**Project Prioritization through Data Driven Performance Measures** 

> Keith Smith, GISP Taruna Tayal, PMP

April 2019 North Carolina Alliance MPOs



# The VHB Team – Crossing Discplines

#### Orlando



Keith Smith (ORL) Applied Technology Manager, Applied Technology

Raleigh



**Taruna Tayal (RAL)** Applied Technology Manager, Applied Technology

#### Corporate



**Steve Anderson (WETH)** VP of Technology Services, Applied Technology



Clay Packard (ORL) Software Engineer, TTG



**Ryan Fetchko (ORL)** Transportation Technology Engineer, TTG



Cedric Gaines (ORL)

Sr. Application Developer, Applied Technology



Andrew Bryson (RAL) GIS Analyst,





**Tony Wyatt (RAL)** Senior Project Manager, Traffic Engineering



**RJ Porter (RAL)** Highway Safety Engineer, Safety



# Beginning in Florida



## **Project Prioritization**

How do we approach? Capacity Performance Safety

Simple Goal

Identify roadways for prioritization

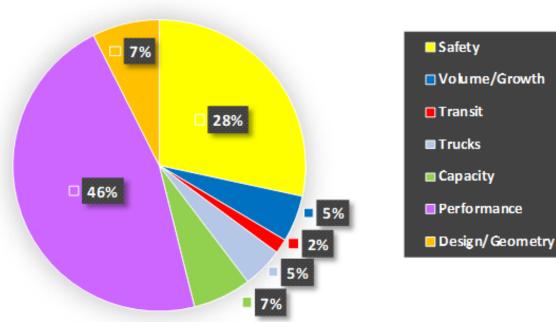
How do we manage data? Real time Big data **Complex Task** 

**Prioritization Process** 

Data driven

Fully automated

**20**+ performance measurements compared



### Scoring Breakdown

## Where to Start???

anges as Identified Below		o State Roads apart from the C	/the
-		New Changes Applied	
Data to be natural breaks r	ounded to	nearest whole	
ing Criteria/Grading Scale	<u>:</u>	Scoring Criteria/Grading Scal	<u>e:</u>
		AADT - Average Annual Dail	/ Traff
T - Average Annual Daily Source: Available in LOS		Analysis file used as base Source: Available in LC	
Scoring Parameters: Ra		Sconing Parameters. N	
Range:	Score:	Range:	Sco
>= 50,000	0	>= 35,000	0
<= 50,000 and > 35,000	0.25	>22,000 and <= 35,000	0.25
<= 35,000 and > 25,000	-	> 12,000 and <= 22,00	J .5
<= 25,000 and > 10,000		> 6,000 and <= 12,000	.75
<= 25,000 and > 10,000	.75	<= 6000	1
	_	Emphasize the Score a	nd ap
Emphasize the Score an	id apply a	high value Calculated Capacity Analysi	- The
		aining capacity values calculated in the LOS Capacity Analysis file for each segmen	
lysis file for each segment		Source, Available III Lu	S Cap
Source: Available in LOS Scoring Parameters: Ra		Analysis file used as base Scoring Parameters: R	ange
Range:	Score:	Range:	Scor
Null (LOS F)	0	Null (LOS F)	0
	-	< 1,000	0
< 1,000	0	>= 1,000 and < 5,000	0
>= 1,000 and < 5,000	0	>= 5,000 and < 10,000	0
>= 5,000 and < 10,000	0	> 10.000	0

- AADT/Calculated Capacity - We may want to sway the counts to not double ne/Capacit count with Capacity Analysis Scoring Parameters: Range

0

Scoring Parameter	s. Kange
Range:	Score:
>1.25	-0.5
<= 1.25 and > 1.0	-0.25
<= 1.0 and > 0.9	0
<= 0.9 and > 0.75	0.25
< 0.75	0.5

> 10,000

KS er Roadways apacity Analysis file used as base core: 25

pply a high value

	lated Capaci		
Analy	sis file for ea		
	Source: Avai Scoring Para		
		interers. No	
	Range:		Score:
	Null (LOS F)		0
	< 1,000		0
	>= 1,000 an	d < 5,000	0
	>= 5,000 and	d < 10,000	0
	> 10,000		0
Volu	me/Capacity	- AADT/Ca	lculated (
	t with Capaci		
Scori	ng Parametei	rs: Range	
Rang	e:	Score:	
>0.9		-0.5	
<= 0.	9 and > 0.7	-0.25	
<= 0.	7 and > 0.5	0	
<= 0.	5 and > 0.25	0.25	
< 0.2	5	0.5	

