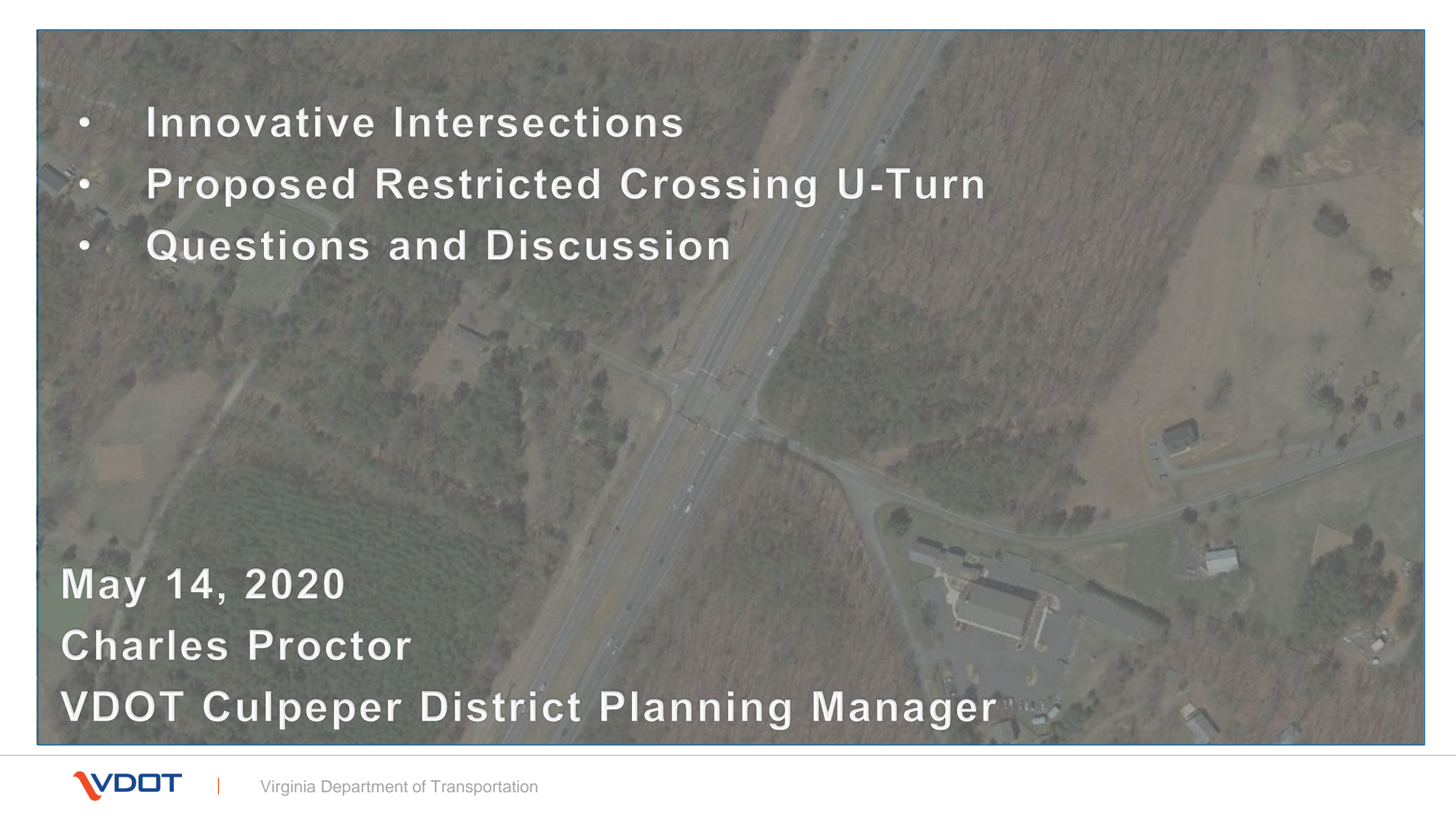




Innovative Intersections

Frays Mill R-CUT








- 
- An aerial photograph of a road intersection. A main road runs vertically through the center. A side road crosses it from the right. A proposed U-turn lane is visible on the side road, crossing the main road. The surrounding area is mostly wooded with some open fields and a few buildings.
- Innovative Intersections
 - Proposed Restricted Crossing U-Turn
 - Questions and Discussion

