NORTH CAROLINA
Department of Transportation

NCDOT's Secondary Road Safety Program:

Program Overview and Before-After Evaluation

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

Background Info

SRSP = Secondary Route Safety Program

- SRSP started in 2016

- Long-term goal is to provide speed limit ordinances for all roadways with statutory 55mph speed limits in NC
  - *Roadways outside of municipalities not accompanied with signed speed limits but where the default speed limit is 55-mph unless posted otherwise*

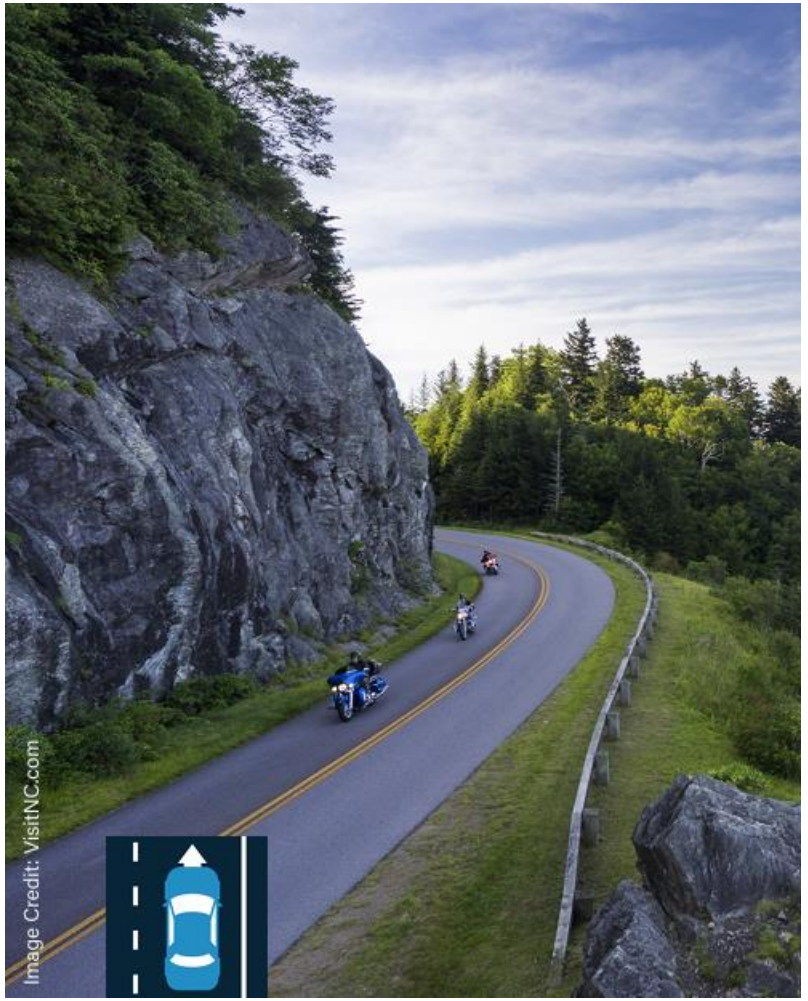
- As of 2024, there are roughly 37,000+ miles of NCDOT roadways that use the 55mph statutory speed limit

Safety Needs on Rural 2-Lane Roadway

- Primary focus of the program is ***Rural 2-Lane*** roadways

- Fatal crash stats from 2018 – 2022:
  - 8,137 fatalities on North Carolina Roadways
  - 4,479 fatalities due to Lane Departure Crashes (55% of total)

- 78% of fatal and serious injury lane departure crashes occur on rural roadways.



SRSP Annual Listing

- Every year, each of the 8 Regions within NCDOT's Traffic Safety Unit is given a prioritized listing of routes with a statutory speed limit of 55 mph
  - Listing is scored based on the number of total, fatal, and A-injury crashes
  - Routes with more fatal & severe injury crashes are on top of list.
- The 8 Regions work with the 14 local division traffic engineers to investigate routes and determine at what speed the ordinance should be set
- Goal of investigating at least 1,000 miles of roadway per year
- All reviewed sites are ordinanced, regardless if they are changed from or kept at 55 mph