### What do we want to Measure?

### What data is Available?

### What data is **Actually Available?**

ansit Routes to be collected to identify if availability exists on corridor or segment. IncludesTransit Ridership information to be collected from providers

## How to Score?

Discussed closely the process to determine Groupings and Score Ranges

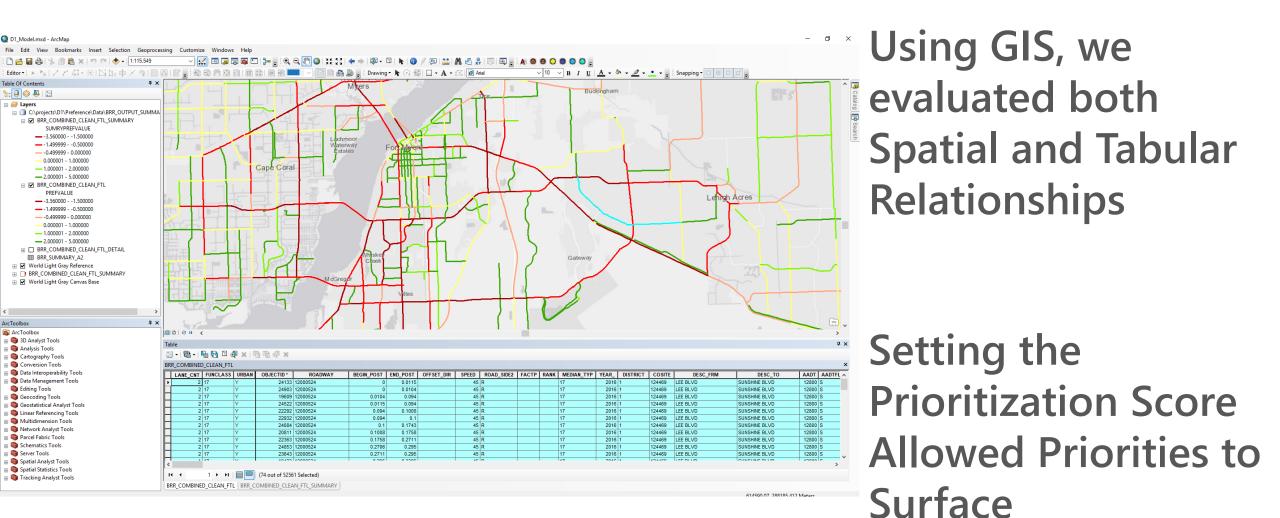
This process allows Priorities to be set based on Focus Areas

#### Groupings

Safety - 4 Capacity - 2 Performance - 7 Trucks - 1 Design/Geometry -3 Transit -2 Volume/Growth - 2

-3.15 to 1.25 -0.5 to 0.5 -6 to 1.2 -0.5 to 0.2 -0.8 to 0.35 0 to 0.25 -0.3 to 0.5

