COMMUNITY SAFETY REPORTS UPDATE

Safety and Operations Council

February 18, 2022

ACTION REQUESTED

No action requested at this time. This item is for presentation and discussion.

PREVIOUS ACTION

None

SAFETY PROGRAMS

Goal: Vision Zero – Zero Deaths or Serious Injuries

Current Safety Improvement Programs:

SAVE Plan

SAVE Plan emphasis areas:

1. Intersection
2. Roadway Departure
3. Young Driver
4. Speed
5. Impaired Driving
6. Older Driver
7. Distracted Driving
8. Pedestrian
9. Motorcycle
10. Bicycle

Safe Routes to School (SRTS)

New Addition:

Systemic Safety Management

(Complement to current safety programs)

SYSTEMIC SAFETY MANAGEMENT

Systemic safety = managing risk across an entire roadway system as opposed to certain locations

- Crash data alone is not always sufficient to determine which countermeasures to implement

SYSTEMIC SAFETY MANAGEMENT

This approach is intended to:

- **Program implementation of safety treatments at sites that reduce the potential for crashes**
- **Address crash types that occur with high frequency across the roadway network, but are not concentrated at individual locations**
- **Program countermeasures for implementation at locations which may not have a history of crashes**

A proactive approach based on the Highway Safety Manual

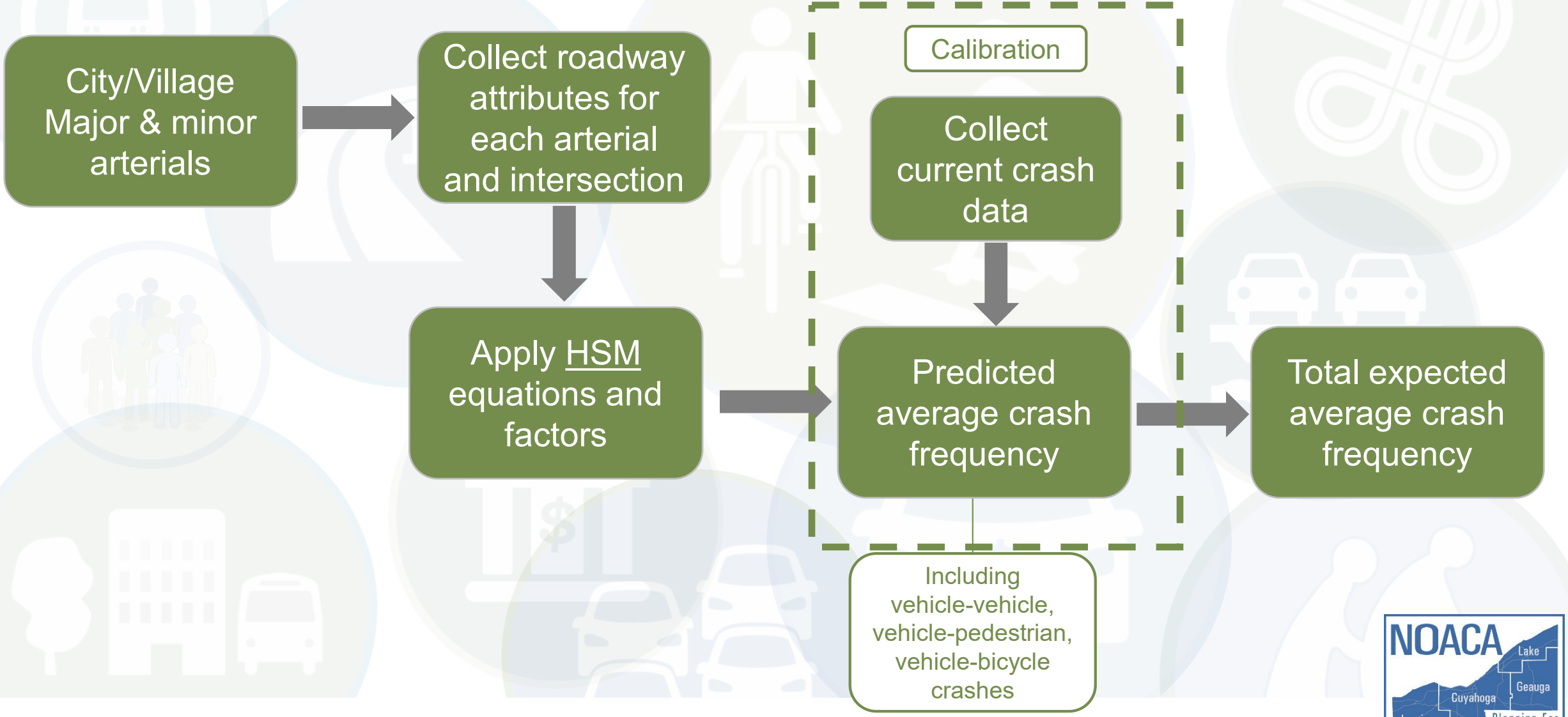
SYSTEMIC SAFETY MANAGEMENT

Implementing Safety treatments at Sites that Reduce the potential for Crashes using:

- **Highway, street, and intersection characteristics in the absence of high-quality site level crash data**
- **Crash Prediction Models**
- **Safety Performance Functions (SPF)**
- **FHWA Crash Modification Factors (CMF)**

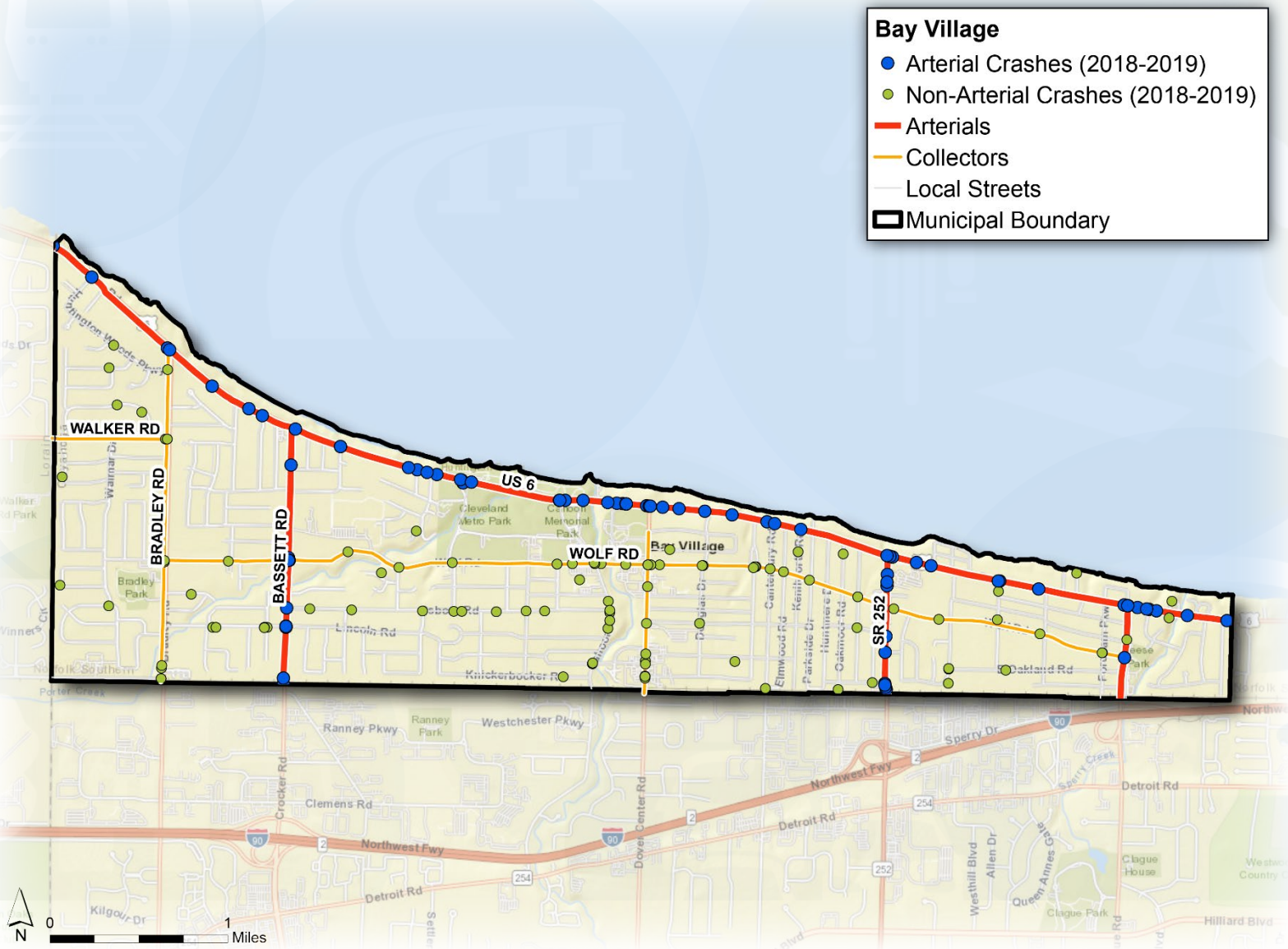
NOACA will Produce biennial Community Safety Reports

PROCESS


City/Village Major & minor arterials
Collect roadway attributes for each arterial and intersection
Apply HSM equations and factors
Calibration
Collect current crash data
Predicted average crash frequency
Including vehicle-vehicle, vehicle-pedestrian, vehicle-bicycle crashes
Total expected average crash frequency

ARTERIALS

Example: Bay Village



DATA INPUT

Roadway segments (Arterials)

