



NORTH CAROLINA
Department of Transportation

NCDOT Vulnerable Road User Safety Assessment

Executive Committee for Highway Safety

February 16, 2024

Connecting people, products and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina

What is the Vulnerable Road User Safety Assessment?

New FHWA requirement for all states per Infrastructure Investment and Jobs Act (IIJA) [23 U.S.C. 148(l). (23 U.S.C. 148(a)(16))]

- “Vulnerable Road Users” defined as:
 - Pedestrian (including “highway worker on foot in a work zone”)
 - Bicyclist (including any person using a device fitting definition of bicycle)
 - Person on personal conveyance

Requirements:

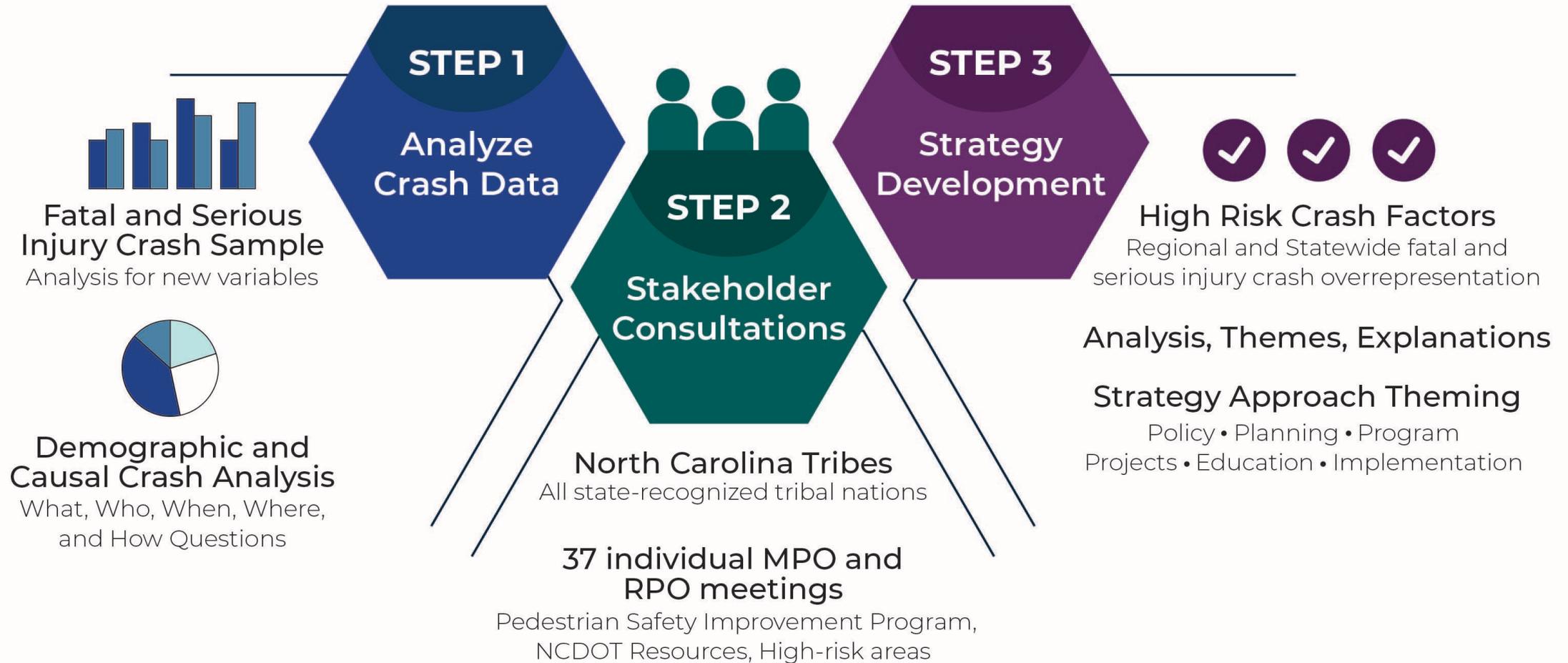
- Conduct a quantitative data analysis of VRU fatal and serious injury crashes to determine “high-risk areas.”
 - Includes location, roadway functional classification, design speed, speed limit, and time of day
 - Considers the demographics of the locations of fatalities and serious injuries, including race, ethnicity, income, and age
- Complete by November 15, 2023, include as part of SHSP
- Update every 5 years

Schedule

- Kickoff 2022
- Adopted Nov 2023
- Included in 2024 SHSP Update
- Updated with 5-year SHSP

