STARS

STRATEGICALLY TARGETED AND AFFORDABLE ROADWAY SOLUTIONS

CTAC Meeting

1. US 29 Corridor: Hydraulic Rd to Woodbrook Rd

2. US 29/250 Bypass Interchange with Emmet St

September 24, 2025

VDOT

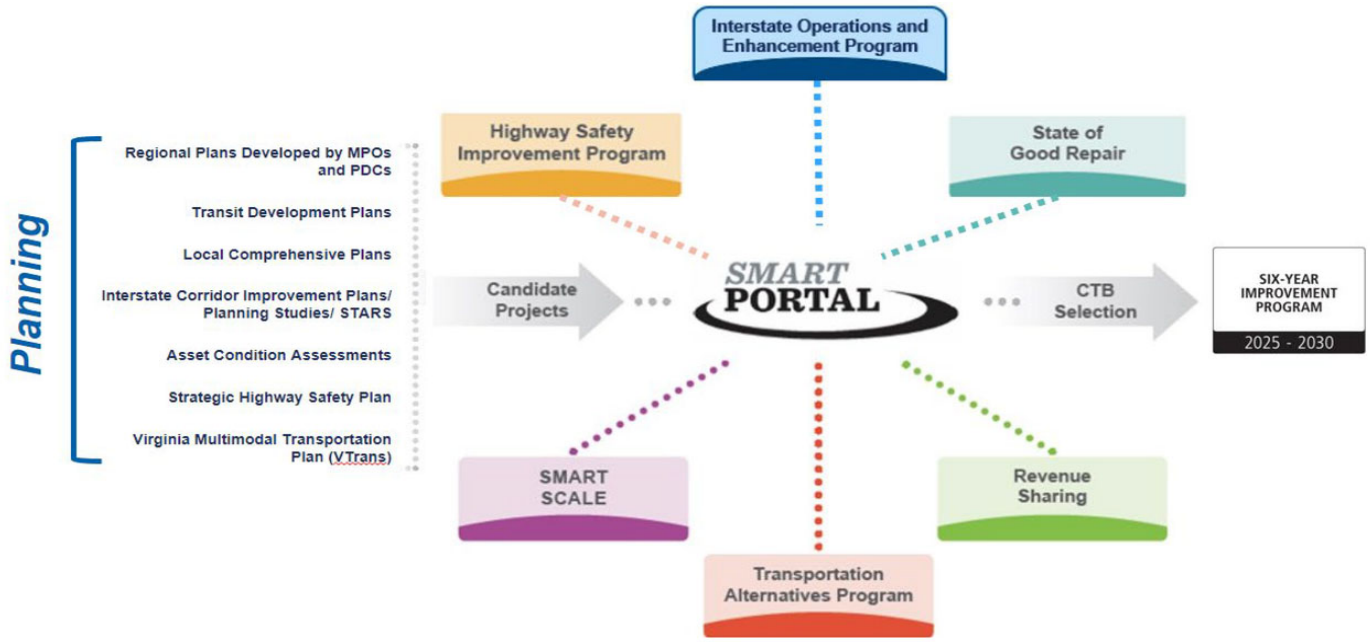
AGENDA

- 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)
- Alternatives Development

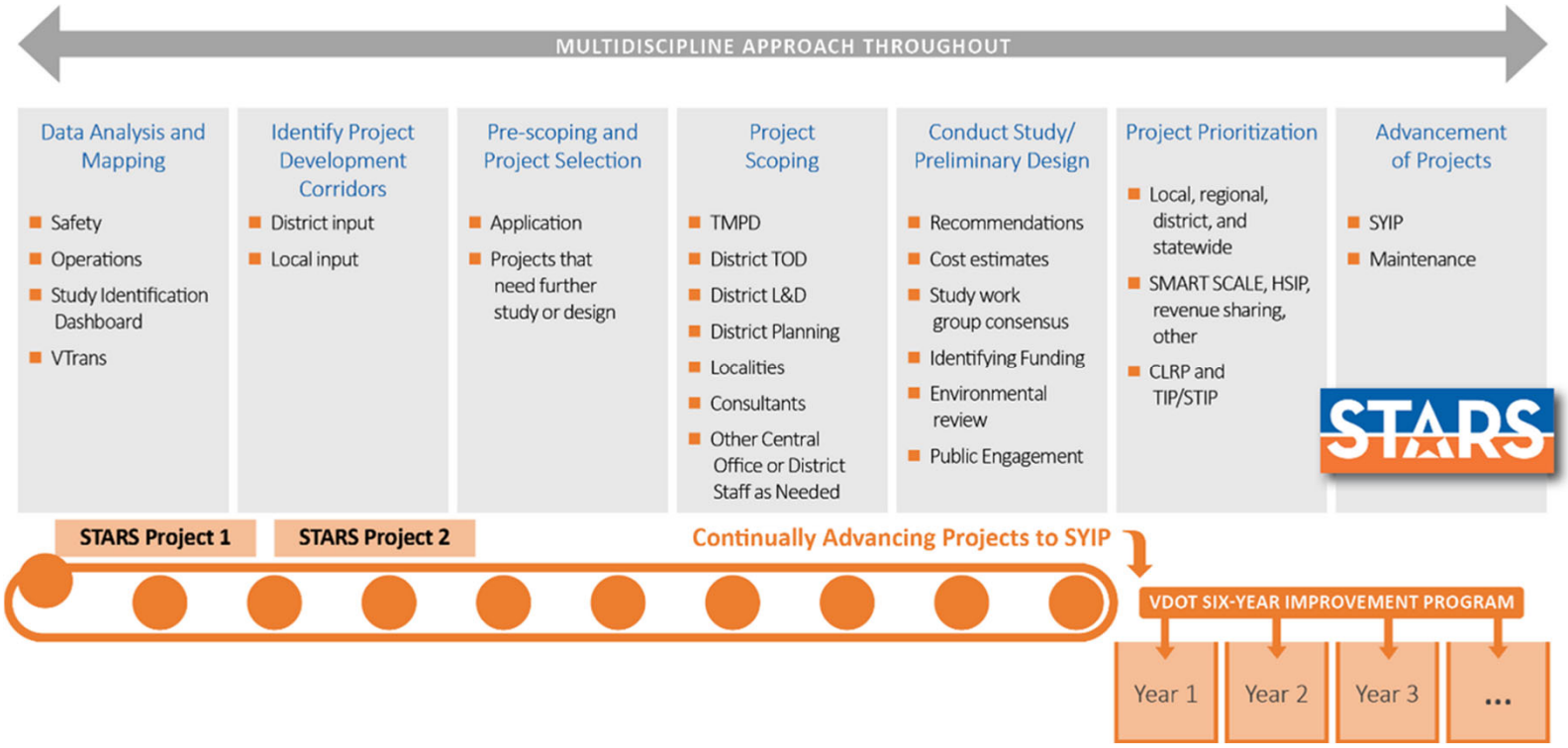
WHAT IS STARS?

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- **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)?



