

STARS

STRATEGICALLY TARGETED AND
AFFORDABLE ROADWAY SOLUTIONS

MPO Technical Meeting

1. US 29 Corridor: Hydraulic Rd to Woodbrook Rd
2. US 29/250 Bypass Interchange with Emmet St

August 5, 2025



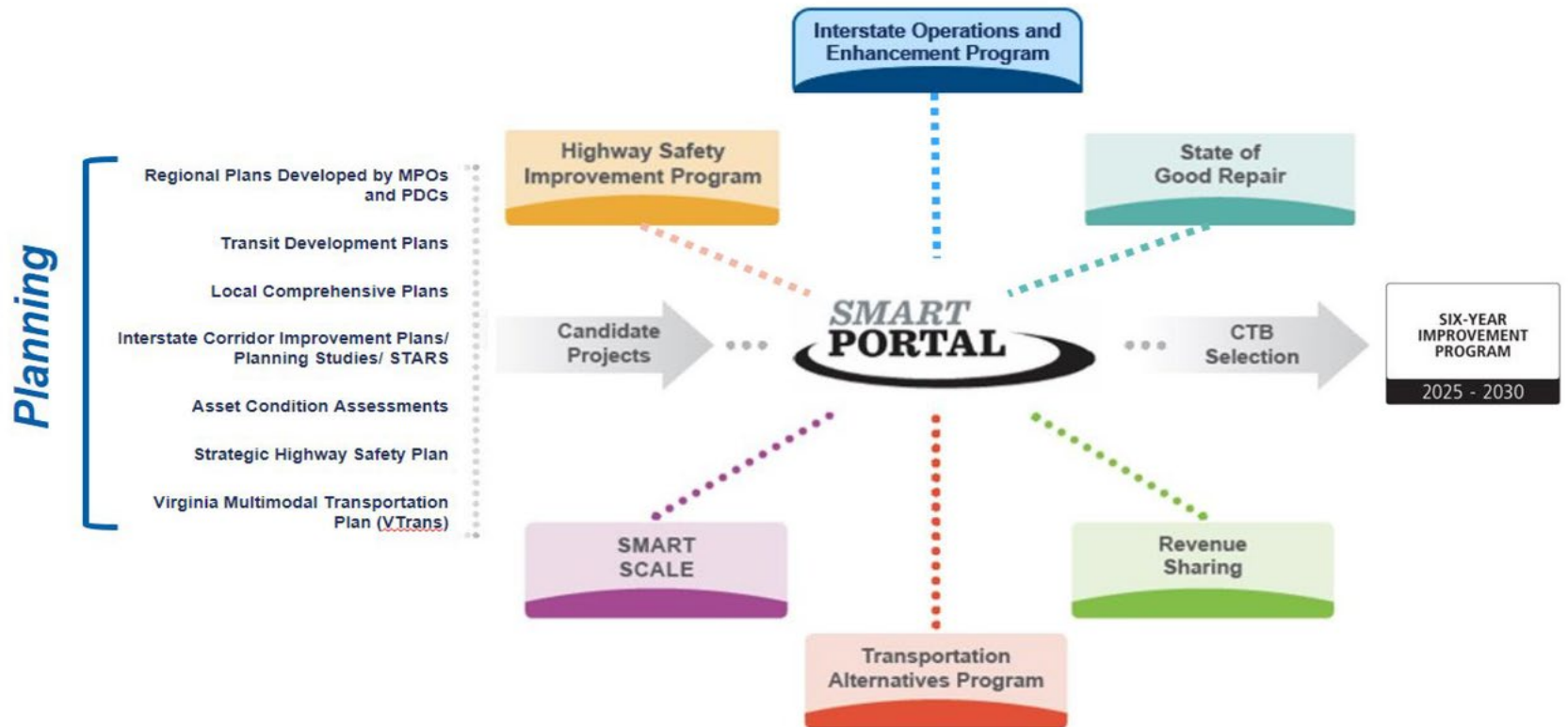
AGENDA

- **What is STARS?**
- **Study #1: US 29 Corridor: Hydraulic Rd to Woodbrook Rd**
- **Study #2: US 29/250 Bypass Interchange with Emmet St**
- **Bike/Ped Red Flag Analysis (both studies)**
- **Transit Component (both studies)**
- **Next Steps**
- **Schedule**

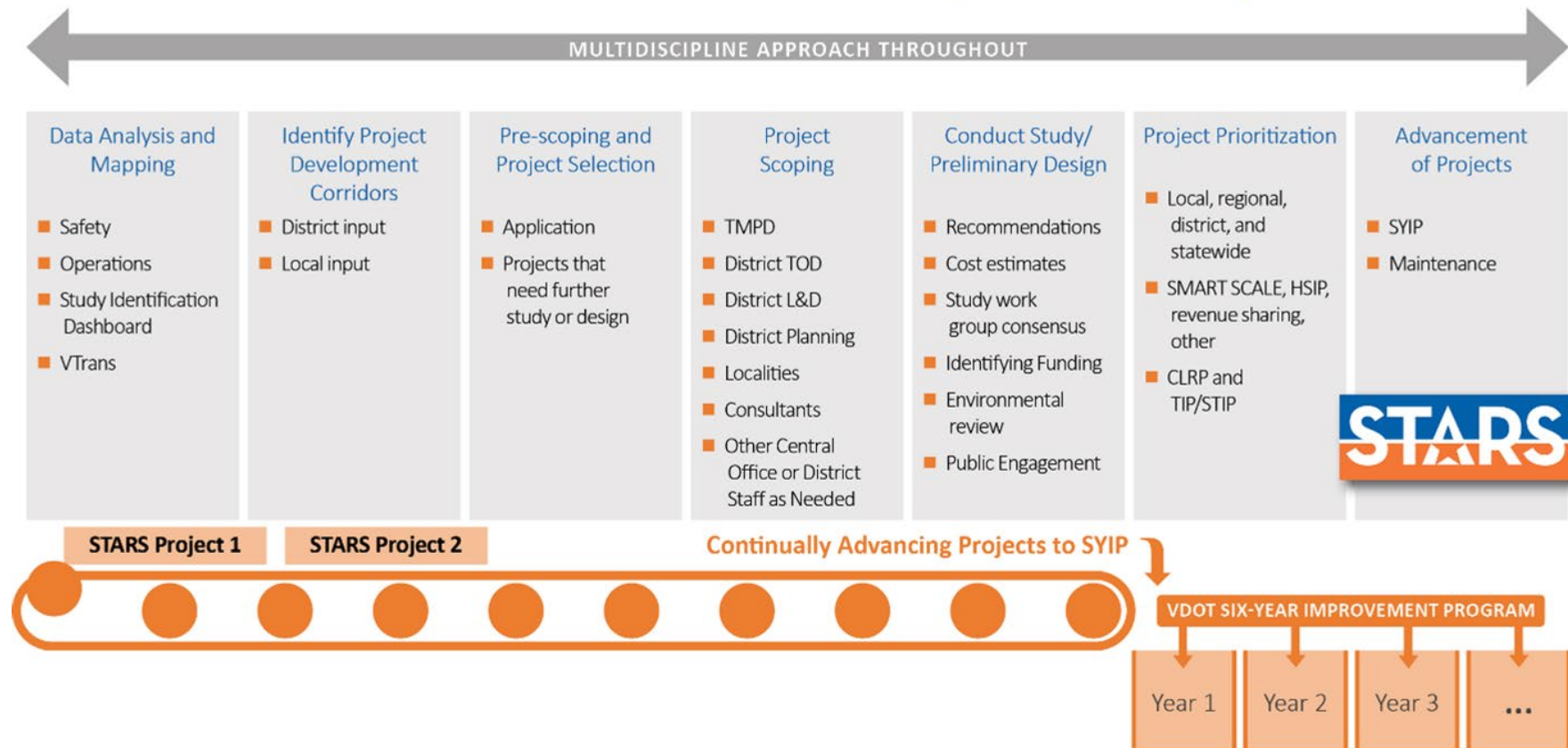
WHAT IS STARS?

The objective of STARS (**Strategically Targeted Affordable Roadway Solutions**) Program is to develop comprehensive and innovative multimodal transportation solutions to address congestion and safety challenges in the Commonwealth.

- Analyze safety needs
- Support economic development in area
- Develop recommendations for future funding (HSIP, SMART Scale, other)



WHAT IS STARS (STRATEGICALLY TARGETED AFFORDABLE ROADWAY SOLUTIONS)?



STUDY #1

US 29 CORRIDOR: HYDRAULIC RD TO WOODBROOK RD

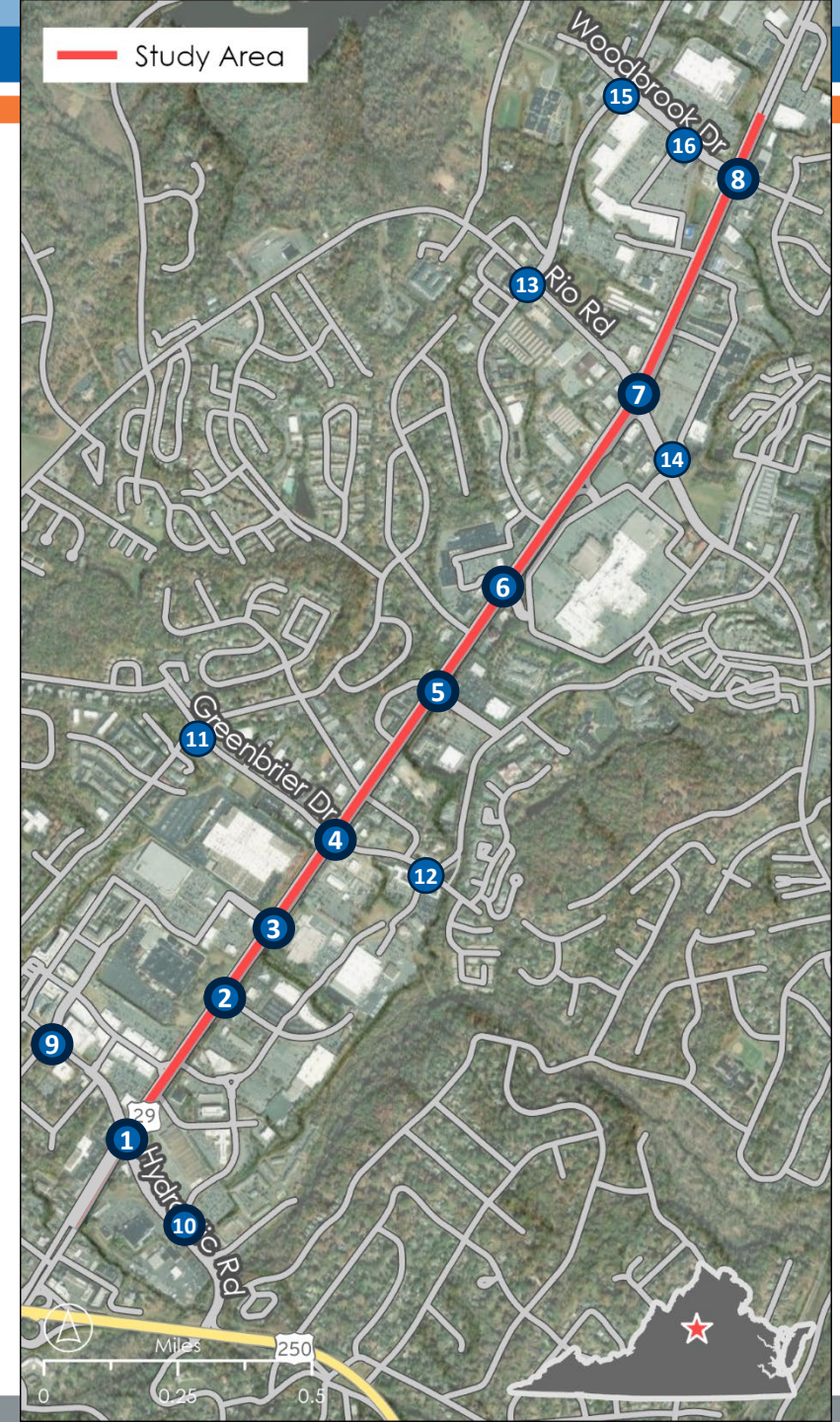
① Data Collection (TMCs) on US 29:

1. Hydraulic Road
2. Seminole Court
3. Lenox Avenue
4. Greenbrier Drive
5. Branchlands Boulevard
6. Fashion Square Drive
7. Rio Road
8. Woodbrook Drive
9. Hydraulic Rd and District Ave/Cedar Hill Rd
10. Hydraulic Rd and Hillsdale Dr

⑪ Supporting Data Collection (TMCs) :

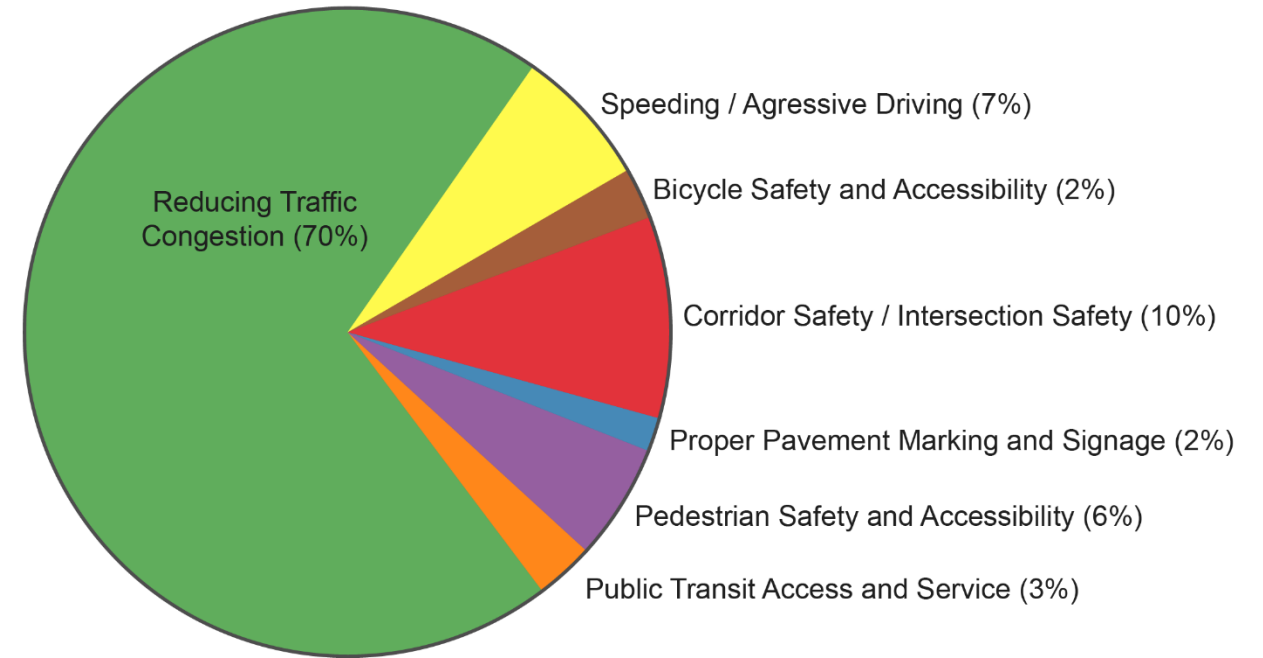
11. Greenbrier Dr and Commonwealth Dr
12. Greenbrier Dr and Hillsdale Dr
13. Rio Rd and Berkmar Dr
14. Rio Rd and Fashion Square Dr
15. Woodbrook Rd and Berkmar Dr
16. Woodbrook Rd and Rio Hill Center

48-hr tube counts were also be collected.



SURVEY RESULTS - COMBINED (BOTH STUDIES)

- **Over 2,300 participants**
- **Top Five Priorities:**
 - Reducing traffic congestion
 - Corridor/intersection safety
 - Ped/Bike safety and accessibility
 - Speeding/aggressive driving
 - Proper pavement marking, signage
 - Public transit access and service



STATEWIDE & LOCALLY IDENTIFIED NEEDS

- **VTrans**
- **PBSAP – US 29 is a PSAP corridor**
- **PSI – Several PSI locations**
- **Pedestrian connectivity (US 29 crossings)**
- **Enhanced Transit**

2023 Mid-Term Needs



Capacity Preservation



Bike & Pedestrian Access



Transit Access



Transportation Demand Management



Pedestrian Safety Improvement



Rail On-Time Performance

EXISTING CONDITIONS — WHAT WE FOUND

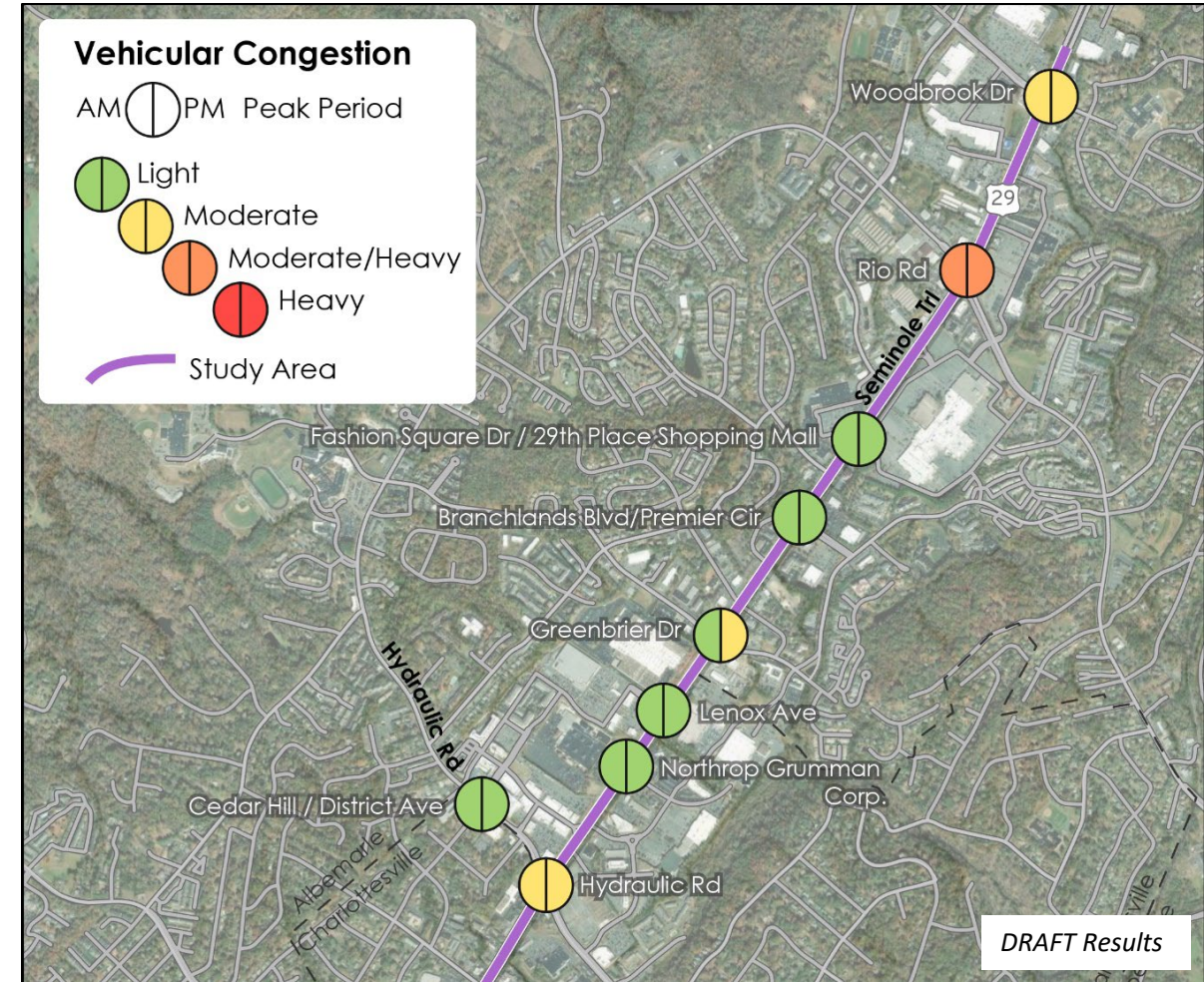
- Operations
- Safety
- Pedestrian and Cyclist Accessibility



OPERATIONS

■ Results Summary

- Overall congestion is Light-to-Moderate/Heavy
- Signal timings are sufficient along US 29 - Queue lengths along are long but vehicles typically clear intersection in one cycle
- Delays and queues are mostly associated with minor movements from side streets
- There are some turning on US 29 mainline with more delay and queues



EXISTING CONDITIONS SAFETY

■ Identified PSI Intersections:

- Woodbrook Drive
- Greenbrier Drive
- Seminole Court
- Hydraulic Road

■ Identified Fatal & Injury Crash Factors:

- Speed differentials for rear-ends
- High density of access points
- Congestion throughout the day
- Rear-ends more concentrated along northbound direction
- More angle crashes involving southbound movements



CRASH SUMMARY (2019-2023)