Overview of SRSP Ordinances

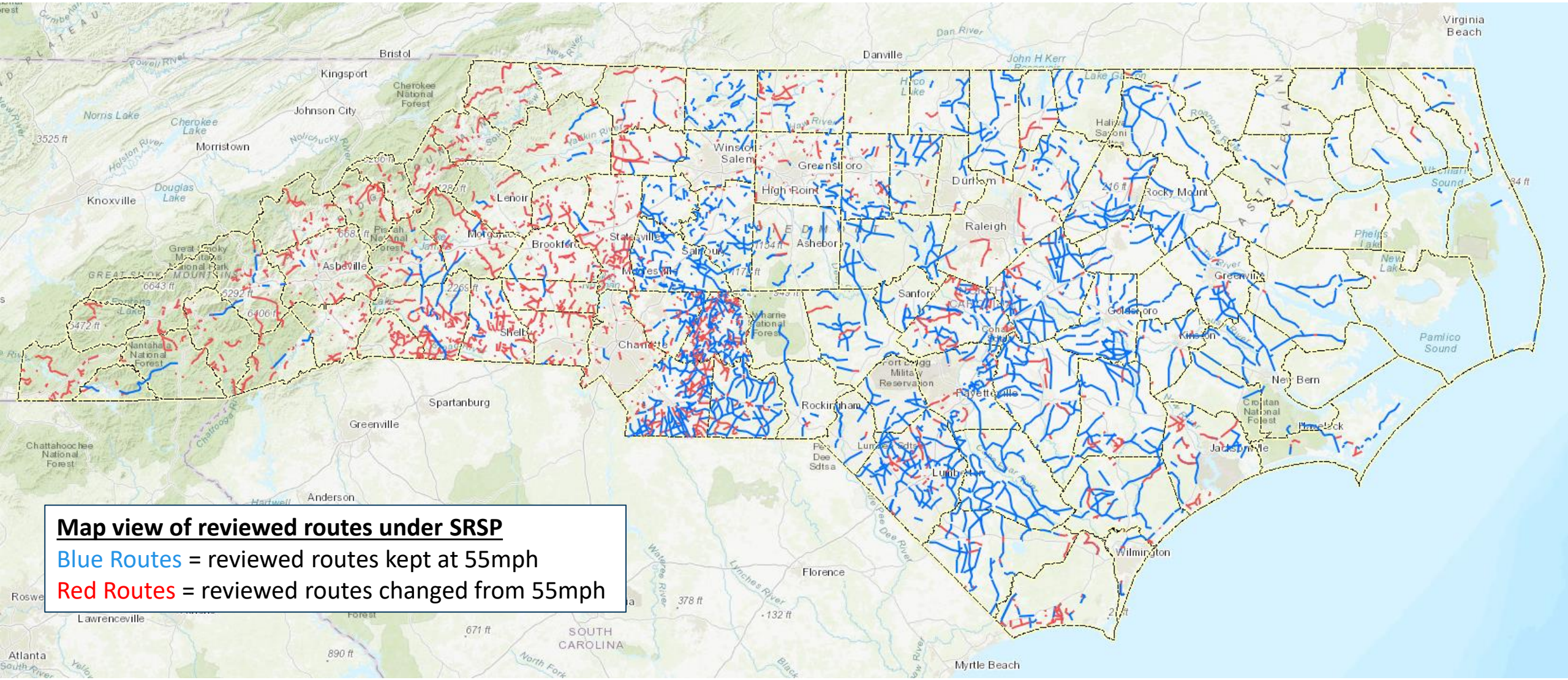
Overview of SRSP Ordinances since Program's Inception

Final Speed Limit	≥ 60 mph	55 mph	50 mph	45 mph	< 45 mph	All Speeds
# of Ordinances	6	1,407	87	978	1,367	3,845
Length (miles)	14.5	6,137.8	238.5	2,348.9	1,185.6	9,925.2
Average Length (miles)	2.4	4.4	2.7	2.4	0.9	2.6
% of Total Mileage	0.1%	61.8%	2.4%	23.7%	11.9%	100.0%

- From start of SRSP in July 2016 through December 2023:
  - 3,845 total ordinances
  - 174 along US routes | 429 along NC routes | 3,242 along Secondary routes
    - Program expanded for primary routes that were Statutory 55mph in 2018.

