

## **SAFETY WARRANTS**

The safety warrant criteria for the 2021 HSIP is based on non-PVA reportable crashes occurring between 2016 and 2020 for 5-year warrants and 2011 through 2020 for 10-year warrants. The following warrants are intended to identify a specific crash type, pattern, or condition and the warrant name is typically used as the identifying moniker. All safety warrants are based on either five or ten years of crash data.

### ***Intersection Warrants***

For the purposes of this warrant, a frontal impact crash is considered to be one of the following crash types:

- Angle
- Left Turn (same or different roads)
- Right Turn (same or different roads)
- Head On

#### **Warrant I-1u: Frontal Impact Urban – 5 Years**

Locations with 25% of the total crashes having occurred in the last 2 years AND at least one of the following conditions:

(a) A minimum of 12 frontal impact crashes AND a minimum of 55% of all crashes were frontal impact crashes.

-OR-

(b) A minimum of 35 total crashes AND a minimum of 35% of all crashes were frontal impact crashes AND a minimum severity index of 6.0 for the frontal impact crashes.

#### **Warrant I-1r: Frontal Impact Rural – 10 Years**

Locations with a minimum of 9 frontal impact crashes, AND 20% of all crashes having occurred in the last 3 years AND a minimum of 60% of all crashes were frontal impact crashes.

#### **Warrant I-2u: Last Year Increase Urban – 5 Years**

Locations with a minimum of 25 total crashes AND a minimum of 38% of the total crashes occurred in the last year.

#### **Warrant I-2r: Last Year Increase Rural – 10 Years**

Locations with a minimum of 20 total crashes AND a minimum of 32% of the total crashes occurred in the last year.

Warrant I-3u: Frequency with a Severity Index Minimum Urban – 5 Years

Locations with a minimum of 25 total crashes AND a minimum severity index of 6.0 AND a minimum of 40% of the total crashes occurred in the last 2 years.

Warrant I-3r: Frequency with a Severity Index Minimum Rural – 10 Years

Locations with a minimum of 20 total crashes AND a minimum severity index of 9.0 AND a minimum of 30% of the total crashes occurred in the last 3 years.

Warrant I-4u: Night Location Urban – 5 Years

Locations with a minimum of 25% of the total crashes occurring in the last 2 years AND a minimum of 12 crashes occurring at night AND a minimum of 40% of the total crashes occurred at night.

Warrant I-4r: Night Location Rural – 10 Years

Locations with a minimum of 20% of the total crashes occurring in the last 3 years AND a minimum of 10 crashes occurring at night AND a minimum of 46% of the total crashes occurred at night.

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## ***Section Warrants***

For each valid warrant location, it is required that for the analysis period of 5 years, a minimum number of crashes and crashes/per mile rates are met. These minimum required values were defined by facility type as follows:

Facility Type	Minimum Total Crashes	Minimum Crashes/Mile Rate
All Freeway Sections	30	30
US Non-Freeway Route	20	40
NC Non-Freeway Route	15	30
SR Non-Freeway Route	12	24
City Non-Freeway Street	20	40

For the purposes of warrants F-1, F-2, N-1 and N-2, a run off road (ROR) type crash is considered to be one of the following crash types:

- Run Off Road (right, left or straight)
- Fixed Object
- Overturn/Rollover
- Sideswipe Opposite Direction
- Parked Motor Vehicle
- Head On

Currently, the animal crash type has been removed from the section warrant analysis to assist in identifying target crash locations. This is done because animal crashes, predominately deer crashes on rural routes, are not applicable to the current warrants. Eliminating these crashes helps to focus the attention on to crash locations that counter measures can be applied based upon the current warrants.

### Warrant F-1: Run Off Road during Wet Road Conditions (Freeway)

Freeway locations that met the minimum total crash and crash rate for freeways AND a minimum of 48% of the total crashes were run off road crashes occurring during wet road conditions.

### Warrant F-2: Run Off Road (Freeway)

Freeway locations that met the minimum total crash and crash rate for freeways AND a minimum of 80% of the total crashes were run off road crashes.

### Warrant F-3: Wet Road Condition (Freeway)

Freeway locations that met the minimum total crash and crash rate for freeways AND a minimum of 55% of the total crashes occurred during wet road conditions.

Warrant F-4: Night Location (Freeway)

Freeway locations that met the minimum total crash and crash rate for freeways AND a minimum of 52% of the total crashes occurred during dark lighting conditions.

Warrant N-1: Run Off Road during Wet Road Conditions (Non-Freeway)

Non-freeway locations that met the minimum total crash and crash rate for the respective facility type AND a minimum of 35% of the total crashes were run off road crashes occurring during wet road conditions.

Warrant N-2: Run Off Road (Non-Freeway)

Non-freeway locations that met the minimum total crash and crash rate for the respective facility type AND a minimum of 68% of the total crashes were run off road crashes.

Warrant N-3: Wet Road Condition (Non-Freeway)

Non-freeway locations that met the minimum total crash and crash rate for the respective facility type AND a minimum of 48% of the total crashes occurred during wet road conditions.

Warrant N-4: Non-Intersection Night Location (Non-Freeway)

Non-freeway locations that met the minimum total crash and crash rate for the respective facility type AND a minimum of 38% of the total non-intersection crashes were run off road crashes occurring during dark lighting conditions.

***Bicycle / Pedestrian Intersection Warrant***

Warrant BP-1: Chronic Location

Locations with a minimum of 5 crashes involving pedestrians or bicyclists reported in the last 10 years AND a minimum of 50% of all crashes involving pedestrians or bicyclists must have occurred in the last 5 years.

## ***Bridge Warrant***

### Warrant B-1: Chronic Location

Locations with a minimum of 5 run off road crashes (ROR) type crashes in the last 10 years AND a minimum of 50% of all crashes were run off road.

Only applies to 2-lane roadways.

Animal crashes should be excluded from the study.

For the purposes of this warrant, a ROR crash is one of the following crash types:

- Run Off Road (right, left or straight)
- Fixed Object
- Overturn/Rollover
- Sideswipe Opposite Direction
- Parked Motor Vehicle
- Head On