Woodbrook Drive

- 106 crashes
 - Congestion
 - Weaving
 - Red-light running

Rio Road

- 75 crashes
 - Highest density at overpass & ramps
 - Underpass – weaving

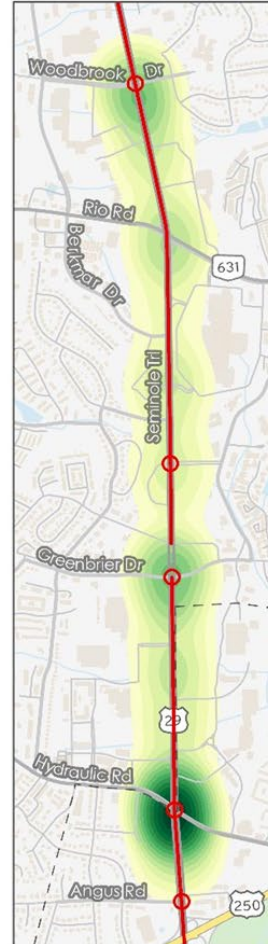
Greenbrier Drive

- 98 crashes
 - Congestion
 - Lane utilization
 - Red-light running
 - 2 Ped incidents

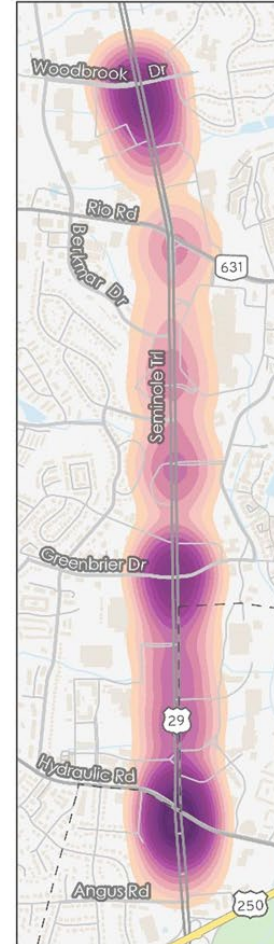
Bicycle/Pedestrian Crashes

- PBSAP corridor
- 9 crashes, injury (88%)

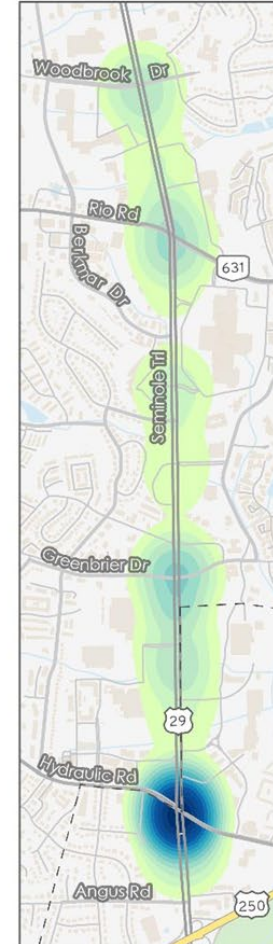
All Crashes



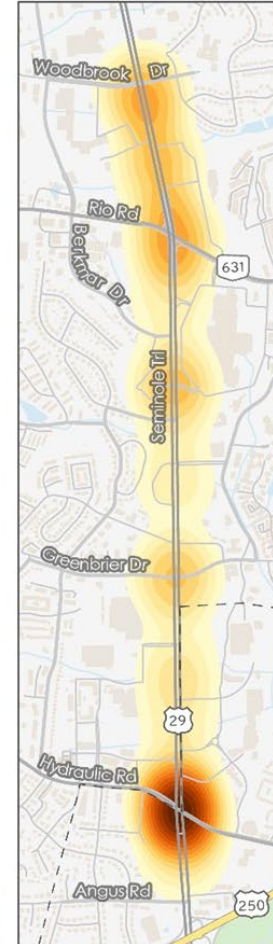
Rear End Crashes



Angle Crashes



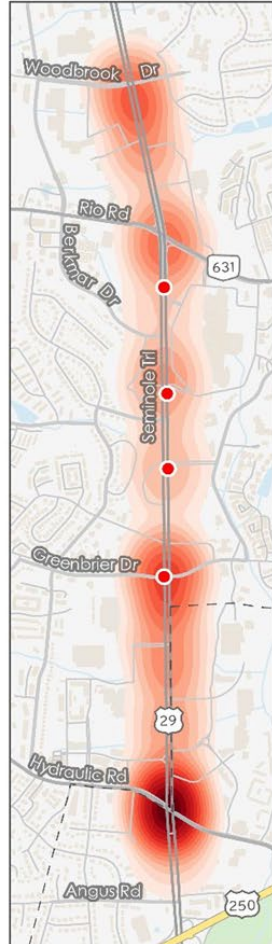
Lane Departure Crashes



Injury Crashes



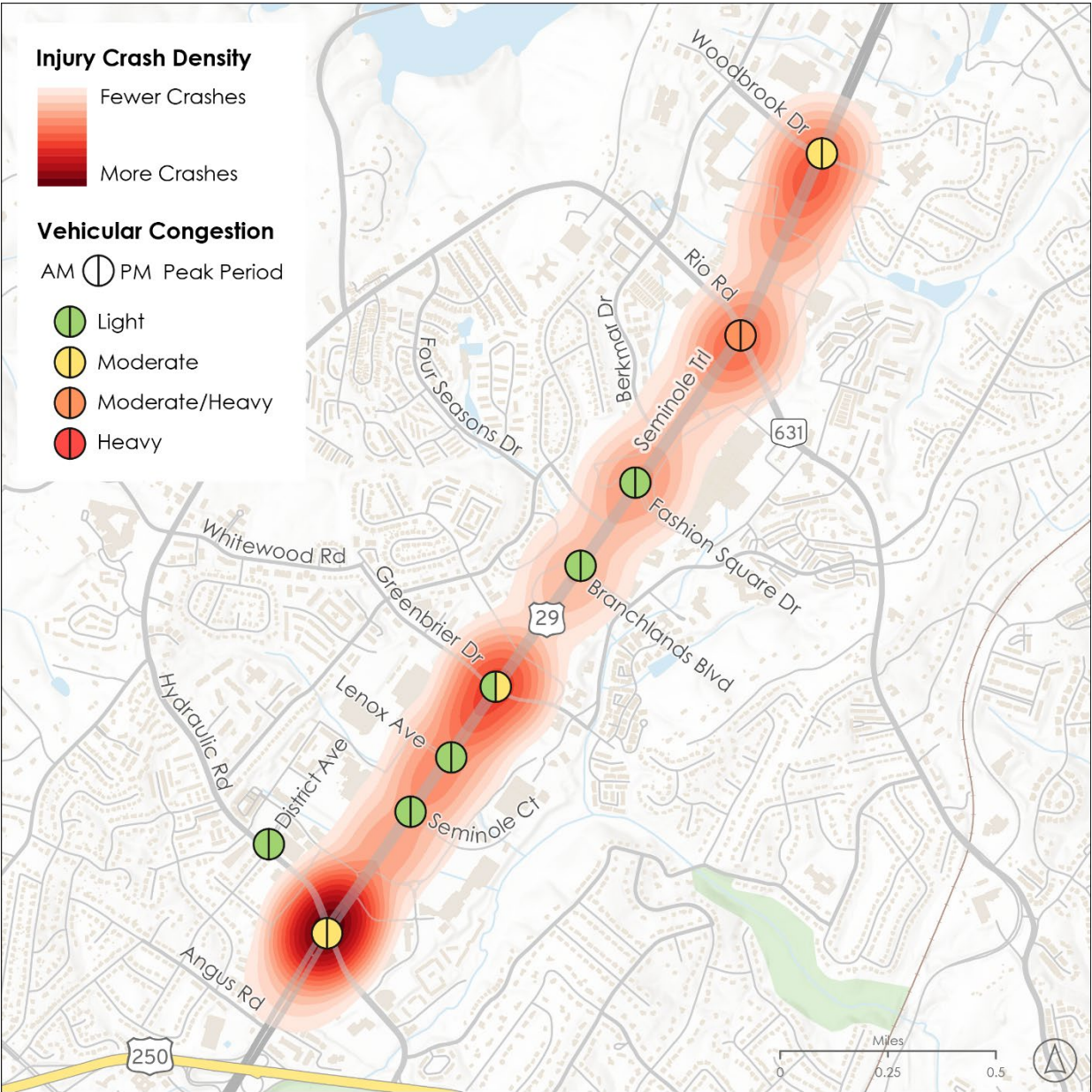
● Fatal Crash



US 29 CORRIDOR FATAL CRASH REVIEW

- **Four fatal crashes between 2019-2023**
- **2 pedestrian fatalities; both crossing US 29 at midblock/unmarked locations (1 near Rio Road involved alcohol)**
 - All occurred during evening hours
- **1 fatal angle crash at Greenbrier Dr; involved alcohol and wet, dark conditions**
 - NBL and SBT; SB thru ran red light
- **Rear-end crash at Branchlands Blvd**
 - Listed in police report that witnesses observed at-fault driver appeared to be having medical emergency; later succumbed to injuries
 - Occurred during the middle of the day

OPERATIONS VS INJURY CRASHES



BICYCLE AND PEDESTRIAN SUMMARY

- **Sidewalk network throughout corridor, no missing segments**
- **Few crosswalks across US 29 throughout corridor; only present at following intersections:**
 - Angus Road
 - Greenbrier Road
 - Rio Road
 - Woodbrook
 - Funded pedestrian bridge in vicinity of Zan Road
- **Observed pedestrians crossing US 29 at unmarked locations**
- **No shared-use path north of Angus Road; bicyclists use travel lanes**
- **Nine pedestrian crashes during analysis period (2019-2023)**
 - Four occurred at mid-block locations
 - Two fatal crashes occurred between Fashion Square Drive, Rio Road