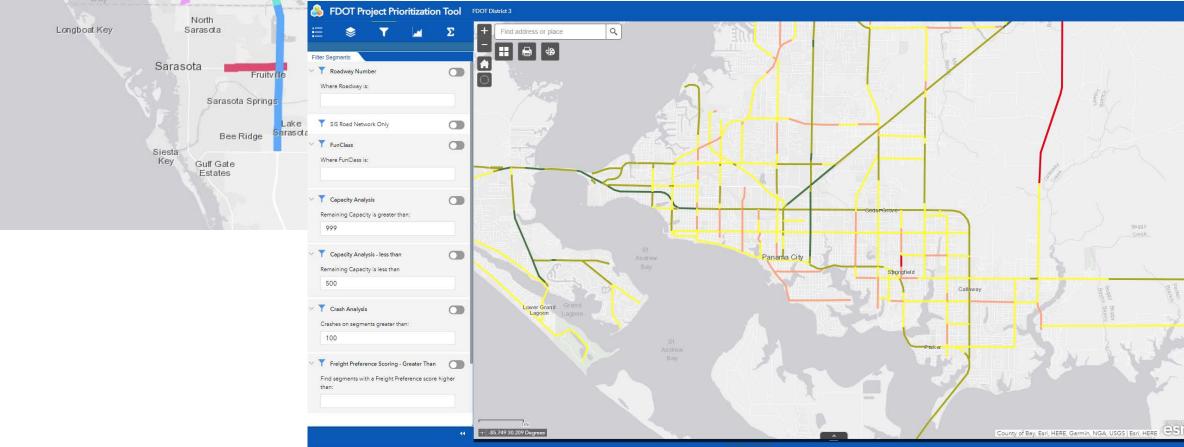
# **Finding Priorities**



# DATA FUSION CENTER

A share a second second

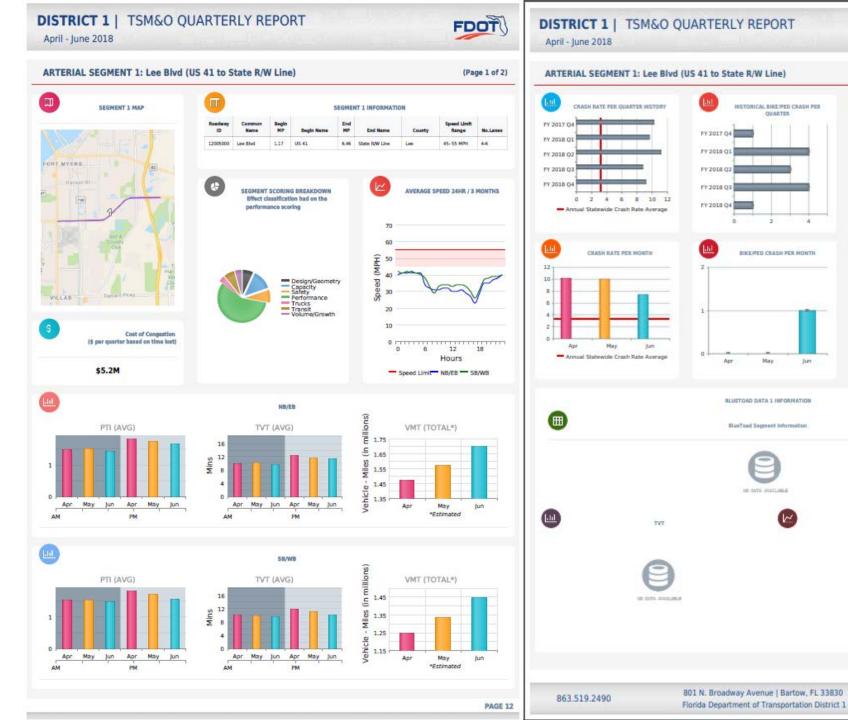
Top Scoring Roadway Segments Across Multiple Categories are Identified and Set as Priorities



Parrish Memphis Palmetto Holmes Beach Bradenton Cortez South Bradenton Bayshore Gardens

Data and Priority Reporting

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% CHANGE COMPARED TO SAME

QUARTER OF PREVIOUS YEAR

-10%

0%

0%

0

PAGE 13

http://www.fdot.gov

CRASH RATE

BIKE/PED

FATALITIES

FY 2017 Q4

PY 2018 Q1

FY 2018 Q2

FY 2018 Q3

FY 2018 Q4 )

-Gr

68

AVERAGE SPEED

10 DITL INVOLUDE.

HISTORICAL BIKE/PED CRASH PER

QUARTER

BIKE/PED CRASH PER MONTH

May.

ILLIETOAD DATA 1 INFORMATION

BlueTood Segment Information

10 ISTA WILLIAMS

Juri

Apr



# Evolving to North Carolina



### Finding Promising Rural Spot Mobility Projects Objectives

- Develop a method to systematically scan NCDOT roadways outside of areas covered by MPOs to look for promising spot mobility sites
- Execute the new method and develop a ranked list of spot mobility sites with potential that NCDOT can utilize to develop candidate mobility projects

### Data Sources

- HERE
  - 2017 Year used
  - 2<sup>nd</sup> Calendar week for each Month
    - 36 Days in total
  - Tuesday, Wednesday, and Thursday
  - Peak Time Periods
    - AM (7-9)
    - PM (4-6)

### **Parameter-Based Scoring**

- An automated and parameter driven methodology to provide a scoring matrix.
- Multiple characteristics were considered with two used in the current analysis to identify segments based on operational performance and volumes.