- Nearly 10,000 miles of roadway have been reviewed.
  - 38% have been ordinanced at a speed less than 55 mph (~3,800 miles) – 25-50 mph
  - 62% received a speed limit ordinance of 55 mph

Map view of SRSP



Map view of reviewed routes under SRSP

Blue Routes = reviewed routes kept at 55mph

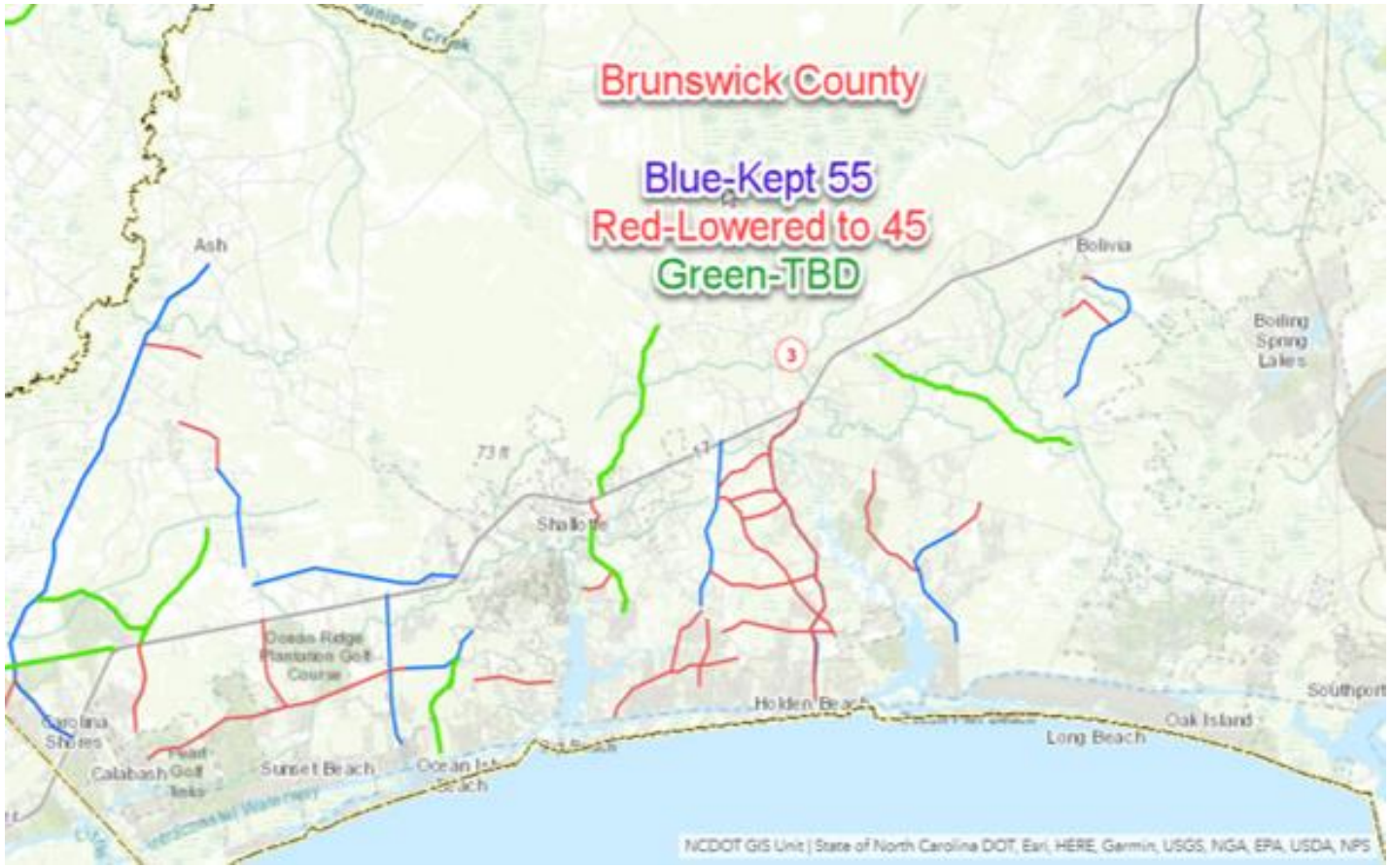
Red Routes = reviewed routes changed from 55mph