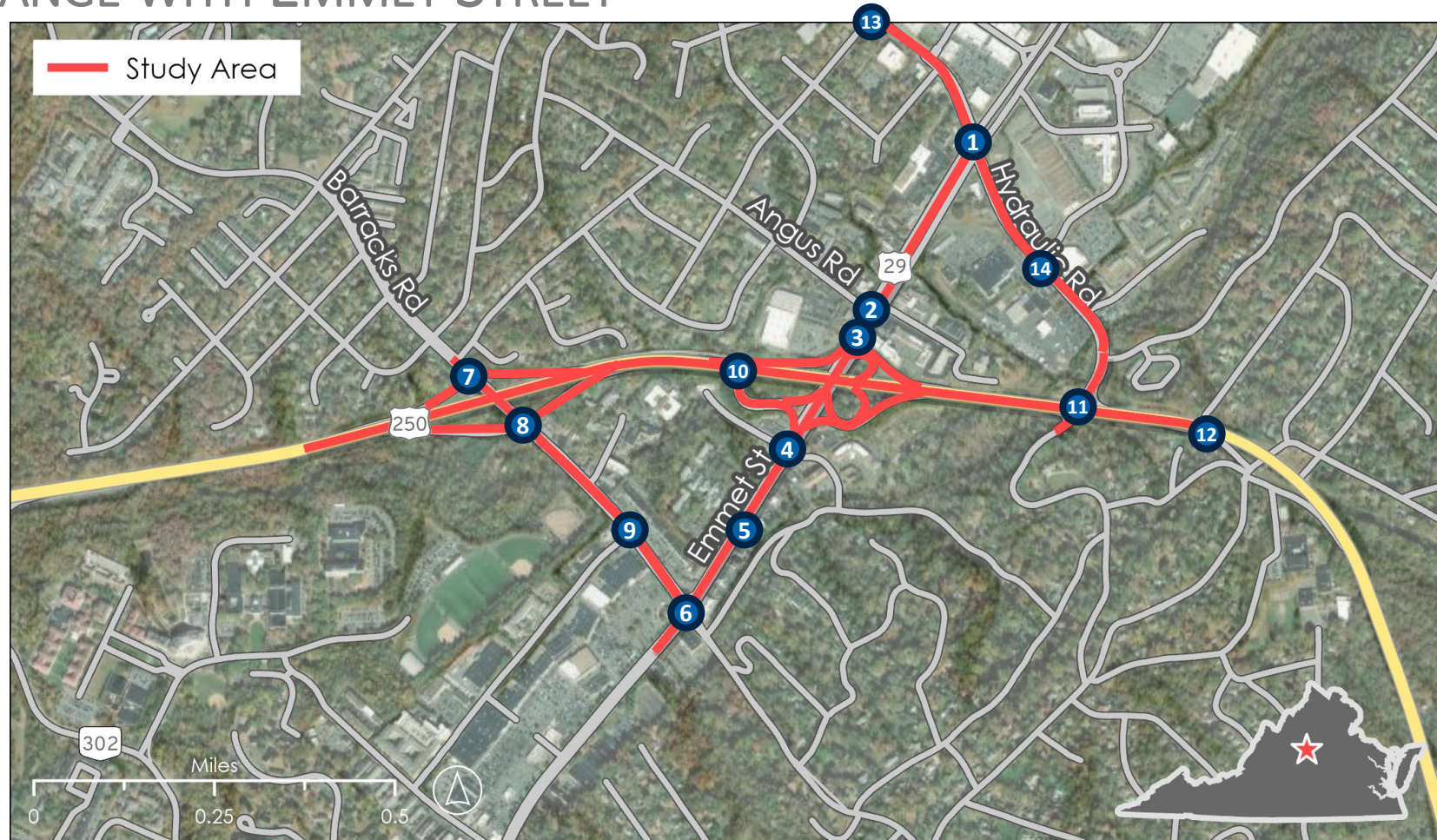
STUDY #2

US 29/250 BYPASS INTERCHANGE WITH EMMET STREET

Data TMCs Collection:

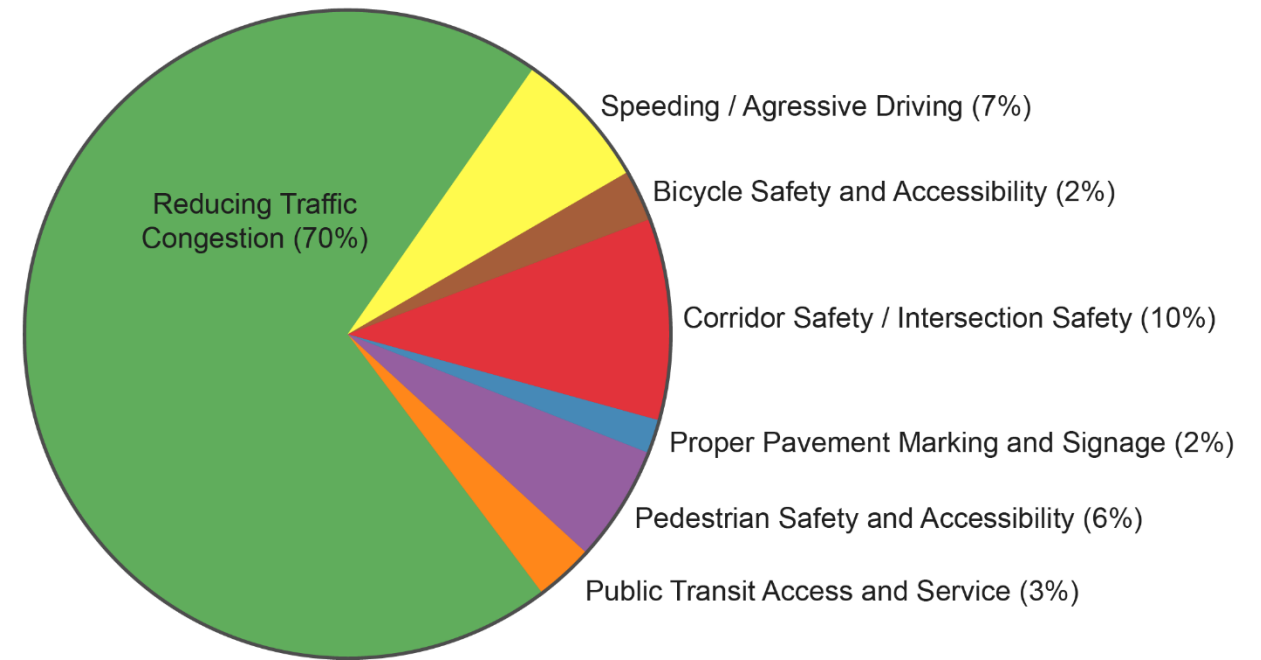
1. US 29 and Hydraulic Road
2. US 29 and Angus Road
3. US 29 and US29/250 Bypass WB ramps
4. Emmet St and Earhart St/Morton Dr
5. Emmet St and Entrance to Fed Exec Institute
6. Emmet St and Barracks Rd
7. Barracks Rd and US29/250 Bypass WB ramps
8. Barracks Rd and US29/250 Bypass EB ramps
9. Barracks Rd and Millmont St
10. US29/250 Bypass and Ramp to SB Emmet St
11. Hydraulic Road and US29/250 Bypass
12. US29/250 Bypass and Ramp to Dairy Rd
13. Hydraulic Road and District Ave
14. Hydraulic Road and Hillsdale Dr

48-hr tube counts will also be collected.



SURVEY RESULTS – COMBINED (BOTH STUDIES)

- **Over 2,300 participants**
- **Top Five Priorities:**
 - Reducing traffic congestion
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 - Ped/Bike safety and accessibility
 - Speeding/aggressive driving
 - Proper pavement marking, signage
 - Public transit access and service



STATEWIDE & LOCALLY IDENTIFIED NEEDS

- **VTrans**
- **PBSAP – Emmet Street is a PSAP corridor**
- **PSI – Several PSI segments**
- **Enhanced Transit**

2023 Mid-Term Needs



Capacity Preservation



Bike & Pedestrian Access



Transit Access



Transportation Demand Management



Pedestrian Safety Improvement



Rail On-Time Performance

EXISTING CONDITIONS — WHAT WE FOUND

- **Operations**
- **Safety**
- **Pedestrian and Cyclist Accessibility**



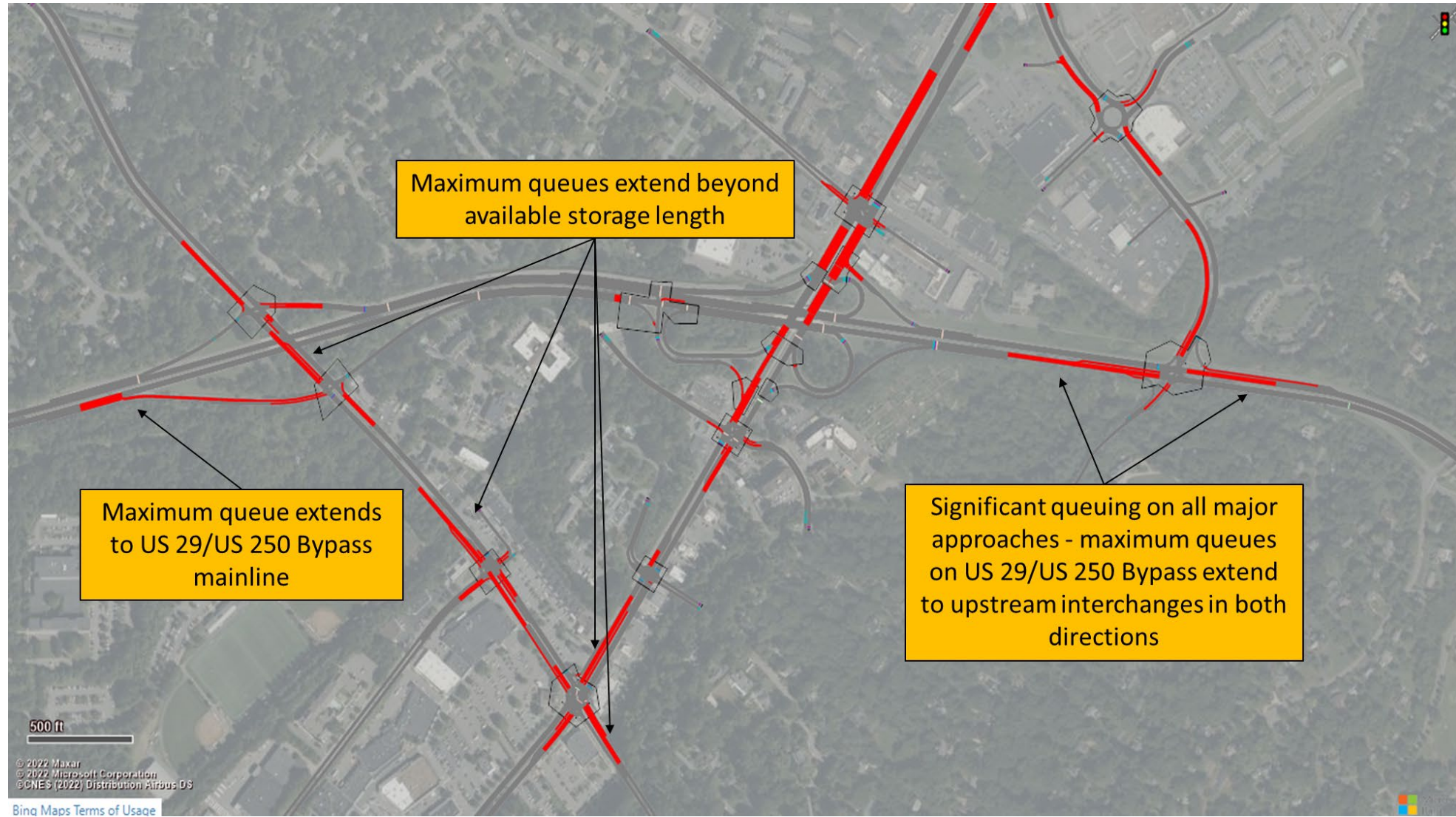
OPERATIONS

■ Results Summary

- Overall congestion is Light-to-Moderate/Heavy
- Queue lengths are long but vehicles typically clear intersection in one cycle along US 29 within interchange area
- Delay along Barracks Rd and at intersection of Emmet St/Barracks is worse than other locations