#### **Volume/Capacity**

Range	Score
> 1.5	-1
<=1.5 and >1.1	-0.75
<=1.1 and > 0.9	-0.5
<=0.9 and > 0.5	0.5
< 0.5	1

Range	Score
<1.0	0.25
>=1.0 and < 1.25	-0.25
>=1.25 and < 1.5	-0.5
>=1.5 and < 2	-0.75
>=2	-1

#### Filter by Region

#### Select a Region

Select a Region

BLUE RIDGE MOUNTAINS

CAPE FEAR

CAPITAL EASTERN OBX

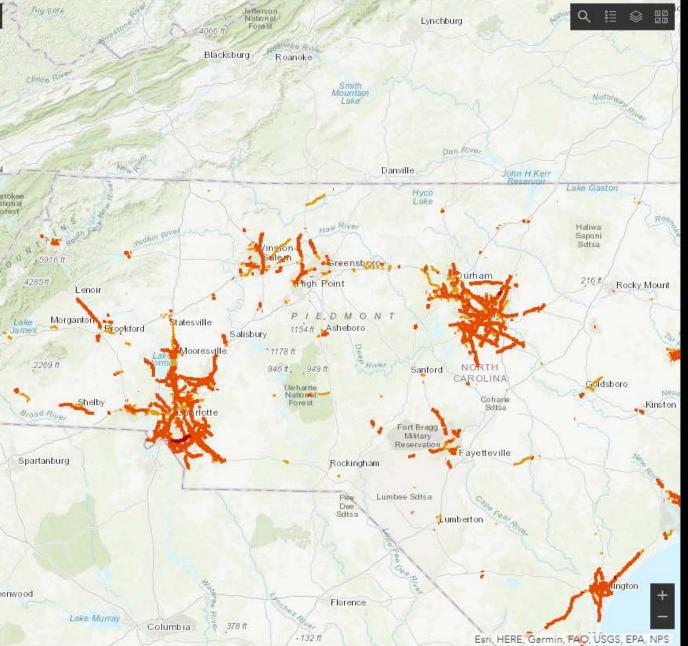
HIGH COUNTRY AND FOOTHILLS

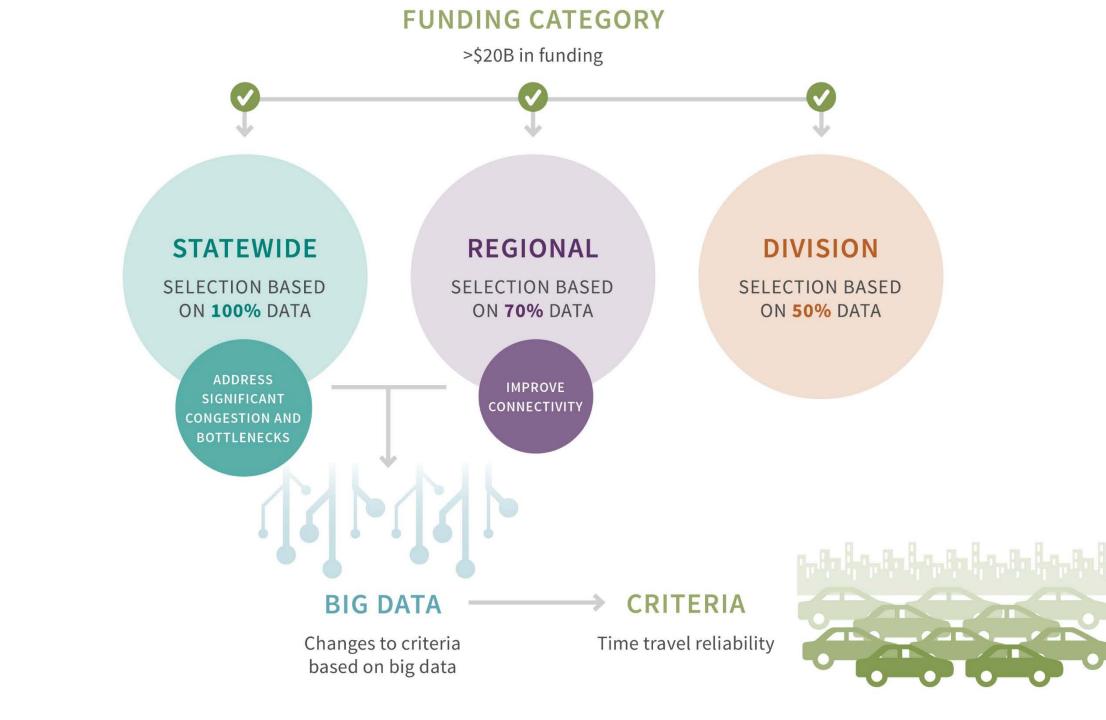
METRO

SANDHILLS

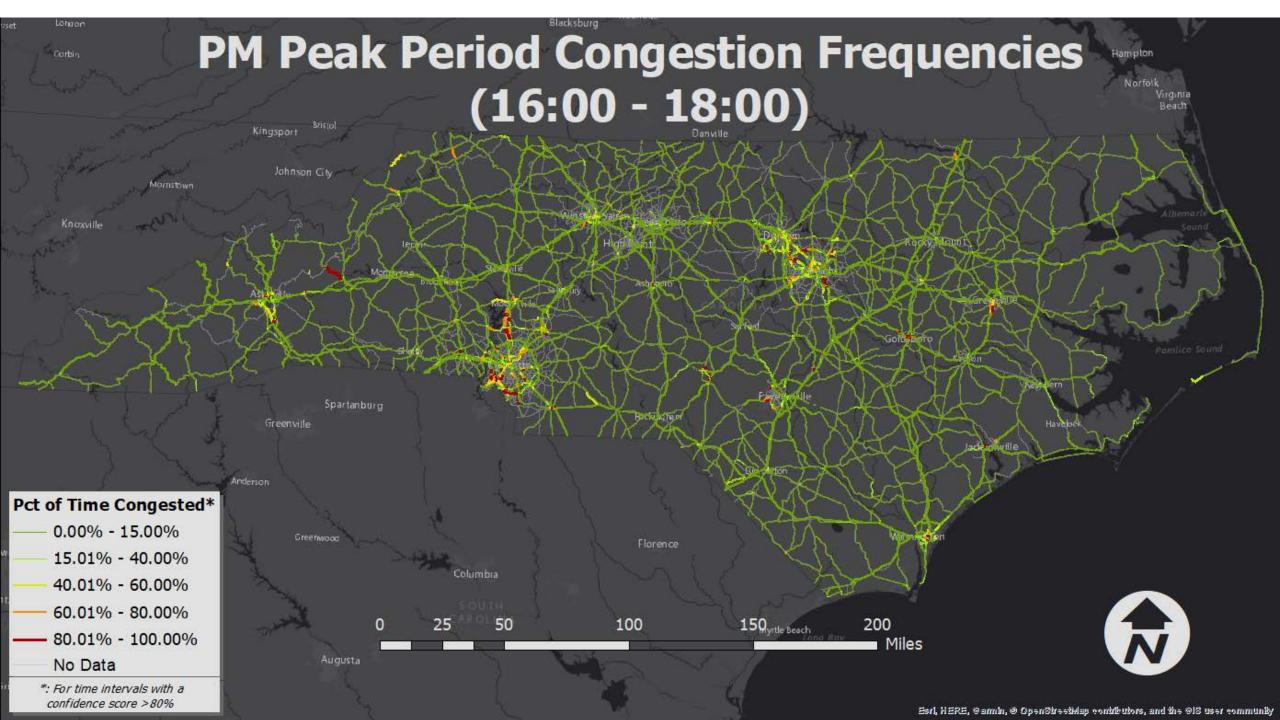
TRIAD

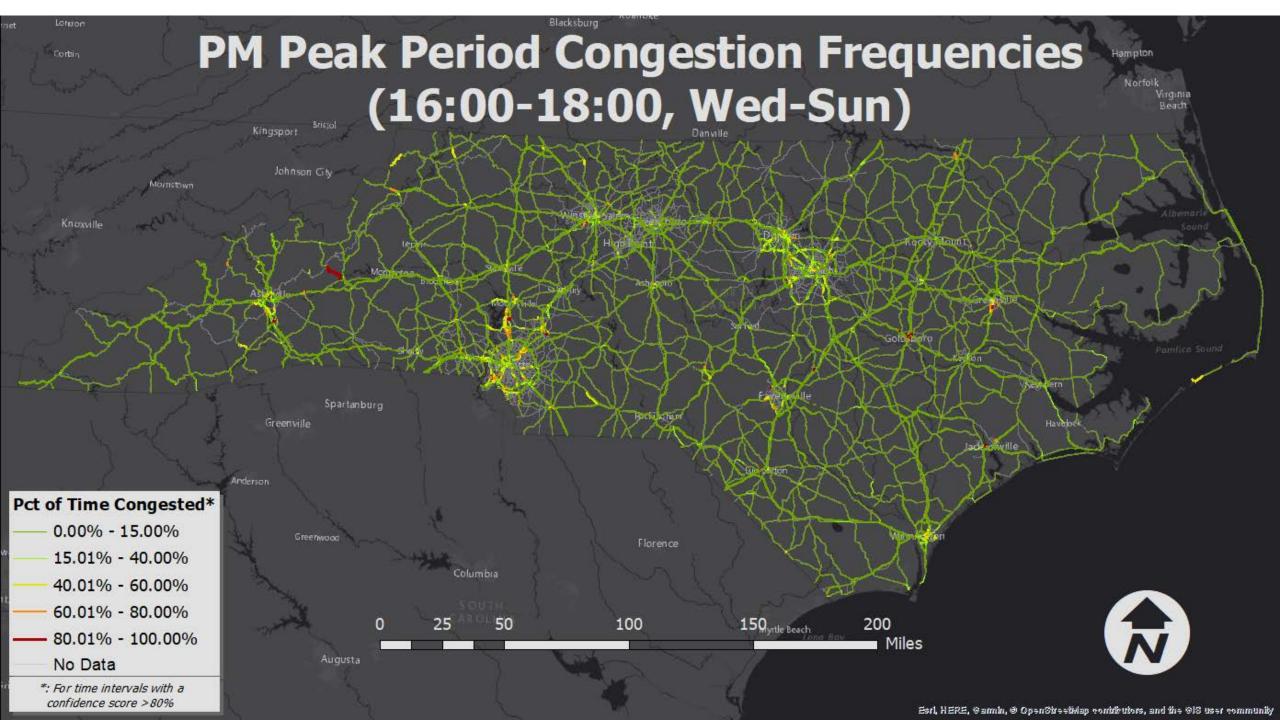
Top 250 Roads - Click to view on map	National Alexandre
Route: NC-51 Score: -2 County: MecklenBurg, Division: 10 Region: METRO	Blacksburg
Route: NC-51 Score: -2 County: MecklenBurg, Division: 10 Region: METRO	Clinen River