SRSP Field Investigations

SRSP Field Investigations

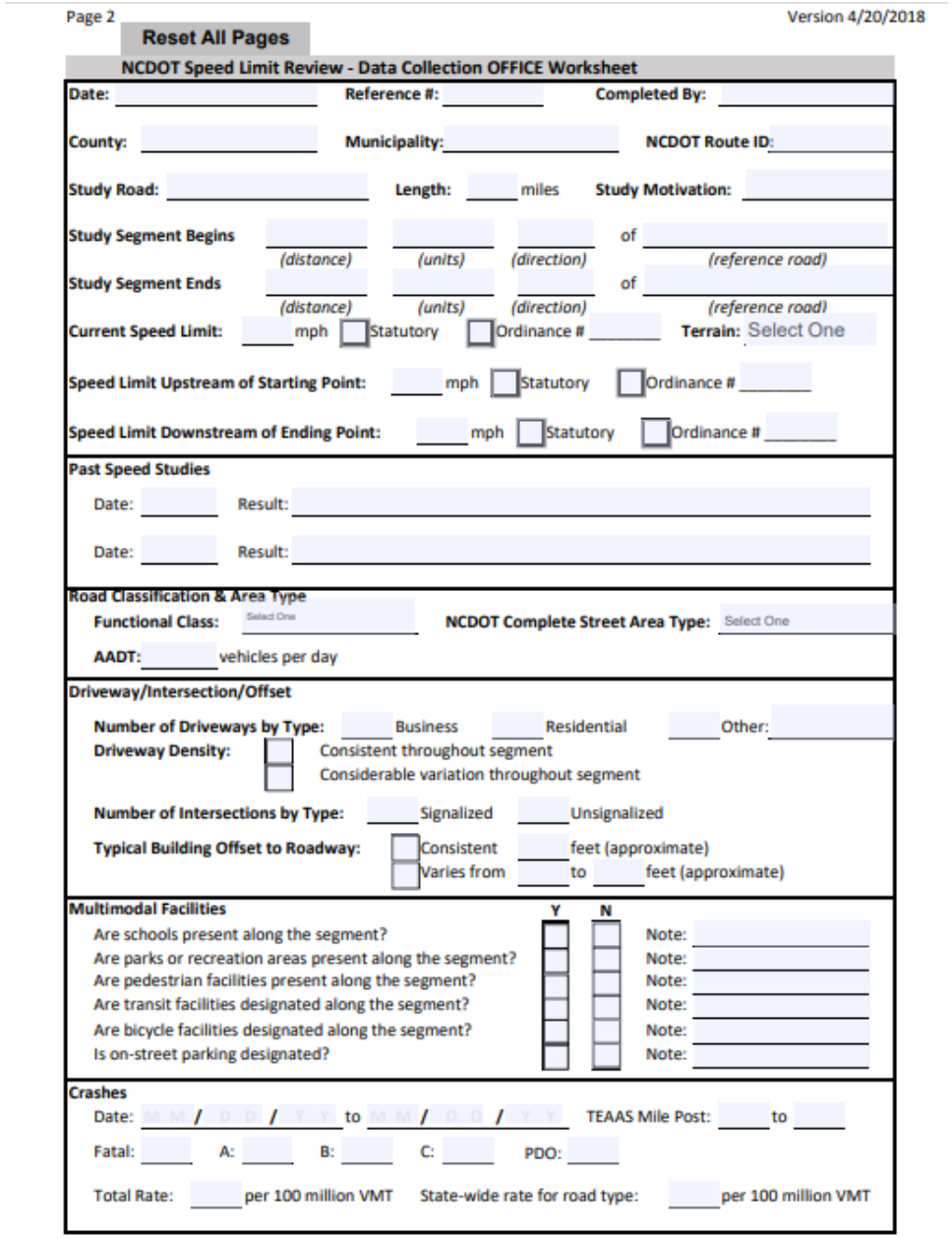
Identify Routes

1. From Traffic Safety Unit
2. Request - Division/Citizen/Law Enforcement
3. Combined Study when doing other investigations
    - Fatal Crash investigations
    - Highway Safety Improvement Program (HSIP)



SRSP Field Investigations

Many factors determine an appropriate speed limit, including crash rates, roadway/shoulder width, horizontal/vertical alignment, driveway density, development, vulnerable road user activity



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NCDOT Speed Limit Review - Data Collection OFFICE Worksheet

Date: Reference #: Completed By:

County: Municipality: NCDOT Route ID:

Study Road: Length: miles Study Motivation:

Study Segment Begins (distance) (units) (direction) of (reference road)

Study Segment Ends (distance) (units) (direction) of (reference road)