May 14, 2020

Charles Proctor

VDOT Culpeper District Planning Manager

Innovative Intersections

	Continuous Green-T (CGT)
	Diverging Diamond Interchange (DDI)
	Displaced Left Turn (DLT)
	Median U-Turn (MUT)
	Quadrant Roadway (QR)
	Restricted Crossing U-Turn (RCUT)
	Roundabout
	Single-Point Urban Interchange (SPUI)

- Improved Safety
 - Reduced Conflict Points
- Increased Efficiency
- Reduced Delay
- Increased Capacity



Restricted Crossing U-Turn (RCUT)

What is an RCUT?

- Intersection design where all side street movements begin with a right turn
- Side street left-turn and through vehicles turn right and make a u-turn at a dedicated downstream median opening to complete the desired movement
- Main intersection and median u-turns can be designed as signalized, stop controlled, or yield controlled

When Should It Be Considered?

- On median-divided highways
- At intersections:
 - With heavy through and / or left-turn traffic volumes on the major street
 - With low through and left-turn traffic volumes on the side street
 - With three or four legs

Benefits

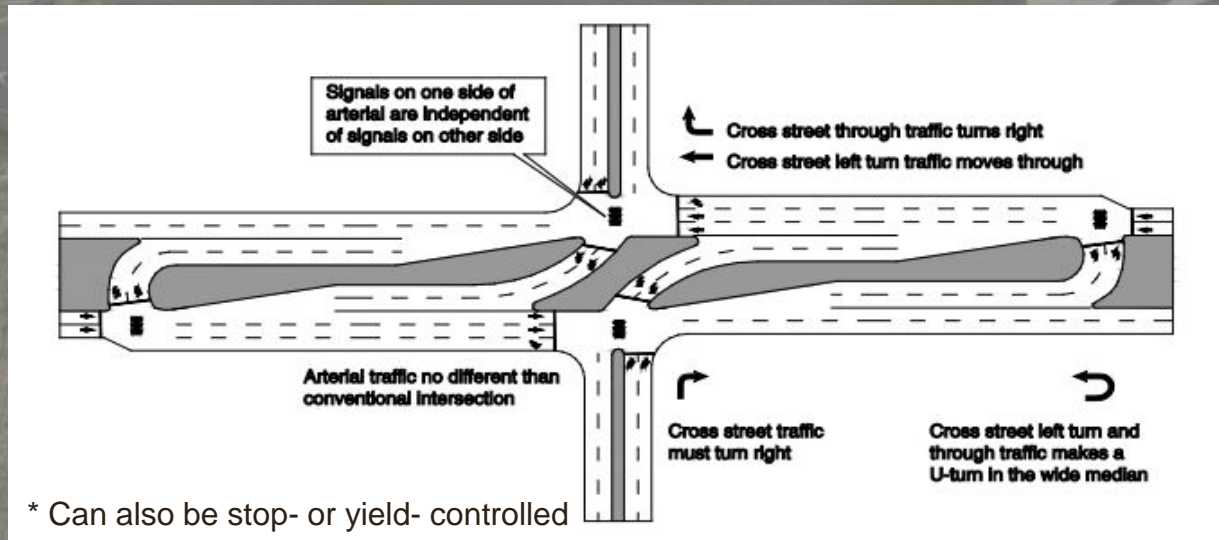
- **Improved safety:** Reduces the number of points where vehicles cross paths and eliminates the potential for head-on crashes
- **Increased efficiency:** Each direction of the major street can operate independently, creating two one-way streets and increasing the overall intersection capacity
- **Shorter wait times:** Fewer traffic signal phases means less stopping for arterial vehicles and allowing only right turns from side street vehicles means less waiting
- **Cost-effective:** An RCUT can be more cost effective than adding lanes to improve capacity



