



An Alternative Interchange

# Brentsville –

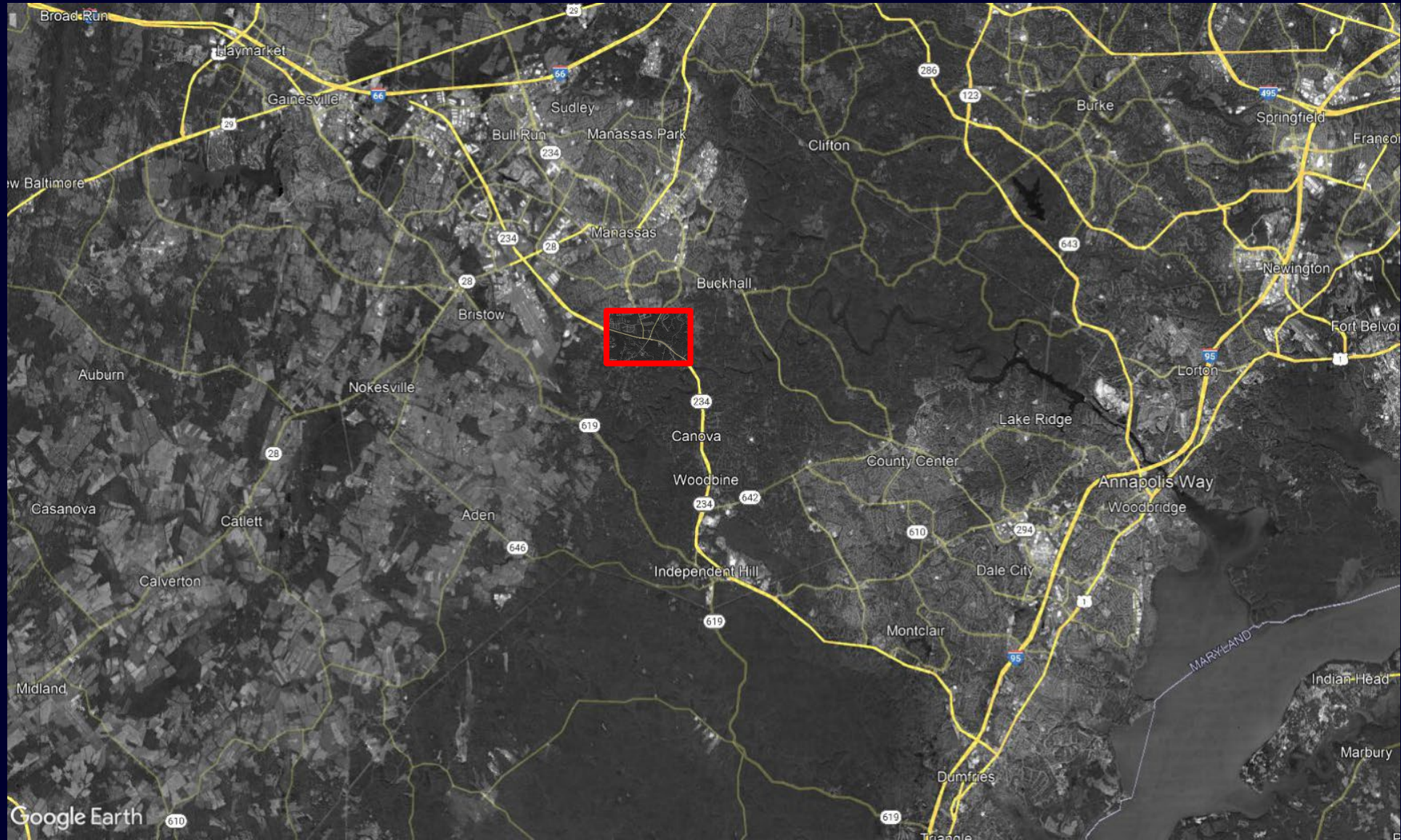
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*with a Double Shot of Green-T Innovation!!!*