Route: NC-51 Score: -2 County: MecklenBurg, Division: 10 Region: METRO	Bristol
Route: NC-133 Score: -2 County: Brunswick, Division: 3 Region: CAPE FEAR	port Cherokee National Fofest
Route: SR-2000 Score: -2 County: Wake, Division: 5 Region: CAPITAL	6286 H 0 1 5916 H
Route: SR-2000 Score: -2 County: Wake, Division: 5 Region: CAPITAL	de 4285 ft Lenoir
Route: SR-2000 Score: -2 County: Wake, Division: 5 Region: CAPITAL	83 ft Piegah Forest James Morganton Eropkford Statesville Ville Lake Mooresville 1 2269 ft orma
Route: SR-2000 Score: -2 County: Wake, Division: 5 Region: CAPITAL	Lare Shelby "Strong River
Route: US-29 Score: -2 County: Guilford, Division: 7 Region: TRIAD	Spartanburg
Route: US-19 Score: -2 County: Buncombe, Division: 13 Region: BLUE RIDGE MOUNTAINS	Greenville
Route: I-540 Score: -2 County: Wake, Division: 5	N NOV I V
Average Performance Score for <b>0.561</b>	Greenwood Sumter ational Columbia 378 ff





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# Head of Congestion

**Congestion** = travel speed < 75% of freeflow speed



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	тмс	TMC1	TMC2	тмсз	TMC4	TMC5
Length	0.5	0.75	1	0.5	1.5	1.25
T-3	.86	.81	.80	.85	.81	.81
T-2	.82	.81	.82	.81	.80	.82
T-1	.83	.80	.80	.79	.77	.84
Т	.81	.79	.80	.76	.65	.83
Т2	.82	.80	.81	.60	.55	.82
Т3	.82	.81	.72	.55	.45	.80
Т4	.79	.71	.68	.55	.74	.79
Т5	.78	.72	.59	.50	.80	.81
Т6	.81	.76	.52	.48	.81	.82
Т7	.82	.78	.65	.54	.79	.80
Т8	.81	.80	.70	.67	.82	.82
Т9	.77	.81	.76	.76	.85	.84
T10	.80	.82	.77	.80	.85	.85