Current Speed Limit: mph Statutory Ordinance # Terrain: Select One

Speed Limit Upstream of Starting Point: mph Statutory Ordinance #

Speed Limit Downstream of Ending Point: mph Statutory Ordinance #

Past Speed Studies

Date: Result:

Date: Result:

Road Classification & Area Type

Functional Class: Select One NCDOT Complete Street Area Type: Select One

AADT: vehicles per day

Driveway/Intersection/Offset

Number of Driveways by Type: Business Residential Other:

Driveway Density: Consistent throughout segment
Considerable variation throughout segment

Number of Intersections by Type: Signalized Unsignalized

Typical Building Offset to Roadway: Consistent feet (approximate)
Varies from to feet (approximate)

Multimodal Facilities

	Y	N	
Are schools present along the segment?			Note:
Are parks or recreation areas present along the segment?			Note:
Are pedestrian facilities present along the segment?			Note:
Are transit facilities designated along the segment?			Note:
Are bicycle facilities designated along the segment?			Note:
Is on-street parking designated?			Note:

Crashes

Date: M M / D D / Y Y to M M / D D / Y Y TEAAS Mile Post: to

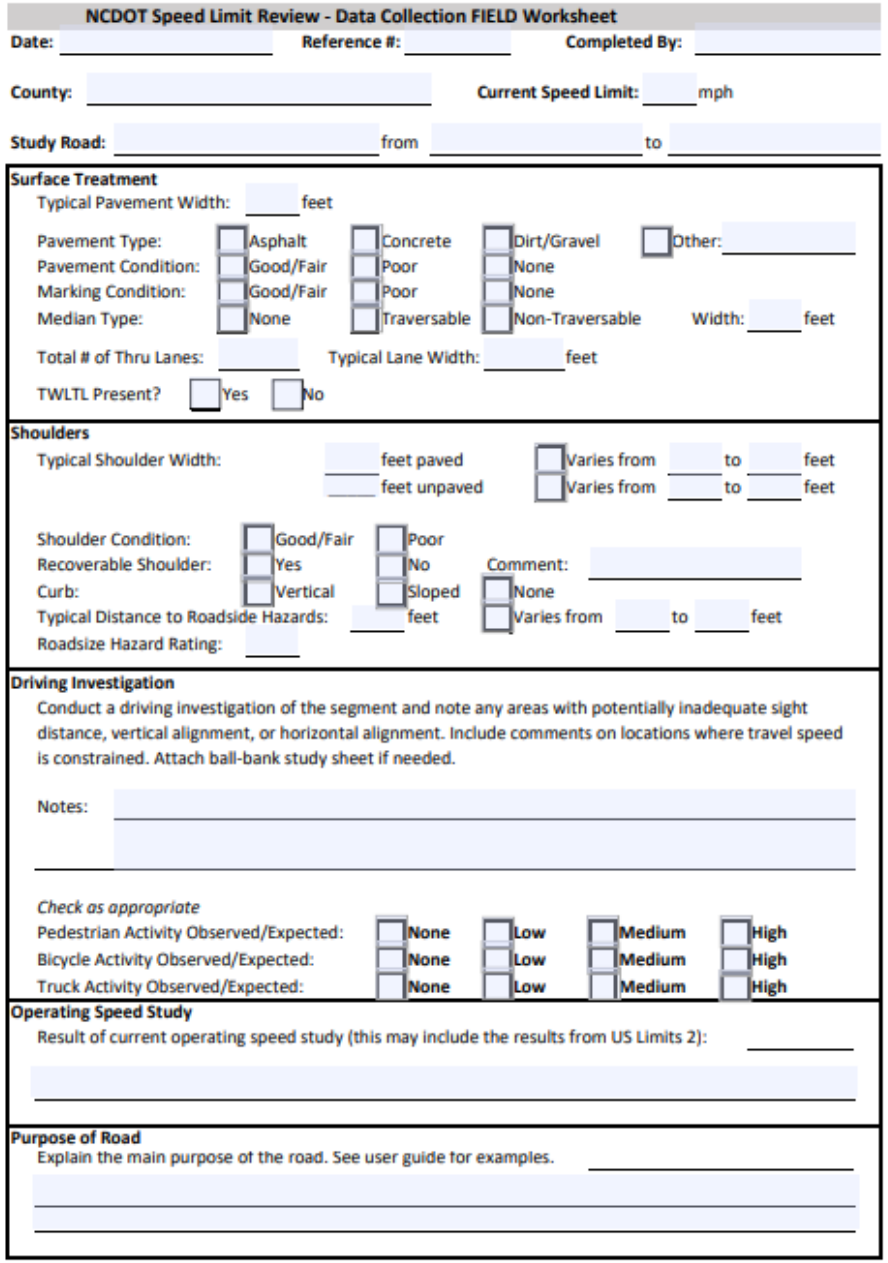
Fatal: A: B: C: PDO:

Total Rate: per 100 million VMT State-wide rate for road type: per 100 million VMT

OFFICE WORKSHEET

- One Page of Data Collected in the Office:

- Location Information
- Existing Speed Limits
- Past Speed Studies
- Road Class & Area
- Driveways, Intersections and Buildings
- Multimodal
- Crash History



NCDOT Speed Limit Review - Data Collection FIELD Worksheet

Date: _____ Reference #: _____ Completed By: _____

County: _____ Current Speed Limit: _____ mph

Study Road: _____ from _____ to _____

Surface Treatment

Typical Pavement Width: _____ feet

Pavement Type: ☐ Asphalt ☐ Concrete ☐ Dirt/Gravel ☐ Other: _____
Pavement Condition: ☐ Good/Fair ☐ Poor ☐ None
Marking Condition: ☐ Good/Fair ☐ Poor ☐ None
Median Type: ☐ None ☐ Traversable ☐ Non-Traversable Width: _____ feet

Total # of Thru Lanes: _____ Typical Lane Width: _____ feet

TWLTL Present? ☐ Yes ☐ No

Shoulders

Typical Shoulder Width: _____ feet paved ☐ Varies from _____ to _____ feet
_____ feet unpaved ☐ Varies from _____ to _____ feet

Shoulder Condition: ☐ Good/Fair ☐ Poor
Recoverable Shoulder: ☐ Yes ☐ No Comment: _____
Curb: ☐ Vertical ☐ Sloped ☐ None
Typical Distance to Roadside Hazards: _____ feet ☐ Varies from _____ to _____ feet
Roadsize Hazard Rating: _____

Driving Investigation

Conduct a driving investigation of the segment and note any areas with potentially inadequate sight distance, vertical alignment, or horizontal alignment. Include comments on locations where travel speed is constrained. Attach ball-bank study sheet if needed.

Notes: _____

Check as appropriate

Pedestrian Activity Observed/Expected: ☐ None ☐ Low ☐ Medium ☐ High
Bicycle Activity Observed/Expected: ☐ None ☐ Low ☐ Medium ☐ High
Truck Activity Observed/Expected: ☐ None ☐ Low ☐ Medium ☐ High

Operating Speed Study

Result of current operating speed study (this may include the results from US Limits 2): _____