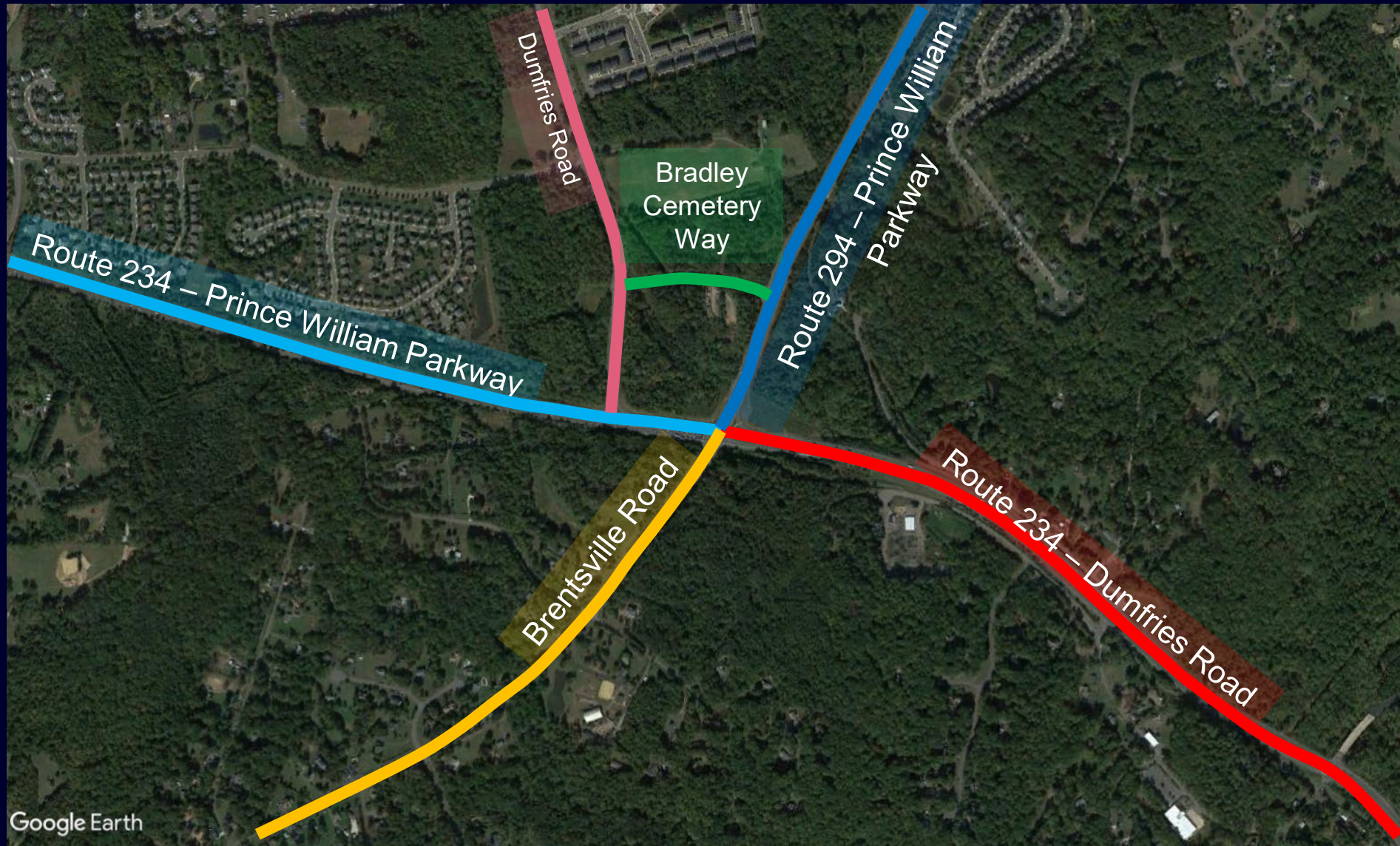


# Introduction





# Introduction

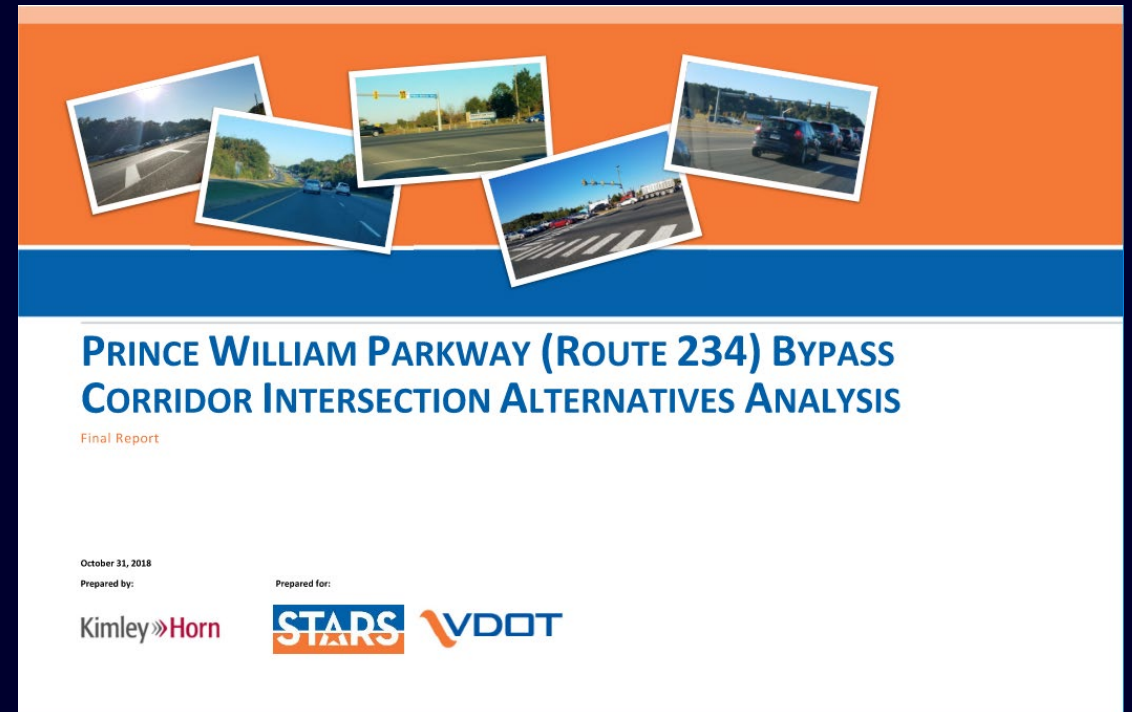


# Evolution of the Project



## Initial Problem:

- Expansion of Prince William Parkway from the mid 1990s through 2005
- They knew that an interchange would be required in the future at several locations; right of way was purchased with this in mind
- Eventual capacity issues with two closely spaced, signalized intersections
  - <800 feet
- STARS report was initiated to look at potential solutions along the corridor





# Evolution of the Project



## STARS Report



Completed in 2018; was a holistic look at Prince William Parkway from Sudley Manor Drive in Manassas to our interchange location at Brentsville



"The purpose of this project is to identify solutions to not only relieve existing congestion, but to also provide sufficient capacity to accommodate the anticipated growth from regional use and local travelers on this major thoroughfare... The innovative intersection designs will increase capacity for Prince William Parkway mainline without compromising crossing streets, enhance access to developing industrial, commercial, and residential areas, and improve safety in the study area.



