

# Enhancing Night Traffic Safety:

## Street Lighting Improvement Recommendations for Reno-Sparks based on Lighting and Pedestrian Crash Data

The Vision Zero Truckee Meadows planning document, published in 2019, highlighted a critical issue: 61% of crashes, including those resulting in injuries and fatalities, occurred during low-light periods between 2011 and 2017. A survey conducted by the Vision Zero Task Force in November 2018 further revealed pedestrians' feelings of insecurity and uncertainty due to inadequate street lighting. To address these concerns, the Nevada Department of Transportation (NDOT) Traffic Safety Engineering (TSE) sponsored the University of Nevada, Reno (UNR) to conduct a detailed study on the relationship between street lighting and night-time crashes in the Reno-Sparks urban area.

*Distributions of 2013-2017 Dark Crashes and Dark Pedestrian Crashes*

Crash Type	Total Crashes	Dark Crashes	Percentage of Dark Crashes
Total K Crashes	173	96	55.5%
Total A Crashes	769	246	32.0%
Total Crashes	36,196	6,932	19.2%
Pedestrian K Crashes	61	49	80.3%
Pedestrian A Crashes	169	65	38.5%
Total Pedestrian Crashes	1,335	434	32.5%

### Background

The study utilized crash data from 2013 to 2017 to analyze dark crash distributions for fatal (K), incapacitating (A), and total crashes. The data revealed a significant proportion of night-time crashes, especially those involving pedestrians, highlighting the vulnerability of this group during low-light conditions.

### Data Collection

The project deployed an on-vehicle data collection system to record horizontal illuminance, front-view video, and GPS points. The system included an illuminance meter, a high-accuracy GPS/GNSS device, and a dash camera. Data collection was conducted in a multi-directional mode across 135 miles of Principal Arterial roads, 223 miles of Minor Arterial roads, and 162 miles of Minor Collector roads in the Reno-Sparks area. Data collection occurred between March and December 2020, focusing on the darkest periods after astronomical twilight and before moonrise.

### Crash Data and Road Safety Measures

Using the 2013-2017 crash dataset, the project team calculated various crash frequencies and rates for road segments, including dark and daytime crashes. The dark traffic volumes were estimated for the 9:00 PM to 4:00 AM period, while dark crashes were identified through records indicating "DARK" in the lighting property.

## Data Processing

The data processing involved creating a GIS layer of road segments with properties such as traffic volumes, safety performance measures, and illuminance measures. This enabled the cross-checking of night pedestrian crashes with illumination data.

## Cross-check Night Pedestrian Crashes and Illumination Data

The analysis showed a correlation between pedestrian dark crashes and illumination levels, while no significant correlation was found for vehicle crashes. The project prioritized segments for lighting improvements based on pedestrian crash data, illumination levels, and other road conditions.

## Determining Ranking Priority

The reviewing team identified segments with pedestrian fatal or injury crash concerns and then prioritized these segments based on several criteria. The ranking priority was determined through a comprehensive review process considering the following factors:

- Pedestrian crash data (fatal and injury crashes)
- Current illumination level (average, minimum, and maximum values)
- Existence of night pedestrian attracting points near the segments (such as parks, homeless shelters, residential areas, shopping areas, alcohol-serving businesses)
- Road geometry
- Other known traffic conditions on each segment (based on the reviewing engineers' knowledge and resources)

The segments were ranked into three priority levels:

- » **Priority 3 (Highest Priority):** Segments with the highest need for lighting improvements.
- » **Priority 2 (Middle Priority):** Segments with moderate need.
- » **Priority 1 (Lowest Priority):** Segments with the lowest need.

## Future Approaches

Future efforts should focus on combining comprehensive datasets of night pedestrian counts and pedestrian-attracting points with street lighting data to proactively identify and prioritize segments for lighting improvements, even if no pedestrian night crashes have occurred yet. This proactive approach can significantly enhance pedestrian safety during nighttime.

## Conclusion

The study underscores the critical importance of adequate street lighting in enhancing night traffic safety, particularly for pedestrians. By identifying and prioritizing road segments for lighting improvements, the project aims to mitigate the risk of night-time crashes and improve overall traffic safety in the Reno-Sparks urban area.

