



Regional Integrated Transportation Information System (RITIS)

High Fidelity Connected Vehicle (CV) Probe Data –
Driving Insights to Origin Destination Travel Patterns

➤ Mobility Intelligence from RITIS

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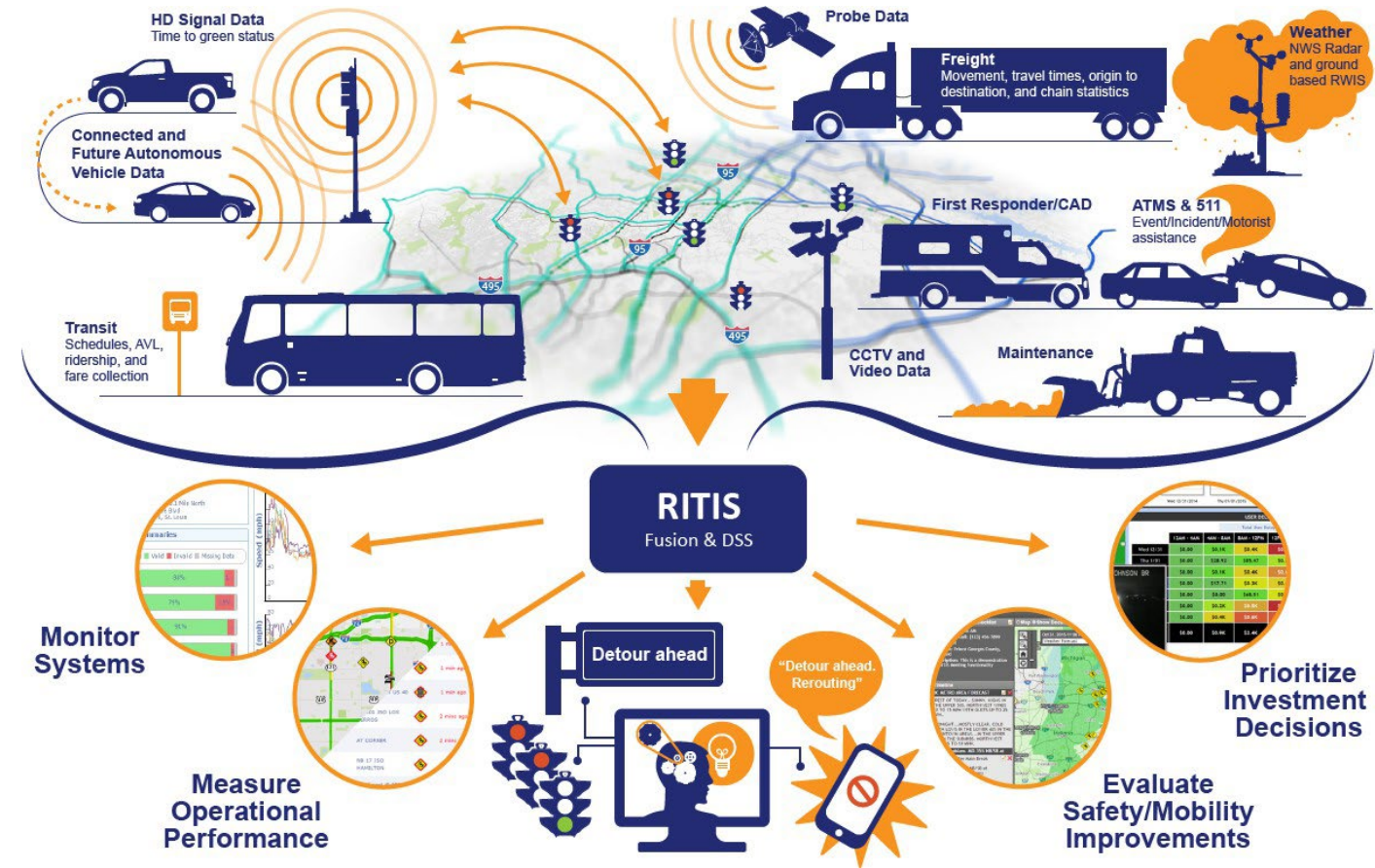
cattlab.umd.edu



Agenda

- Overview of OD Travel Pattern Analytics
 - Foundational data
 - Key analytical features
 - Open architecture
 - Output information products
 - Operations and planning use cases
- Q&A

<https://trips.ritis.org/>



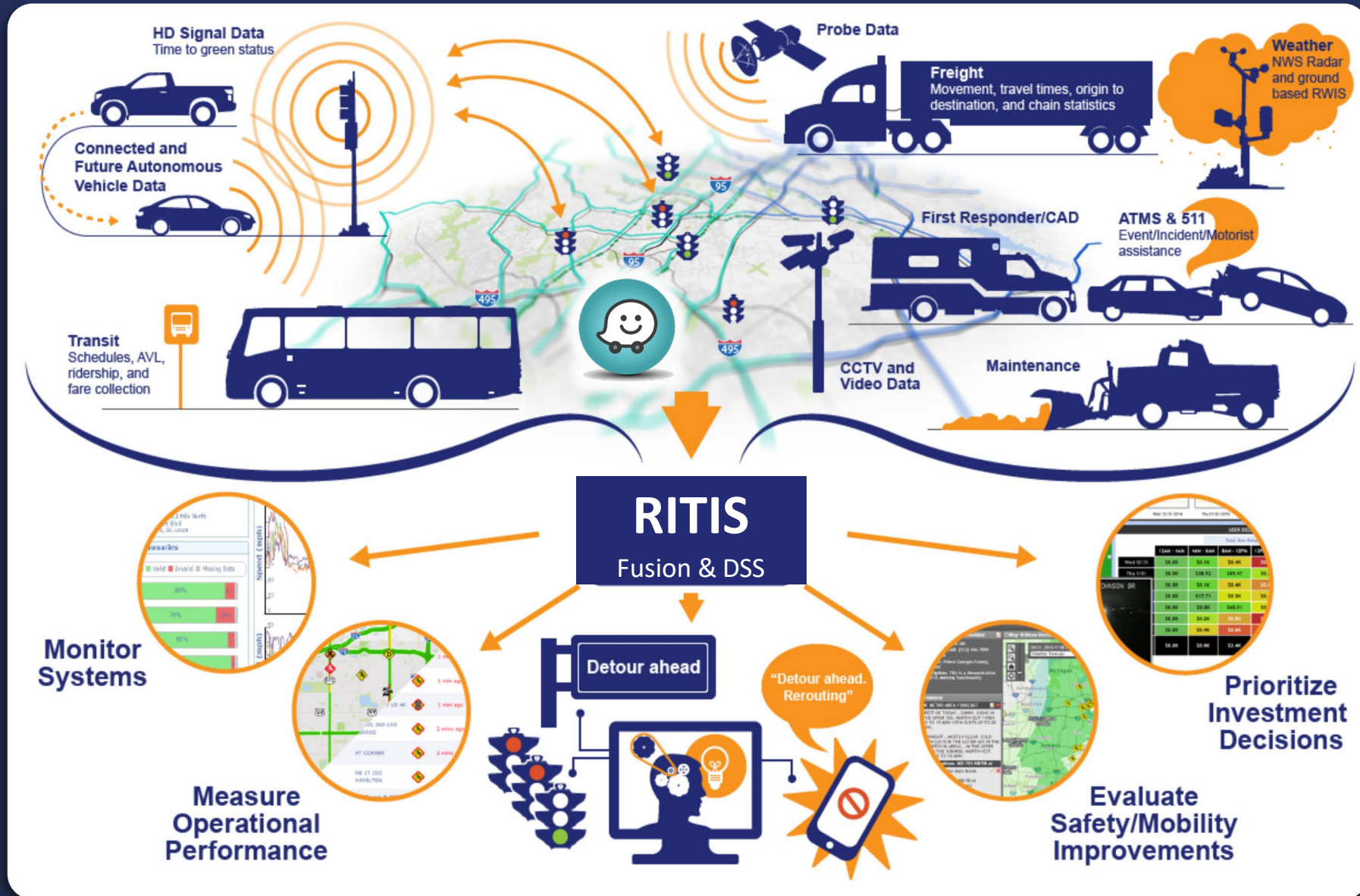
<https://ritis.org>

CATT Lab (Who we are)

- The CATT Lab operates the world's largest transportation data archive and analytics platform
- We are the industry leader of applied big-data analytics for transportation applications (operations, planning & research)
 - > Big Data Analytics
 - > Information/Data Visualization
 - > System Integration
 - > Performance Management



Regional Integrated Transportation Information System



RITIS – Enterprise Transportation Solutions

RITIS

The screenshot shows the RITIS Tool Catalog website. At the top, there is a navigation bar with the RITIS logo and links for INTRODUCTION, TOOL CATALOG, USE CASES, GET ACCESS, TUTORIALS, TEMPLATES, and a LOG IN button. Below the navigation bar is the title "RITIS Tool Catalog". A horizontal menu contains icons for ALL TOOLS, OPERATIONS, PLANNING, RESEARCH, DEVELOPER RESOURCES, TRAVELER INFORMATION, and OTHER. The main content area is titled "All Tools" and displays a grid of 48 tool icons, each with a label below it. The tools are organized into rows. A yellow box highlights three tools in the bottom row: "TRIP ANALYTICS - OD MATRIX ANALYSIS", "TRIP ANALYTICS - SCENARIO ANALYSIS", and "TRIP ANALYTICS - ROUTE ANALYSIS".

RITIS Tool Catalog

INTRODUCTION **TOOL CATALOG** USE CASES GET ACCESS TUTORIALS TEMPLATES LOG IN

ALL TOOLS OPERATIONS PLANNING RESEARCH DEVELOPER RESOURCES TRAVELER INFORMATION OTHER

All Tools

CHART REPORTING COVID-19 IMPACT ANALYSIS PLATFORM DETECTOR TOOLS - DETECTOR PROFILE DETECTOR TOOLS - HEALTH SUMMARY DETECTOR TOOLS - LAUNCHPAD DETECTOR TOOLS - ROAD PROFILE EXPLORE AND VISUALIZE CRASHES (EVC) INCIDENT CLUSTERING EXPLORER (ICE)

PDA - BOTTLENECK RANKING PDA - CONGESTION SCAN PDA - CORRIDOR TIME COMPARISON PDA - DASHBOARD PDA - ENERGY USE AND EMISSIONS CHARTS PDA - ENERGY USE AND EMISSIONS MATRIX PDA - ENERGY USE AND EMISSIONS TREND MAP PDA - MAP 21

PDA - MASSIVE DATA DOWNLOADER PDA - NPMRDS COVERAGE MAP PDA - PERFORMANCE CHARTS PDA - PERFORMANCE SUMMARIES PDA - PROBE DATA API PDA - REGION EXPLORER PDA - SPEED THRESHOLD BREAKDOWN PDA - TEMPORAL COMPARISON MAPS

PDA - TRAVEL TIME COMPARISON PDA - TRAVEL TIME DELTA RANKING PDA - TREND MAP PDA - USER DELAY COST ANALYSIS PDA - VEHICLE OWNERSHIP CHARTS RITIS - EVENT QUERY TOOL RITIS - INCIDENT ALERTS RITIS - INCIDENT LIST

RITIS - INCIDENT OVERVIEW RITIS - INCIDENT TIMELINE RITIS - MAP RITIS - FILTER API RITIS - MEETING RITIS - SPEED ALERTS RITIS - TRAFFIC CAMERAS RITIS - TRAFFICVIEW

RITIS - WORK ZONE PERFORMANCE MONITORING APPLICATION (WZPMA) SIGNAL ANALYTICS - INTERSECTION ANALYSIS **TRIP ANALYTICS - OD MATRIX ANALYSIS** **TRIP ANALYTICS - SCENARIO ANALYSIS** **TRIP ANALYTICS - ROUTE ANALYSIS** TREEVERSTY VIRTUAL INCIDENT MANAGEMENT TRAINING VIRTUAL WEIGH STATION

CATT LABORATORY



Trip and Travel Pattern Insights



OD Matrix



Zone Map



Route Analysis

Trip Analytics

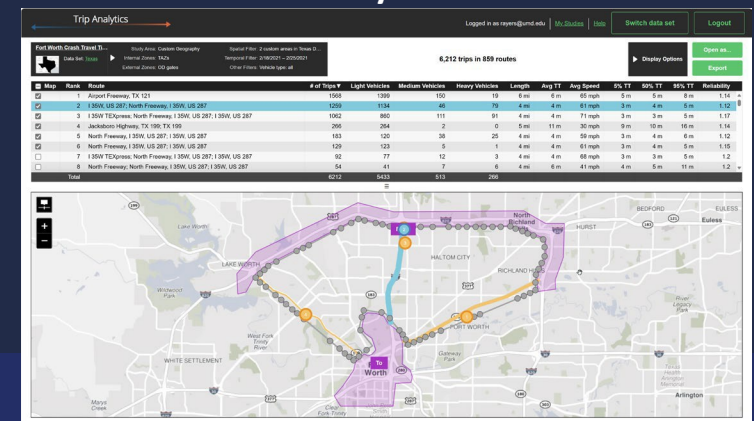
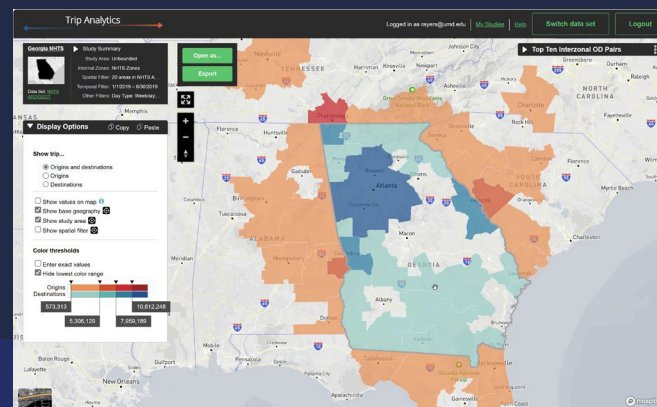
Logged in as ryans@umt.edu | My Studies | Help | Switch data set | Logout