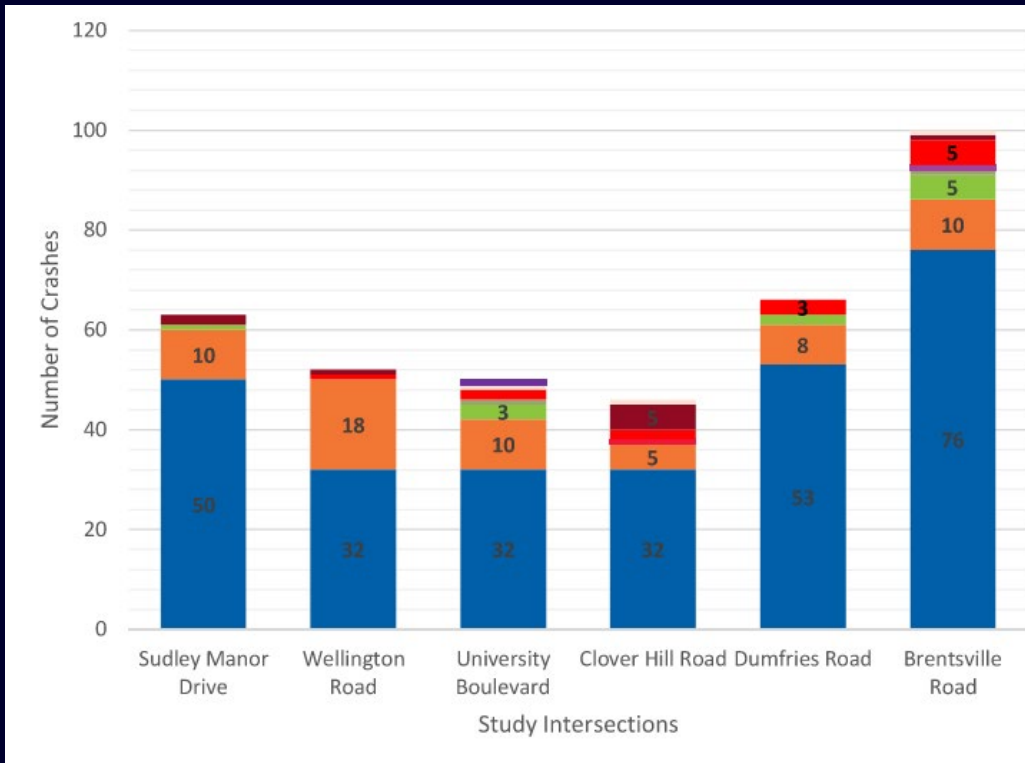
Safety was closely examined with an inordinate number of rear-end crashes compared with other types – indicative of over capacity issues along a corridor



# Evolution of the Project



## STARS Report – Crashes





# Evolution of the Project



## STARS Report – Initial Concept

1. Grade separate the eastern intersection of Prince William Parkway and Dumfries Road
2. Convert the intersection of Prince William Parkway and Bradley Cemetery Way to a Green-T
3. Realign Brentsville Road
4. Convert the signal at Prince William Parkway and Brentsville Road to a three-phase operation
  - Remove the northbound and southbound lefts