Example: Bay Village

PREDICTED MODELS FOR URBAN & SUBURBAN ARTERIAL ROADWAY SEGMENTS - DATA INPUTS									
SECTION #	ROAD NAME	FROM	TO	FUNCTION CLASS	NUMBER of LANES	LENGTH (Miles)	Number of Driveways	SEGMENT TYPE	AVERAGE DAILY TWO-WAY TRAFFIC VOLUME
6100	BASSETT RD	WESTLAKE NCL	LAKE RD (US-6)	MINOR ARTERIAL	2	1.08	20	2U	3,102
3340	CLAGUE RD	I-90 NORTH RAMPS	LAKE RD (US-6)	MINOR ARTERIAL	4	0.41	20	4U	5,850
22351	SR 252	WESTLAKE NCL	LAKE RD (US-6)	PRINCIPAL ARTERIAL-OTHER	2	0.58	20	2U	2,798
	US 6	CUYAHOGA COUNTY WCL	BRANDON PL	PRINCIPAL ARTERIAL-OTHER	2	5.33	100	2U	5,596

Intersections (Arterial-Arterial)

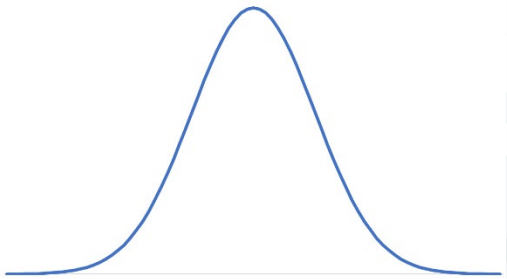
PREDICTED MODELS FOR URBAN & SUBURBAN ARTERIAL INTERSECTIONS - DATA INPUT					
MAJOR RD	MINOR RD	INTERSECTION TYPE	AVERAGE DAILY TWO_WAY TRAFFIC VOLUME FOR MAJOR RD	AVERAGE DAILY TWO_WAY TRAFFIC VOLUME FOR MINOR RD	PEDESTRIAN ACTIVITY
US 6	BASSETT RD	3ST	5,168	3,103	LOW
CLAGUE RD	US 6	3SG	5,850	4,678	LOW
US 6	SR 252	3ST	4,678	2,798	LOW

CALIBRATION PROCESS - METHODOLOGY

Calibration: adjusting the predicted values based on real crash data in order to make the numbers more applicable to the conditions specific to our region

1. County
   - County characteristics
2. VMT of arterials
   - Categorize jurisdictions by creating a **Normally Distributed VMT set**
3. Ratio of **actual and predicted** crashes
   - Apply ratio to each predicted value

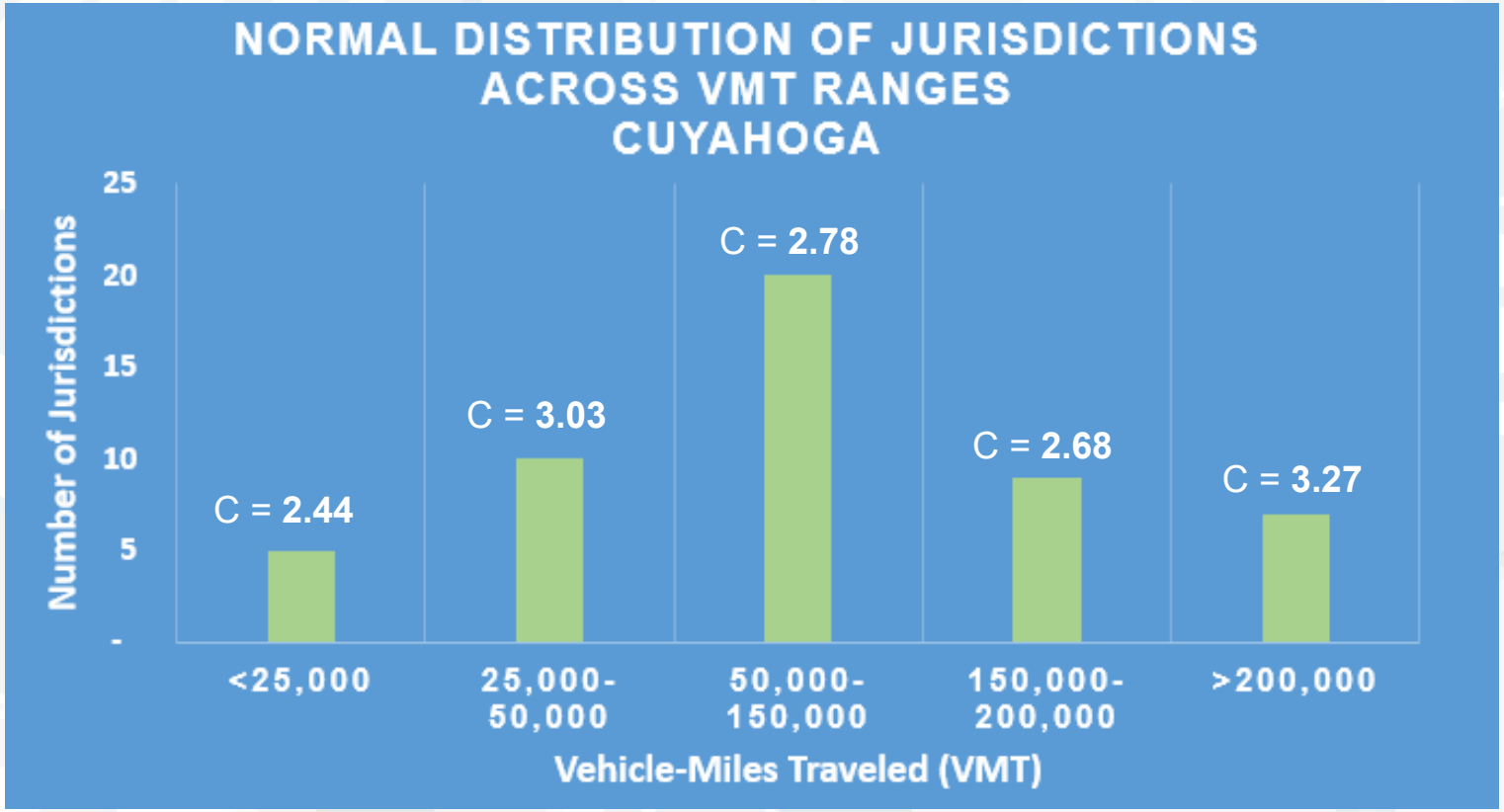
Normal Distribution:



Ratio: $\frac{Actual\ Crashes}{Predicted\ Crashes}$

CALIBRATION PROCESS

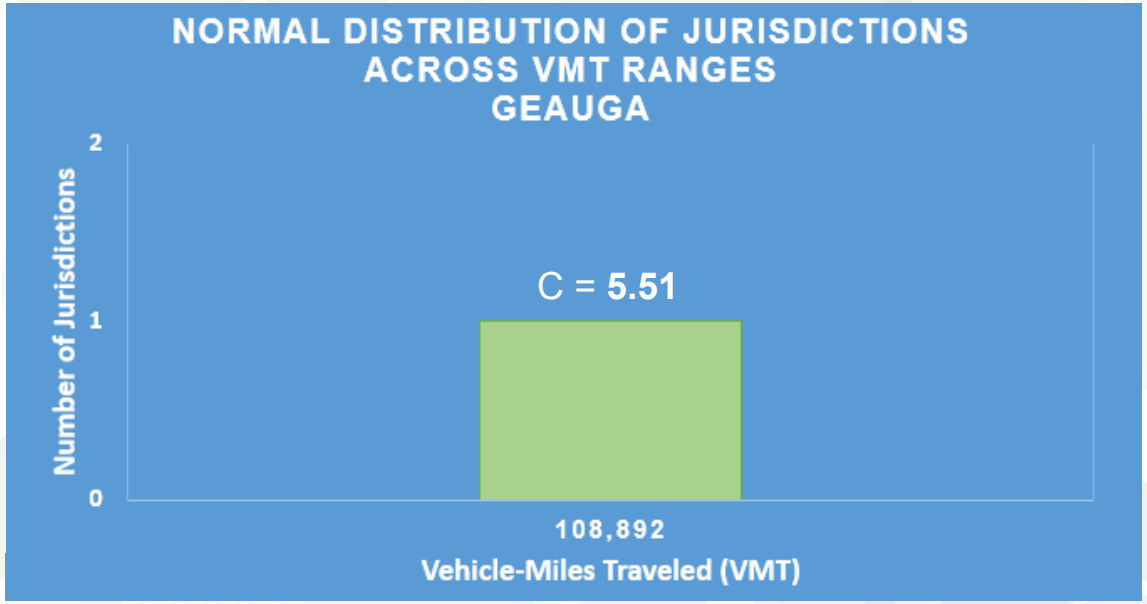
Cuyahoga County



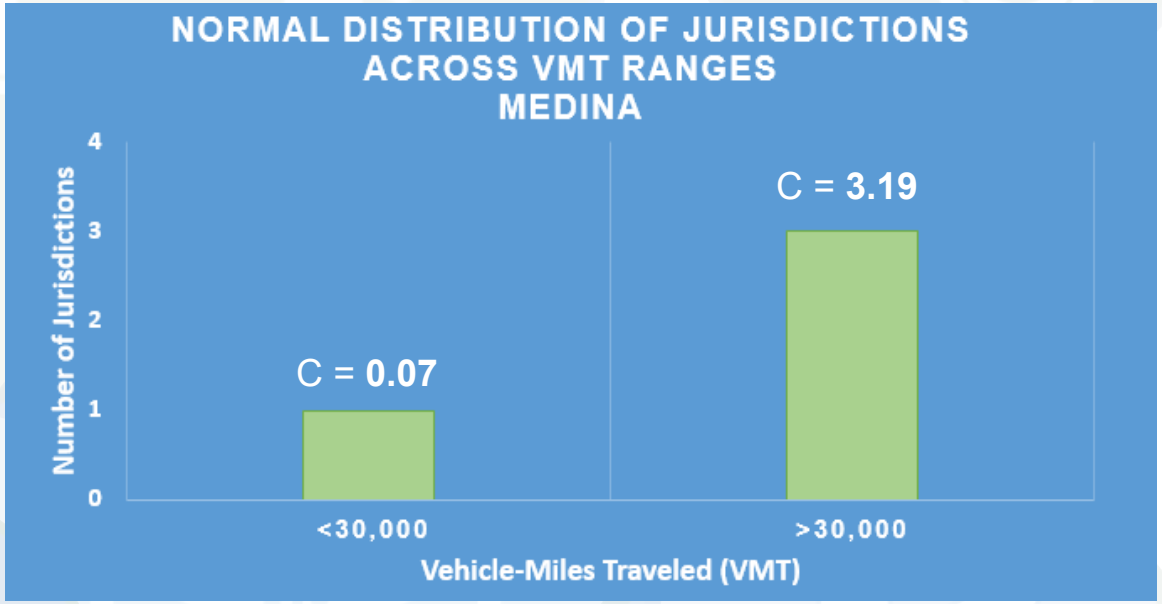
C = Calibration Factor

CALIBRATION PROCESS

Geauga County



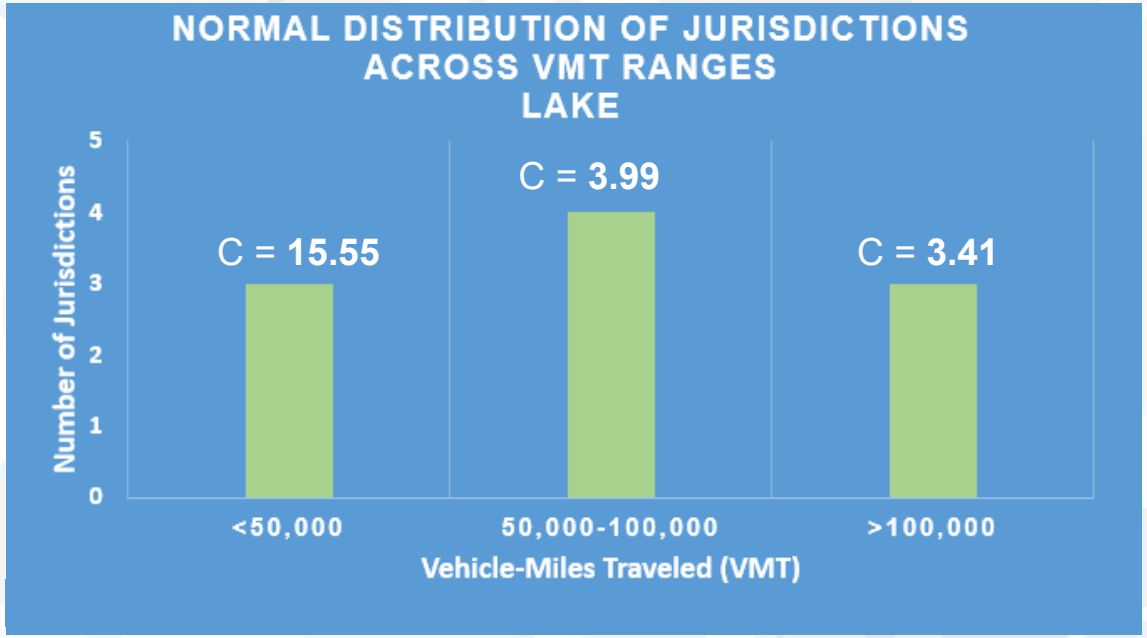