Task	FALL 2022	WINTER 23/23	SPRING 2023	SUMMER 2023	FALL 2023
KA Sample Crash Review	[Blue bar]				
Causal Factor Analysis		[Dark blue bar]			
Outreach & Consultation		[Pink bar]			
Strategy Development				[Purple bar]	
Final Report					[Grey bar]

North Carolina Vulnerable Road User (VRU) Safety Assessment Process



K/A Crash Sample

- Sample of appx 500 KA ped crashes
- Summary of key metrics
 - [NCDOT VRU Data Viewer](#)
- Unusual circumstance crash review (“flags”)



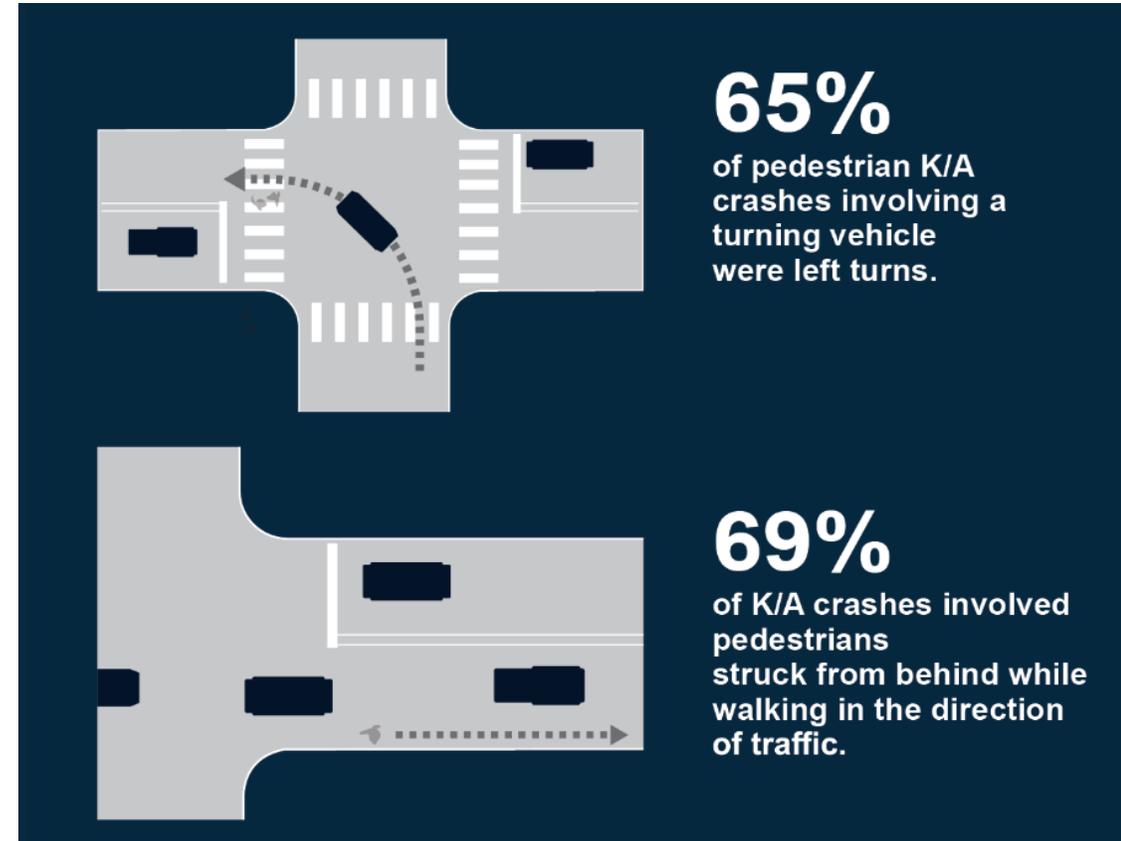
Sample Key Findings

73% of K/A VRU crashes occurred outside of intersection locations

69% of K/A VRU crashes occurred in non-daylight conditions (including dawn and dusk)

66% of K/A VRU crashes occurred in areas where the percent of households in poverty is greater than state average (measured by Census block groups where the percent of households under 150% of the federal poverty level (FPL) is greater than the state average)

- K/A = Fatal (K) and Serious Injury (A) crashes



Causal Factor Analysis

To identify factors that may contribute directly or indirectly to bicyclist and pedestrian-involved crashes through a long-term dataset analysis

All reported bicycle and pedestrian crashes in North Carolina over a 10-year period: January 1st, 2012 and December 31st, 2021