Study Area: Custom Geography | Spatial Filter: 2 Custom areas in Texas D | Legend | 1,586 | Display Options | Export

Data Set: Texas | Internal Zones: WAZ | Temporal Filter: 2/18/2021 - 2/25/2021 | External Zones: OD pairs | Other Filters: Vehicle type: all

Origins	Destinations												Total	
	Internal						External							
	48428010002022	4842801020002	4842801100013	Airport Freeway, TX 121	Airport Freeway, TX 121	East Northside Drive (east)	135W, US 287	Jackobson Highway, TX 199	North Beach Street	North Main Street, US 287, P. Business (east)	North University Drive (east)	Other	Count	Rate
Airport Freeway, TX 121	7	9	2	28	106	4	9	5	0	0	0	0	24	1.57
Airport Freeway, TX 121	0	0	0	2	25	0	2	0	0	0	0	0	1	0.06
135W, US 287 (west)	19	0	4	9	18	129	3	0	0	0	0	0	13	0.85
135W, US 287	0	0	0	1	0	36	3	0	1	0	0	0	2	0.13
135W, US 287	4	5	13	8	3	16	126	29	0	3	0	0	22	1.49
Jackobson Highway, TX 199	2	0	0	3	1	0	0	0	0	0	0	0	6	0.43
North Beach Street	0	1	0	0	28	1	23	0	0	13	0	0	6	0.44
North Freeway	0	0	1	0	1	1	56	0	0	2	0	0	2	0.13
North Main Street, US 287, P. Business (west)	0	1	0	0	0	0	48	0	0	2	10	0	20	1.36
Unassigned	0	2	0	0	1	0	2	10	1	0	0	1	5	0.31
Unassigned	0	0	0	0	0	3	91	1	0	0	0	0	5	0.36
Unassigned	0	0	3	0	1	0	91	1	0	2	0	0	2	0.10
Other	3	5	7	7	19	7	167	30	8	29	14	0	94	6.21
Total	38	20	20	54	178	44	1,071	55	30	41	19	0	201	13.21

Displaying 12 origins and destinations



Foundational Source Data –

150 million+ trips per day in the US - Multiple Types - All CAV GPS Based (1-3 sec frequency)

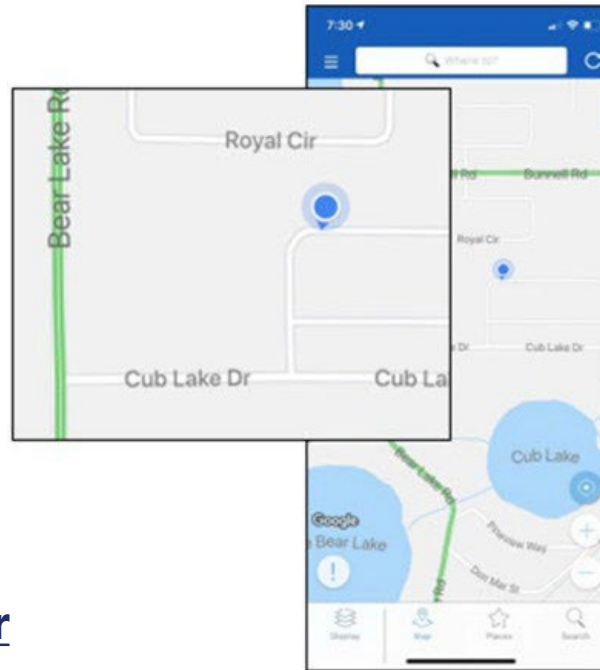
▶▶ Data Types:

- Connected Vehicles
- Local Fleets (service, delivery, etc.)
- Long Haul Trucks
- Consumers/Mobile Phones

▶▶ Core Source Data Elements:

- Device/Trip ID
- Location
- Heading
- Speed

▶▶ All Output Data Can be Downloaded for Further Analysis



INRIX

Trip Analytics – Differentiators

- *Solution uses observed data (not modeled)*
- *Users can SPATIALLY EXPLORE underlying trip paths*
- *Solution is architected to support ANY waypoint or OD data set*



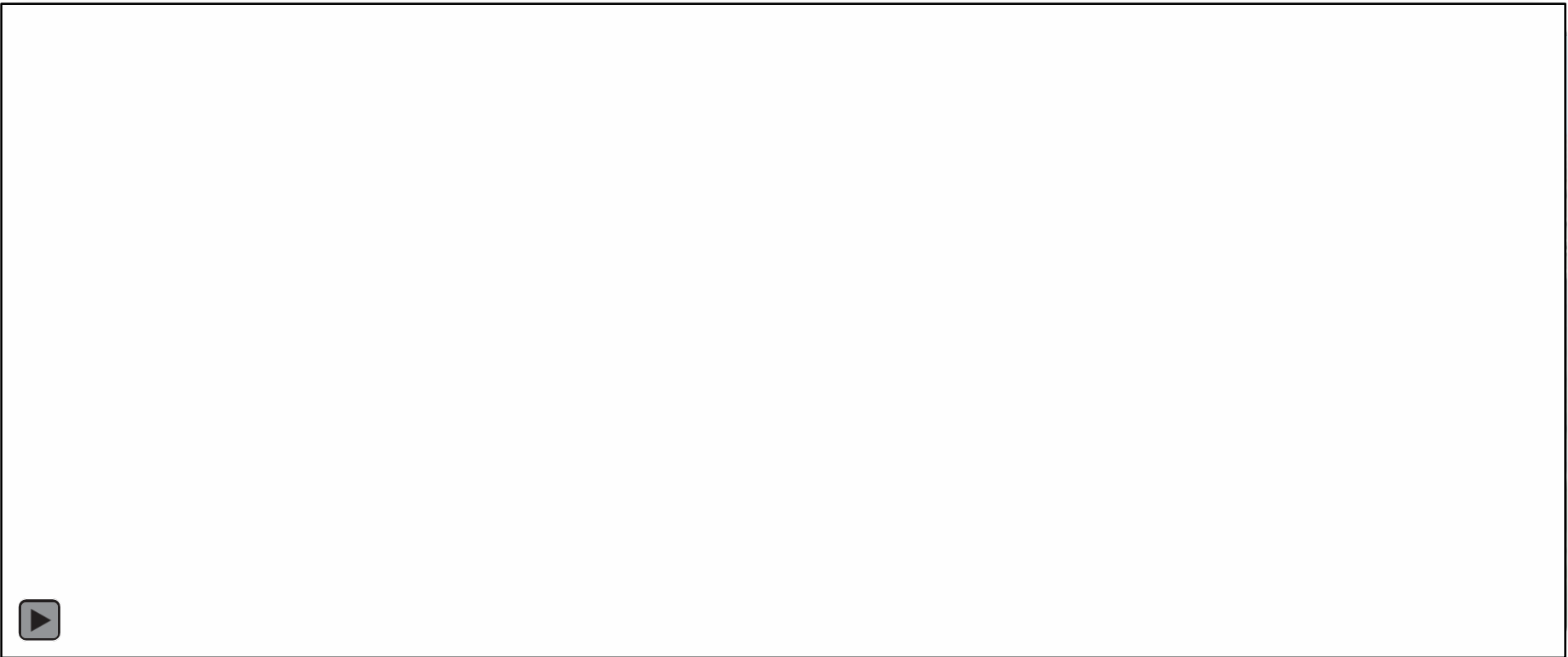
Trip and Travel Pattern Insights – Trip Analytics

TRIP FILTERING WITH INRIX TRIP PATHS

Where did they go?

When did they go there?

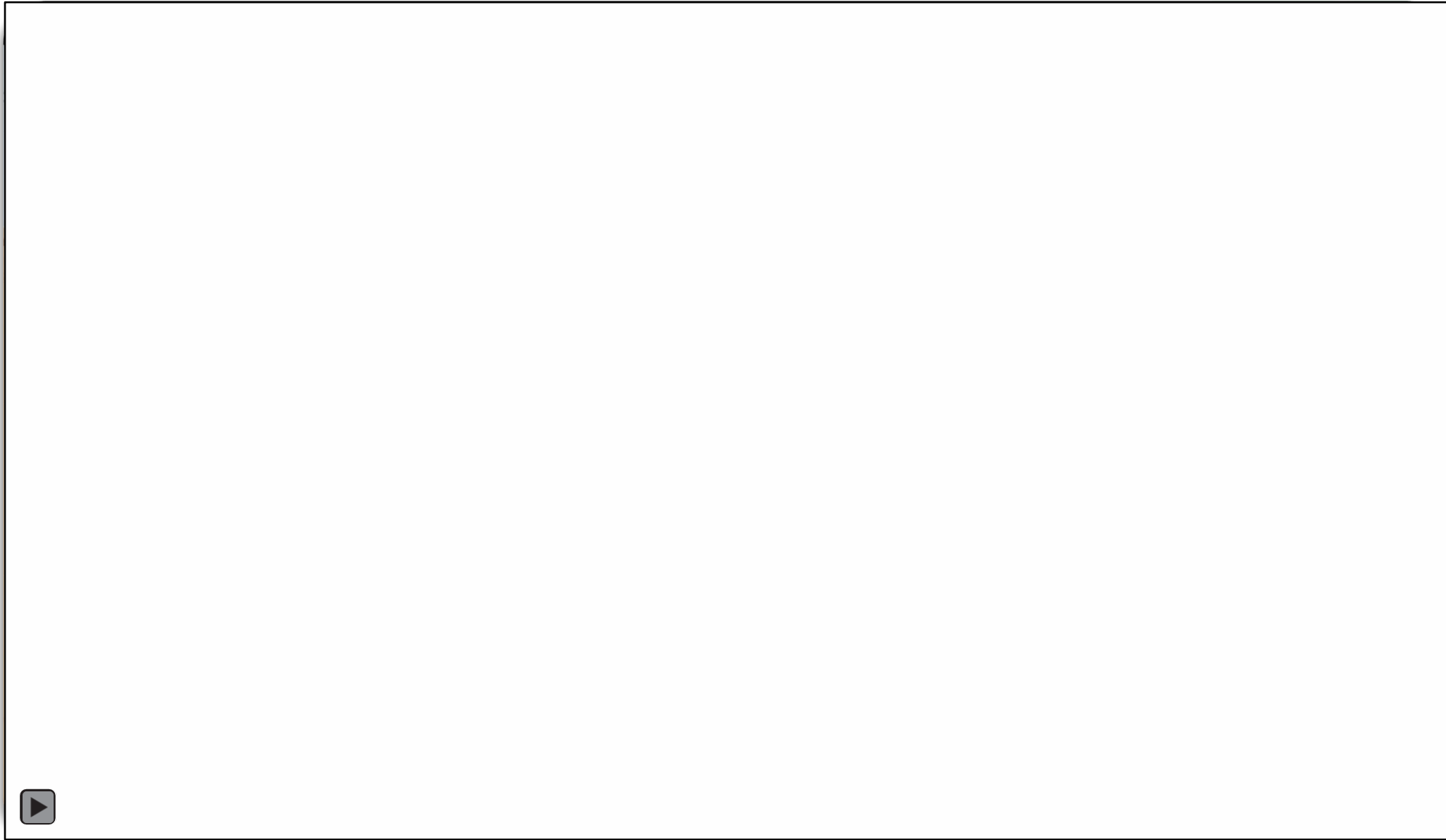
Which ones went there?



What are Trip Paths *(150M per day)*?



Trip and Travel Pattern Insights – Trip Analytics



Trip Analytics – v4 Beta

Query results in three matching reports - with the O/Ds, routes and travel times of those trips

Report Header: Run on Howard County to... Date: 07/20/2024 10:00 AM

Destinations: Annapolis, Arlington, Bethesda, Damascus, Fairfax, Gaithersburg, Greenbelt, Laurel, Mount Airy, Mount Vernon, Pikesville, Springfield, Sully, etc.

Origins	Annapolis	Arlington	Bethesda	Damascus	Fairfax	Gaithersburg	Greenbelt	Laurel	Mount Airy	Mount Vernon	Pikesville	Springfield	Sully	Total
00200000000000000000 (Anne Arundel County)	1	1	1	1	1	1	1	1	1	1	1	1	1	13
00110000000000000000 (Montgomery County)	1	1	1	1	1	1	1	1	1	1	1	1	1	13
00000000000000000000 (Howard County)	10	10	10	10	10	10	10	10	10	10	10	10	10	130
00000000000000000000 (Montgomery County)	10	10	10	10	10	10	10	10	10	10	10	10	10	130
00000000000000000000 (Howard County)	10	10	10	10	10	10	10	10	10	10	10	10	10	130
00000000000000000000 (Montgomery County)	10	10	10	10	10	10	10	10	10	10	10	10	10	130
00000000000000000000 (Howard County)	10	10	10	10	10	10	10	10	10	10	10	10	10	130
00000000000000000000 (Montgomery County)	10	10	10	10	10	10	10	10	10	10	10	10	10	130
00000000000000000000 (Howard County)	10	10	10	10	10	10	10	10	10	10	10	10	10	130
00000000000000000000 (Montgomery County)	10	10	10	10	10	10	10	10	10	10	10	10	10	130
Total	140	140	140	140	140	140	140	140	140	140	140	140	140	1680

OD Matrix

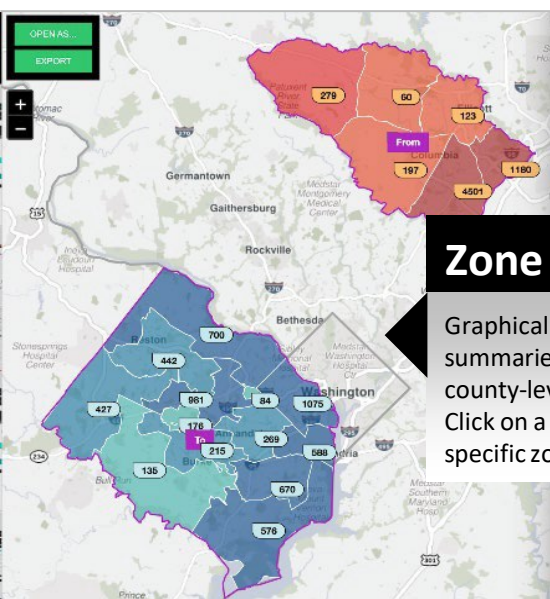
Zone-to-zone trip tables, from county-level to TAZ. Filter by date, TOD, vehicle class, etc.