Medina County



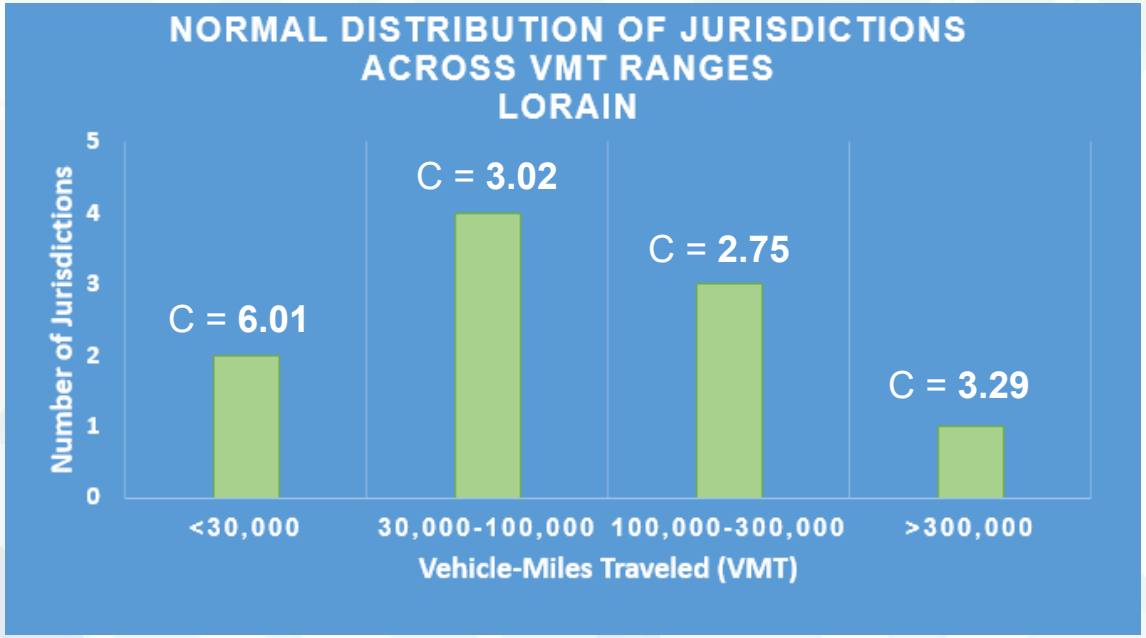
C = Calibration Factor

CALIBRATION PROCESS

Lake County



Lorain County



C = Calibration Factor

EXPECTED CRASHES

Expected crashes (with calibration factor already applied)

