	Install curb and gutter	.89
Angle Collision	3-inch retroreflective sheeting on signal backplates	.85
	Install roundabout	.818
Excessive Speeding	3-inch retroreflective sheeting on signal backplates	.85
	Install Roundabout	.818
Hit Fixed Object, Dark Conditions	Increase visibility of stop signs poles	.725
	Install curb and gutter	.89

## Step 5: Prioritize Projects

**Table 6** lists the prioritized projects. Highlighted projects indicate projects prioritized for immediate funding needs due to overlap with existing projects prioritized for construction with existing match funds.

**Table 6: Prioritized Project List**

Location	Priority	Treatment	Cost
Priority 1 signalized intersections: 20 locations citywide	1	Install 3” retroreflective borders on traffic signal backplates	\$180,000
All Priority 1 and 2 corridors: 600 Locations citywide	1 and 2	Increase visibility of stop sign posts and 35 MPH signs posts	\$80,000
Barker Road Safety Improvements	2	Add Shared use path, curb and gutter, and Two-way Center Turn Lane	
Sprague and Barker Intersection Improvement	2	Install roundabout, curb and gutter, sidewalks, bike facilities and crosswalks	\$795,000

## Conclusion

In summary, this Risk-Based Safety Assessment followed Target Zero and used the Systemic Safety Project Selection Tool to identify key roadway characteristics associated with fatal and serious injury crashes occurring in the City of Spokane Valley. After identifying locations with a high likelihood for such crashes, this assessment identified appropriate treatments for these locations. The resulting project list provides the City with a path forward for proactively addressing future fatal and serious injury crashes throughout the City's transportation network.

While the projects selected for near-term funding applications and implementation do not draw directly from the top of the Priority 1 and 2 lists of locations, they overlap with previously-identified safety projects that are already at some stage of design, with anticipated or secured funding and listed in Spokane Valley's Six-Year Transportation Improvement Program. This method of prioritization enables these projects to move forward in the short-term while scopes, designs and funding sources are identified for the locations at the top of each list. It is the City's intent to focus on the highest-priority locations in the development of future safety projects.

## Appendix 1: Current Crashes by Corridor

Comparing the City’s highest-crash corridors to the results of the systematic analysis conducted herein helps answer the question: would the current highest-crash corridors rank highly for selected systemic improvements?

Reviewing the crash data, a majority of crashes occurred on a small number of streets, and in particular on three corridors: Sprague Avenue, Pines Road (SR 27), and Trent Avenue (SR 290). Beyond these three primary corridors, other streets that exhibit priority crash characteristics are Broadway Avenue, Mission Avenue, Sullivan Road, Park Road, and 8<sup>th</sup> Avenue. Sprague Avenue stands out with the most crashes across all categories. This determination aligns with the priority levels and project selections identified through the systematic safety project selection process.

**Table 1: High-Crash Corridors by Mode**

Fatal & Serious Crashes						
Mode	Most Crashes	#	2nd-Most Crashes	#	3rd-Most Crashes	#
Pedestrian	Sprague	4	Pines/Trent	3	Mission	2
Bicycle	Sprague	2	5-way tie*	1	5-way tie*	1
Motor vehicle	Trent	12	Sprague	8	Broadway	6
All	Sprague	12	Trent	11	Pines	7
All Crashes						
Mode	Most Crashes	#	2nd-Most Crashes	#	3rd-Most Crashes	#
Pedestrian	Pines	19	Sprague	15	Sullivan	5
Bicycle	Sprague	23	Pines	17	8th Ave.	5
Motor vehicle	Pines	613	Sprague	577	Broadway	270
All	Sprague	828	Broadway	377	Broadway	377

\*Park, Dick, Dishman-Mica, 2nd Ave., and 11th. Ave.

It is possible to determine that a large majority of crashes occur on only a small percentage of roads in Spokane Valley, as categorized below. This table can be read as: “X% of crashes occur on Y% of Spokane Valley streets.”

**Table 2: Percent of Crashes Happening by Percent of Streets**

Mode	Fatal & Serious Crashes		All Crashes	
	Crash %	Street %	Crash %	Street %
Pedestrian <sup>1</sup>	100%	4%	100%	10%
Bicycle <sup>2</sup>	100%	1%	90%	6%
Motor vehicle <sup>3</sup>	70%	2%	89%	9%
All <sup>4</sup>	80%	4%	80%	5%

<sup>1</sup>33.3% of crashes happened on three streets: Pines, Sprague and Trent  
<sup>2</sup>40% of crashes occurred on Sprague and Pines  
<sup>3</sup>50% occurred on 5 streets: Pines, Sprague, I-90, Trent, Broadway  
<sup>4</sup>50% of all crashes occurred on 1% of city streets