Route Map & Table

Lists how many trips followed each unique route and calculates travel time and reliability metrics. The Route Map displays segment-by-segment pathways; draw screen lines to produce sample counts and split percentages for each crossing.

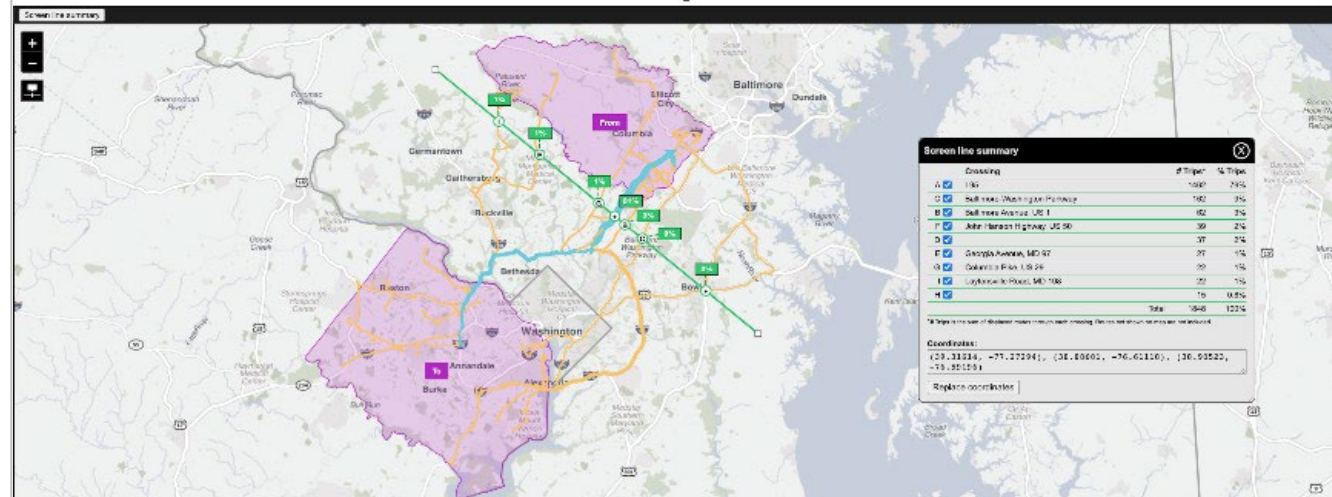
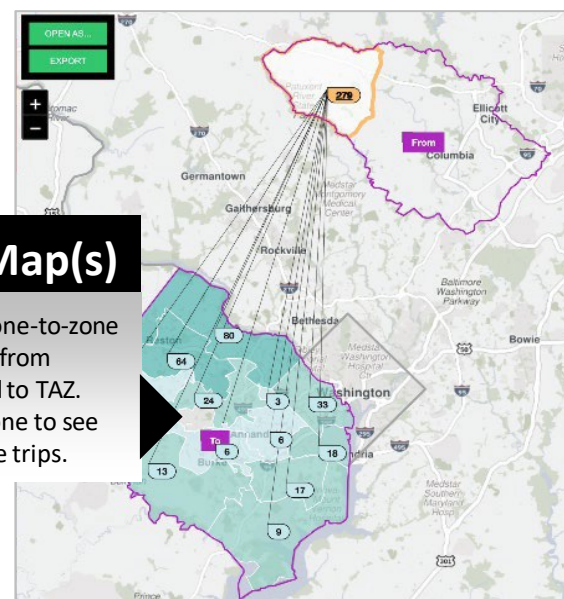
Route Map & Table Screenshot

Map	Rank	Route	# Trips	%	Travel Time	Reliability
1	1	Nassauwauk Road, Annapolis, MD 21403, US 1, US 50, I-95, I-495, I-270	10	7%	10 min	95%
2	2	Annapolis, MD, US 1, US 50, I-95, I-495, I-270	10	7%	10 min	95%
3	3	US 1, US 50, I-95, I-495, I-270	10	7%	10 min	95%
4	4	I-95, I-495, I-270	10	7%	10 min	95%
5	5	I-270	10	7%	10 min	95%
6	6	I-95, I-495, I-270, US 1, US 50	10	7%	10 min	95%
7	7	I-95, I-495, I-270, US 1, US 50, I-95, I-495, I-270	10	7%	10 min	95%
8	8	I-95, I-495, I-270, US 1, US 50, I-95, I-495, I-270, US 1, US 50	10	7%	10 min	95%
9	9	I-95, I-495, I-270, US 1, US 50, I-95, I-495, I-270, US 1, US 50, I-95, I-495, I-270	10	7%	10 min	95%
10	10	I-95, I-495, I-270, US 1, US 50, I-95, I-495, I-270, US 1, US 50, I-95, I-495, I-270, US 1, US 50	10	7%	10 min	95%
Total			140	100%	140 min	95%



Zone Map(s)

Graphical zone-to-zone summaries, from county-level to TAZ. Click on a zone to see specific zone trips.



Trip Analytics – v4.0

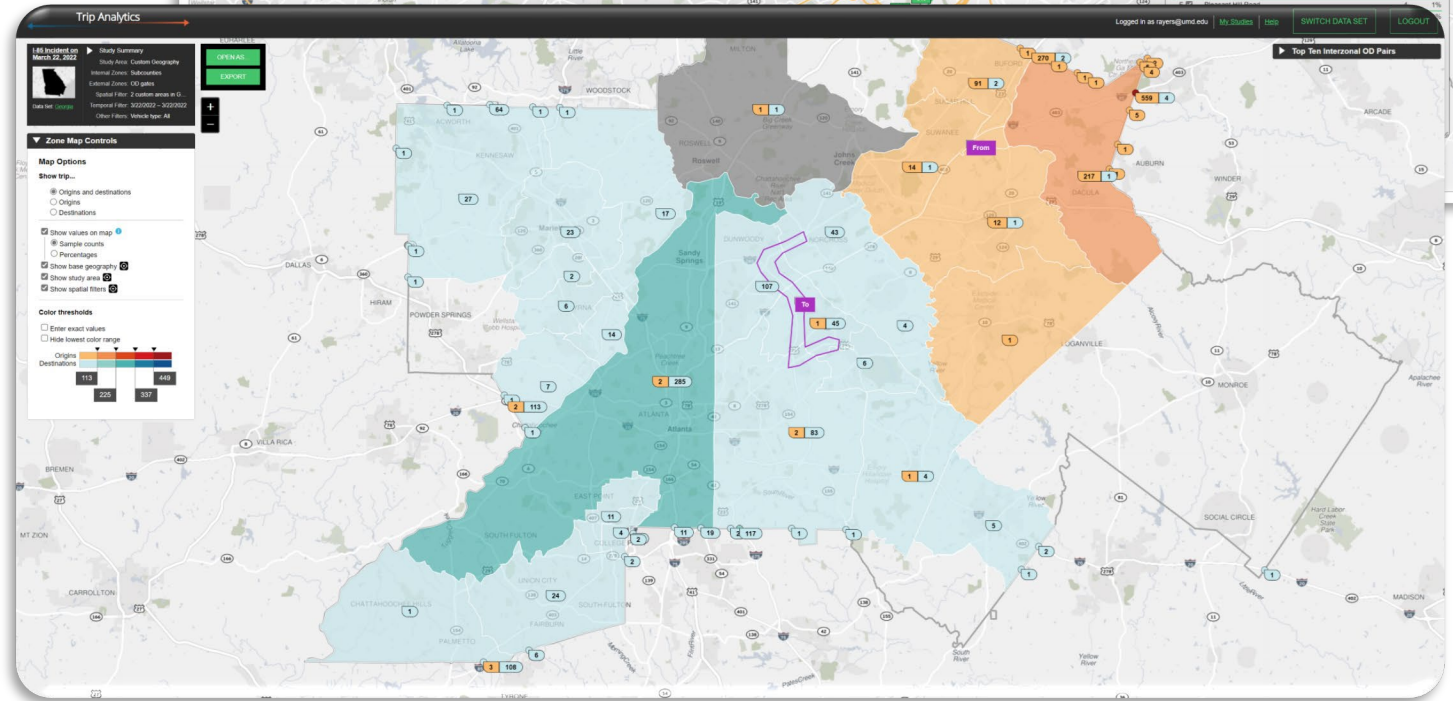
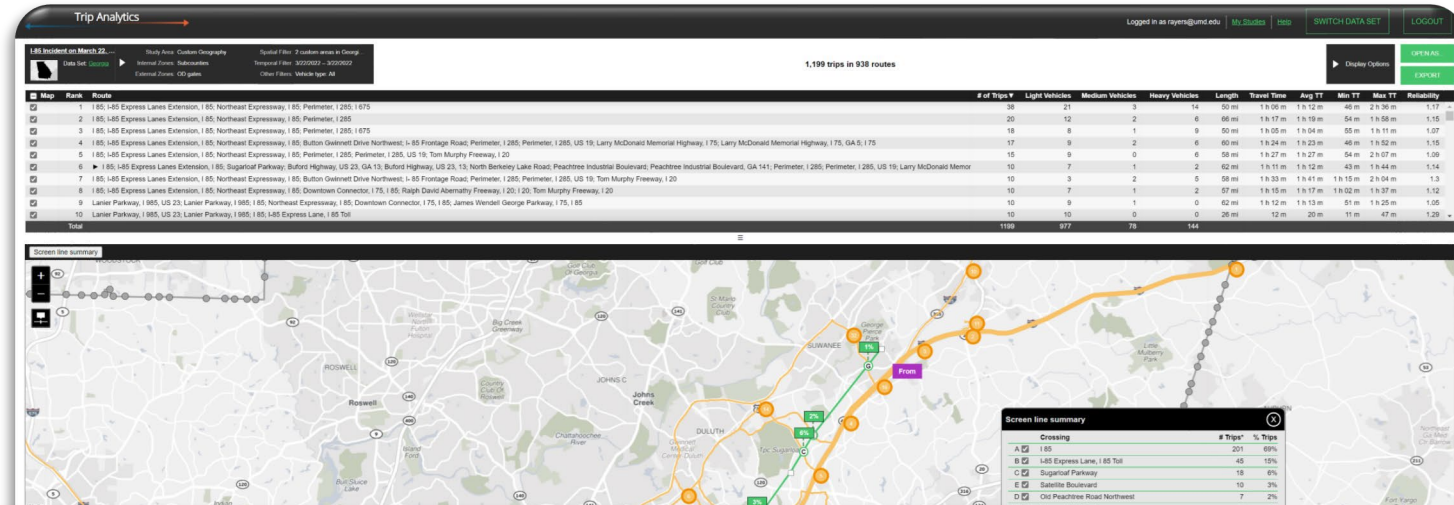
Custom Filters

TRIP FILTERING WITH TRIP WAYPOINTS OR PATHS

Where did they go?

When did they go there?

Which ones went there?



ZONE MAP

Trip and Travel Pattern Insights – Trip Analytics

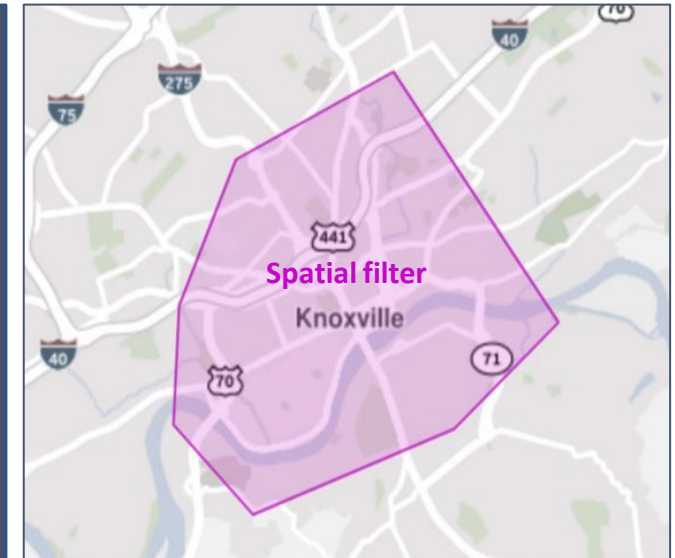
Trips are captured based on where they went...

Spatial filters are like fishing nets that “catch” trips based on where they went; they can be any size, and placed anywhere that trips went (that are in the underlying dataset)

Pass-through check-boxes let users fine-tune which trips are caught

Select pass-through settings for this filter:

<input type="checkbox"/> Started Inside	<input checked="" type="checkbox"/> Ended Inside
<input checked="" type="checkbox"/> Started Outside	<input type="checkbox"/> Ended Outside



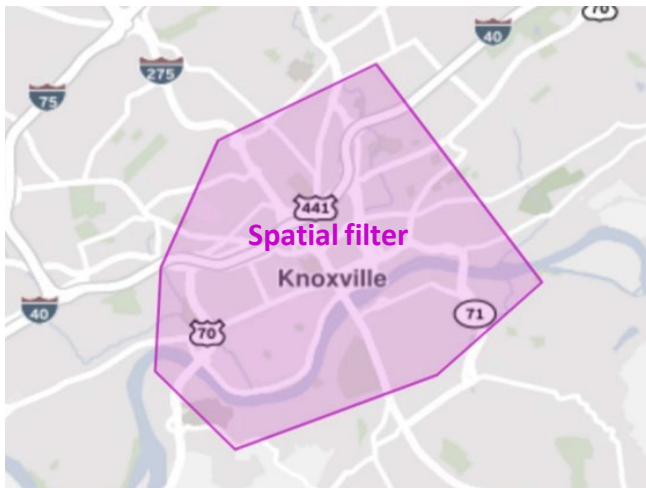
Trip and Travel Pattern Insights – Trip Analytics

Multiple pass-through options for geofenced filters:

Spatial filtering

Task:

Find & analyze five different types of trips to, from, in, or through the Knoxville central business district (CBD)

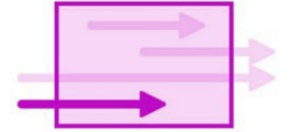


OPTIONS TO FIND:

...commuter arrivals,
7-9 a.m.