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STUDY #1
US 29 CORRIDOR: HYDRAULIC RD TO WOODBROOK RD

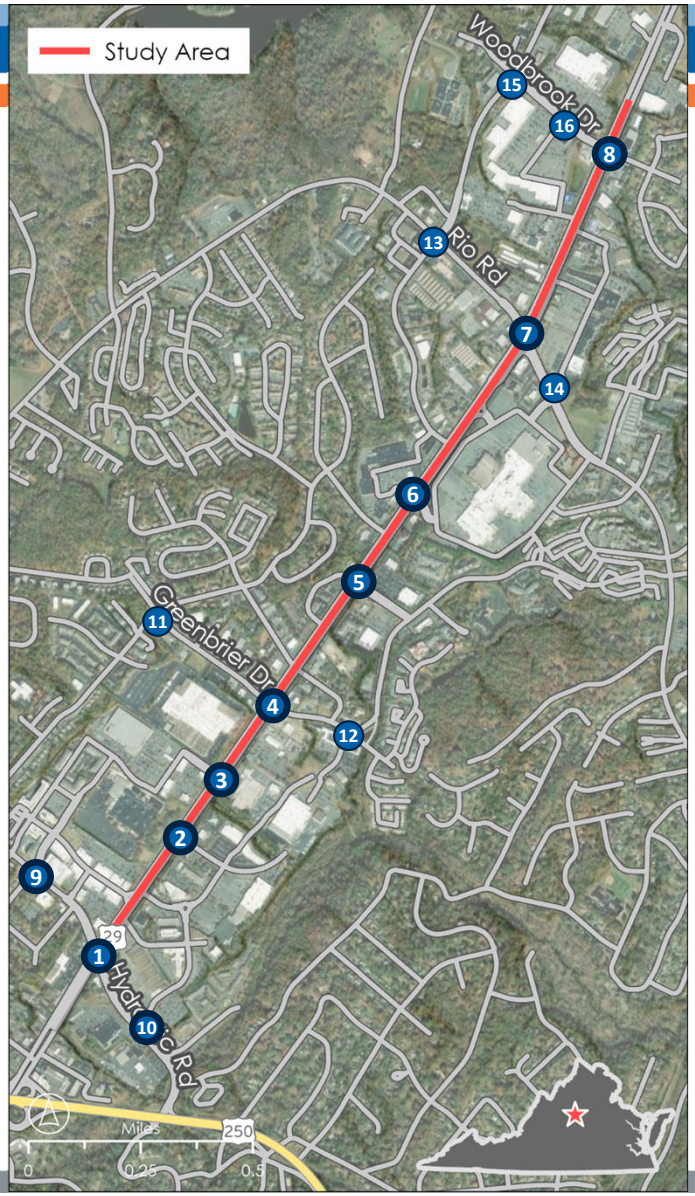
1 Data Collection (TMCs) on US 29:

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) :

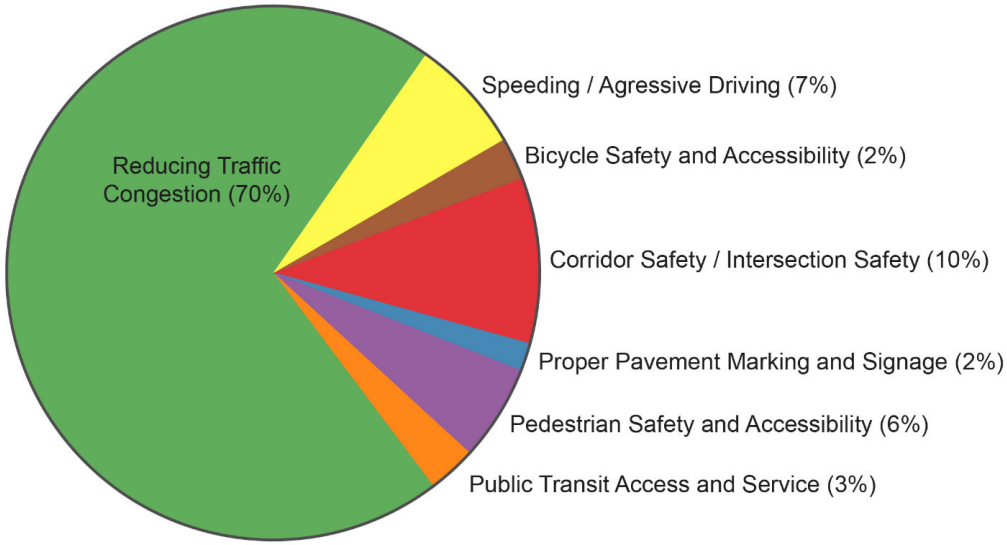
11. Greenbrier Dr and Commonwealth Dr
12. Greenbrier Dr and Hillsdale Dr
13. Rio Rd and Berkmar Dr
14. Rio Rd and Fashion Sqare Dr
15. Woodbrook Rd and Berkmar Dr
16. Woodbrook Rd and Rio Hill Center

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

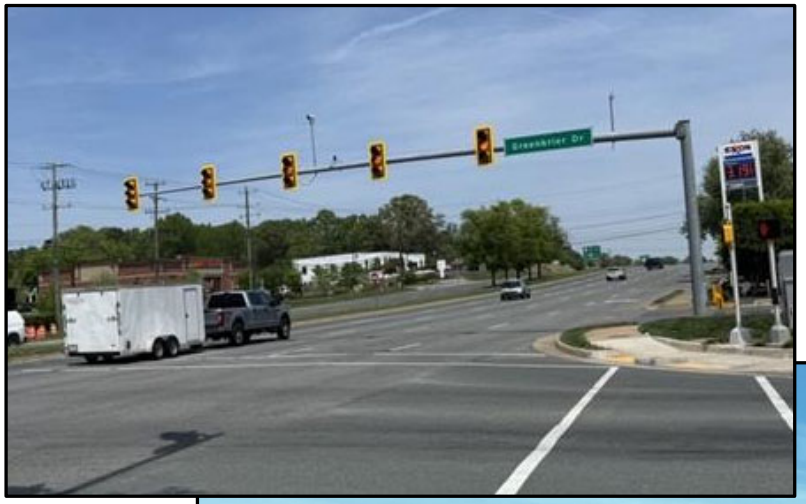
- **VTrans**
- **PBSAP – US 29 is a PSAP corridor**
- **PSI – Several PSI locations**
- **Pedestrian connectivity (US 29 crossings)**
- **Enhanced Transit**



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Existing Conditions – What we Found

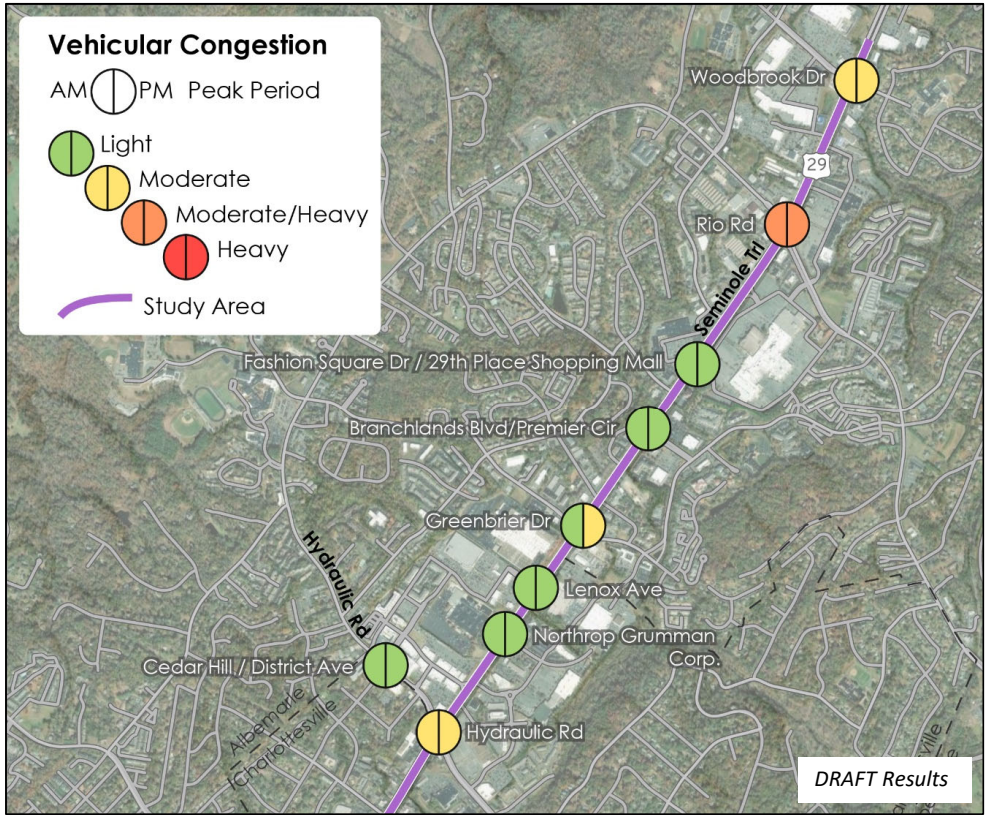
- **Operations**
- **Safety**
- **Pedestrian and Cyclist Accessibility**