Segment Length

1 mile

0.5 mile

5 miles

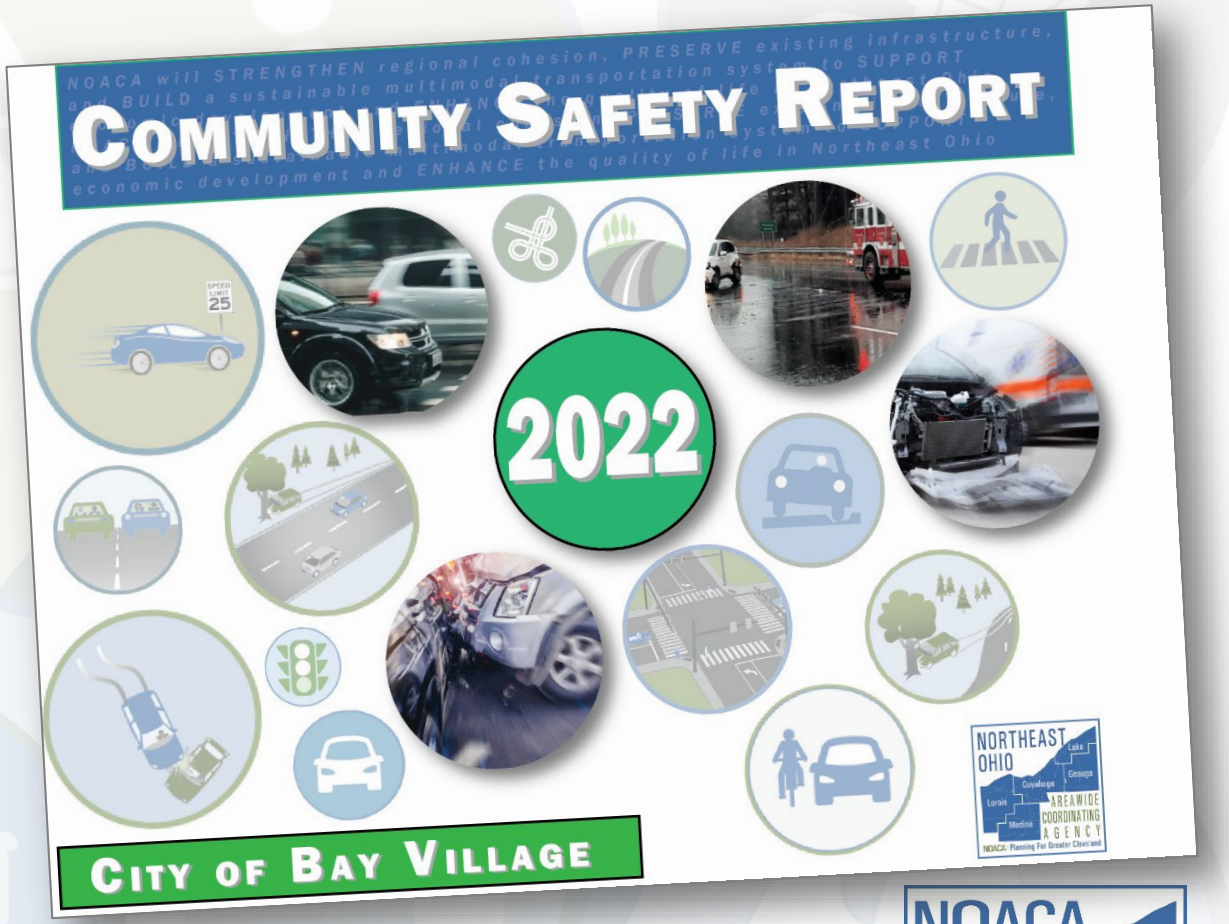
ROAD NAME	CALIBRATION FACTOR	AVERAGE CRASHES PER YEAR	Crash Data: Average of 2018 & 2019
BASSETT RD	3.03	2.168	7.5
CLAGUE RD	3.03	2.332	3
SR 252	3.03	1.191	7
US 6	3.03	19.403	28

