Pedestrian Signal RAISE Grant Memo

City Identification Methodology

NCDOT began with scoring and ranking all cities in the State with populations greater than 5,000 as candidates for systemic implementation of pedestrian signal heads at NCDOT-maintained signals. Rankings are based on an index that accounted for *Crash*, *Equity*, *Need*, and *Opportunity scores*.

Crash Scores describe municipalities based on crash history and population. Crash history and severity are sourced from on-roadway NCDOT pedestrian-involved crashes (not including crashes located outside of the right-of-way). Population estimates are sourced from American Community Survey (ACS) data. To normalize these scores across municipalities, the following indicators were included for each municipality:

- 10-years (2012-2021) of total pedestrian involved crashes
- 10-years of fatal or serious injury (KA) pedestrian-involved crashes
- 10-year ACS population totals

These indicators were used to calculate a total crash rate per 1,000 residents and a KA crash rate per 1,000 residents for each municipality for each of the ten years in the study period. These rates were then averaged and normalized to create an average annual crash rate (and KA rate) per 1,000 residents for each municipality.

Equity Score uses the NCDOT Environmental Justice (EJ) and NCDOT Transportation Disadvantage Index (TDI) tool to assess municipalities' per relative representation of historically disadvantaged populations. EJ Scores were calculated using 2020 5-year estimate ACS data and assess the census block group concentration of racial minorities, ethnic minorities and low-income population. TDI Scores were calculated using 2020 5-year estimate ACS data and assess the census block group concentration of low-income households, households with mobility impaired individuals, households with youth of non-driving age, households with seniors, BIPOC (Black, Indigenous, Persons of Color) population, and zero-car households. These scores were weighted and divided for each municipality based on municipal boundaries. The EJ and TDI scores were then normalized and averaged to create an *Equity Score* for each municipality.

Need Score described the percentage of on-roadway pedestrian-involved crashes occurring within 100 feet of an NCDOT signal between 2012 and 2021. This percentage was then normalized to create a Need Score for each municipality.

Opportunity Score described the percentage of NCDOT signals within municipal limits without a pedestrian signal head/WALK phase. Signal data was sourced from an inventory of NCDOT-maintained signals, updated in April 2022. The percentage of DOT signals in Areas of Persistent Poverty without a pedestrian signal head was also calculated but was not included in rankings due to overlap with the *Equity Score*.

Ranking

Various scenario indices were calculated to rank cities. Each scenario assessed *Crash* and *Equity* Scores. Since pedestrian signal improvements are a systemic safety improvement, *Opportunity* and *Need* Scores were used to validate the rankings. Through this process, 12 municipalities were identified for priority implementation. Municipalities with fewer than 10 crashes over the 10-year study period or 5 over the most recent 5 years were excluded from the rankings. This did not impact any municipalities in the top 20. Municipalities with fewer than 10 signals without pedestrian signal heads were excluded from the rankings.

Feasibility Assessment

The goal of a feasibility assessment was to determine a quick estimate of the percentage of intersections identified in the ranking that would be feasible for implementation. Presence of a sidewalk within 250 feet of a corner was the threshold used for feasibility. This quick estimate was created using the following process.

- Identify the signal using the NCDOT signal inventory
- Use Nearmap (aerial imagery data) to locate a recent aerial of the intersection
- Use Google Maps to assess the most recent street view image of the intersection
- Measure the distance to the nearest crosswalk for each approach
- Record the current pedestrian safety infrastructure (pedestrian signal, crosswalk, cut curb)
- Recommend the feasibility of safety improvements for each approach

In order to be considered feasible, a corner of the intersection must have a sidewalk within 250'. The quick estimate for implementation feasibility was then calculated based on the number of intersections with a minimum L-crossing recommended.

Implementation

The goal of an implementation assessment was to determine the capacity of the agency to implement this project. This assessment identified municipalities that would act as "sister cities" and merit implementation in both. These municipalities are marked with an "*" in the Rank column of *Table 1*. Additionally, this assessment evaluated the division structure at NCDOT to determine efficient implementation capability. Through this evaluation, NCDOT added Salisbury, which scored in the top 40, in order to have two municipalities in Division 9. Signals by Division are displayed in *Table 2*. Deploying this implementation assessment ensures that NCDOT is best able to efficiently deliver these safety improvements across divisions.

Results

After removing from consideration signals that did not meet the feasibility threshold or were noted as "complete" (all feasible crossings had crosswalk, cut curb and pedestrian signal installed), the following cities remained:

Table 1. Municipality Rankings and Signal Counts

Rank	Division	City	NCDOT Signal Count	Signal Improvement Count
1	6	Lumberton	51	17
2	2	Washington	34	11
3	4	Selma	28	7
4	5	Henderson	57	16
5	4	Roanoke Rapids	43	19
6	8	Rockingham	27	11
7	9	Lexington	69	25
8	4	Smithfield	44	10
9	4	Wilson	98	33
10	2	Kinston	66	30
11	8	Siler City	21	13
24	5	Oxford	33	15
39	9	Salisbury	82	23
*	8	Hamlet	9	6
*	4	Weldon	7	4
			Total	**240**

Table 2. Signals by Division

Division	Signal
2	41
4	73
5	31
6	17
8	30
9	48