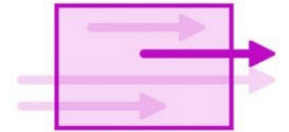
Select pass-through settings for this filter:

- Started Inside
- Started Outside
- Ended Inside
- Ended Outside



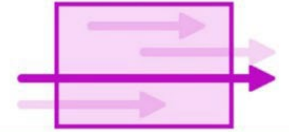
...commuter departures,
4-6 p.m.

- Started Inside
- Started Outside
- Ended Inside
- Ended Outside



...only cut-through traffic

- Started Inside
- Started Outside
- Ended Inside
- Ended Outside



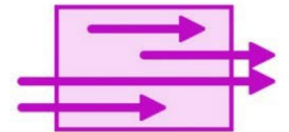
...only local traffic

- Started Inside
- Started Outside
- Ended Inside
- Ended Outside



...all trips in the dataset that
traversed the CBD

- Started Inside
- Started Outside
- Ended Inside
- Ended Outside



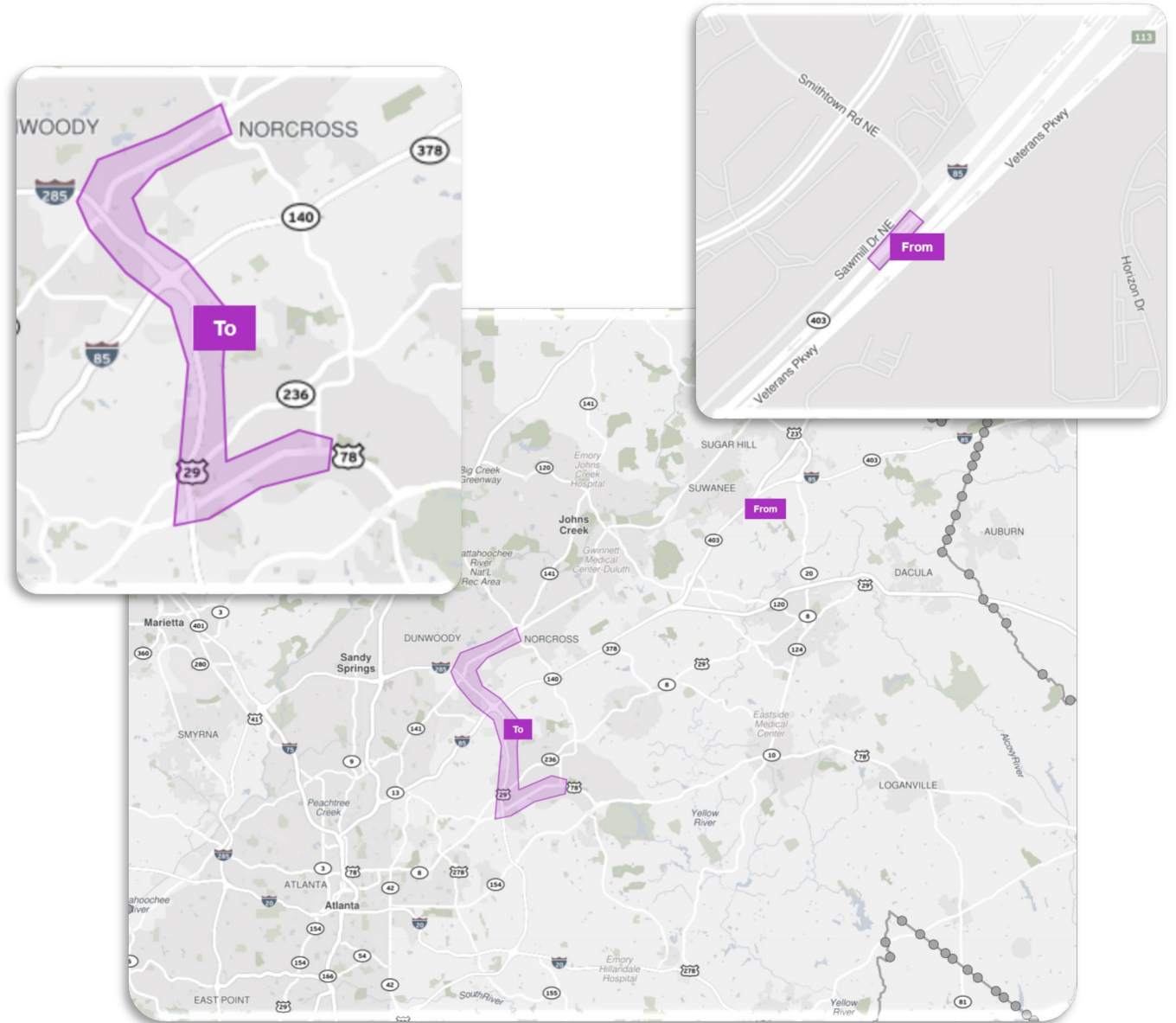
Trip and Travel Pattern Insights – Trip Analytics

Define Geofences

- * FROM – TO geofences for trip capture

Trips must pass through both fences/polygons;

- “started” pass-through settings apply to the FROM region, and
- “ended” settings apply to the TO region



Trip and Travel Pattern Insights – Trip Analytics

Define Geofences

Use of small geofences as gates for select link trip capture

Create or Load custom polygon:



Click pass-through settings:



Set Spatial Filter(s)

Choose one of the following spatial filters. This geography will be used to further filter out trips that don't interact with it.

From To

Upload GeoJSON Select predefined areas Draw area

Click the spatial filter to edit it. Click the trash button to delete it.

Selection Summary

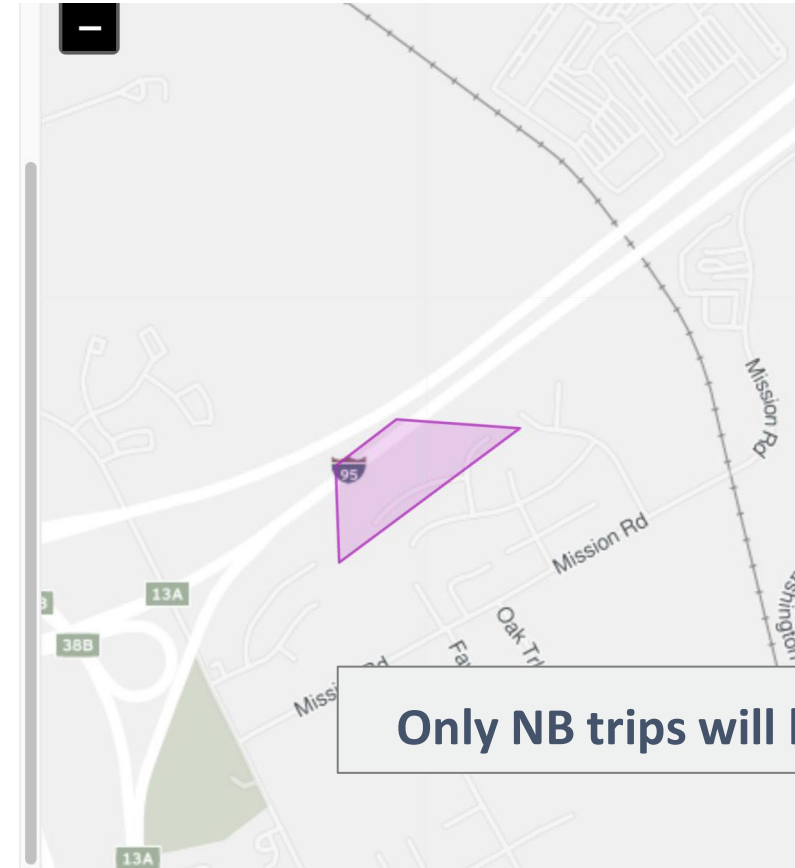
1 custom area

Select pass-through settings for this filter:

Ended Inside

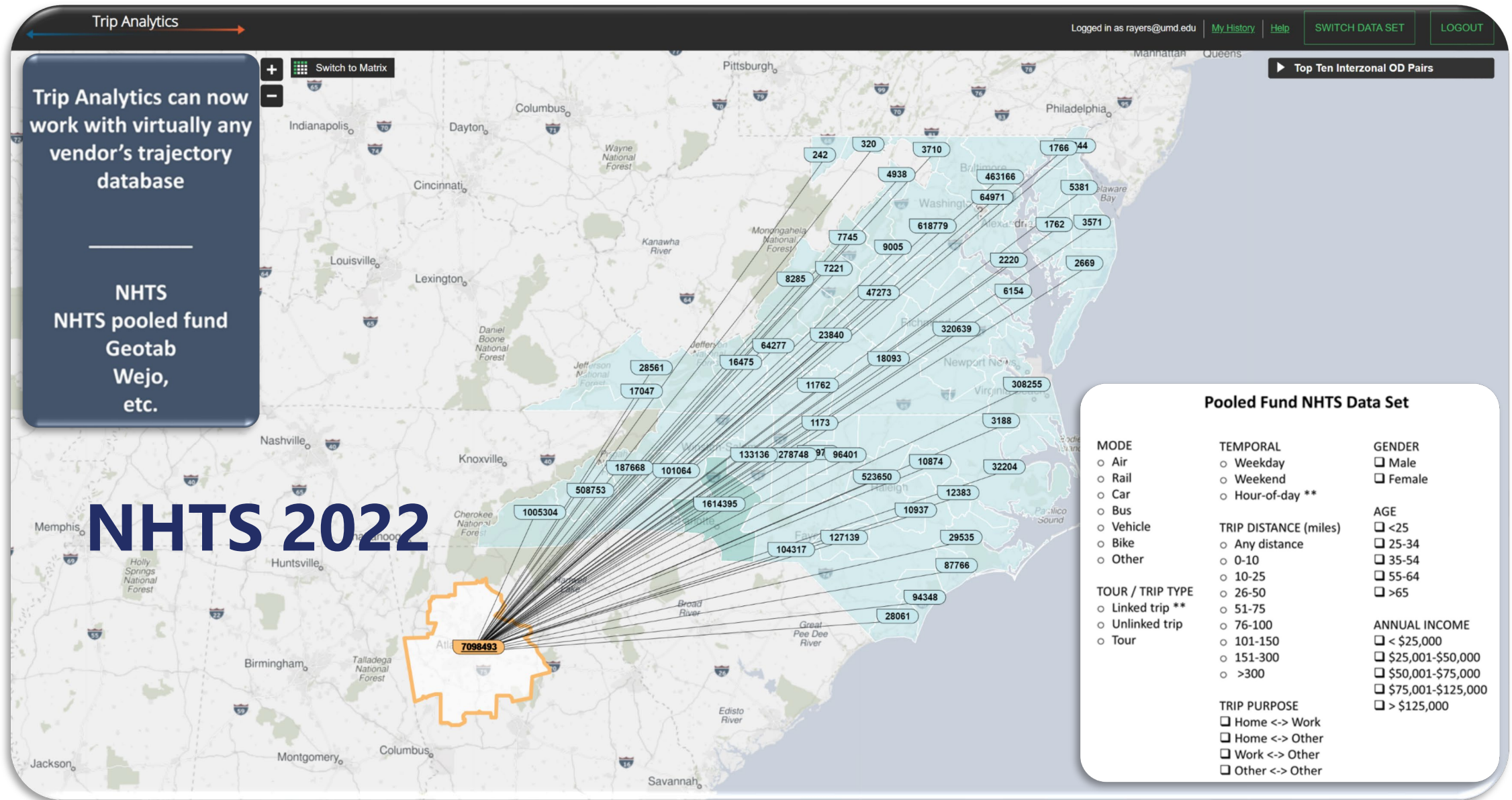
Ended Outside

Next



Only NB trips will be found

Open Data Architecture – Use Any 3rd Party Trajectory Data



Trip Analytics – NHTS 2022

National Household Travel Survey



Trip Analytics Use Cases



Trip and Travel Pattern Insights



OD Matrix



Zone Map



Route Analysis

Trip Analytics

Study Area: Custom Geography

Temporal Filter: 2018/02/01 - 2018/02/01

External Zones: OQ gates

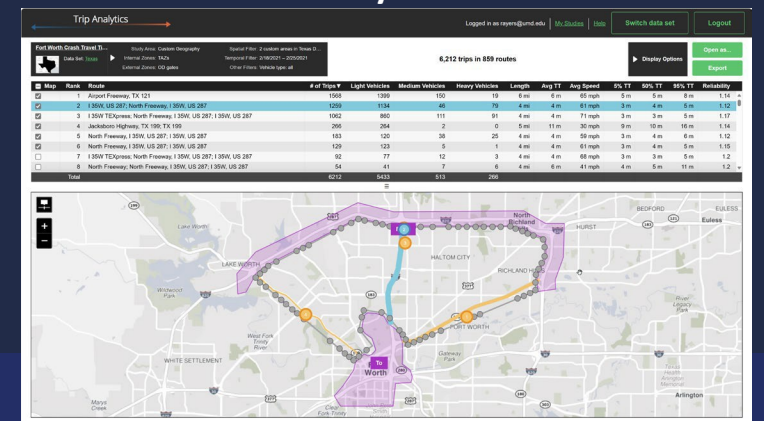
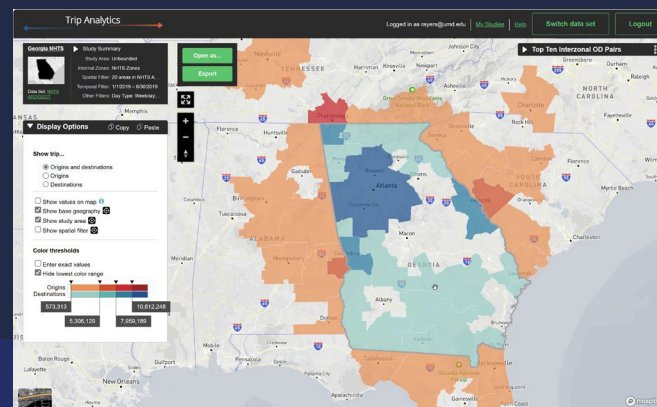
Other Filters: Vehicle type: all