QUEUES



EXISTING CONDITIONS SAFETY

■ PSI Intersections:

- US 29 at Hydraulic Road
- US 29/US 250 SB Ramp at Barracks Road

■ Identified PSI Segments:

- Segment between Hydraulic Road and US 29/US 250 Interchange
- Segment between Morton Drive and Barracks Road
- Hydraulic Road segment between Hillsdale Drive and US 250 Bypass

■ Identified Fatal & Injury Crash Factors:

- Congestion throughout the day
- Interchange ramp geometry
- Off-road/Lane-Departures



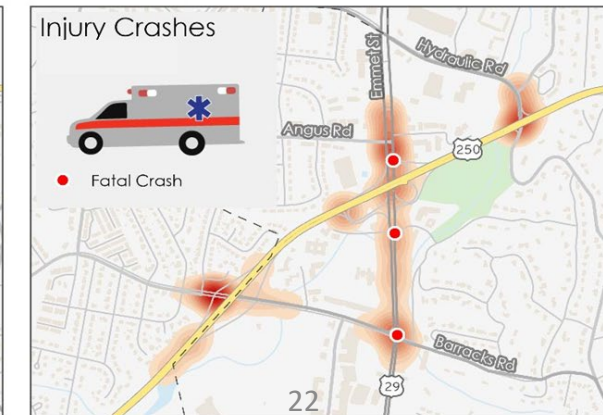
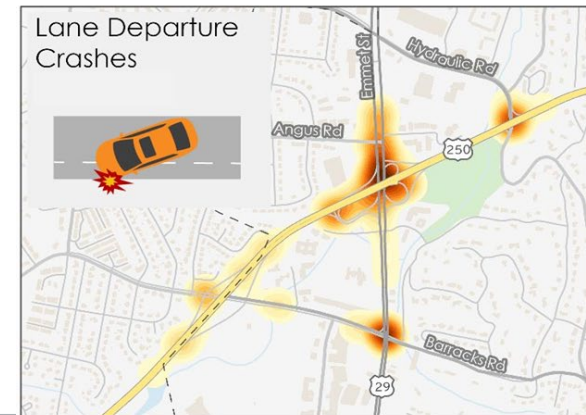
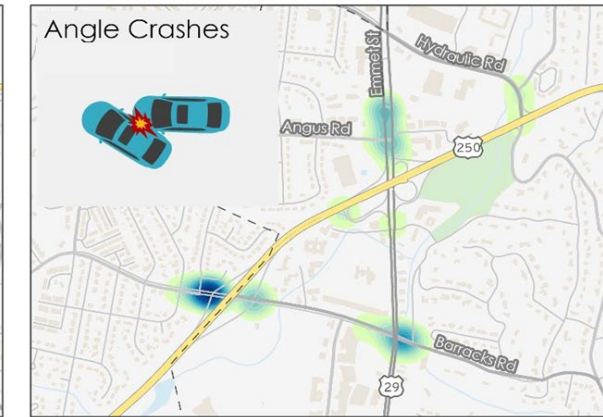
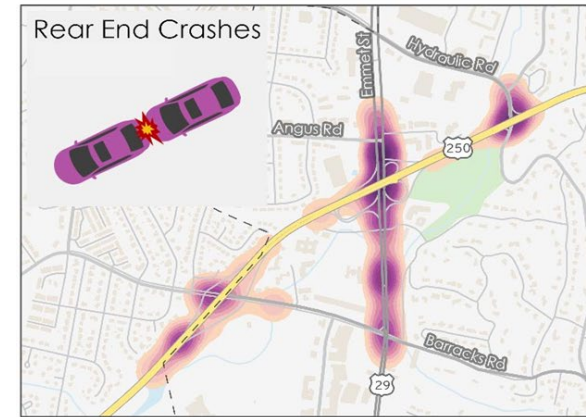
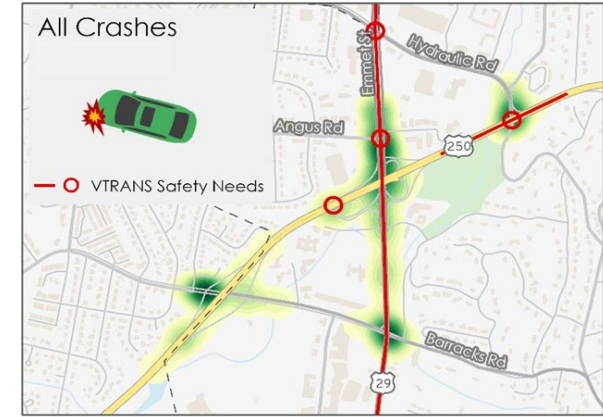
CRASH SUMMARY (2019-2023)

■ Study Intersection Crash Hotspots

- Hydraulic Road/Emmett St – 212 crashes
- Angus Road/Emmett St – 53 crashes

■ Overall Crash Patterns

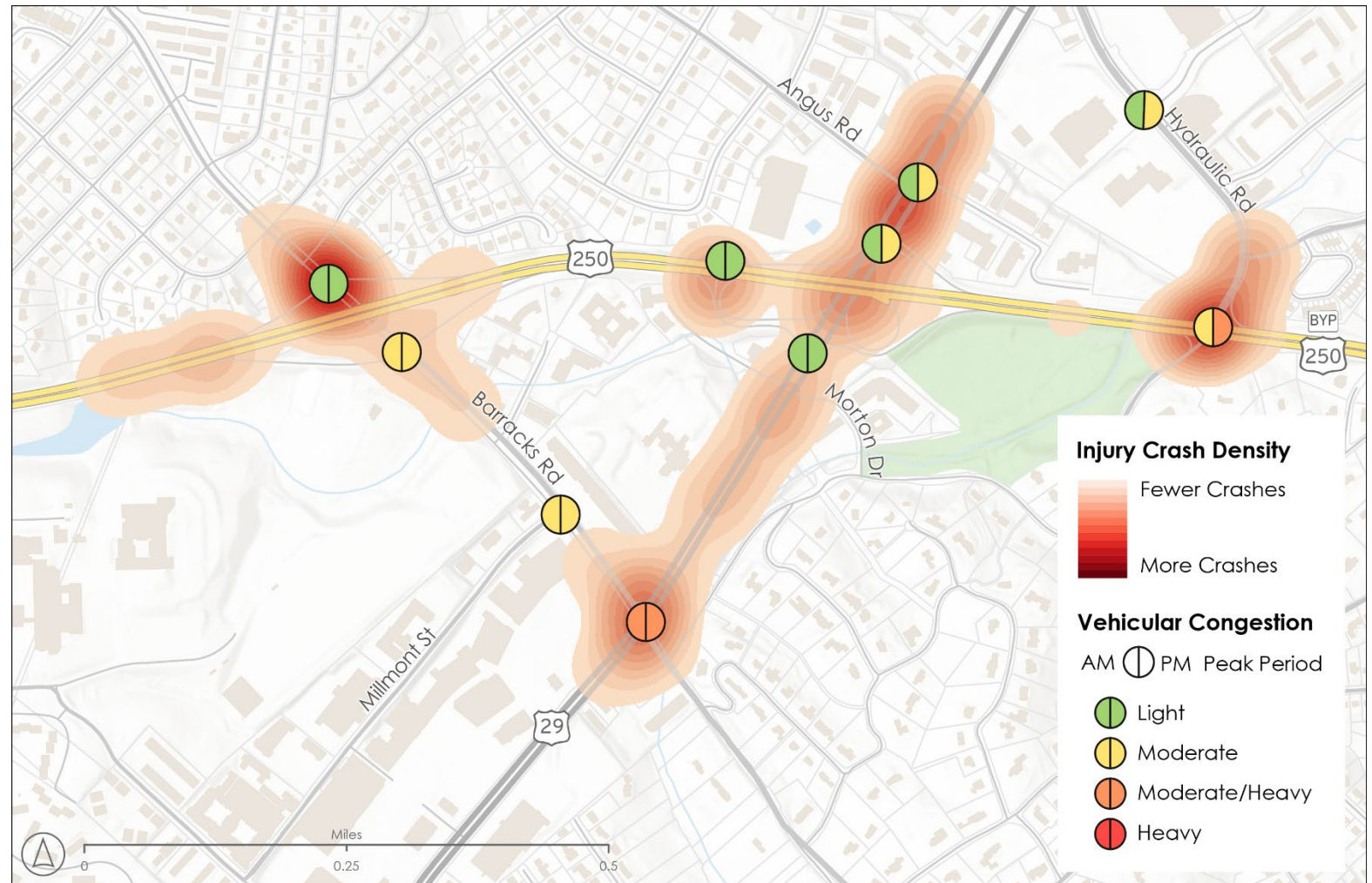
- Access management
 - Southbound between Kroger Way and Holiday Drive
 - Earhart/Morton Drive and 250 off-ramp
- Sideswipes
 - Approach of Hydraulic Road and 250 Bypass
- Interchange conflicts
 - Sideswipes
 - Fixed Object & Rear Ends



US 29/250 INTERCHANGE — FATAL CRASH REVIEW

- **3 Fatal Crashes since 2019; all along Emmet Street**
 - 1 Angle, 1 rear-end, 1 Pedestrian
- **Angle crash occurred at Barracks Rd intersection**
 - According to report, Veh. 1 was attempting NBL and collided with SBT.
 - Report noted that NBT lanes had green light; possible Veh. 1 driver thought NBL had the green light as well
 - Occurred at 10:46 AM; Rainy conditions were reported
 - **LT signals are not on mast arm, but pole mounted**; appears to have visibility concerns
- **Pedestrian crash occurred at Morton Drive**
 - Vehicle had right-of-way, struck pedestrian using marked crosswalk
 - Report indicates that alcohol was involved; occurred at 8:01 PM
- **Rear-end crash near WB on/off-ramps at interchange**
 - Motorcycle lost control heading northbound on Emmet, struck vehicle
 - No adverse conditions were reported; speed listed
 - Possible that motorcycle was coming from interchange off-ramp to NB 29 and lost control

OPERATIONS VS INJURY CRASHES



BICYCLE AND PEDESTRIAN SUMMARY

- Sidewalk network throughout corridor, no missing segments
- Crosswalks present at all signalized intersections along Emmet Street
- Shared-use path within median from Morton Drive to Angus Road
- Three pedestrian crashes during analysis period (2019-2023), including one fatal
 - Two occurred near Angus Road
 - Fatal crash occurred at Morton Drive; police report noted pedestrian may have been intoxicated.