Calibration factor

Actual crashes

COMMUNITY SAFETY REPORT

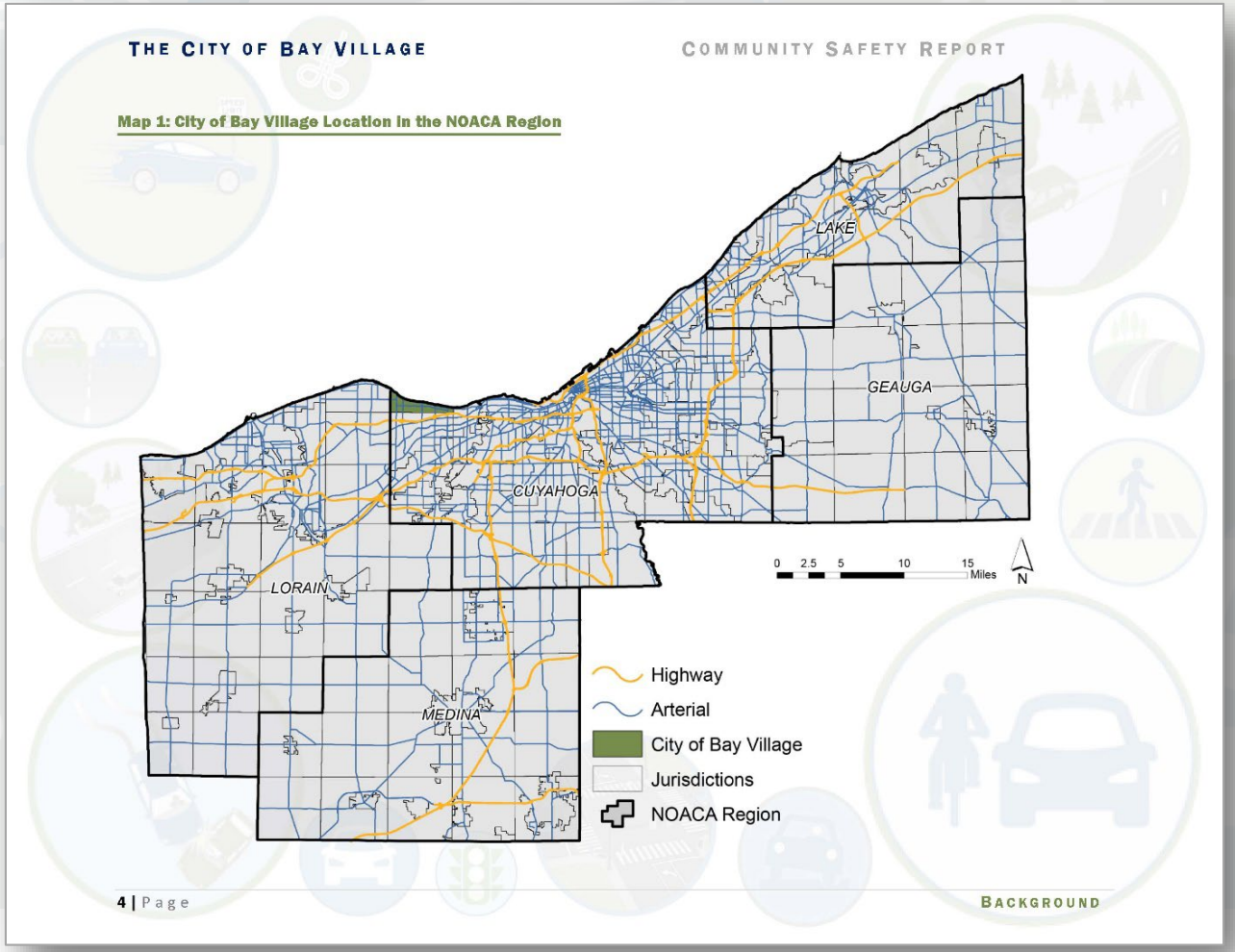
1. Jurisdiction Background
2. Definitions and Predictive Models
3. Inputs and Coefficients of Safety Performance Functions (SPF)
4. Predicted Crash Outputs
5. Summary of Priority Corridors and Intersections