Legend

Destinations

Origins	Destinations												Total
	Internal	External											
	48428010002022	48428010200002	48428011000113	Airport Freeway, TX 121	East Northside Drive (east)	135W, US 287	Jackoborn Highway, TX 199	North Beach Street	North Main Street, US 287, P. Business (east)	North University Drive (east)	Other	Sum	Count
Airport Freeway, TX 121	7	9	2	28	106	4	9	5	0	0	0	24	57
135W, US 287	0	0	0	2	25	0	2	0	0	0	0	1	28
Jackoborn Highway, TX 199	19	0	4	9	18	129	3	0	0	1	1	13	150
North Beach Street	0	0	0	1	0	36	3	0	1	0	0	2	40
North University Drive (east)	4	5	13	8	3	16	120	29	0	3	0	22	149
North Main Street, US 287, P. Business (north)	2	0	0	3	1	0	0	0	0	0	0	6	43
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum	35	14	17	54	178	44	147	33	3	3	1	59	474

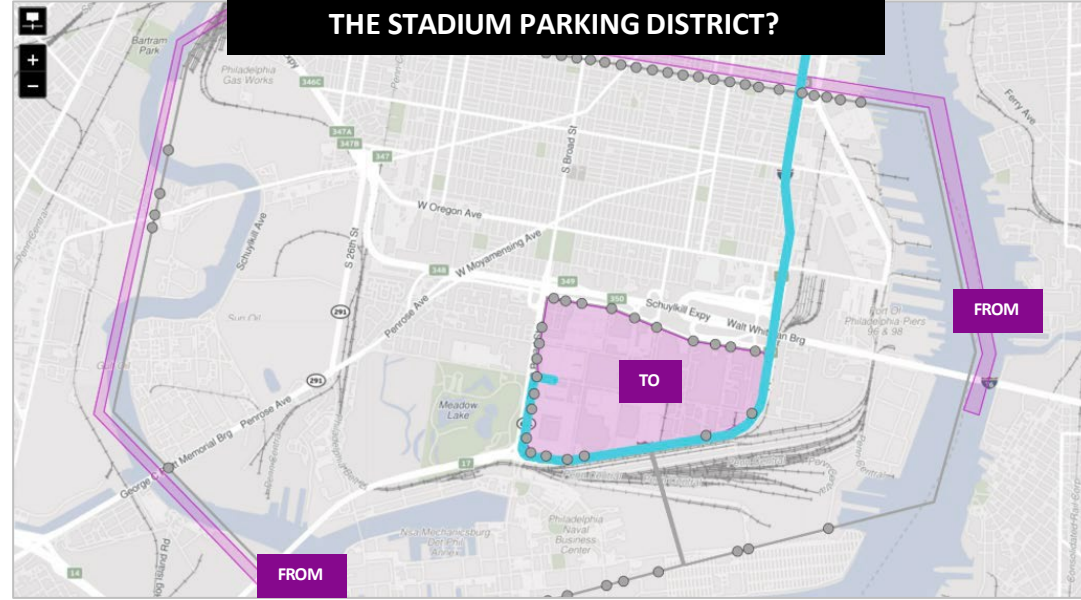
Displaying 12 origins and destinations



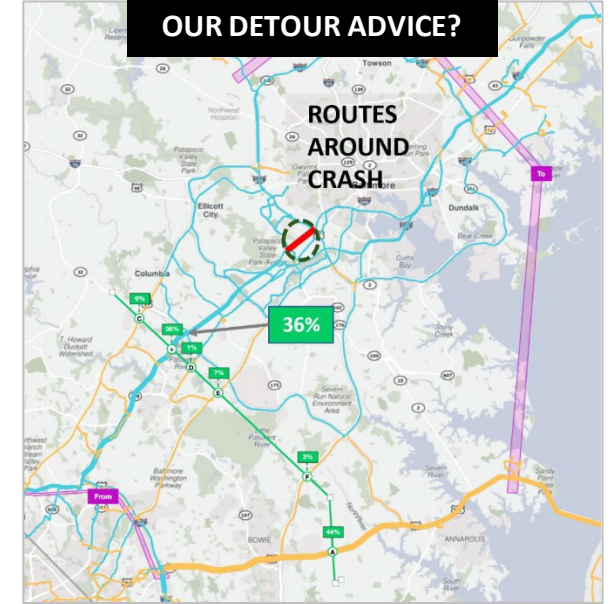
ARE PORT TRUCKS CUTTING THROUGH NEIGHBORHOODS?



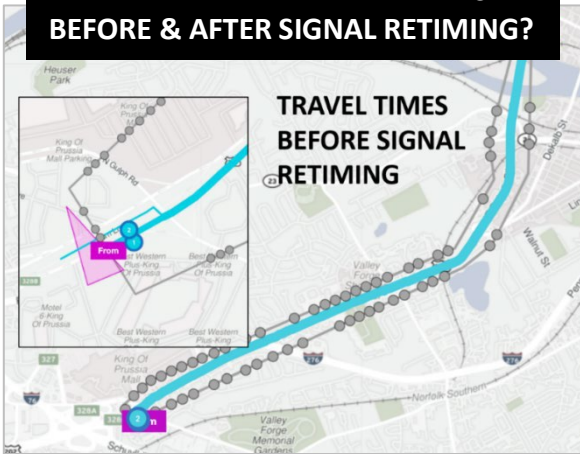
WHAT ARE THE ROUTES & TRAVEL TIMES TO THE STADIUM PARKING DISTRICT?



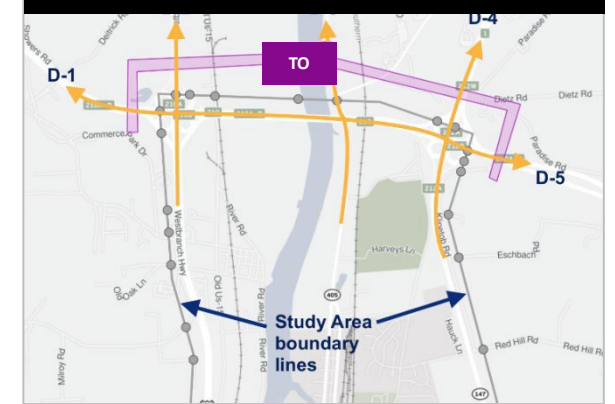
DID DRIVERS FOLLOW OUR DETOUR ADVICE?



WHAT ARE THE TRAVEL TIMES BEFORE & AFTER SIGNAL RETIMING?



WHAT ARE THE TRAVEL TIME BENEFITS OF NEW BRIDGE & HIGHWAY?



Trip Analytics can help provide answers to a variety of Planning and Operations situations

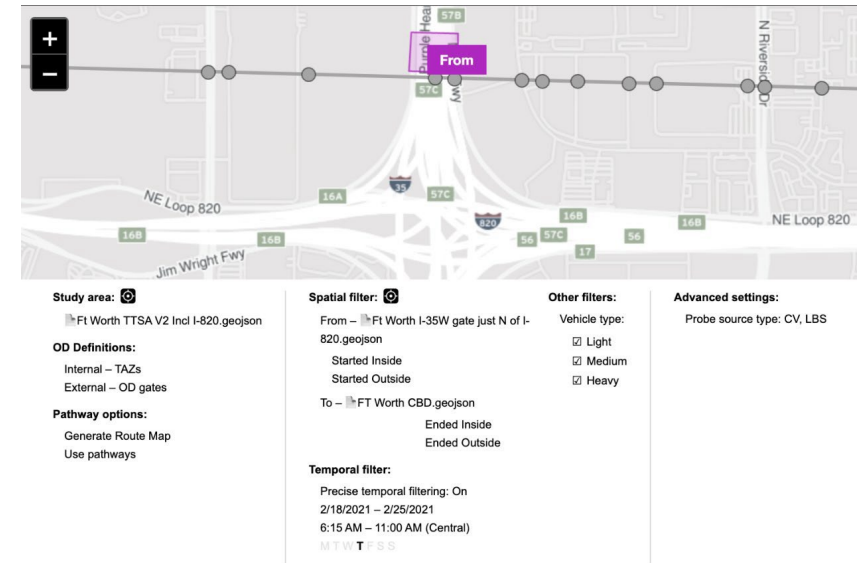
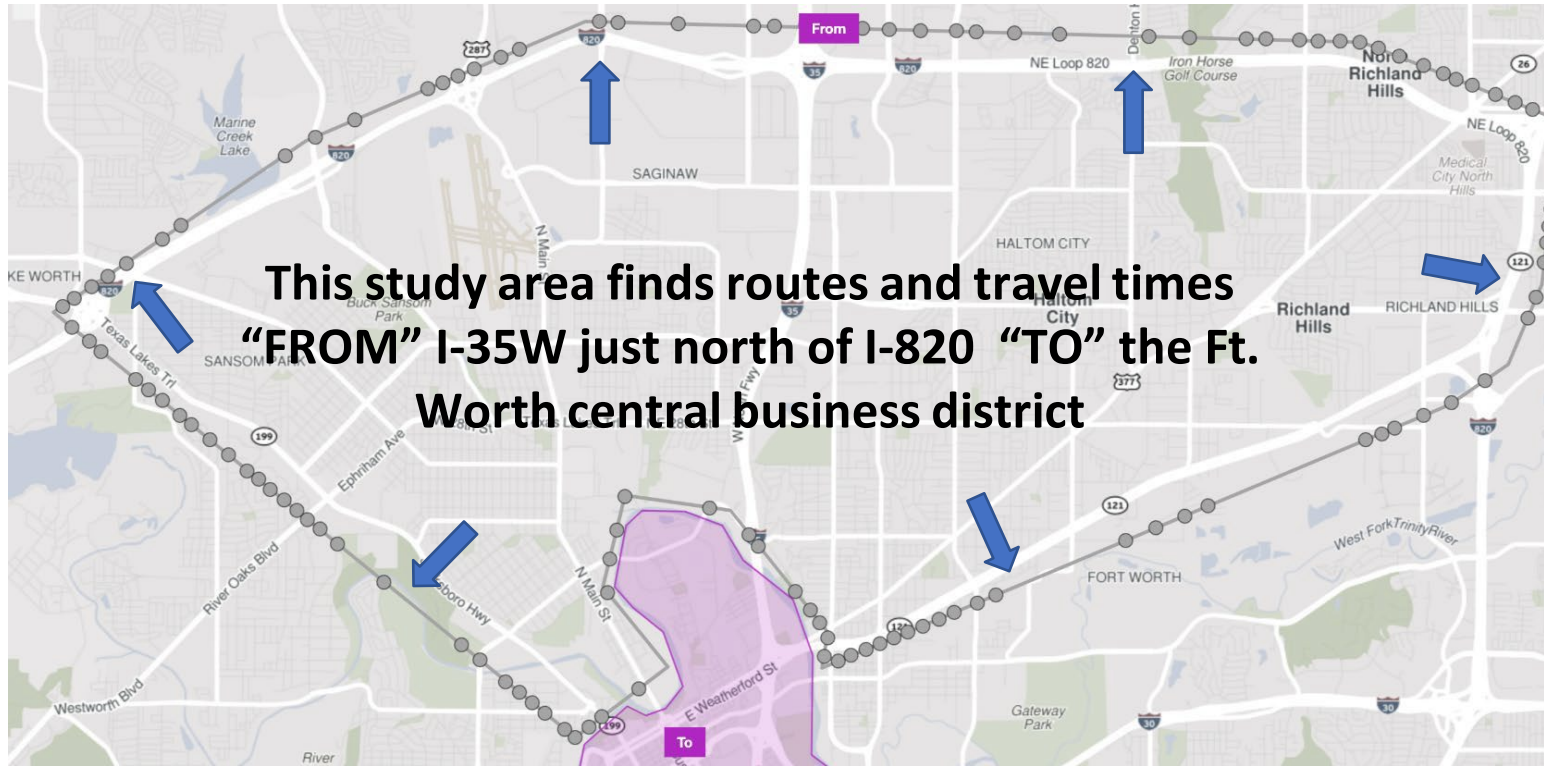
Ft. Worth Crash Analysis – Detour routes and travel times



a winter freeze we will never forget.

Ft. Worth Crash Analysis

- Recent sever weather event - Detour routes and travel times of traffic from SB I-35W just north of I-820 to Ft. Worth CBD



Fort Worth TTSA includin...

Study Area: Custom Geography

Spatial Filter: 2 custom areas in Texas ...