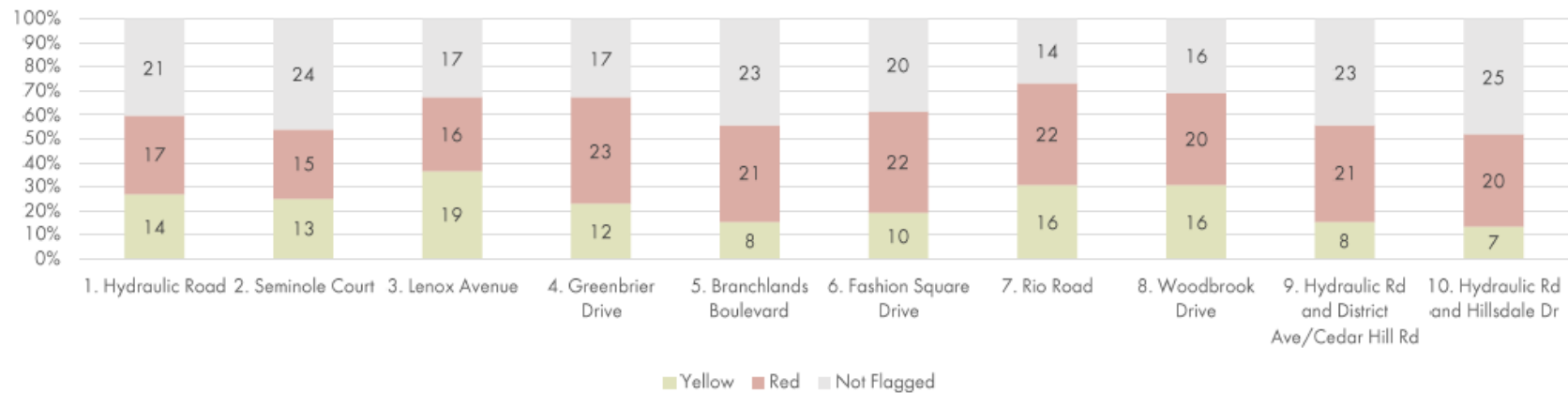


NCHRP 948 BIKE/PED RED FLAG ANALYSIS - OVERVIEW

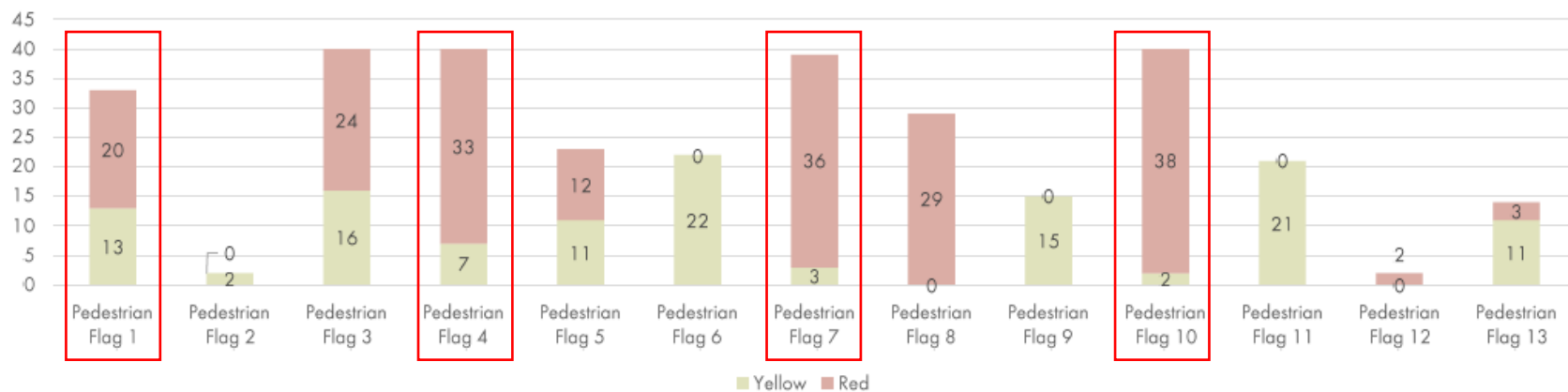
- **NCHRP 948 is a bicycle and pedestrian intersection safety analysis tool.**
 - Analysts complete a **20-flag survey of each movement** at an intersection to determine **possible conflicts** between auto and pedestrian or bicycle movements.
- **Conflicts are given yellow or red flags based on severity.**
 - Severity is determined by characteristics like vehicular speed, volume, existing roadway design, or lack of critical infrastructure.
- **Goal of the analysis is to identify opportunities to improve roadway design for bicycles and pedestrians from existing conditions.**
 - Engineers are **not** typically trying to resolve every problem flagged.
 - Stakeholders and engineers must work together to identify **priority flags** to resolve.

NCHRP 948 DESIGN FLAG PEDESTRIAN ANALYSIS – US 29

NCHRP 948 Pedestrian Results

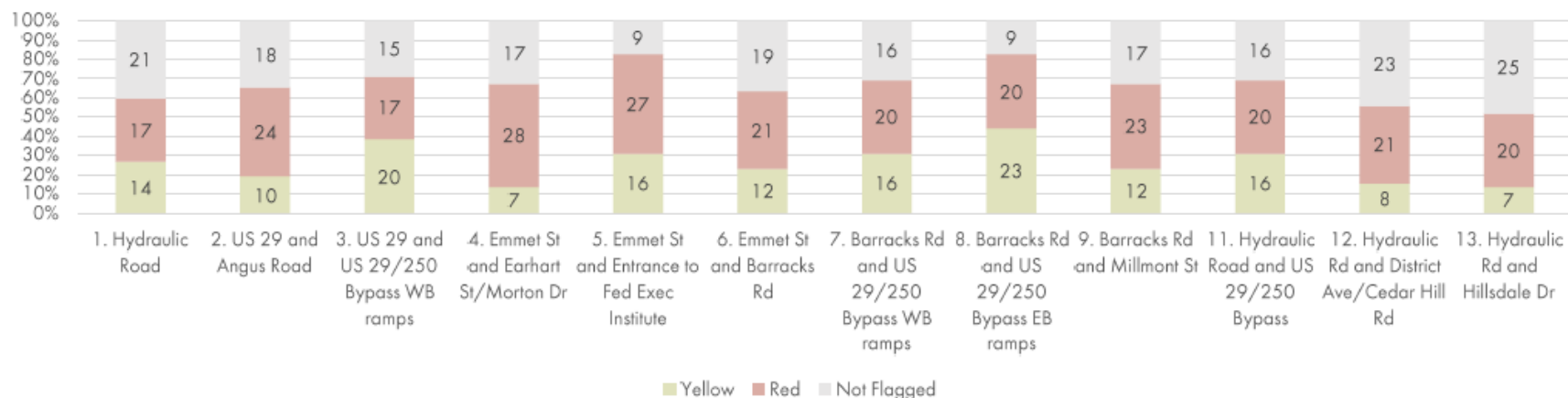


Breakdown On Flagging Counts

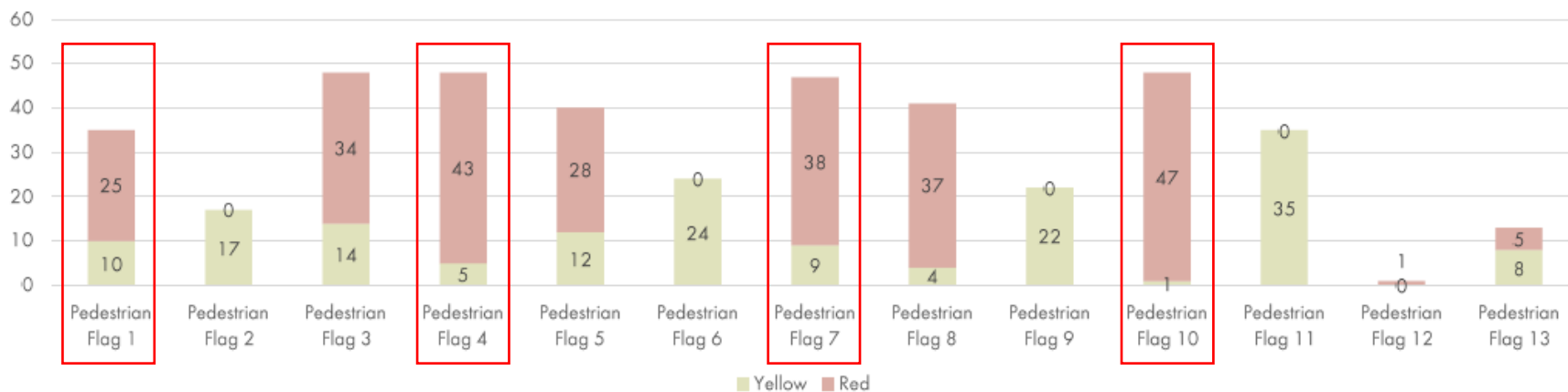


NCHRP 948 DESIGN FLAG PEDESTRIAN ANALYSIS – INTERCHANGE AREA

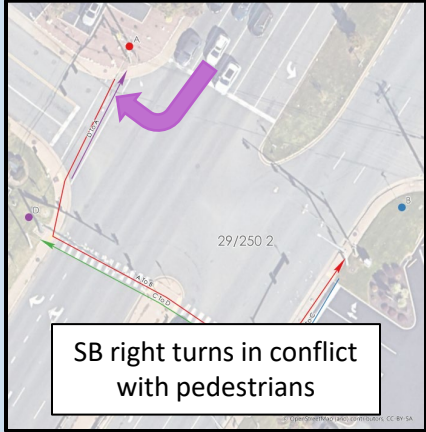
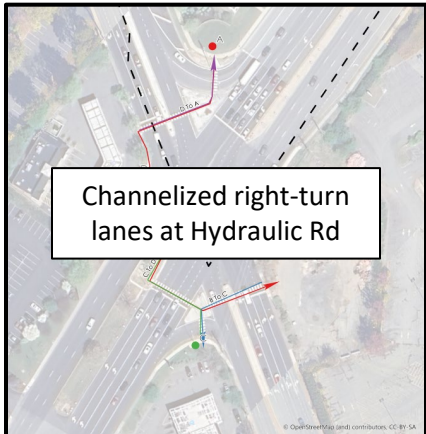
NCHRP 948 Pedestrian Results