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



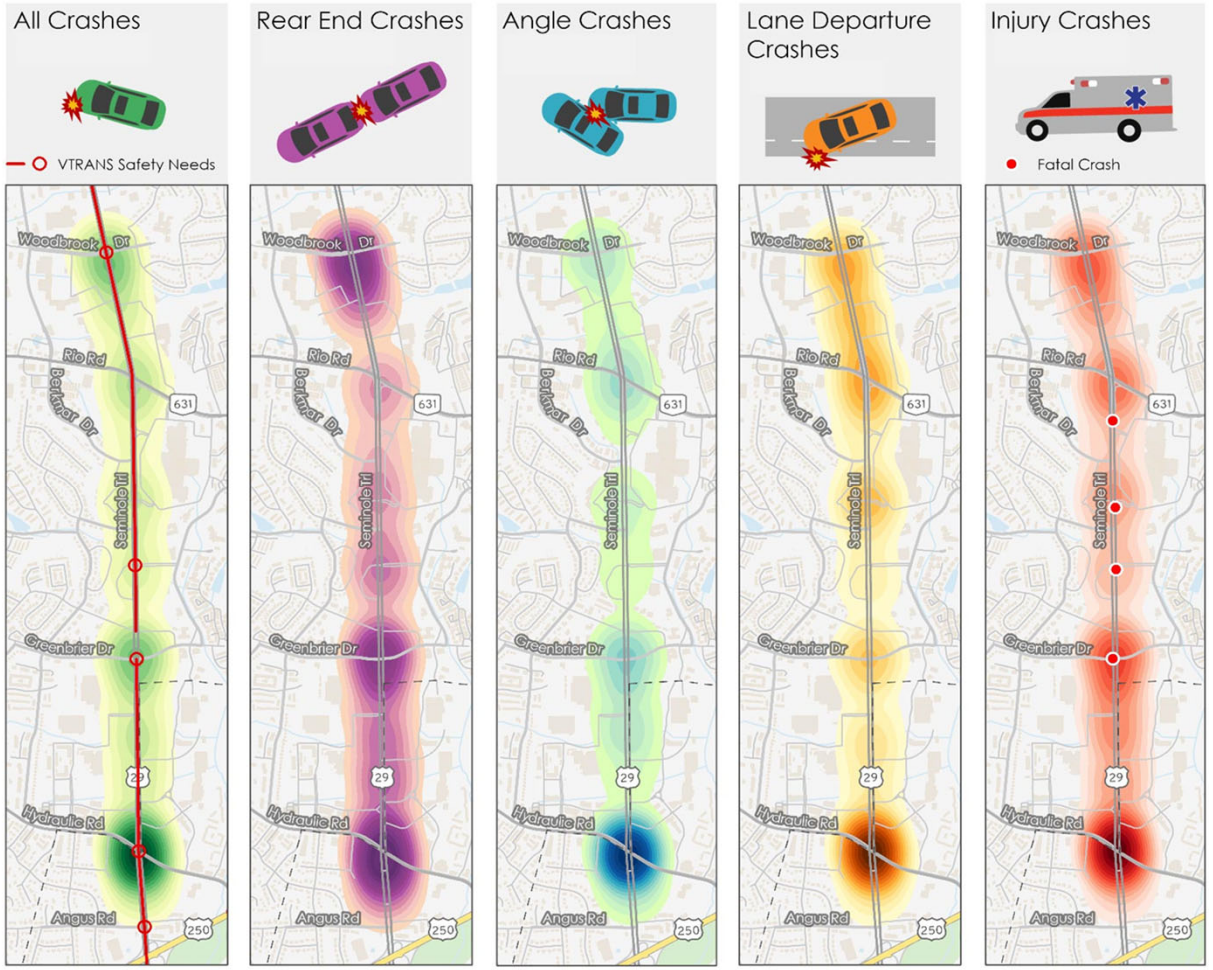
Existing Conditions Safety

- **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%)



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

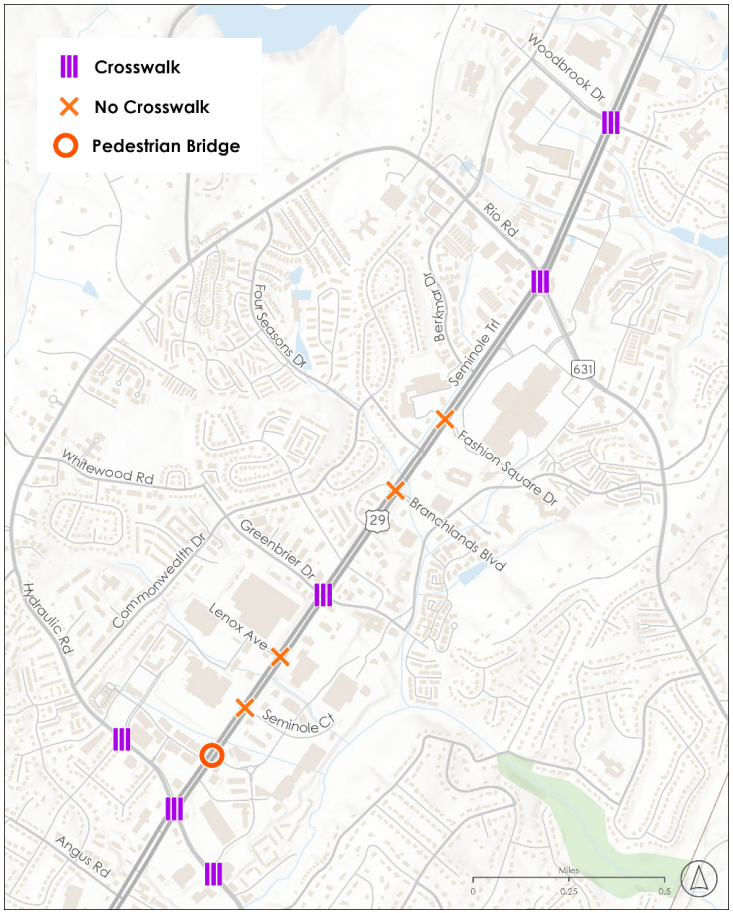
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Existing Pedestrian Accommodations – US 29 Corridor

Intersections with marked crosswalks across US 29:

- Hydraulic Road (NB approach only)
- Greenbrier Drive (SB approach only)
- Rio Road (NB approach only)
- Woodbrook (SB approach only)

Pedestrian Bridge near Zan Road currently in construction



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



Unmarked crossing
US 29 near Rio Road


Bicyclist in traffic on Rio Road

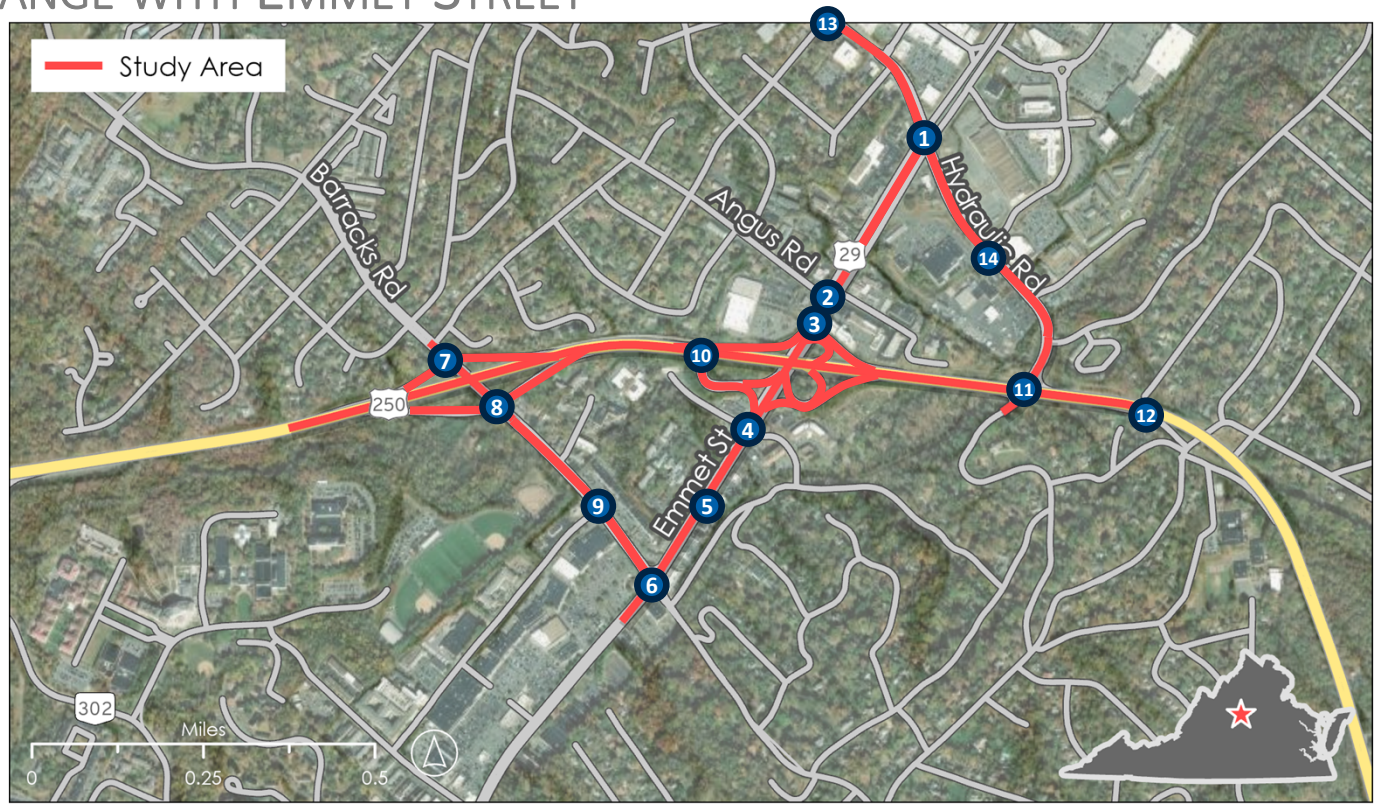
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STUDY #2
US 29/250 BYPASS INTERCHANGE WITH EMMET STREET

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

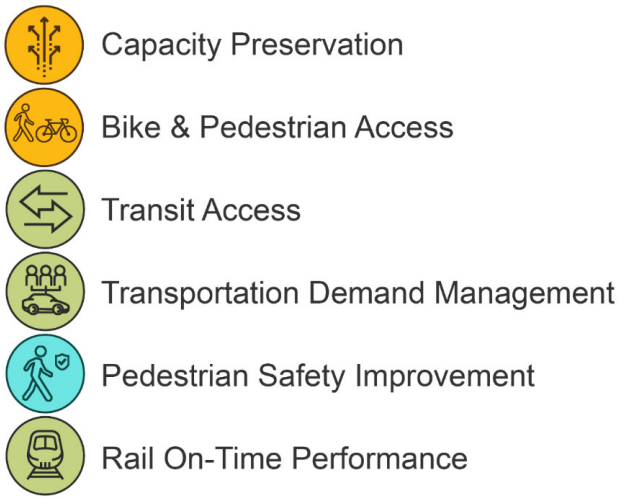
48-hr tube counts will also be collected.