Data Set: Texas

Internal Zones: TAZs

Temporal Filter: 2/18/2021 – 2/25/2021

External Zones: OD gates

Other Filters: Vehicle type: all

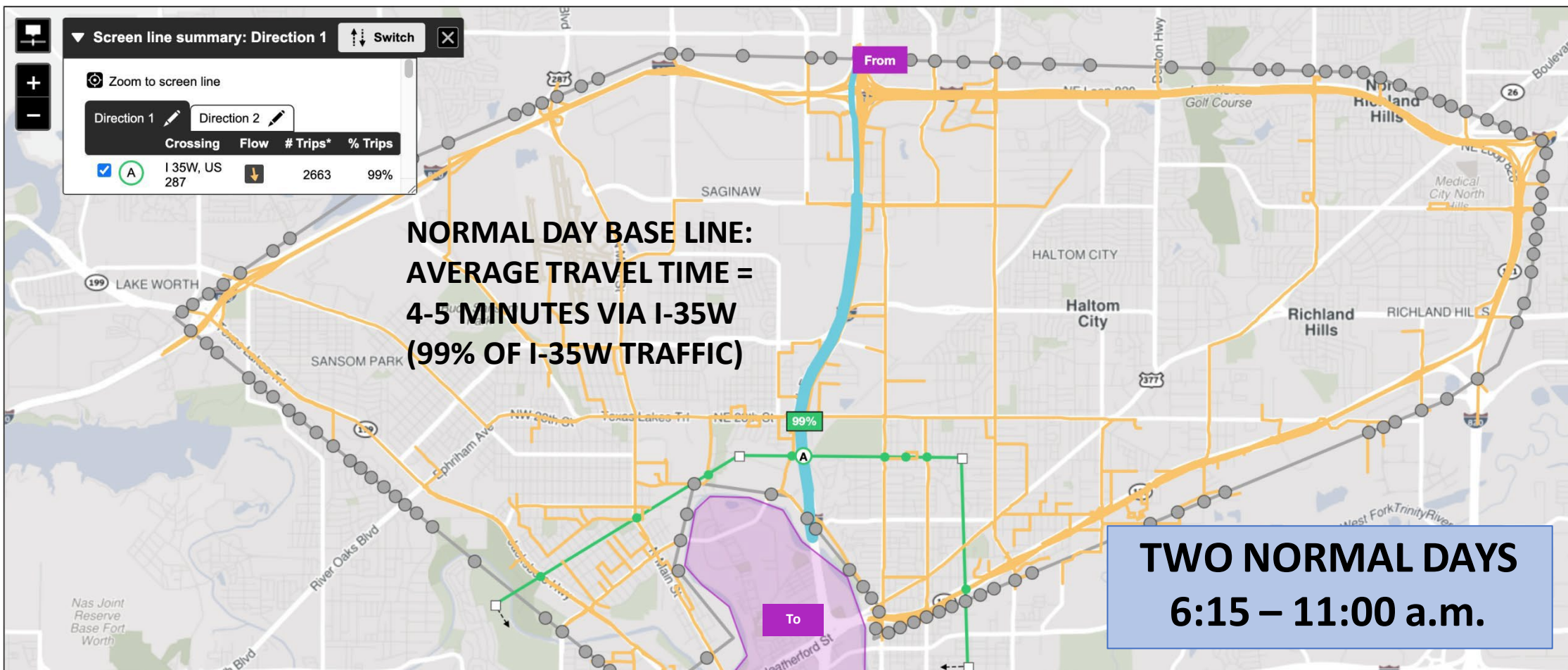
2,749 trips in 287 routes

Display Options

Open as...

Export

Map	Rank	Route	# of Trips	Light Vehicles	Medium Vehicles	Heavy Vehicles	Length	Avg TT	5% TT	50% TT	95% TT	Reliability
<input checked="" type="checkbox"/>	1	North Freeway, I 35W, US 287; I 35W, US 287	1246	1123	45	78	5 mi	5 m	4 m	5 m	6 m	1.1
<input checked="" type="checkbox"/>	2	I 35W TEXpress; North Freeway, I 35W, US 287; I 35W, US 287	1051	850	110	91	5 mi	4 m	3 m	4 m	6 m	1.17
<input checked="" type="checkbox"/>	3	North Freeway, I 35W, US 287; I 35W, US 287	25	23	2	0	10 mi	36 m	24 m	36 m	55 m	1.16
Total			2749	2341	213	195						



2 normal Thursdays after the crash day (Feb. 18 and 25, 0221) – 99% of sampled vehicles went straight through on I-35W

Fort Worth TTSA includin...

Study Area: Custom Geography

Spatial Filter: 2 custom areas in Texas ...



Data Set: Texas

Internal Zones: TAZs

Temporal Filter: 2/11/2021

External Zones: OD gates

Other Filters: Vehicle type: all

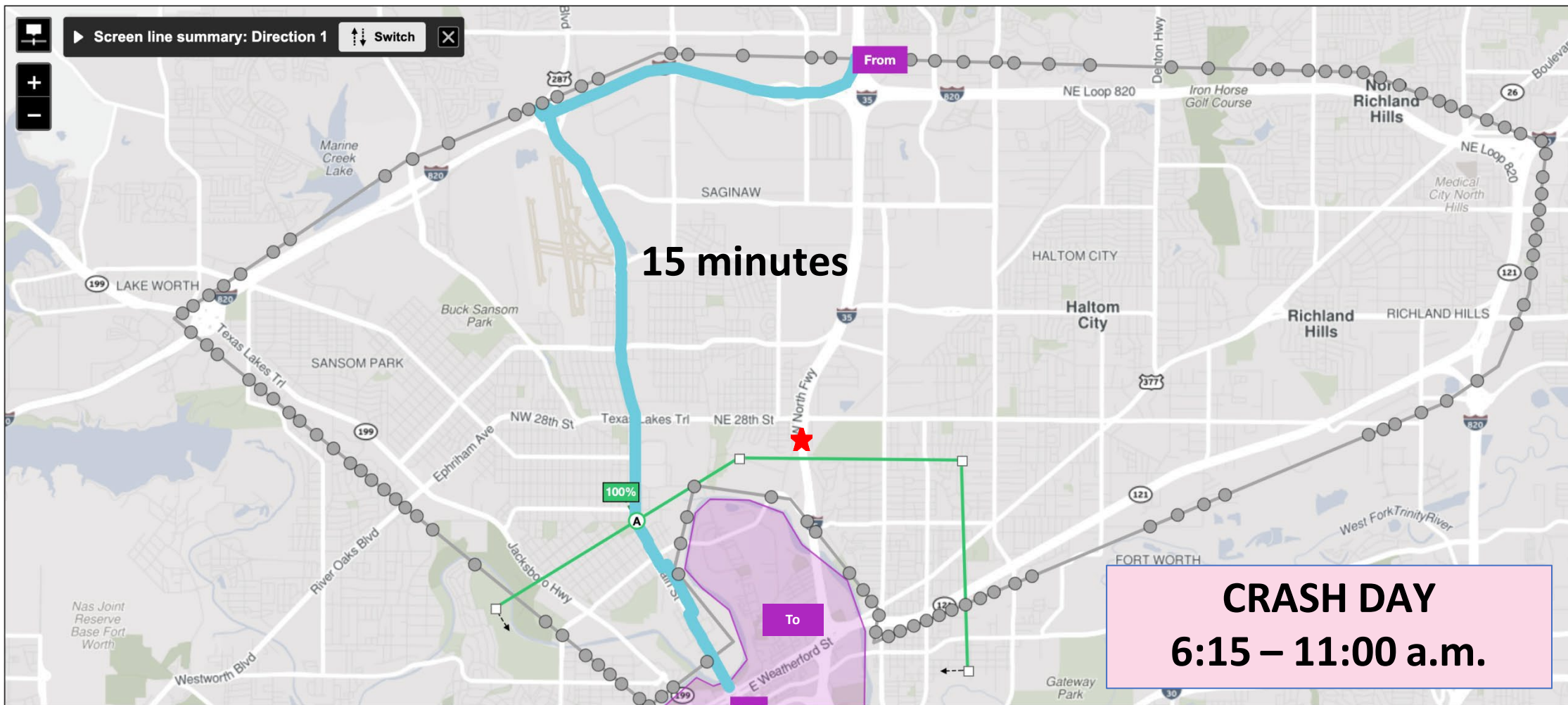
290 trips in 214 routes

Display Options

Open as...

Export

Map	Rank	Route	# of Trips	Light Vehicles	Medium Vehicles	Heavy Vehicles	Length	Avg TT	50% TT	95% TT	Reliability
<input type="checkbox"/>	1	Northeast Loop TEXpress; Northeast Loop, I 820; I 820, TX 121, TX 183; I 820, TX 121; Airport	12	5	0	7	15 mi	16 m	15 m	18 m	1.14
<input checked="" type="checkbox"/>	2	Jim Wright Freeway Northeast, I 820; North Main Street, US 287-P Business; Northeast 11th St	10	10	0	0	9 mi	15 m	15 m	17 m	1.07
<input checked="" type="checkbox"/>	3	Northeast Loop, I 820; I 820, TX 121, TX 183; I 820, TX 121; Airport Freeway, TX 121	8	6	0	2	15 mi	21 m	15 m	1 h 02 m	1.04
Total			290	251	15	24					



Fort Worth TTSA includin...

Study Area: Custom Geography

Spatial Filter: 2 custom areas in Texas ...



Data Set: [Texas](#)

Internal Zones: TAZs

Temporal Filter: 2/11/2021

External Zones: OD gates

Other Filters: Vehicle type: all

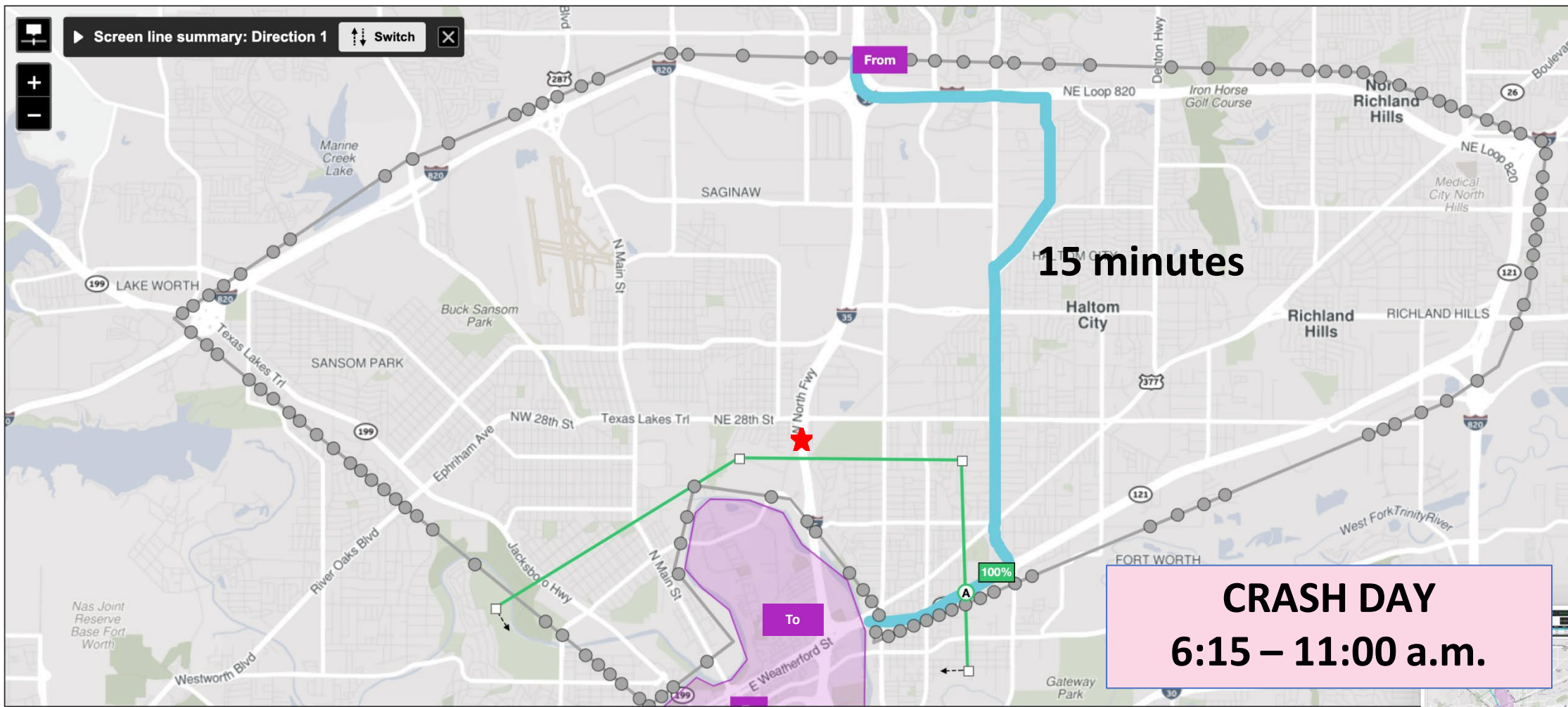
290 trips in 214 routes

Display Options

Open as...

Export

Map	Rank	Route	# of Trips	Light Vehicles	Medium Vehicles	Heavy Vehicles	Length	Avg TT	50% TT	95% TT	Reliability
<input checked="" type="checkbox"/>	4	▶ North Freeway, I 35W, US 287; I 35W, US 287; North Freeway; Northeast 28th Street, TX 183;	7	7	0	0	8 mi	21 m	17 m	36 m	1.42
<input checked="" type="checkbox"/>	5	▶ Northeast Loop, I 820; Northeast Loop 820 Service Road South; Anderson Boulevard; Old Den	5	4	1	0	8 mi	15 m	15 m	16 m	1.02
<input checked="" type="checkbox"/>	6	▶ Northeast Loop TEXpress; Northeast Loop 820 Service Road South; Denton Highway, US 377;	5	4	0	1	10 mi	17 m	17 m	18 m	1.03
Total			290	251	15	24					



Fort Worth TTSA includin... Study Area: Custom Geography Spatial Filter: 2 custom areas in Texas ...