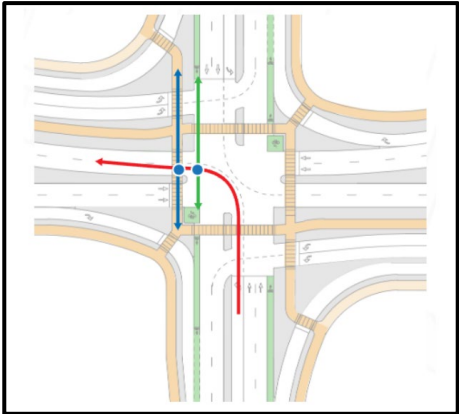
Breakdown On Flagging Counts



NCHRP 948 DESIGN FLAG ANALYSIS EXAMPLES

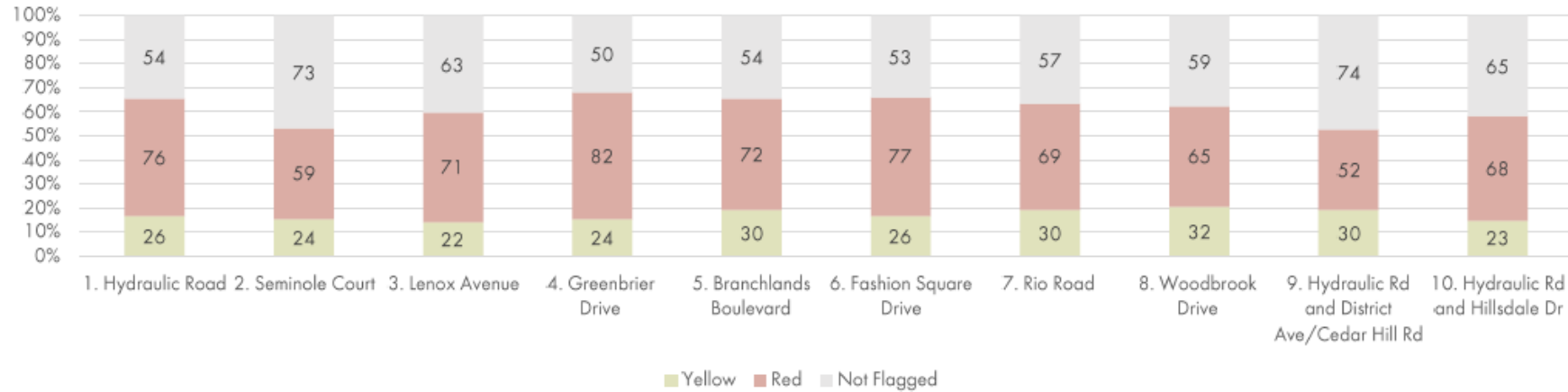
Design Flag (Applicability)	Description	Example	Countermeasures
#1: Motor Vehicle Right Turns (Bikes and Peds)	Right-turning vehicles directly conflict with pedestrian crossings at intersections. Vehicles turning right on red or permissive green phases degrades pedestrian comfort (Example: Noted concerns with conflict between southbound right-turn and pedestrians at Angus Road)		Install leading pedestrian interval (LPI) Restrict right-turn-on-red Provide ample storage between crosswalk and conflicting vehicle path
#4: Crossing Yield- or Uncontrolled Vehicle Paths (Bikes and Peds)	Locations where channelized, yield-controlled and uncontrolled crossings may lead to unsafe interactions between vehicles and pedestrians (Example: Channelized right-turn lanes at Hydraulic Road)		Reduce vehicle speeds through turns Install raised crosswalks

NCHRP 948 DESIGN FLAG ANALYSIS EXAMPLES

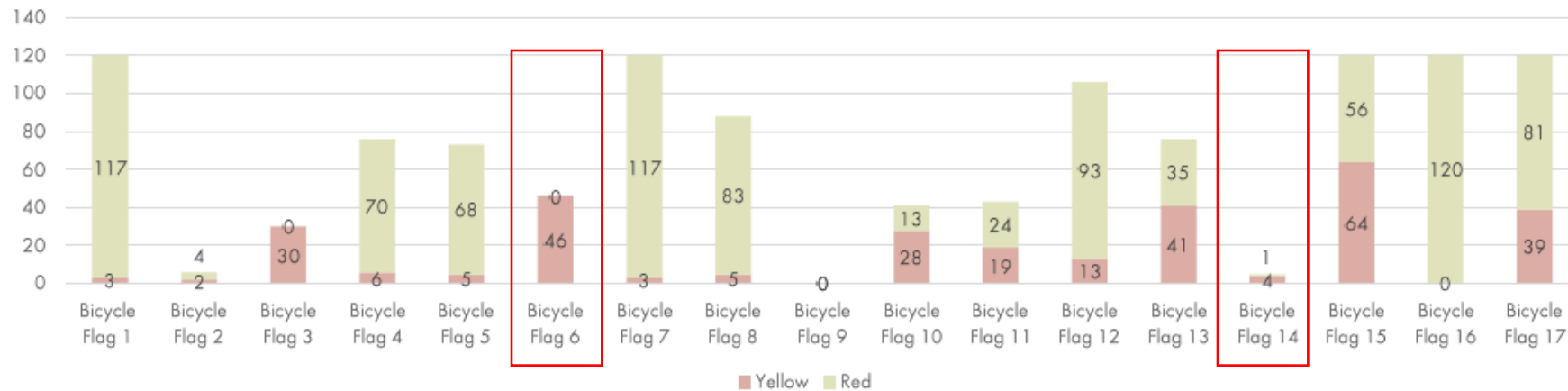
Design Flag (Applicability)	Description	Example	Countermeasures
#7: Multilane Crossings (Bikes and Peds)	Long crossings with multiple lanes in both directions increase pedestrian stress and un-comfortability		Reduce # of travel lanes Provide two-stage crossings Provide parallel pedestrian facilities
#10: Motor Vehicle Left Turns (Bikes and Peds)	Research has shown that permissive left-turning vehicles may not be aware of pedestrians crossing in conflict. Even if signals are protected-only, movements can still be flagged if volumes exceed 50 vehicles per hour		Relocate/eliminate left turns at intersections Convert permissive left-turn movements to protected only

NCHRP 948 DESIGN FLAG BICYCLE ANALYSIS – US 29

NCHRP 948 Bicycle Results

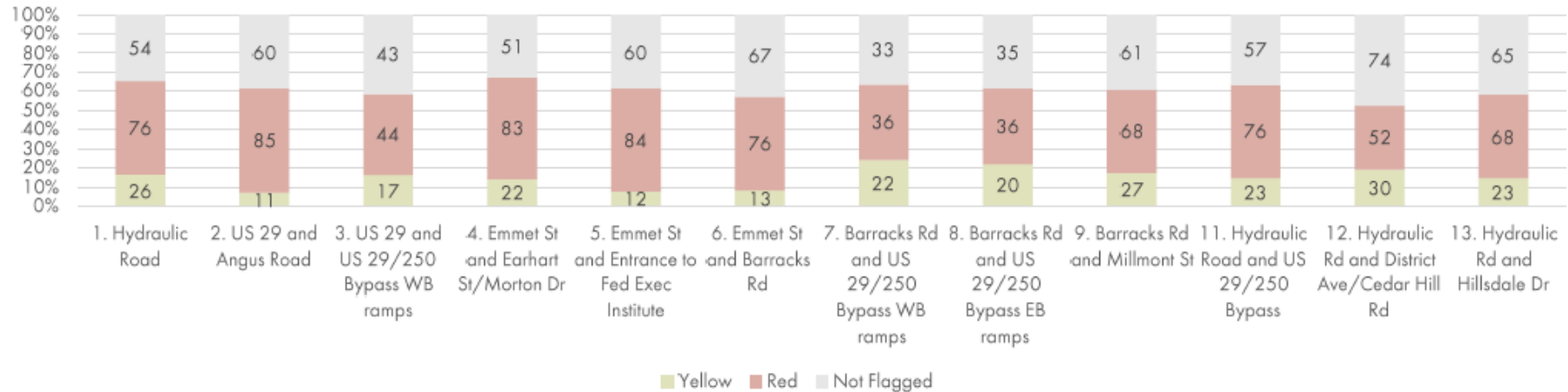


Breakdown On Flagging Counts

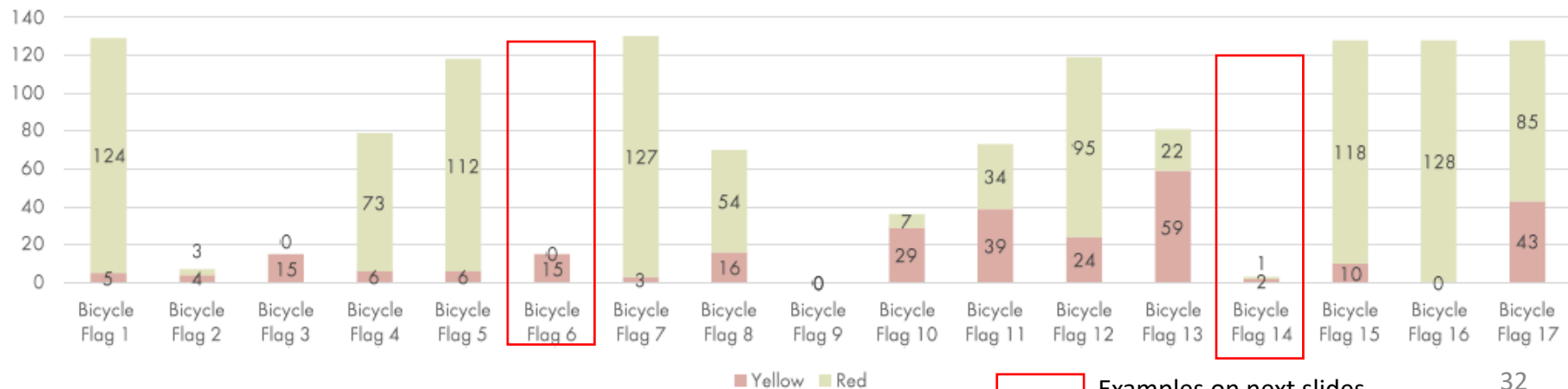


NCHRP 948 DESIGN FLAG BICYCLE ANALYSIS – INTERCHANGE AREA

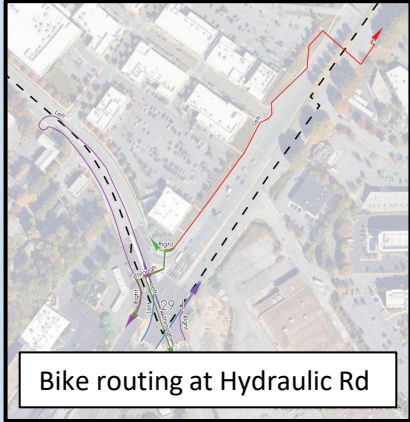
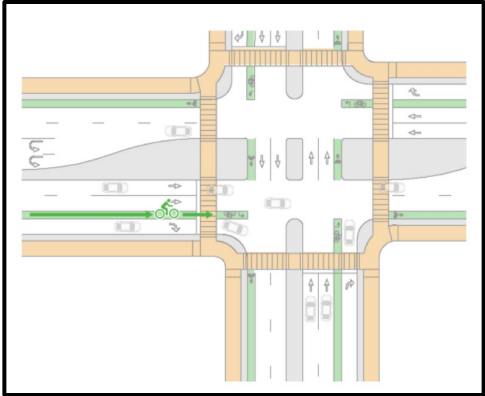
NCHRP 948 Bicycle Results