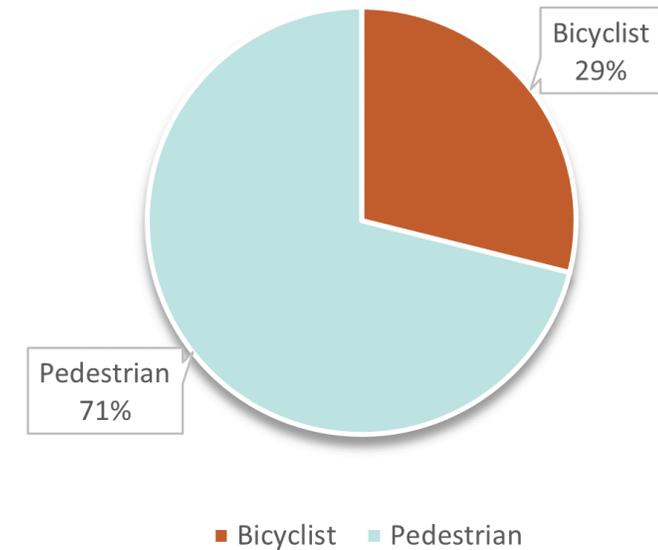
- In that 10-year period, there were **31,024 total crashes**. 22,057 were pedestrian crashes and 8,927 were bicycle crashes.

Analysis Factors:

- Injury Classification
- Urban / Rural, Context
- Intersection vs Non-Intersection
- Roadway Characteristics
- Socioeconomic / Demographic Characteristics
- Time and Weather
- Crash Type and Other Factors

Summary Stats for State and MPO/RPO-level

Bicyclist vs. Pedestrian Crashes



Find more information here:

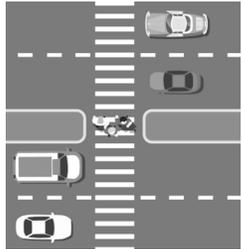
- [NCDOT Pedestrian and Bicyclist Crash Dashboard](#)
- [NCDOT VRU Data Viewer](#)

Causal Factors (Statewide) – Example Findings

VRU (Pedestrian and Bicyclist) Crashes Statewide



46% of KA crashes occurred on an arterial roads (minor or principal) and **68% of KA crashes** occurred on roads with posted speeds greater than 35 mph.



73% of KA crashes occurred at non-intersection locations.



65% of KA crashes occurred during dark conditions.

Consultations

Outreach to federal and state-recognized tribal nations

Survey to all regional planning organizations (MPO/RPO)

Meetings with each MPO and RPO

Outcome: identify high risk areas, barriers to safety planning for vulnerable road users in each MPO/RPO region