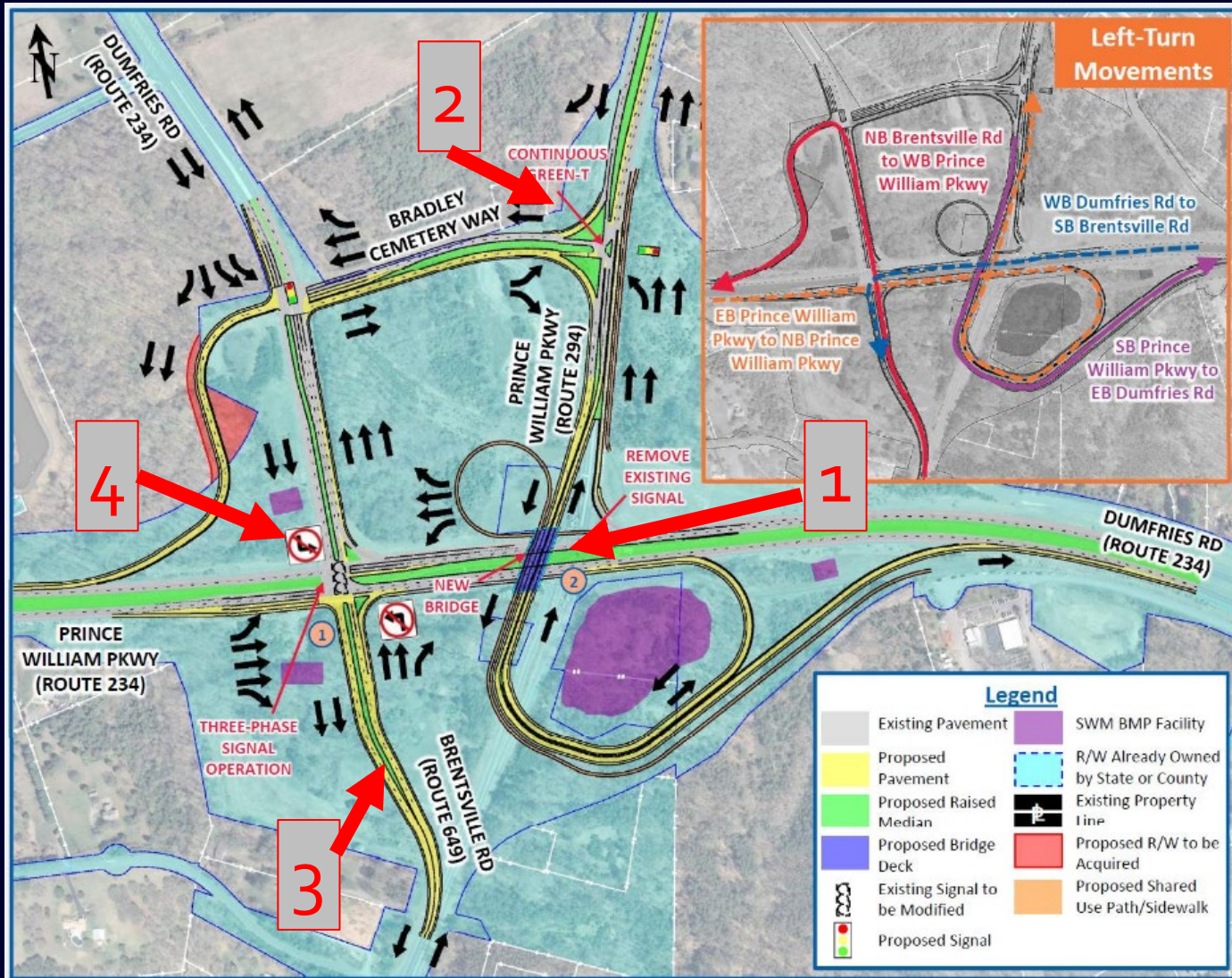


# Evolution of the Project

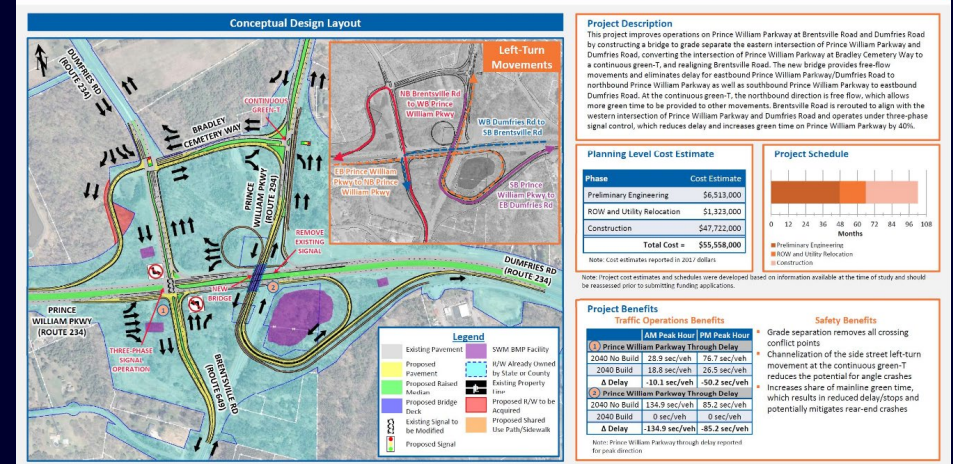


## STARS Report – Initial Concept

- The concept was initially referred to as a Grade Separated SPORK
- Cozy combination of grade separation & innovative at-grade treatments
- Side Note: An alternative working title was... *SPORK Interchange, not just for middle school lunches any more*