Breakdown On Flagging Counts



NCHRP 948 BICYCLE DESIGN FLAG ANALYSIS EXAMPLES

Design Flag (Applicability)	Description	Example	Countermeasures
#6: Executing Unusual Movements (Bicycles Only)	Long crossings with multiple lanes in both directions increase pedestrian stress and un-comfortability		Local knowledge of intersection configuration Driver education Proper pavement markings and signage
#14: Riding in Mixed Traffic (Bicycles Only)	Riding next to motorized vehicles with high speeds and/or high volumes are a safety and comfort issue for bicyclists.		Provide separate bike facility parallel to US 29

EXISTING CONDITIONS - TRANSIT

■ Existing Service Providers

■ Charlottesville Area Transit

- Operates fixed route and microtransit service covering the City of Charlottesville and urban Albemarle County

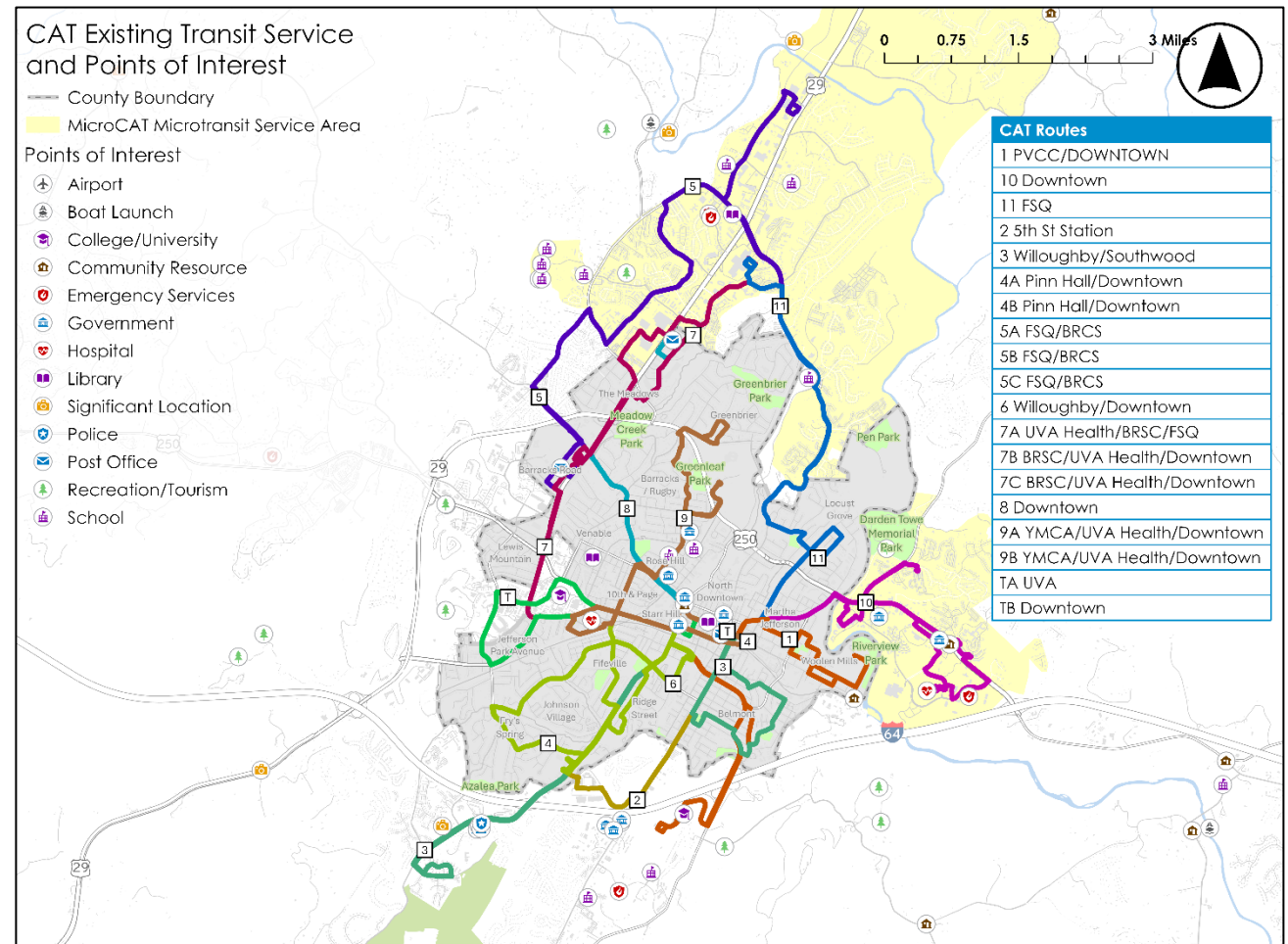
■ 2 routes on or around US 29:

- 5, 7, and 8

■ MicroCAT zone: US 29 Zone

■ Jaunt Transit

- Operates commuter service and demand-response in region
- 29 North Connect commuter route



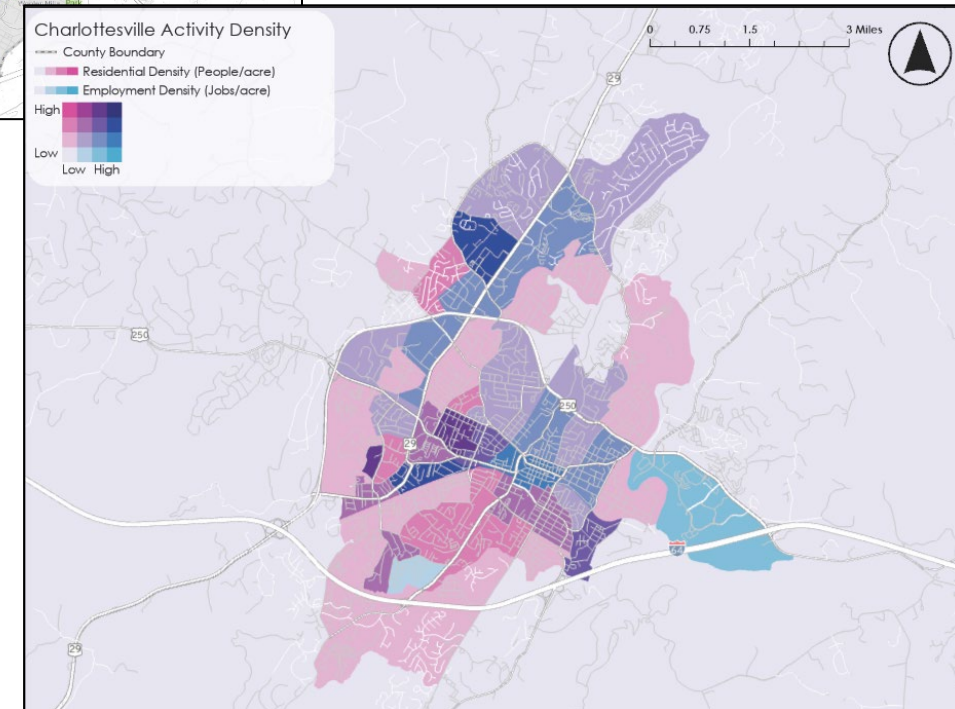
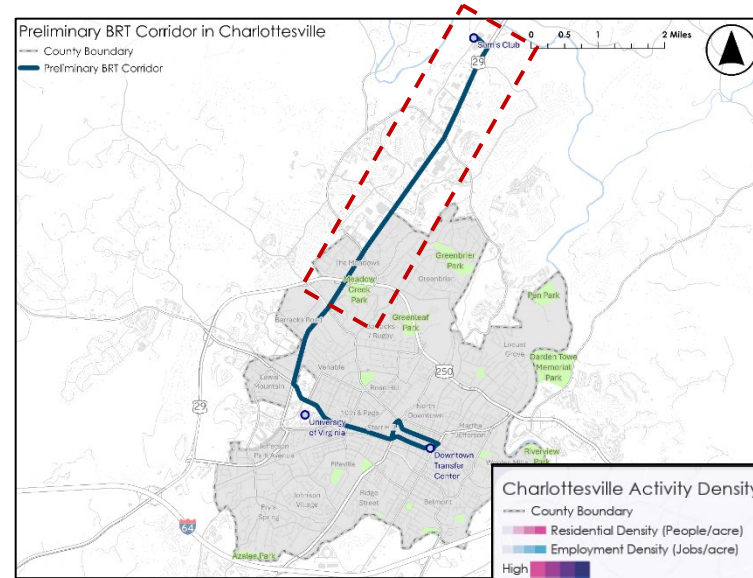
EXISTING CONDITIONS - TRANSIT

■ Analysis Objectives:

- Identify potential high-level BRT alternatives in US 29 corridor between Downtown and US 29 North
- Ensure no other recommendations preclude high-capacity transit in future.

■ Analysis Steps:

- Determine potential alignment and station locations based on activity density, redevelopment potential, and operational feasibility
 - Residential and employment density
 - Redevelopment potential (ownership patterns, parcelization, future land use, etc.)
 - Multimodal accessibility



NEXT STEPS

- **Develop Preliminary Solutions targeted to:**
 - Reduce congestion along US 29, Emmet Street, and the US 250/Emmet Street interchange
 - Mitigate risk of fatal and injury crashes
 - Improve access and mobility by improving existing bike / pedestrian network
 - Enhance Transit Access

SCHEDULE

<i>Task Milestone</i>	<i>Planned Start Date (MM/DD/YYYY)</i>	<i>Planned Completion Date (MM/DD/YYYY)</i>	<i>Meeting Type</i>
NTP Phase 2 (Study Phase)	3/17/2025	3/24/2025	N/A
Data Collection	4/1/2025	4/25/2025	N/A
Initial Public Engagement (PublicInput.com)	5/9/2025	5/23/2025	Virtual
Existing Condition Calibration Memo	4/25/2025	7/18/2025	N/A
Existing Conditions Report	5/9/2025	8/1/2025	N/A
Traffic Forecasting Memorandum	7/18/2025	8/15/2025	N/A
Preliminary Alternatives Review Meeting	9/5/2025	9/5/2025	Virtual
Preliminary Alternatives Screening Process (external within Stakeholder group)	9/8/2025	9/26/2025	N/A
Advanced Alternatives Review Meeting	10/6/2025	10/6/2025	Virtual
Refine Advanced Alternatives based on Stakeholder feedback	10/6/2025	11/14/2025	N/A
Detailed Concepts Meeting	11/14/2025	11/14/2025	Virtual
Concepts Public Engagement (PublicInput.com)	1/5/2026	2/6/2026	Virtual
Preferred Alternatives Selection Meeting	2/20/2026	2/20/2026	Virtual
Smart Scale Application Process	3/1/2026	8/1/2026	N/A
Draft Report	3/1/2026	5/15/2026	N/A
Final Report	6/12/2026	8/1/2026	N/A
Study Closeout Checklist	8/1/2026	8/28/2026	N/A

STUDY CONTACTS

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VDOT District Contact

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