NOACA
Lake
Geauga
Cuyahoga
Lorain
Medina
Planning For
GREATER CLEVELAND

COMMUNITY SAFETY REPORT

1. Jurisdiction Background



COMMUNITY SAFETY REPORT

2. Definitions and Predictive Models

Predictive Models for Urban & Suburban Arterial Roadway Segments

$$N_{predictedrs} = C_r \times (N_{br} + N_{pedr} + N_{biker})$$

Where:

$N_{predictedrs}$ = *Predicted average frequency of an individual roadway segment for the year of 2020*

N_{br} = *Predicted average frequency of an individual roadway segment (excluding vehicle – pedestrian and vehicle – bicycle collisions)*

N_{biker} = *Predicted average frequency of vehicle – bicycle collisions for an individual roadway segment*

N_{pedr} = *Predicted average frequency of vehicle – pedestrian collisions for an individual roadway segment*

C_r = *Calibration factor for roadway segments of a specific type developed for use for a particular geographical area*

A Predictive Method for Estimating Crash Frequency and Duration

Roadway Segment Types

Two-lane undivided arterial (2U) – a roadway consisting of two lanes with a continuous cross-section providing two directions of travel in which the lanes are not physically separated by either distance or a barrier.

Three-lane arterials (3T) – a roadway consisting of three lanes with a continuous cross-section providing two directions of travel in which center lane is a two-way left-turn lane (TWLTL).

Four-lane undivided arterials (4U) – a roadway consisting of four lanes with a continuous cross-section providing two directions of travel in which the lanes are not physically separated by either distance or a barrier.

Four-lane divided arterials (i.e. including a raised or depressed median) (4D) – a roadway consisting of two lanes with a continuous cross-section providing two directions of travel in which the lanes are physically separated by either distance or a barrier.

Five-lane arterials including a center TWLTL (5T) – a roadway consisting of five lanes with a continuous cross-section providing two directions of travel in which the center lane is a two-way left-turn lane (TWLTL).

Three-leg intersection with stop control (3ST) – an intersection of a urban or suburban arterial and a minor road. A stop sign is provided on the minor road approach to the intersection only.

Three-leg signalized intersection (3SG) – an intersection of a urban or suburban arterial and a minor road. Signalized control is provided at the intersection by traffic lights.

Four-leg intersection with stop control (4ST) – an intersection of a urban or suburban arterial and two minor roads. A stop sign is provided on both the minor road approaches to the intersection.

Four-leg signalized intersection (4SG) – an intersection of a urban or suburban arterial and two minor roads. Signalized control is provided at the intersection by traffic lights.

COMMUNITY SAFETY REPORT

3. Inputs and Coefficients of Safety Performance Functions (SPF)

Table 1: 2022 Bay Village Arterial Segment – Data Inputs

PREDICTED MODELS FOR URBAN & SUBURBAN ARTERIAL ROADWAY SEGMENTS - DATA INPUTS								
ROAD NAME	FROM	TO	FUNCTIONAL CLASS	NUMBER OF LANES	LENGTH (MI)	NUMBER OF DRIVEWAYS	SEGMENT TYPE	AVERAGE TWO-WAY TRAFFIC VOLUME
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Table 2: 2022 Bay Village Arterial Intersections – Data Inputs

PREDICTED MODELS FOR URBAN & SUBURBAN ARTERIAL INTERSECTIONS - DATA INPUT					
MAJOR ROAD	MINOR ROAD	INTERSECTION TYPE	AVERAGE DAILY TWO-WAY TRAFFIC VOLUME OF MAJOR ROAD	AVERAGE DAILY TWO-WAY TRAFFIC VOLUME OF MINOR ROAD	PEDESTRIAN ACTIVITY
US 6	BASSETT RD	3ST	5,168	3,103	LOW
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US 6	SR 252	3ST	4,678	2,798	LOW

4. Predicted Crash Outputs

5. 2022 Predicted Crash Outputs

Table 3: Arterial Crash Prediction Results

ROAD NAME	CRASH DATA – 2018 AND 2019 AVERAGE	CALIBRATION FACTOR	AVERAGE PREDICTED CRASHES PER YEAR
BASSETT RD	7.5	3.03	2.2
CLAGUE RD	3	3.03	2.3
SR 252	7	3.03	1.2
US 6	28	3.03	19.4

Table 4: Totals Crashs Predicted for Bay Village Principal Arterials

TOTAL PREDICTED AVERAGE CRASHES PER YEAR	TOTAL AVERAGE CRASHES IN 2018 AND 2019
33	42

NEXT STEPS

- **Staff will continue work on a community safety report format and template and proceed with creation of reports for all jurisdictions.**

NOACA will **STRENGTHEN** regional cohesion, **PRESERVE** existing infrastructure, and **BUILD** a sustainable multimodal transportation system to **SUPPORT** economic development and **ENHANCE** quality of life in Northeast Ohio.