Data Set: Texas Internal Zones: TAZs Temporal Filter: 2/11/2021

External Zones: OD gates Other Filters: Vehicle type: all

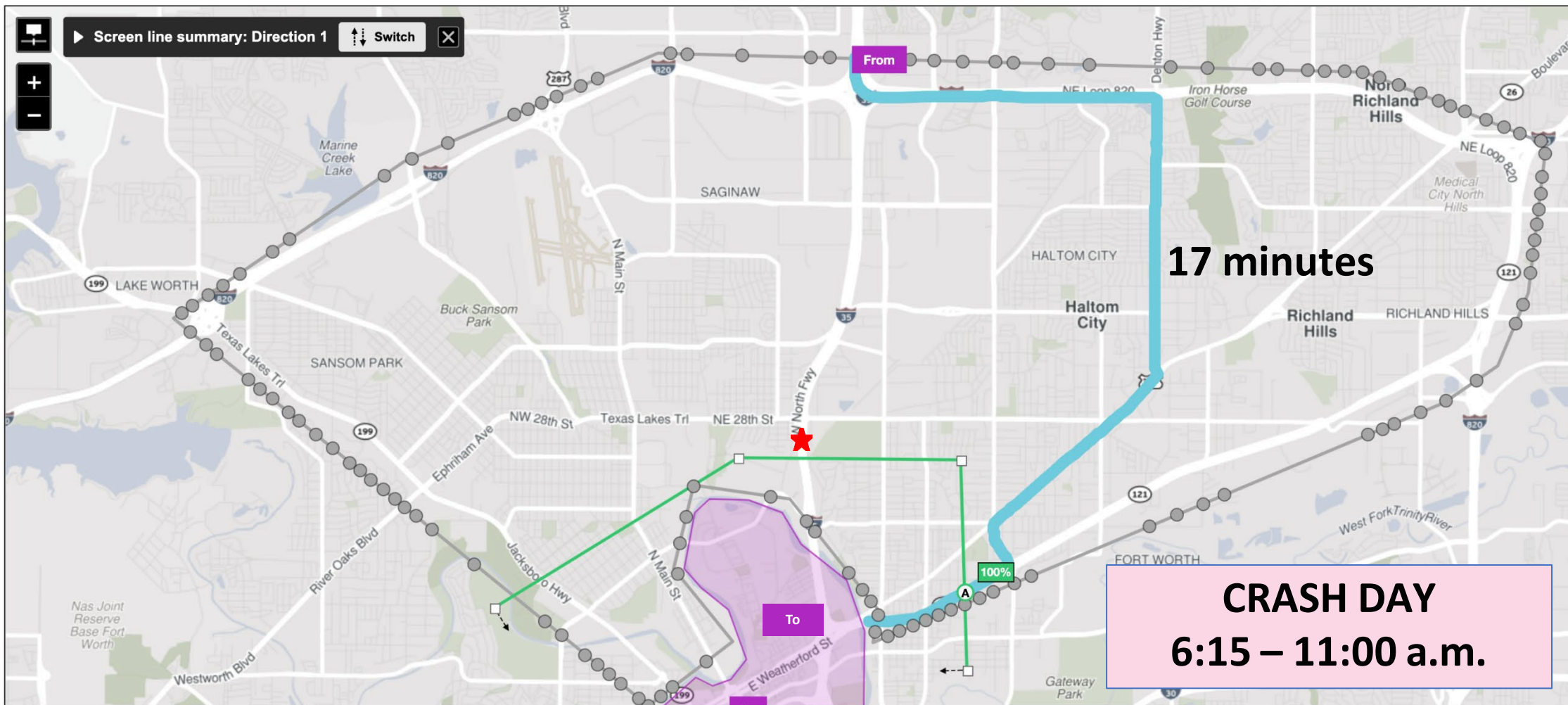
290 trips in 214 routes

Display Options

Open as...

Export

Map	Rank	Route	# of Trips	Light Vehicles	Medium Vehicles	Heavy Vehicles	Length	Avg TT	50% TT	95% TT	Reliability
<input checked="" type="checkbox"/>	8	▶ Jim Wright Freeway Northeast, I 820; North Main Street, US 287-P Business; West Northside C	4	4	0	0	10 mi	18 m	17 m	21 m	1.26
<input checked="" type="checkbox"/>	9	▶ North Freeway, I 35W, US 287; I 35W, US 287; North Freeway; Northeast 28th Street, TX 183;	4	4	0	0	5 mi	10 m	10 m	12 m	1.21
<input checked="" type="checkbox"/>	10	▶ Northeast Loop, I 820; Northeast Loop 820 Service Road South; Denton Highway, US 377; Bell	4	4	0	0	10 mi	17 m	17 m	20 m	1.18
Total			290	251	15	24					



Fort Worth TTSA includin...

Study Area: Custom Geography

Spatial Filter: 2 custom areas in Texas ...



Data Set: Texas

Internal Zones: TAZs

Temporal Filter: 2/11/2021

External Zones: OD gates

Other Filters: Vehicle type: all

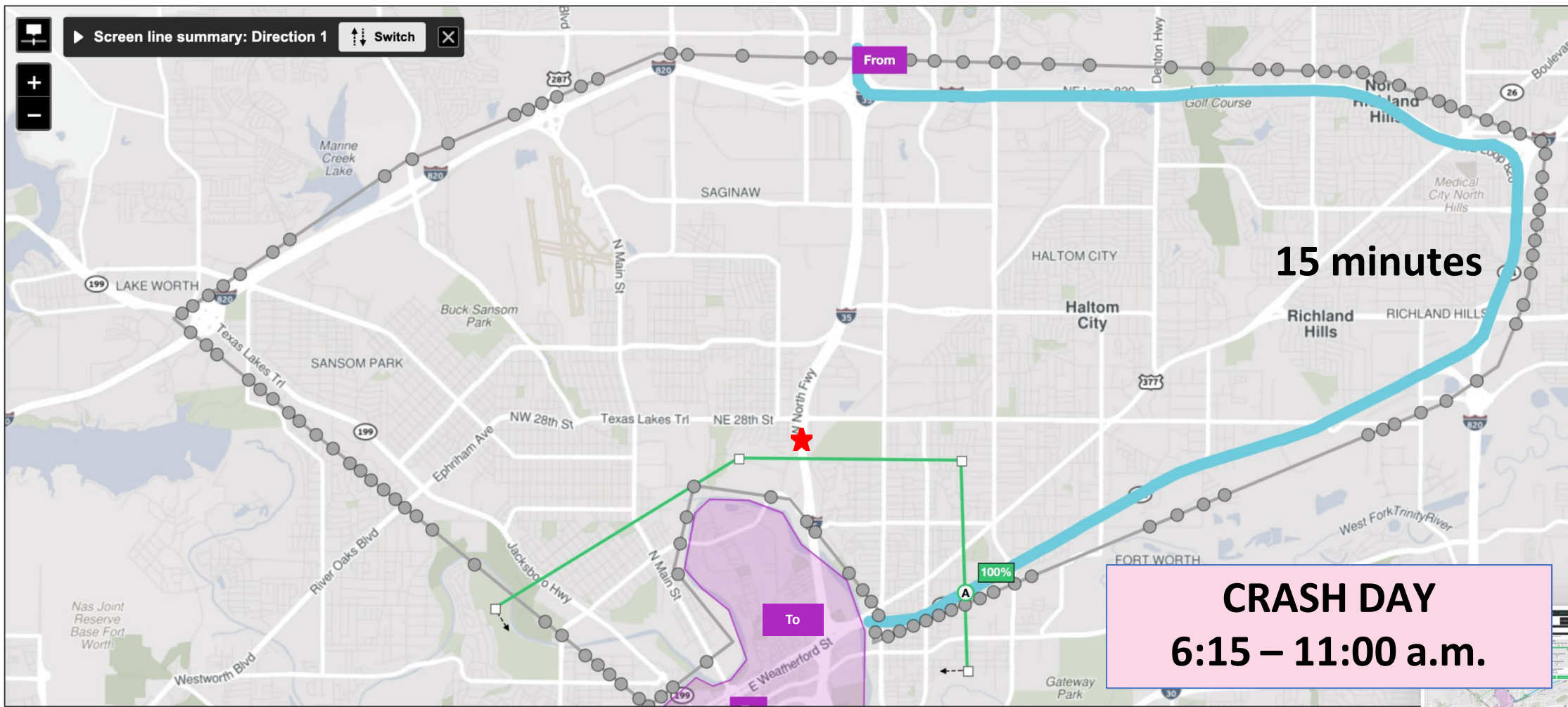
290 trips in 214 routes

Display Options

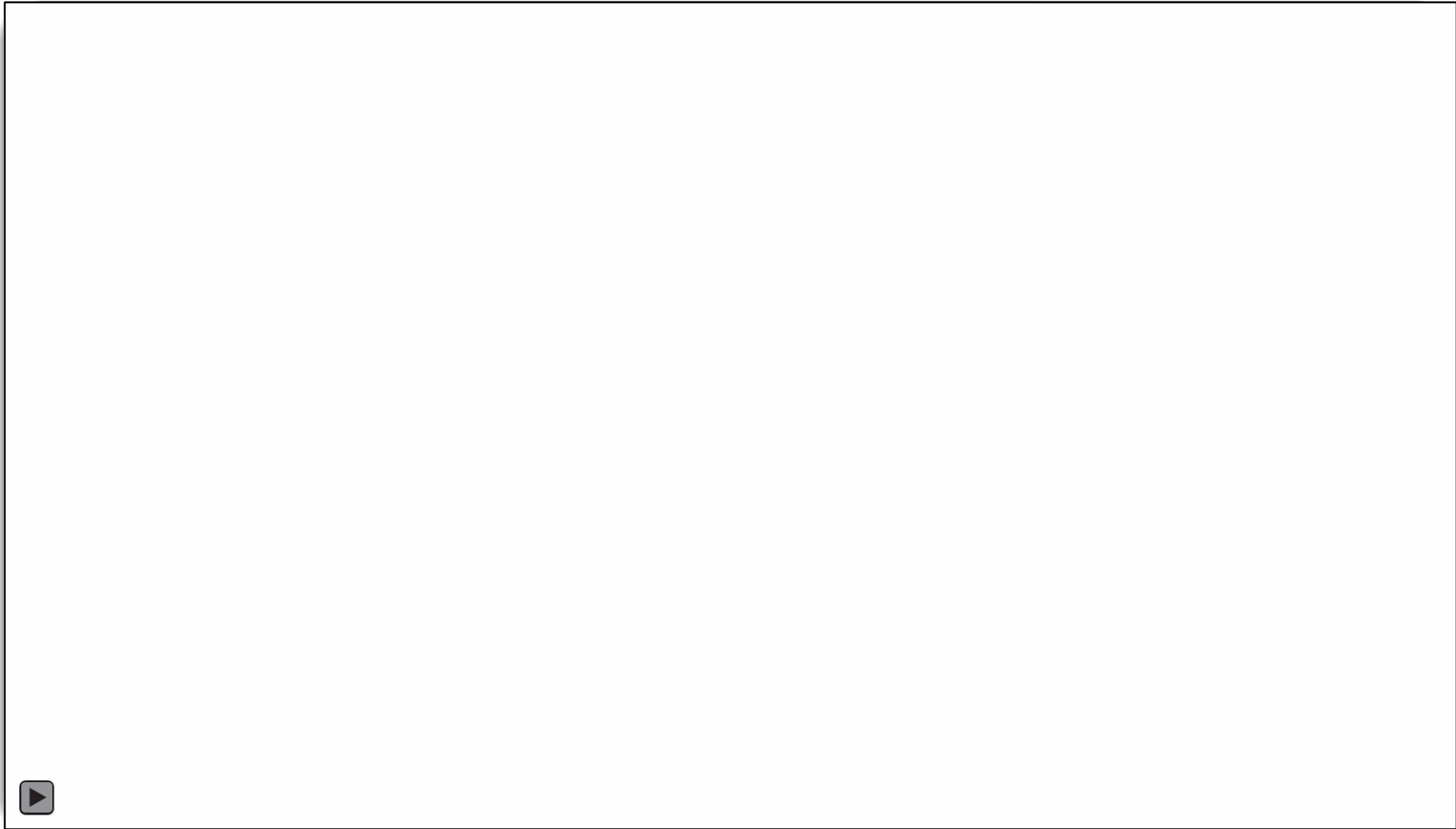
Open as...