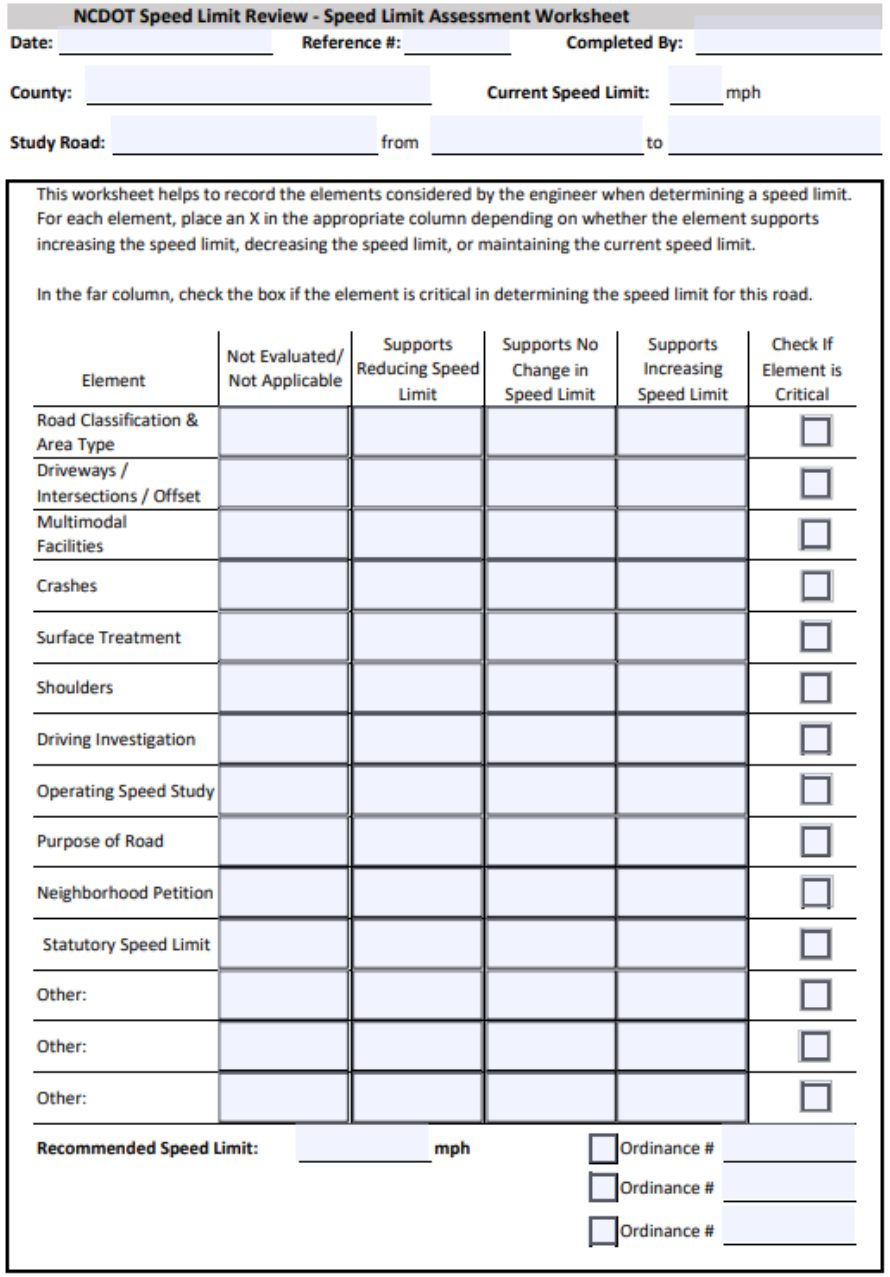
Purpose of Road

Explain the main purpose of the road. See user guide for examples. _____

FIELD WORKSHEET

- Two Pages of Data Collected in the Field:

- Pavement, Markings, Cross Section
- Shoulders
- Sight Distance, Vertical Alignment, Horizontal Alignment
- Ped, Bike and Truck Activity
- Operating Speed
- Purpose of Road



NCDOT Speed Limit Review - Speed Limit Assessment Worksheet

Date: _____ **Reference #:** _____ **Completed By:** _____

County: _____ **Current Speed Limit:** _____ mph

Study Road: _____ from _____ to _____

This worksheet helps to record the elements considered by the engineer when determining a speed limit. For each element, place an X in the appropriate column depending on whether the element supports increasing the speed limit, decreasing the speed limit, or maintaining the current speed limit.

In the far column, check the box if the element is critical in determining the speed limit for this road.

Element	Not Evaluated/ Not Applicable	Supports Reducing Speed Limit	Supports No Change in Speed Limit	Supports Increasing Speed Limit	Check If Element is Critical
Road Classification & Area Type					☐
Driveways / Intersections / Offset					☐
Multimodal Facilities					☐
Crashes					☐
Surface Treatment					☐
Shoulders					☐
Driving Investigation					☐
Operating Speed Study					☐
Purpose of Road					☐
Neighborhood Petition					☐
Statutory Speed Limit					☐
Other:					☐
Other:					☐
Other:					☐

Recommended Speed Limit: _____ **mph**

☐ Ordinance # _____

☐ Ordinance # _____

☐ Ordinance # _____

SPEED LIMIT ASSESSMENT

- Two Pages That Document the Engineer's Decision and the Elements Considered

- Identifies Elements Evaluated
- Notes Any Critical Elements
- Records Recommended Speed Limit
- Records Ordinance Numbers

Evaluation of SRSP

What is the before → after effect?

Before-After Safety Evaluation - 2024

Conducted a before-after analysis of crash data on over 1,000 SRSP Sites

- At least 1-mi; No other major safety treatments; Ordinance effective date prior to 2022

Note about Signing Practice:

- For new ordinances less than 55mph => All 14 divisions add new speed limit signs
- For new ordinances of 55 mph => 12 of 14 divisions don't install new speed limit signs
  - Only divisions 3 and 10 add new speed limit signs to 55mph sites.
  - 55mph sites from all other divisions are *essentially a control group*. Nothing physically changes at their sites, so the drivers should be unaware of any changes.