## Results

The study identified 16 segments with night pedestrian fatal crashes and 12 segments with two or more night pedestrian injury crashes. The prioritization process ranked segments for lighting improvements as follows:

### Segments with Night Pedestrian Fatal Crashes:

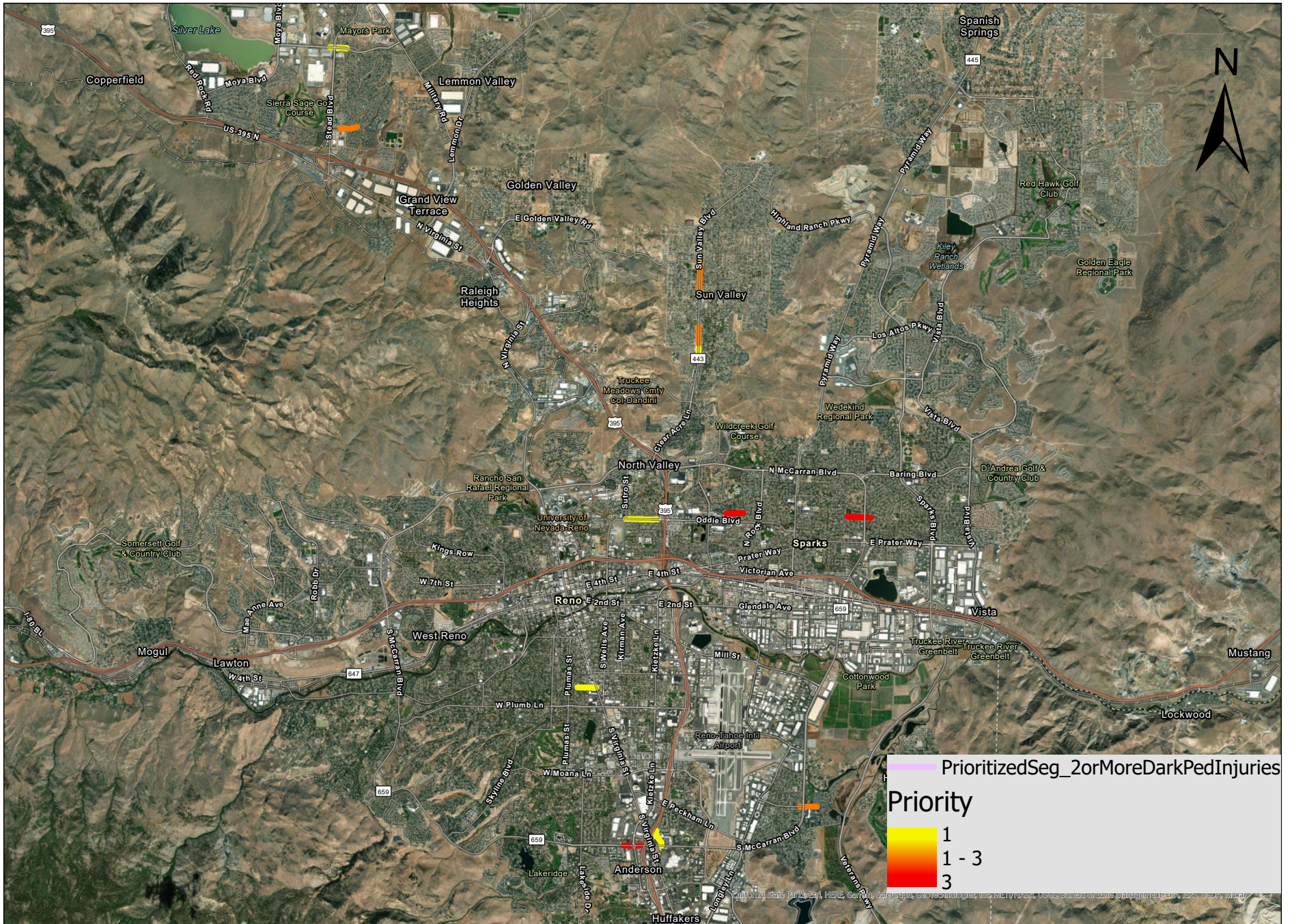
- » **Priority 3:** 3 segments
- » **Priority 2:** 6 segments
- » **Priority 1:** 7 segments

### Segments with Two or More Night Pedestrian Injury Crashes:

- » **Priority 3:** 3 segments
- » **Priority 2:** 4 segments
- » **Priority 1:** 5 segments

One segment, Oddie Blvd west of US 395, appeared in both lists and was given a middle priority due to its existing lighting condition (average illumination of 3.6 lux).

Priority Ranking for Segments with Night Pedestrian Fatal Crashes



Priority Ranking for Segments with 2 or More Night Pedestrian Injuries