Statewide & Locally Identified Needs

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

2023 Mid-Term Needs



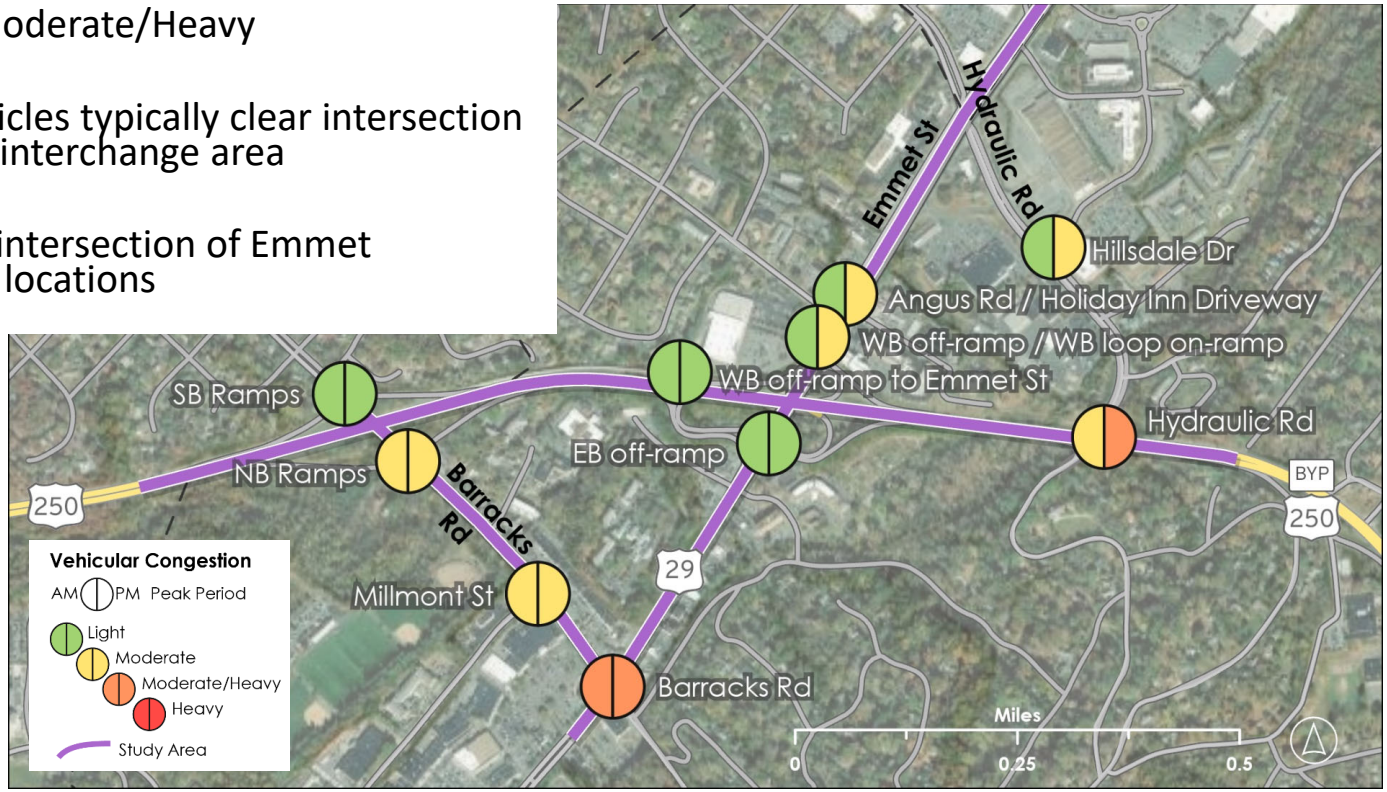
Existing Conditions – What we Found

- **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



Existing Conditions Safety

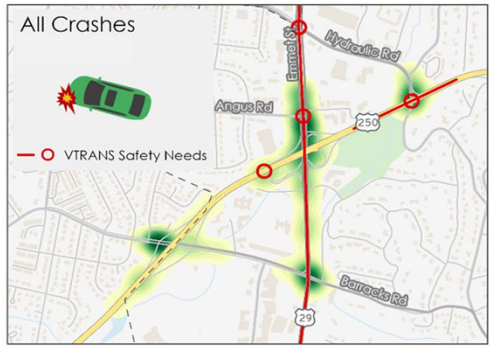
- **PSI Intersections:**
  - US 29 at Hydraulic Road
  - US 29/US 250 SB Ramp at Barracks Road
- **Identified PSI Segments:**
  - Segment between Hydraulic Road and US 29/US 250 Interchange
  - Segment between Morton Drive and Barracks Road
  - Hydraulic Road segment between Hillsdale Drive and US 250 Bypass
- **Identified Fatal & Injury Crash Factors:**
  - Congestion throughout the day
  - Interchange ramp geometry
  - Off-road/Lane-Departures

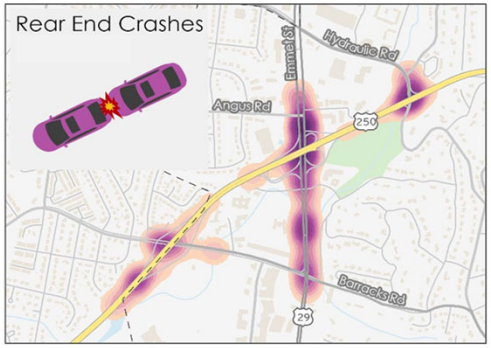


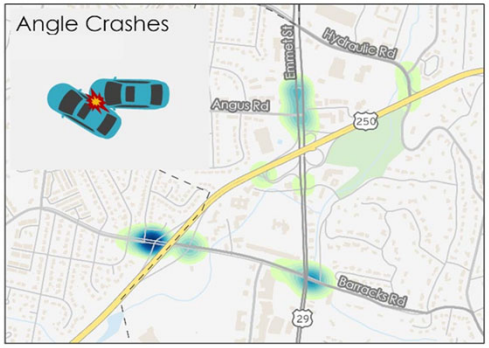
Westbound Barracks Road approach at Emmet Street

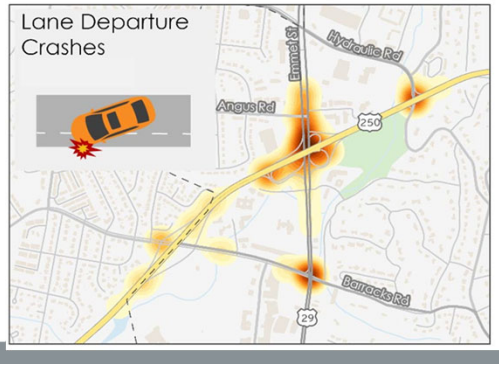
Crash Summary (2019-2023)

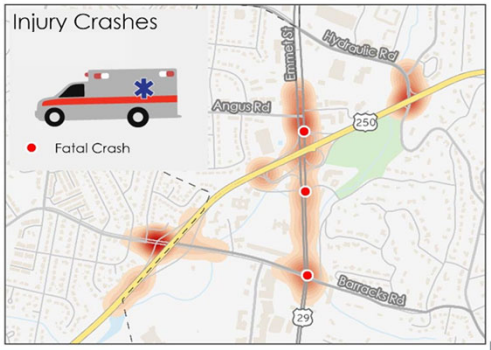
- **Study Intersection Crash Hotspots**
  - Hydraulic Road/Emmett St – 212 crashes
  - Angus Road/Emmett St – 53 crashes
- **Overall Crash Patterns**
  - Access management
    - Southbound between Kroger Way and Holiday Drive
    - Earhart/Morton Drive and 250 off-ramp
  - Sideswipes
    - Approach of Hydraulic Road and 250 Bypass
  - Interchange conflicts
    - Sideswipes
    - Fixed Object & Rear Ends











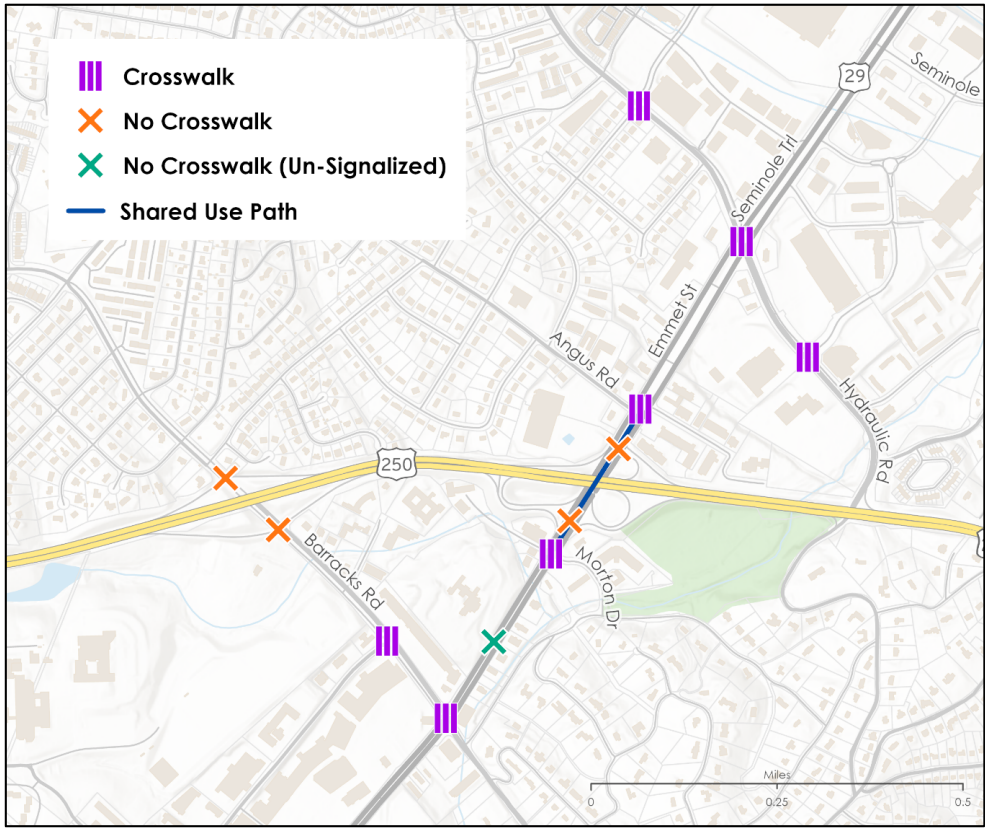
US 29/250 Interchange – Fatal Crash Review