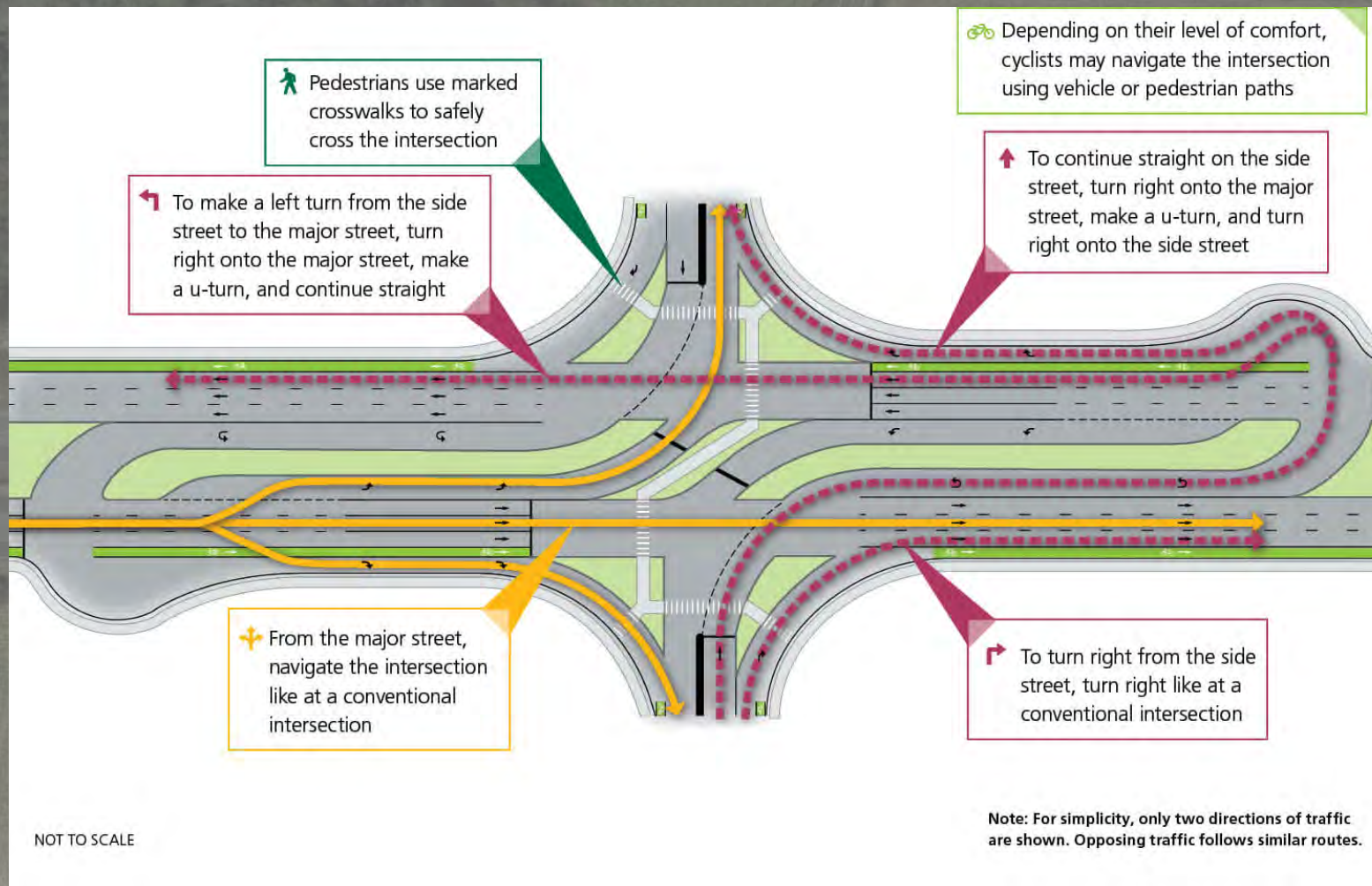
Restricted Crossing U-Turn (RCUT)

- Alternative to signalized intersections
 - Can be Stop- or Yield- Controlled
- Corridor treatment
 - Major route integrity
 - Minimize travel time
 - Increase Capacity
- Can be Signalized

■ **Shorter wait times:** Fewer traffic signal phases means less stopping for mainline vehicles and right turns only from the side street vehicles means less time waiting



Navigating an R-CUT



<https://www.youtube.com/watch?v=g1SA1mAXmfk&feature=youtu.be>

US29 & Burnley Station



5- year Crash History:

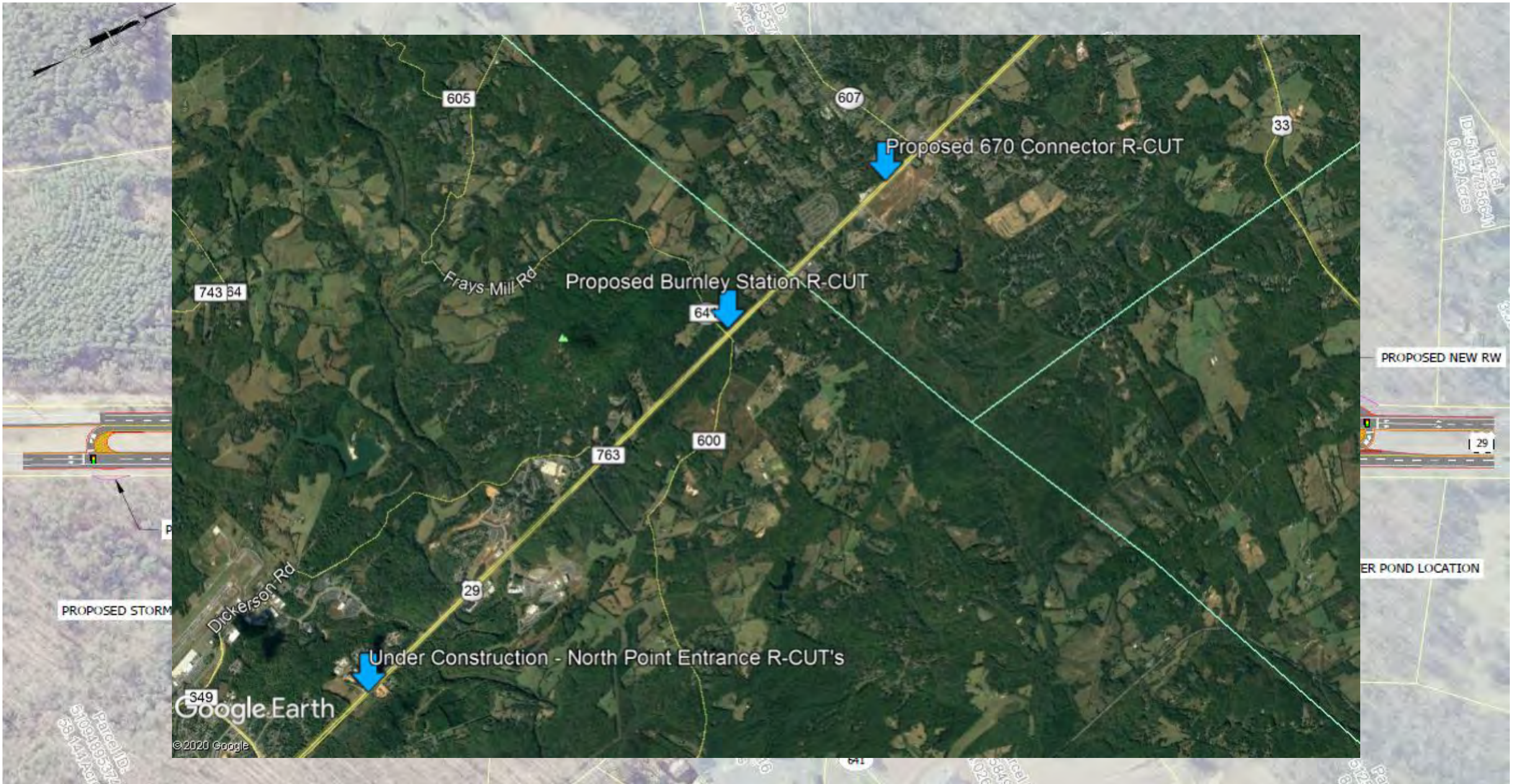
- 1 - Deer Strike
- 1 - Fixed Object Off Road
- 1 - Non-Collision

Targeted Crashes:

- 4 - Angle
- 28 - Rear Ends

9 – Injury Crashes

MARYLAND	MINNESOTA	MISSOURI	NORTH CAROLINA
9 RCUT intersections along US 15 and US 201 ¹	8 RCUT intersections ³	5 RCUT intersections along US 63 ⁴	93 RCUT intersections ^{5,6}
<ul style="list-style-type: none"> ■ 44% reduction in total crashes 	<ul style="list-style-type: none"> ■ 100% reduction in fatal and serious injury right-angle crashes 	<ul style="list-style-type: none"> ■ 35% reduction in total crashes ■ 54% reduction in fatal and injury crashes 	<ul style="list-style-type: none"> ■ 59% reduction in total crashes ■ 71% reduction in fatal and injury crashes
RCUT at US 301 and MD-313² <ul style="list-style-type: none"> ■ 92% crash reduction over a 10-year period ■ 100% reduction in right-angle collisions and fatal and injury crashes 	<ul style="list-style-type: none"> ■ 77% reduction in all severity right-angle crashes ■ 50% reduction in injury crashes 		<ul style="list-style-type: none"> ■ The study also showed that these crash reductions remained consistent over a range of intersection volumes



Summary Matrix

Scenarios	Criteria					
	Delay AM	Delay PM	Estimated Cost	Vehicle Safety	Bike & Ped. Safety	Initial Driver Familiarity
Existing Condition	82.3 (F)	62.7 (F)	N/A	Existing Conditions 48 Conflicts Point	No Current Ped Facilities. Bicycles Share the Road	N/A
2035 No-Build	104.4 (F)	74.1 (F)	No Change	No Change 48 Conflict Points	No Change from Existing Conditions	Current Condition
2035 Signalized R-Cut Main NB	17.5 (B)	14.6 (B)	\$9.5 Mil	Reduces Conflicts 48 > 20	Provides Multi-Stage Protected Crossing	Moderate
2035 Signalized NB U-Turn	27.4 (C)	10.6 (B)			N/A	
2035 Signalized R-Cut Main SB	28.3 (C)	9.8 (A)			Provides Multi-Stage Protected Crossing	
2035 Signalized SB U-Turn	2.8 (A)	7.6 (A)			N/A	

Frequently Asked Questions

- Safety Concerns for vehicles having to merge through multiple lane of traffic to get to the u-turn location?

The intersections are still signalized and the right turns can cross over when the signal cycles giving them a green right turn arrow

- Safety concerns for vehicle making the U-turn?

The U-turn locations are also signalized to allow for the safe maneuvering of vehicles.

- Concerns of long delays/additional time needed for vehicles from the side streets?

The current intersection operates at a Level of Service 'F' in the AM and E in the PM Peak Hour periods (based on the 2018 study) The operations will continue to decline in the future. This is mainly due to the growth in the traffic on Route 29. To address this affect the Innovation Intersection treatment like the R-Cut are installed to preserve the capacity of the main roadway and provide continue access from the side street into the future.

Frequently Asked Questions (cont.)

- Concerns that vehicles will need to travel to Greene County to make the U-turn movement?

A new U-turn cross-over will be built just north of the current intersection (Approximately 900 ft.) about half way to the Albemarle County Sign.

- Concerns that US 29 traffic is being favored over local Albemarle County Traffic?

US 29 is classified as Principal Arterial roadway. It traverses the State and provides access to this part of the Commonwealth. It accommodates local, regional and statewide travel as well as commerce and freight to and through the region. Yes we do favor US 29 as it is the only major thoroughfare through this part of the State and it needs to be preserved for all travelers. This is the reason the Innovative intersection treatment are evaluated as they maintain reasonable access for the side streets while continuing to preserve operations on the major roadway.

Frequently Asked Questions (cont.)

- Safety concerns for pedestrian and bicyclist crossing US 29 at the Intersection?

There are currently no Bicycle and Pedestrian facilities at or near the intersection. We currently were not including new facilities from those mode with this improvement. However we will evaluate options for a wider splitter median to accommodate a crossing of the intersection when facilities are built.

An aerial photograph of a road intersection. A multi-lane road runs diagonally from the top-left to the bottom-right. It intersects with a road that runs horizontally across the middle. To the right of the intersection, there is a large building complex with a parking lot. The surrounding area is mostly wooded with bare trees, suggesting a late autumn or winter setting. The text "Questions and Discussion" is centered over the image in a large, white, sans-serif font.

Questions and Discussion