#### 

Start: 2018-12-09 11:10, Head: 125P04834, Impact Score: 59.7704732022858, Distance: 1.36974 miles, Duration: 5 minutes, Impacts: {
 11:10: [tmc: 125P04834, sp: 31, % of FF: 56%, tmc: 125+04834, sp: 31, % of FF: 56%]}

#### 

Start: 2018-12-09 13:45, Head: 125P04834, Impact Score: 188.575844494629, Distance: 1.36974 miles, Duration: 20 minutes, Impacts: {
 13:45: [tmc: 125P04834, sp: 39.66, % of FF: 72%, tmc: 125+04834, sp: 39.66, % of FF: 72%],
 13:50: [tmc: 125P04834, sp: 32.62, % of FF: 59%, tmc: 125+04834, sp: 32.62, % of FF: 59%],
 13:55: [tmc: 125P04834, sp: 36, % of FF: 65%, tmc: 125+04834, sp: 36, % of FF: 65%],
 14:00: [tmc: 125P04834, sp: 36, % of FF: 65%, tmc: 125+04834, sp: 36, % of FF: 65%]}

#### \*\*\*\*\*\*

Start: 2018-07-29 07:00, Head: 125P04833, Impact Score: 26.9017330342102, Distance: 0.85973 miles, Duration: 5 minutes, Impacts: {
 07:00: [tmc: 125P04833, sp: 37.79, % of FF: 69%, tmc: 125+04833, sp: 37.79, % of FF: 69%]}

#### \*\*\*\*\*\*\*\*\*\*

Start: 2018-07-29 07:30, Head: 125P04833, Impact Score: 453.593556526985, Distance: 0.85973 miles, Duration: 65 minutes, Impacts: {
 07:30: [tmc: 125P04833, sp: 38.37, % of FF: 70%, tmc: 125+04833, sp: 38.37, % of FF: 70%],
 07:35: [tmc: 125P04833, sp: 9.37, % of FF: 17%, tmc: 125+04833, sp: 9.37, % of FF: 17%],
 07:40: [tmc: 125P04833, sp: 11.64, % of FF: 21%, tmc: 125+04833, sp: 11.64, % of FF: 21%],
 07:45: [tmc: 125P04833, sp: 12.8, % of FF: 23%, tmc: 125+04833, sp: 12.8, % of FF: 23%],
 07:50: [tmc: 125P04833, sp: 27, % of FF: 49%, tmc: 125+04833, sp: 27, % of FF: 49%],
 08:00: [tmc: 125P04833, sp: 20.59, % of FF: 37%, tmc: 125+04833, sp: 35.73, % of FF: 37%],
 08:05: [tmc: 125P04833, sp: 35.73, % of FF: 65%, tmc: 125+04833, sp: 31.8, % of FF: 58%, tmc: 125+04833, sp: 31.8, % of FF: 66%, tmc: 125+04833, sp: 36.26, % of FF: 66%];
 08:30: [tmc: 125P04833, sp: 36.26, % of FF: 66%, tmc: 125+04833, sp: 36.26, % of FF: 66%]}

#### \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Start: 2018-07-29 09:35, Head: 125P04833, Impact Score: 24.8852715815735, Distance: 0.85973 miles, Duration: 5 minutes, Impacts: {
 09:35: [tmc: 125P04833, sp: 39.08, % of FF: 71%, tmc: 125+04833, sp: 39.08, % of FF: 71%]}

#### 

Start: 2018-07-29 10:40, Head: 125P04833, Impact Score: 340.707360930557, Distance: 1.54241 miles, Duration: 35 minutes, Impacts: {
 10:40: [tmc: 125P04833, sp: 34.54, % of FF: 63%, tmc: 125+04833, sp: 34.54, % of FF: 63%, tmc: 125P04832, sp: 23.11, % of FF: 42%, tmc: 125+04832, sp: 23.11, % of FF: 42%],
 10:45: [tmc: 125P04833, sp: 33.63, % of FF: 61%, tmc: 125+04833, sp: 33.63, % of FF: 61%],
 10:50: [tmc: 125P04833, sp: 16.7, % of FF: 30%, tmc: 125+04833, sp: 16.7, % of FF: 30%],
 10:55: [tmc: 125P04833, sp: 12.07, % of FF: 22%, tmc: 125+04833, sp: 12.07, % of FF: 22%],
 11:05: [tmc: 125P04833, sp: 23.42, % of FF: 43%, tmc: 125+04833, sp: 23.42, % of FF: 43%],