<u>Treatment sites broken down into 4 groupings for this evaluation:</u>

1. Overall grouping (All Sites) – 1,094 sites
2. Sites given 45mph ordinances – 311 sites
3. Sites given 55mph ordinances and new signs – 161 sites
4. Sites given 55mph ordinances without new signs (*control group*) – 481 sites

Before → After Changes in Crash Data

- Grouping 1 – Overall:
  - 2% reduction in total crashes*
  - 14% reduction in Fatal-and-injury crashes*
- Grouping 2 - 45mph:
  - 6% reduction in total crashes*
  - 19% reduction in Fatal-and-injury crashes*.
- Grouping 3 - 55mph with new signs:
  - 9% reduction in total crashes*
  - 19% reduction in Fatal-and-injury crashes*.
- Grouping 4 - 55mph without signs (*control*):
  - 2% increase in total crashes
  - 9% reduction in Fatal-and-injury crashes*.

Conclusions taken from these findings:

- Overall, the program seems to have had a positive effect.
- 55mph sites that received new signs perform better than control.
- Sites reduced to 45 have reductions in crash totals.
  - Note: hard to compare 45 to 55 control. Roadways ordinanced to 45mph have different physical characteristics than sites kept at 55mph.

note: Statistically Significant at 95% confidence level

Additional conclusions taken from Before-After Study

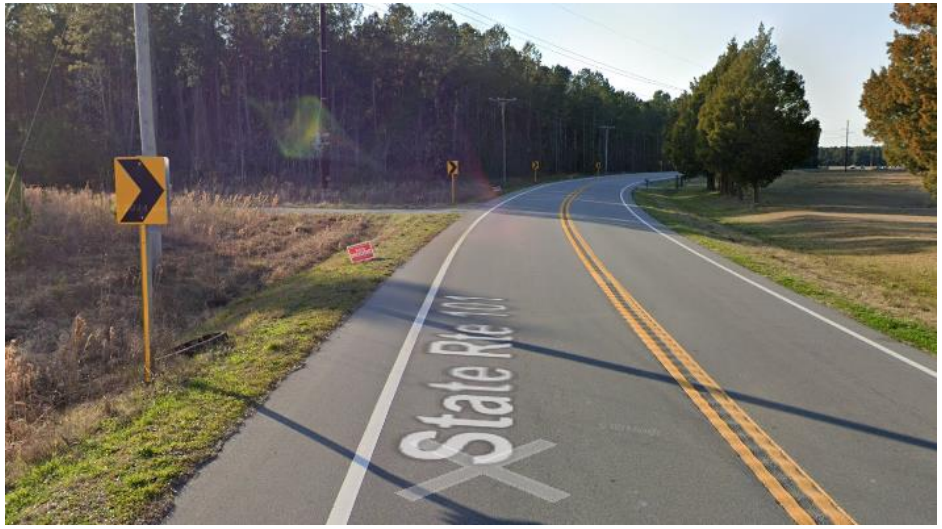
Other Noteworthy Crash Trends:

- Lane departure crash trends like that of total crashes
  - Overall reduction observed with higher reductions for 45mph sites and for 55mph sites with signs.
- Reductions seen in animal crashes within 45mph grouping, but no change in animal crashes in either 55mph grouping.

Additional conclusions taken from Before-After Study

Sites may have received smaller division-funded safety improvements around same time as new SRSP speed limit

- Engineering staff might have noticed items to address during field investigation.
- Ex: intersection or curve signing improvements, shoulder work, etc.
- Tried to exclude sites with other prominent safety treatment. These smaller improvements are hard to track but could have an impact on crash trends.
- This could help explain the reductions in fatal-and-injury crashes in the control group.
- Likely also impacts the non-control groups as well.



Additional conclusions taken from Before-After Study

Preliminary look at speed data showed minimal changes in average speeds following new ordinances

- Changes in average and 85th percentile speeds varied site-to-site. Some sites showed increases, some showed decreases.
- We plan to collect more speed data in the future to further analyze as the program continues.

Thank you!

https://connect.ncdot.gov/resources/safety/Pages/Safety-Evaluation.aspx