- **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

Existing Pedestrian Accommodations – Interchange Area

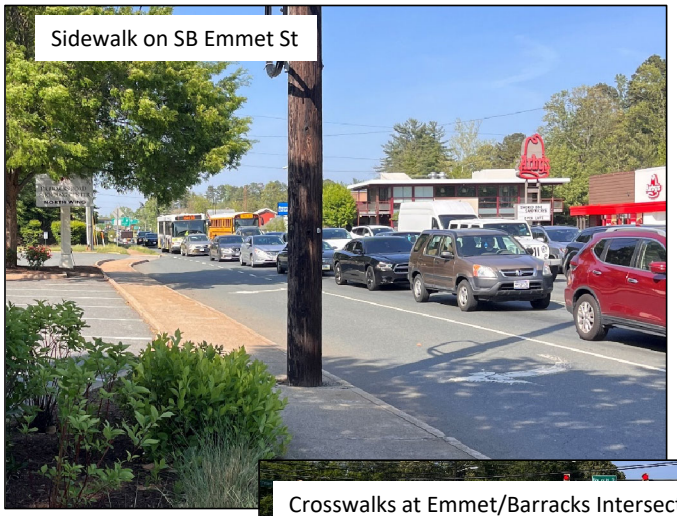
Intersections with marked crosswalks across Emmet Street:

- Angus Road (NB approach only)
- Morton Drive
- Barracks Road



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.


Sidewalk on SB Emmet St



Crosswalks at Emmet/Barracks Intersection

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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.

Bike/Ped Red Flag Analysis Findings

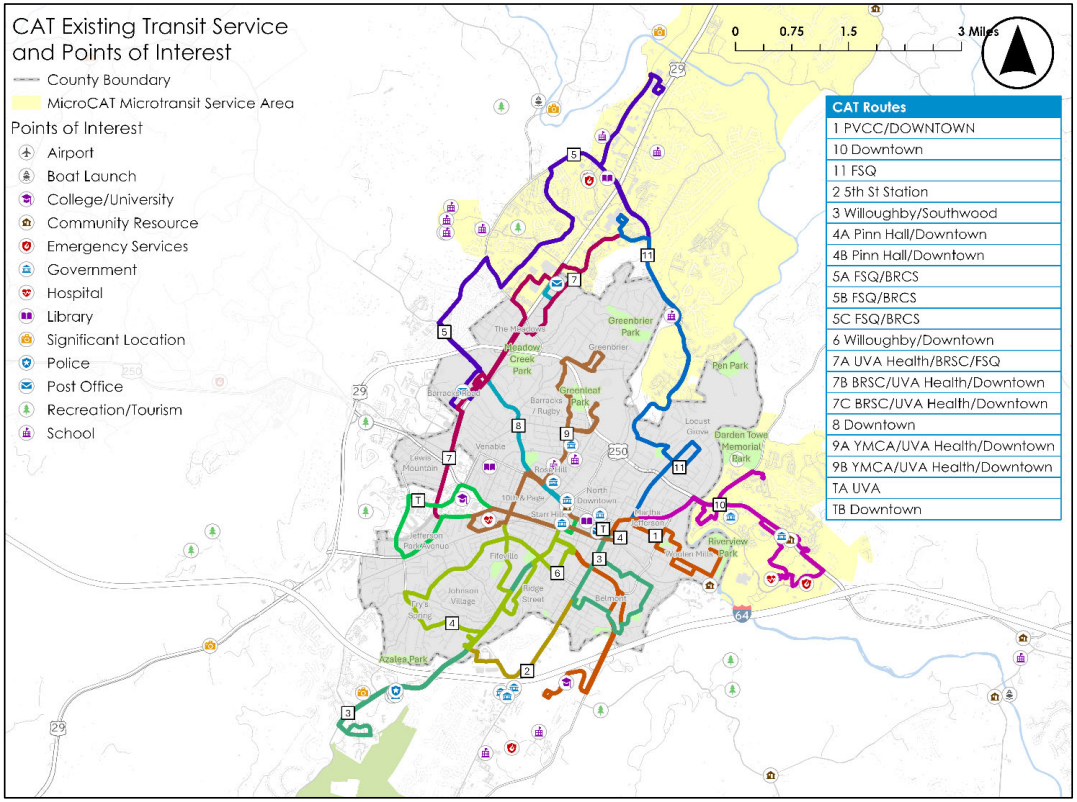
- **Most Common Pedestrian Red Flags:**
  - Flag #1: Motor Vehicle Right-Turns
  - Flag #3: Nonintuitive Motor Vehicle Movements
  - Flag #4: Crossing Yield- or Uncontrolled Vehicle Paths
  - Flag #7: Multilane Crossings
  - Flag #10: Motor Vehicle Left-Turns
- **Most Common Bicycle Red Flags:**
  - Flag #6: Executing Unusual Movements
  - Flag #13: Grade Change
  - Flag #15: Bicycle Clearance Times
  - Flag #17: Channelized Lanes



Flag #1: SB right turns in conflict with pedestrians
Flag #7: Multilane Crossings
Flag #10: Motor Vehicle Left-Turns across pedestrian path