Export

Map	Rank	Route	# of Trips	Light Vehicles	Medium Vehicles	Heavy Vehicles	Length	Avg TT	5%	50% TT	95% TT	Reliability
<input checked="" type="checkbox"/>	1	Northeast Loop TEXpress; Northeast Loop, I 820; I 820, TX 121, TX 183; I 820, TX 121; Airport	12	5	0	7	15 mi	16 m	14 m	15 m	18 m	1.14
<input checked="" type="checkbox"/>	2	Jim Wright Freeway Northeast, I 820; North Main Street, US 287-P Business; Northeast 11th St	10	10	0	0	9 mi	15 m	13 m	15 m	17 m	1.07
<input checked="" type="checkbox"/>	3	Northeast Loop, I 820; I 820, TX 121, TX 183; I 820, TX 121; Airport Freeway, TX 121	8	6	0	2	15 mi	21 m	13 m	15 m	1 h 02 m	1.04
Total			290	251	15	24						

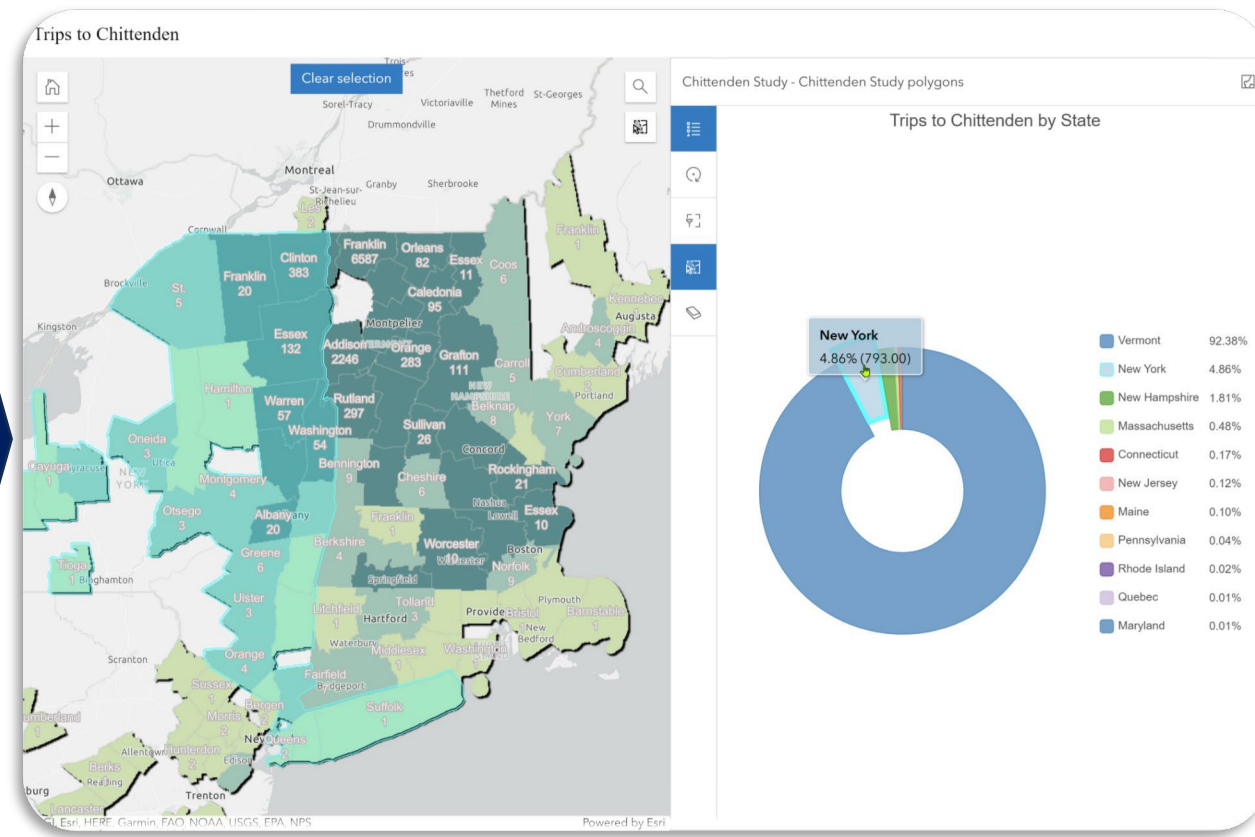
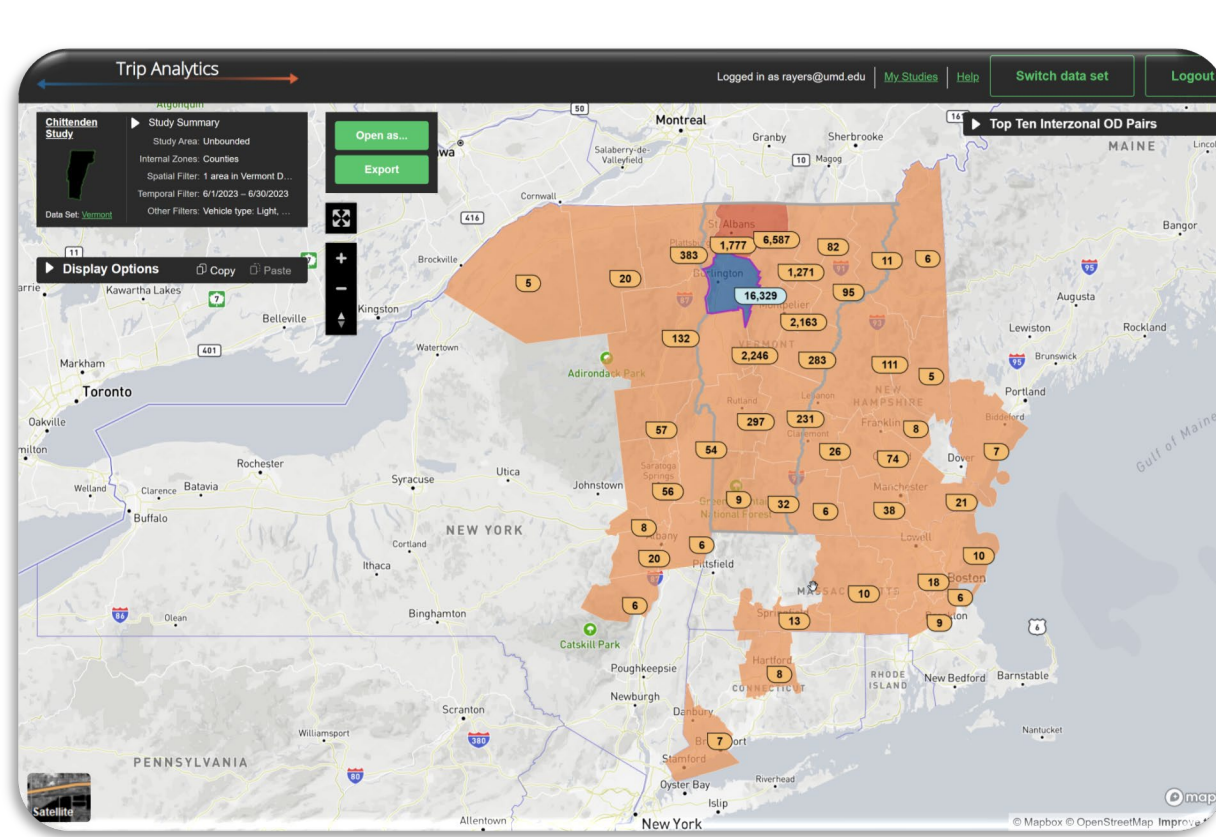


I-10 Bridge Fire in Los Angeles – Nov. 2023



Interstate Travel into Burlington, VT

- What percentage of trips into Burlington originate from out of Vermont during the month of June 2023?
- Illustration of GIS integration with Esri ArcGIS Online



<https://go.umd.edu/Vermont>

Trip Analytics applications for Operations

- Plan for major construction, detour, or regional event
- Make a contingency plan for major emergency
- Show the need for a ramp meter, or evaluate its effectiveness
- Conduct a post-mortem review of a major incident or event
- Document truck route compliance near neighborhoods
- Make the case for a new investment in ITS infrastructure
- Document the benefits of prior investments



Trip Analytics applications for Planning

- Understand the intricacies of regional traffic patterns
- Calibrate or validate travel demand models
- Provide information and basic data for major investment studies
- Evaluate potential sites for:
 - Terminals
 - Transit stops
 - Park-n-rides
 - EV charging stations and more
- Prioritize proposed or existing transportation improvement projects
- Quantify and document the benefits of infrastructure investments



Questions and Answers

The RITIS logo features the word "RITIS" in a blue, serif font. Above the letter "I" are three curved lines of increasing size, resembling a signal or Wi-Fi icon, colored in a gradient from yellow to orange.

RITIS

The QATT LABORATORY logo consists of a stylized white "Q" followed by the word "ATT" in a bold, sans-serif font, with "LABORATORY" in a smaller, all-caps sans-serif font below it.

QATT
LABORATORY

The background of the slide is a photograph of a wet street at night. The wet pavement reflects the lights from cars and street lamps, creating a bokeh effect of out-of-focus light spots in various colors like blue, yellow, and white. The overall scene is dark, with the lights providing the primary illumination.

**REGIONAL INTEGRATED
TRANSPORTATION INFORMATION SYSTEM**

RITIS - Trip Analytics Resources

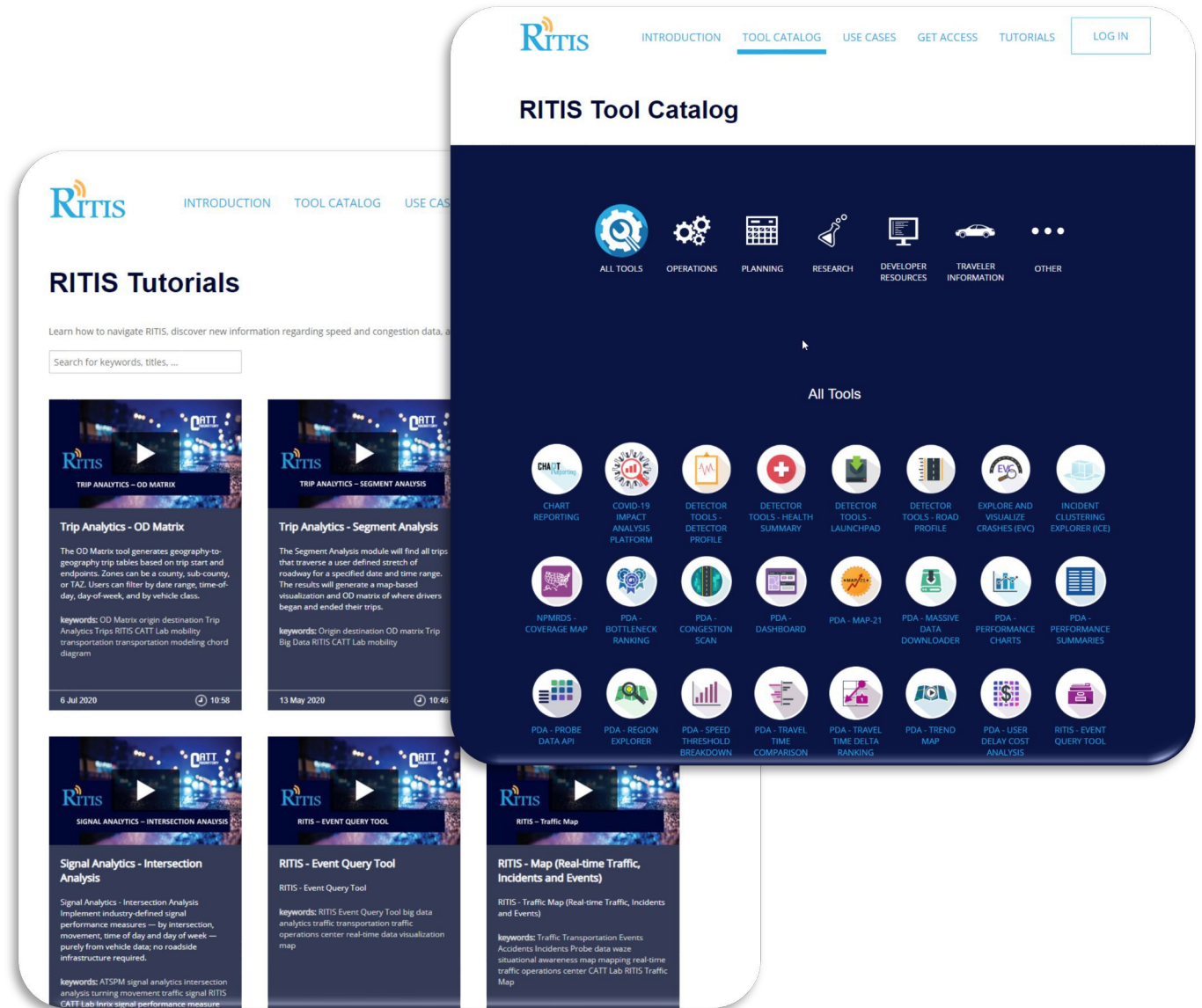
Trip Analytics Workshop

- <https://www.youtube.com/watch?v=fMHX4CAuDnA>



RITIS Tutorials

- <https://ritis.org/tutorials>



The image displays two overlapping screenshots of the RITIS website. The top screenshot shows the 'RITIS Tool Catalog' page, which features a navigation menu with 'INTRODUCTION', 'TOOL CATALOG', 'USE CASES', 'GET ACCESS', 'TUTORIALS', and 'LOG IN'. Below the navigation is a grid of tool icons categorized into 'ALL TOOLS', 'OPERATIONS', 'PLANNING', 'RESEARCH', 'DEVELOPER RESOURCES', 'TRAVELER INFORMATION', and 'OTHER'. The 'All Tools' section lists various tools such as 'CHART REPORTING', 'COVID-19 IMPACT ANALYSIS PLATFORM', 'DETECTOR TOOLS - DETECTOR PROFILE', 'DETECTOR TOOLS - HEALTH SUMMARY', 'DETECTOR TOOLS - LAUNCHPAD', 'DETECTOR TOOLS - ROAD PROFILE', 'EXPLORE AND VISUALIZE CRASHES (EVC)', 'INCIDENT CLUSTERING EXPLORER (ICE)', 'NPMRDS - COVERAGE MAP', 'PDA - BOTTLENECK RANKING', 'PDA - CONGESTION SCAN', 'PDA - DASHBOARD', 'PDA - MAP-21', 'PDA - MASSIVE DATA DOWNLOADER', 'PDA - PERFORMANCE CHARTS', 'PDA - PERFORMANCE SUMMARIES', 'PDA - PROBE DATA API', 'PDA - REGION EXPLORER', 'PDA - SPEED THRESHOLD BREAKDOWN', 'PDA - TRAVEL TIME COMPARISON', 'PDA - TRAVEL TIME DELTA RANKING', 'PDA - TREND MAP', 'PDA - USER DELAY COST ANALYSIS', and 'RITIS - EVENT QUERY TOOL'.

The bottom screenshot shows the 'RITIS Tutorials' page, which includes a search bar and a grid of video thumbnails. The thumbnails are titled 'Trip Analytics - OD Matrix', 'Trip Analytics - Segment Analysis', 'Signal Analytics - Intersection Analysis', 'RITIS - Event Query Tool', and 'RITIS - Traffic Map'. Each thumbnail includes a brief description of the tool and its keywords.

Thank You!



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