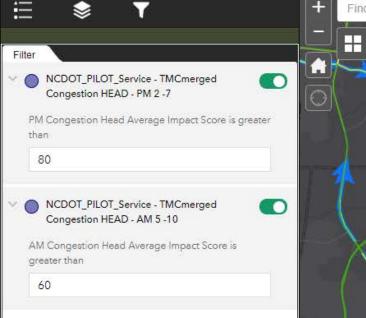
11:10: [tmc: 125P04833, sp: 17, % of FF: 31%, tmc: 125+04833, sp: 17, % of FF: 31%]}

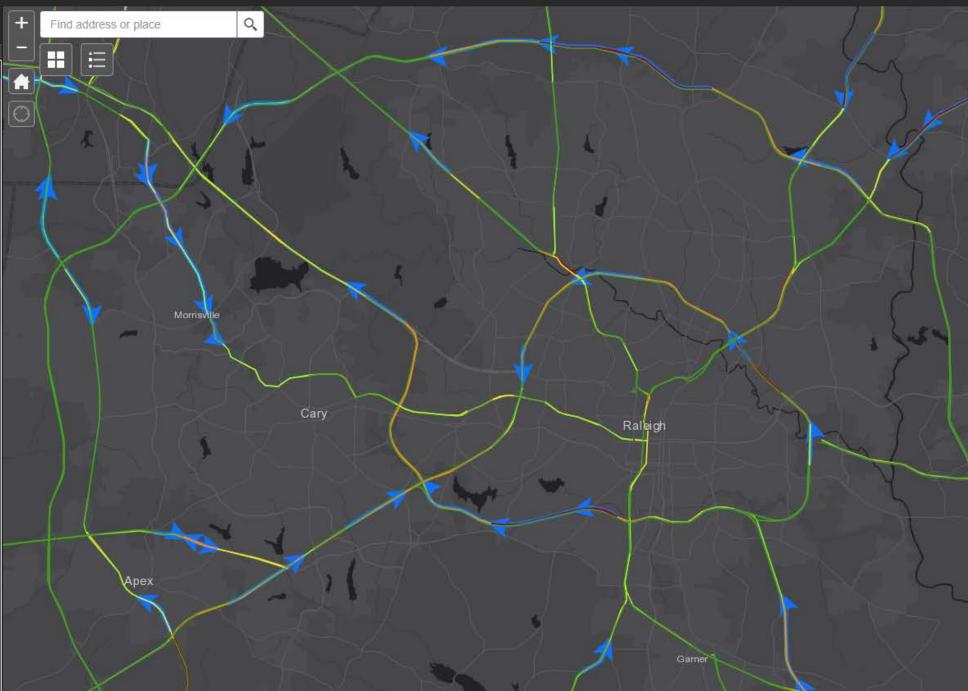
### **Next Steps - Potential Aggregations**

- 5 Minute
- Maximum Impact during Each Peak Period or
- Aggregate of all Impact during Each Peak Period
- When Occurrence as Head of Congestion is greater than 40%
- Historical Data 2016, 2017

								MC_CH_AM_join	_Congestion_AM -	125P06515	
		71	1306		17172		119	OBJECTID_1 TMC Total Impact Sco Average Impact 9 Maximum Impact Average Bottlene Maximum Bottler Average Bottlene Maximum Bottler Pct of Time in Co Shape_Length	Score : Score ck Distance teck Distance ck Duration	551 125P06515 4375.1196 6.398775 73.757989 0.055678 17.441818 165 Period) 78.57% 3832.0779	3
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#### **NCDOT Congestion Pilot** with Web AppBuilder for ArcGIS by VHB





# In the Future



We are ready to go! **Big Data Management** Dashboards **Healthy Community** and Smart City Connected/ **Autonomous Vehicles** Machine Learning & **Artificial Intelligence** 