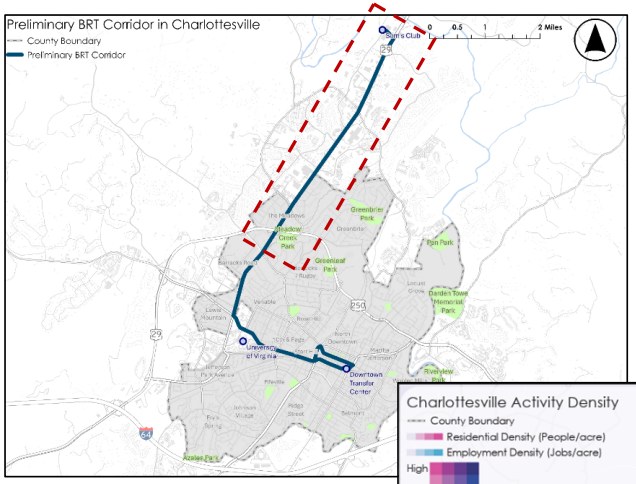
EXISTING CONDITIONS - TRANSIT

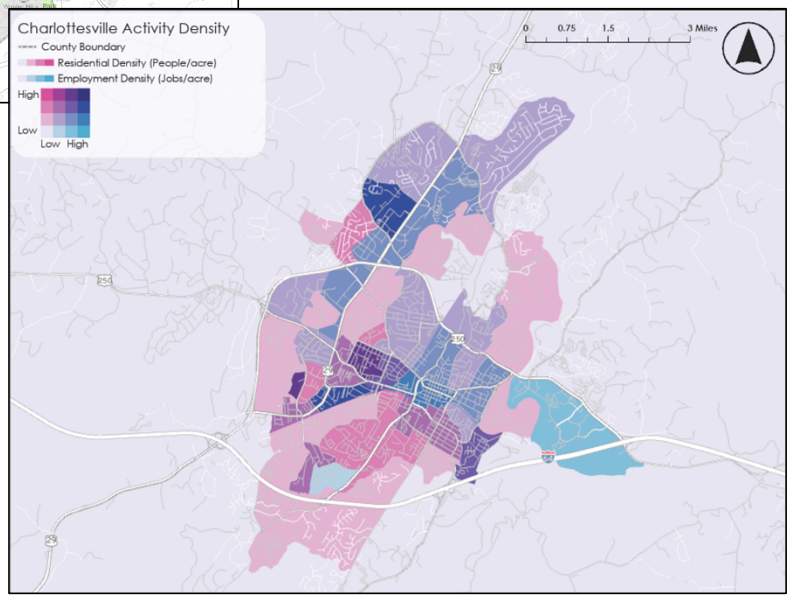
- **Existing Service Providers**
  - Charlottesville Area Transit
    - Operates fixed route and microtransit service covering the City of Charlottesville and urban Albemarle County
    - **2 routes on or around US 29:**
      - **5, 7, and 8**
    - **MicroCAT zone: US 29 Zone**
  - Jaunt Transit
    - Operates commuter service and demand-response in region
    - **29 North Connect commuter route**

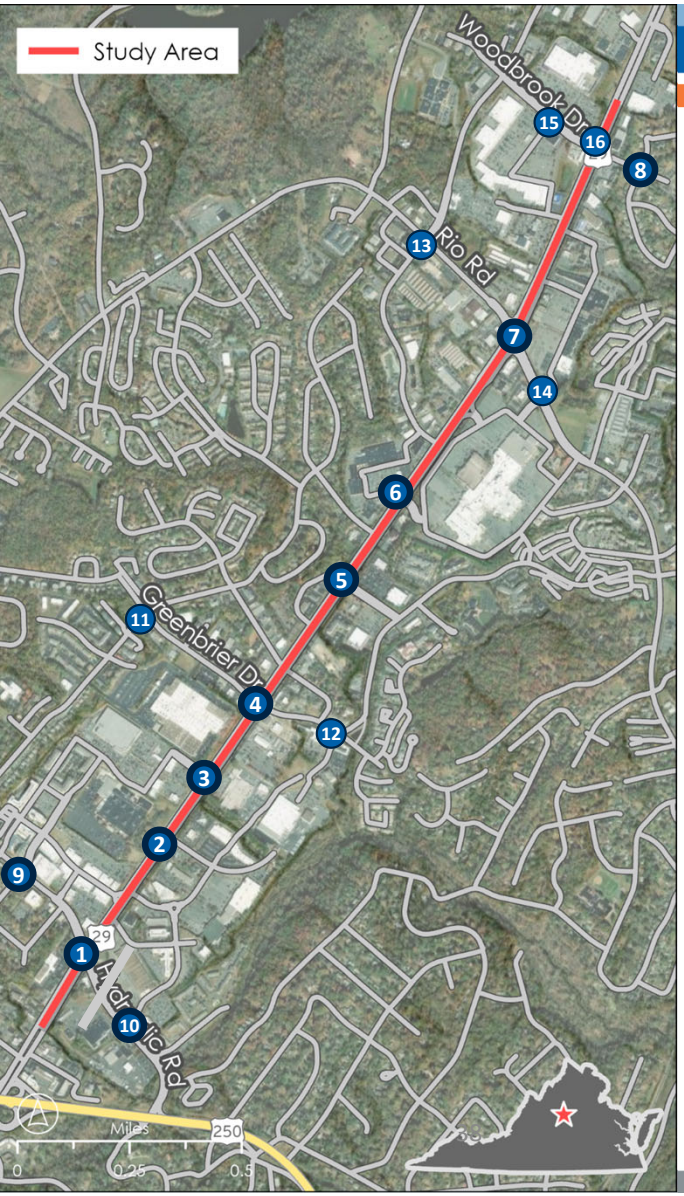


Existing Conditions - Transit

- **Analysis Objectives:**
  - Identify potential high-frequency transit 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





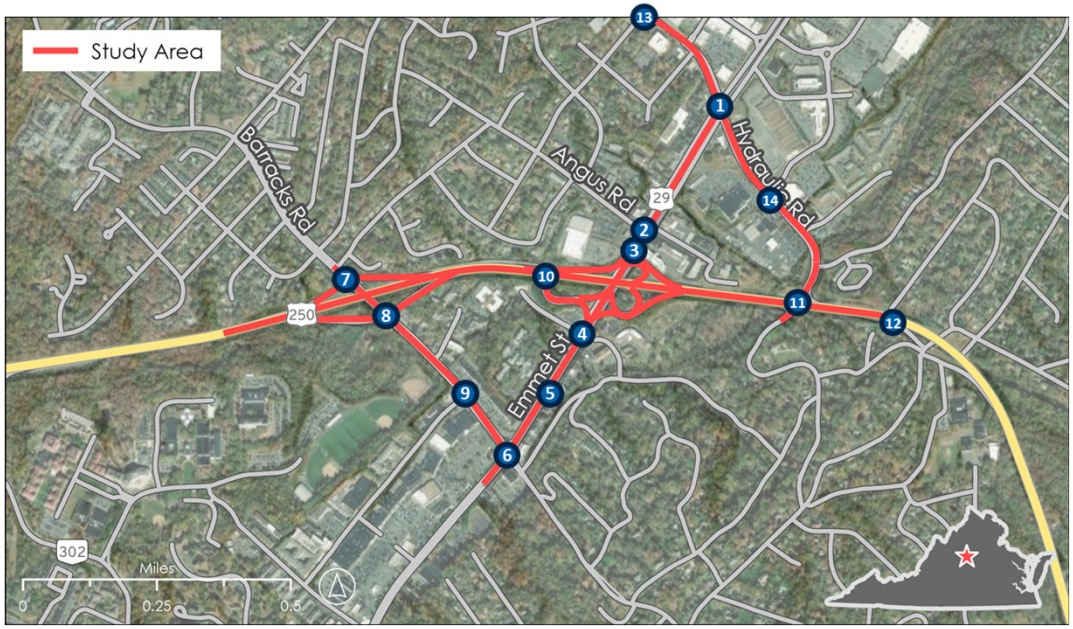


Toolbox of Solutions:

- **Innovative Intersections**
  - Bowtie Intersections, Roundabouts, Restricted Crossing U-Turns, Continuous Green-Ts, etc.
- **Traditional Improvements**
  - Turn lane improvements, signal timing optimization, etc.
- **Bike/Ped Improvements**
  - Crosswalks at targeted locations, shared-use paths, pedestrian bridge, transit service upgrades, etc.
- **Low-Cost Improvements**
  - Signal timing optimization, turn lanes, hard separation barriers to prevent weaving, etc.