VRU Safety Assessment – Summary Report

Overview of Vulnerable Road User Safety Performance

Relationship with SHSP

Relationship to HSIP

Summary of Quantitative Analysis

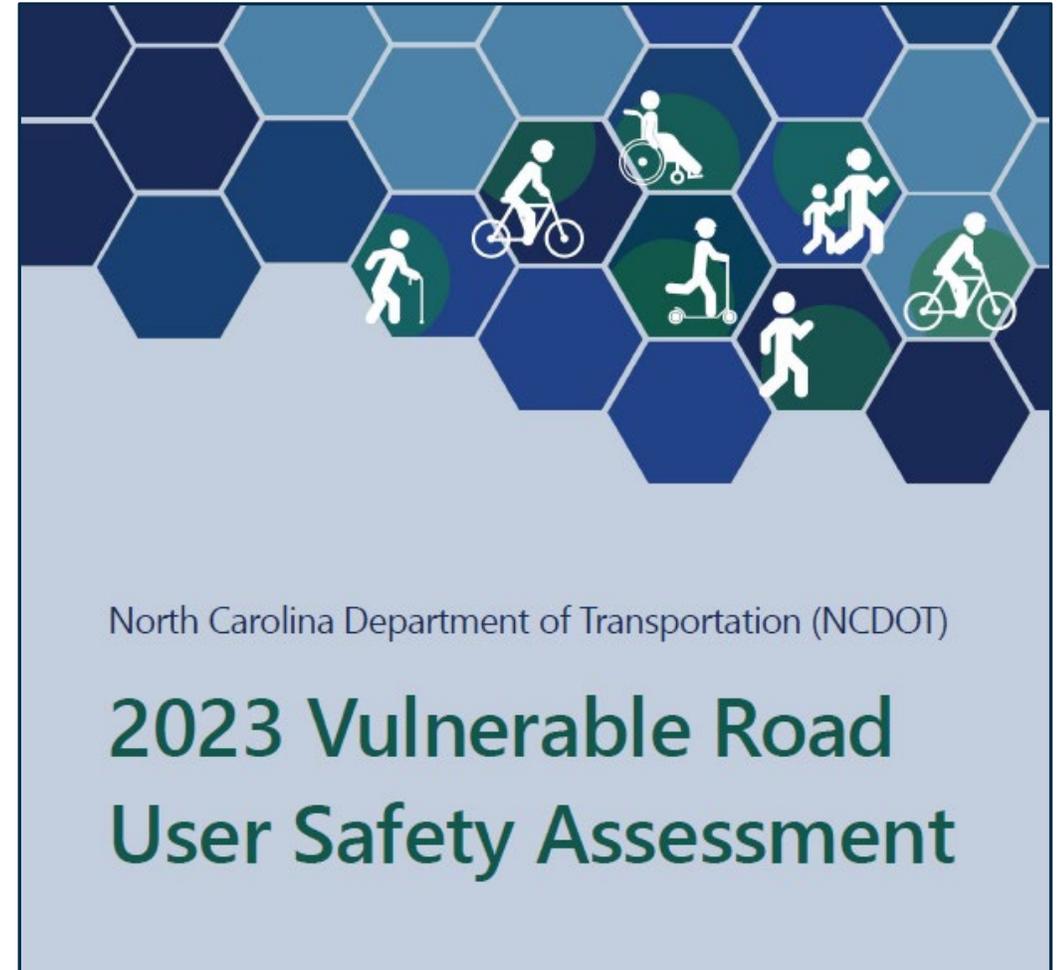
Crash Sample Review

Causal Factor – Crash Analysis

Summary of Consultation

Regional Planning Organizations

Program of Strategies



Program of Strategies

Policy

Planning

Programs

Projects

Education

Implementation

Policy

Create and publish guidance for developing and implementing more safety projects for vulnerable road users.

- Review gaps and provide training for policies and guidance that address vulnerable road user safety and provide support for the application of these.
- Apply guidance to identify safety needs at trail crossings, signalized intersections, and transit corridors.
- Standardize pedestrian crossing guidance application in STIP project review.
- Develop guidance for target speeds and assess needs for incorporation in high-risk areas for vulnerable road users.



Planning

Partner with regional planning organizations and local agencies to develop safety plans and studies across all high-risk contexts.

- Provide financial and technical support for local and regional roadway safety plans. These safety plans should include vulnerable road user safety.
- Review bicycle and pedestrian network plans for crossing safety enhancements. Incorporate trail crossing guidance to network plans and integrate these plans into project development processes.
- Conduct pedestrian and bicycle safety studies, including corridor studies and Road Safety Assessments, on urban arterials.
- Establish an approach to speed management planning in urban areas that is context-sensitive and considers target speeds and operating speeds.



Program

Identify new partners for city-wide and regional engagement with disadvantaged communities to inform safety strategies and projects.

- Monitor PSIP large city pilot implementation in Wilmington and Fayetteville and mid-sized city implementation. Formalize large city pilot program and expand into additional large and mid-sized cities.
- Develop approaches for applying PSIP implementation in small cities and rural areas.
- Incorporate public health into vulnerable road user safety programming. Encourage further partnerships with statewide and local public health officials to understand needs of vulnerable road users in safety planning and studies.



Projects

Develop safety projects that are responsive and risk-based.

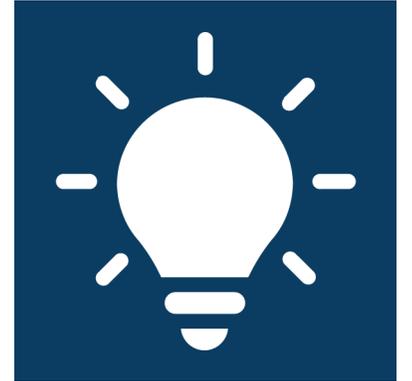
- Standardize pedestrian and bicyclist safety review in STIP project review and promote vulnerable road user safety improvements in local project reviews.
- Implement systemic safety improvements for vulnerable road user safety, prioritizing low-cost treatments.



Education

Provide training and increase opportunities for NCDOT and local agency partners to develop safety projects.

- Develop toolkits for safety countermeasure selection and implementation that include established safety benefit measures and application guidance.
- Develop training resources for consultants and local staff to lead Road Safety Assessments for all road users.
- Develop and launch web-based tools and information about PSIP.



Implementation

Leverage data sources and methods to prioritize needs and assess performance of vulnerable road user safety.

- Update and maintain Pedestrian and Bicycle Infrastructure Network (PBIN) as an inventory of existing conditions for safety improvements.
- Maintain data for pedestrian safety at signalized intersections. Incorporate safety improvement data into statewide traffic signal inventory.
- Conduct further research on interstates and expressways that experience disproportionate vulnerable road user crash frequencies to understand trends and inform safety implementation.
- Maintain and improve exposure and risk models. Review exposure and risk models for opportunities to enhance their effectiveness and responsiveness.



Thank you!