Solutions will be targeted to:

- Reduce delay for side-street movements without compromising US 29 through movements
- Mitigate risk of angle and rear-end collisions
- Improve reliability of travel times throughout the corridor
- Provide pedestrian accommodations at targeted locations



Toolbox of solutions:

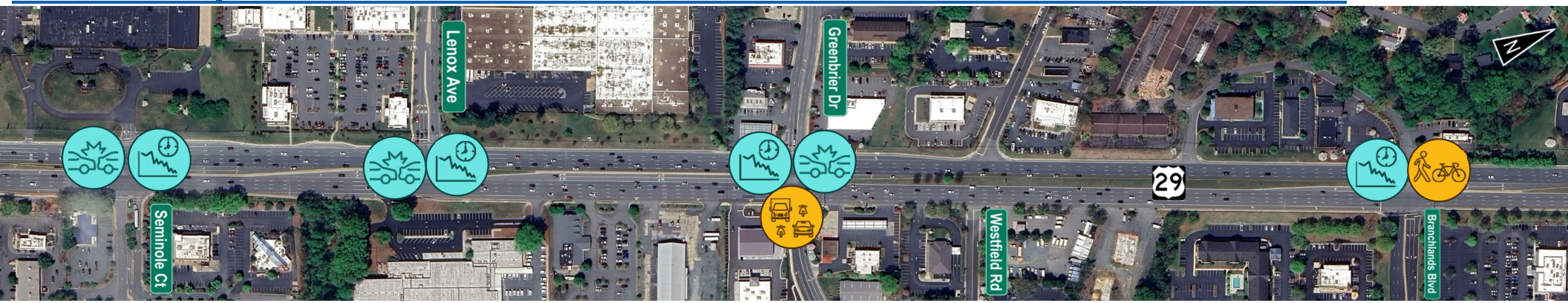
- Interchange Modification
  - Innovative interchange solutions
- Traditional Improvements
  - Ramp improvements
- Bike/Ped Improvements
  - Shared-use paths, pedestrian bridge, transit service upgrades, etc.
- Low-Cost Improvements
  - Signal timing optimization, turn lanes, hard separation barriers to prevent weaving, etc.

Solutions will be targeted to:

- Alleviate congestion associated with current interchange design
- Mitigate risk of angle and rear-end collisions near ramp termini and along the bypass
- Preserve capacity at interchange while improving operations

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Preliminary Ideas Overview: Seminole Court to Branchlands Boulevard



Solutions are targeted to:

- Reduce delay for side-street movements without compromising US 29 through movements
- Mitigate risk of angle and rear-end collisions
- Improve reliability of travel times throughout the corridor
- Provide pedestrian accommodations at targeted locations

Toolbox of Solutions

- Pedestrian Crossing Locations
- Left-Turn Restrictions
- Access Management
- Utilizing Hillsdale Drive as parallel route
- Extending SUP on Hillsdale Drive
- Low-cost Improvements



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Alternative Development: Fashion Square Drive to Woodbrook Drive



Solutions are targeted to:

- Reduce delay for side-street movements without compromising US 29 through movements
- Mitigate risk of angle and rear-end collisions
- Improve reliability of travel times throughout the corridor
- Improve pedestrian connectivity at targeted locations between Greenbrier Dr and Fashion Square Drive

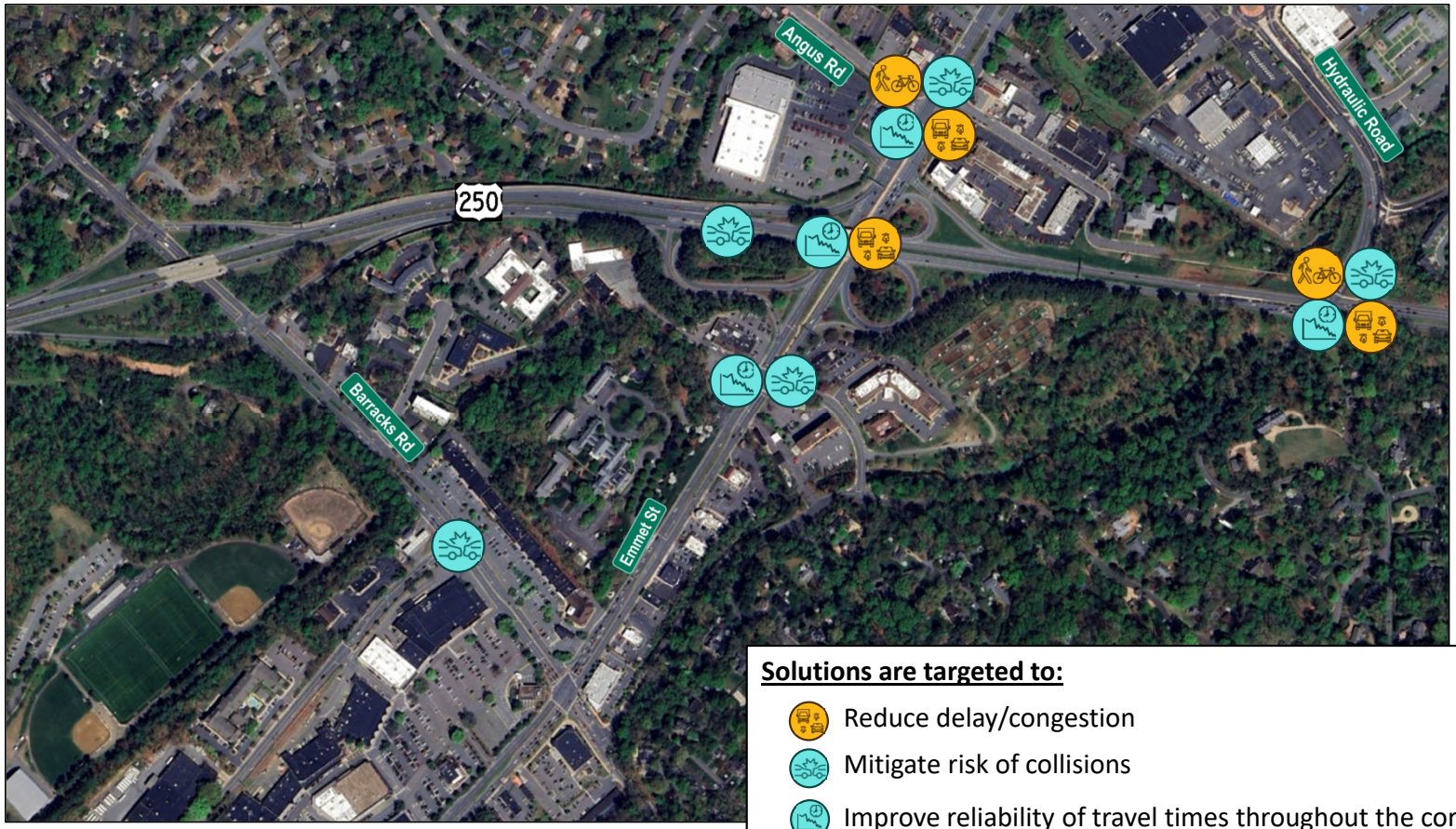
Toolbox of Solutions



- Pedestrian Crossing Locations
- Left-Turn Restrictions
- Utilizing Hillsdale Drive as parallel route
- Extending SUP on Hillsdale Drive
- Improve/Eliminate weave on NB US 29 from Rio Road
- Low-cost Improvements

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Alternative Development: US 250 Bypass Interchange Study Area





Toolbox of Solutions

- Alternative interchange/intersection configurations
- Relocating low-volume movements
- Arterial safety improvements
- Maintain/Improve bike/ped accommodations
- Access management
- Low-cost Improvements

Solutions are targeted to:

- Reduce delay/congestion
- Mitigate risk of collisions
- Improve reliability of travel times throughout the corridor
- Provide pedestrian accommodations at targeted locations

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Study Contacts

VDOT District Contact
Chuck Proctor
charles.proctor@vdot.virginia.gov

VDOT District Contact
Sandy Shackelford
sandy.shackelford@vdot.virginia.gov