PRINCE WILLIAM PARKWAY AND BRENTSVILLE ROAD/DUMFRIES ROAD  
PREFERRED ALTERNATIVE: GRADE SEPARATED SPORK

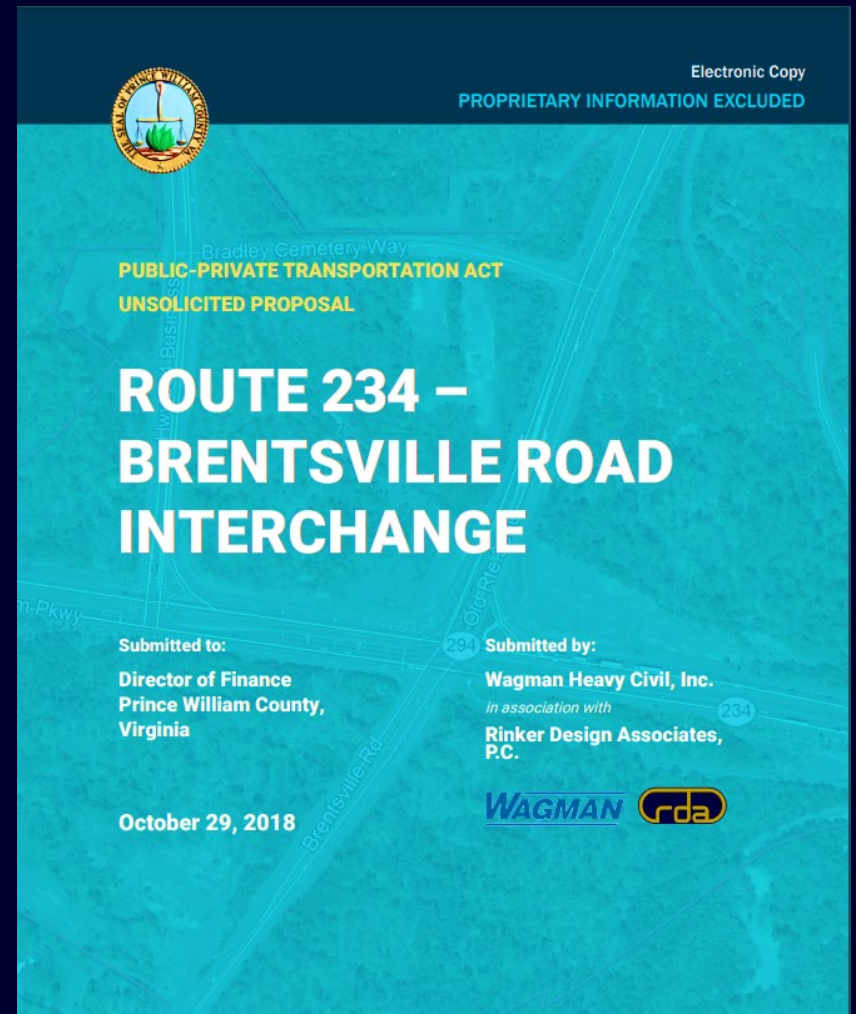




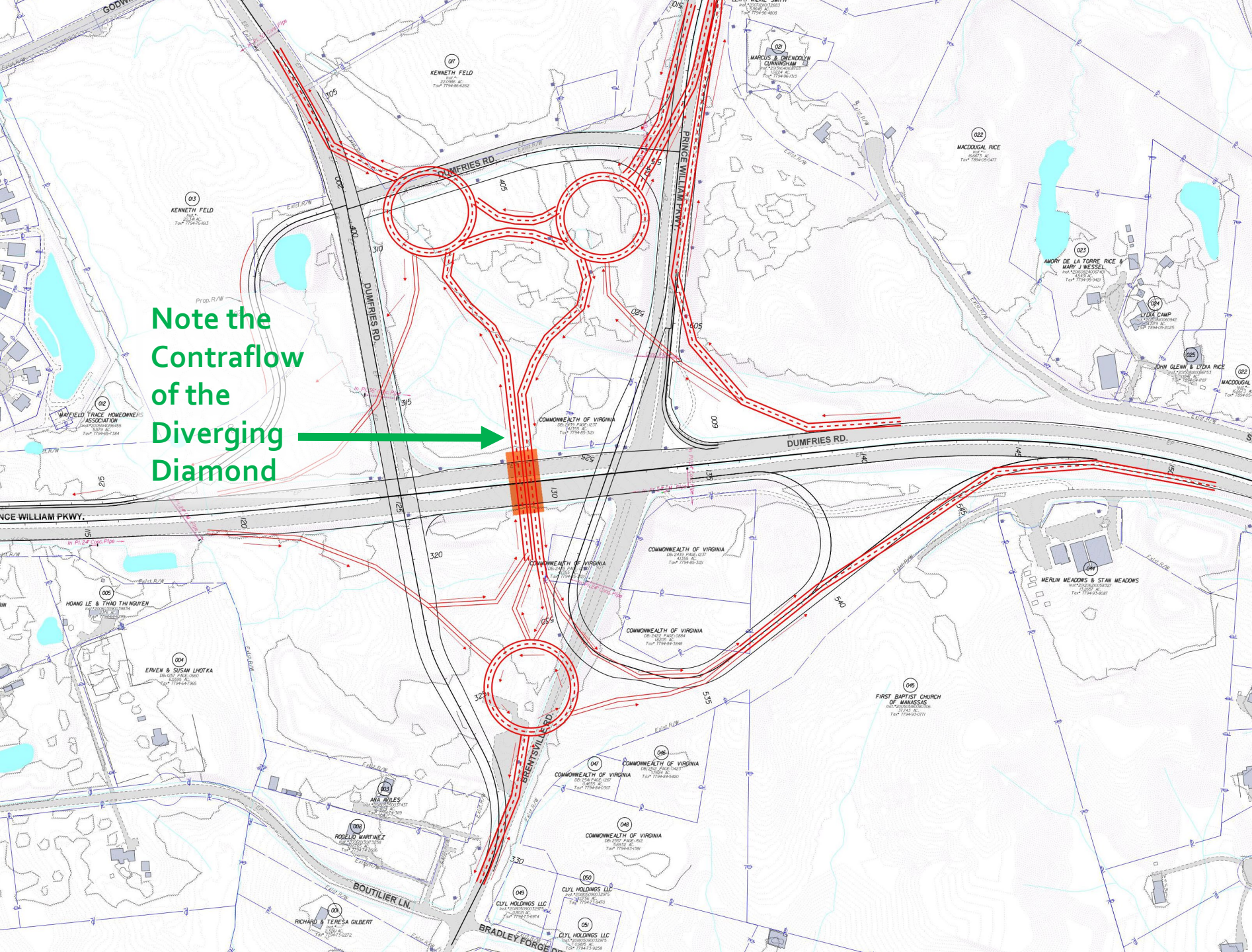
# Evolution of the Project



- An unsolicited bid was received by Prince William County utilizing PPTA funds for the project from Wagman and RDA
- After the required solicitation per the requirements of PPTA, the project was to be developed via the Design-Build delivery method and was awarded to Wagman and RDA







Note the  
Contraflow  
of the  
Diverging  
Diamond





# Refinement of the Interchange



## HALO

- May be referred to as the "Hamburger"
- Local inspiration: I-395 at Shirlington Road

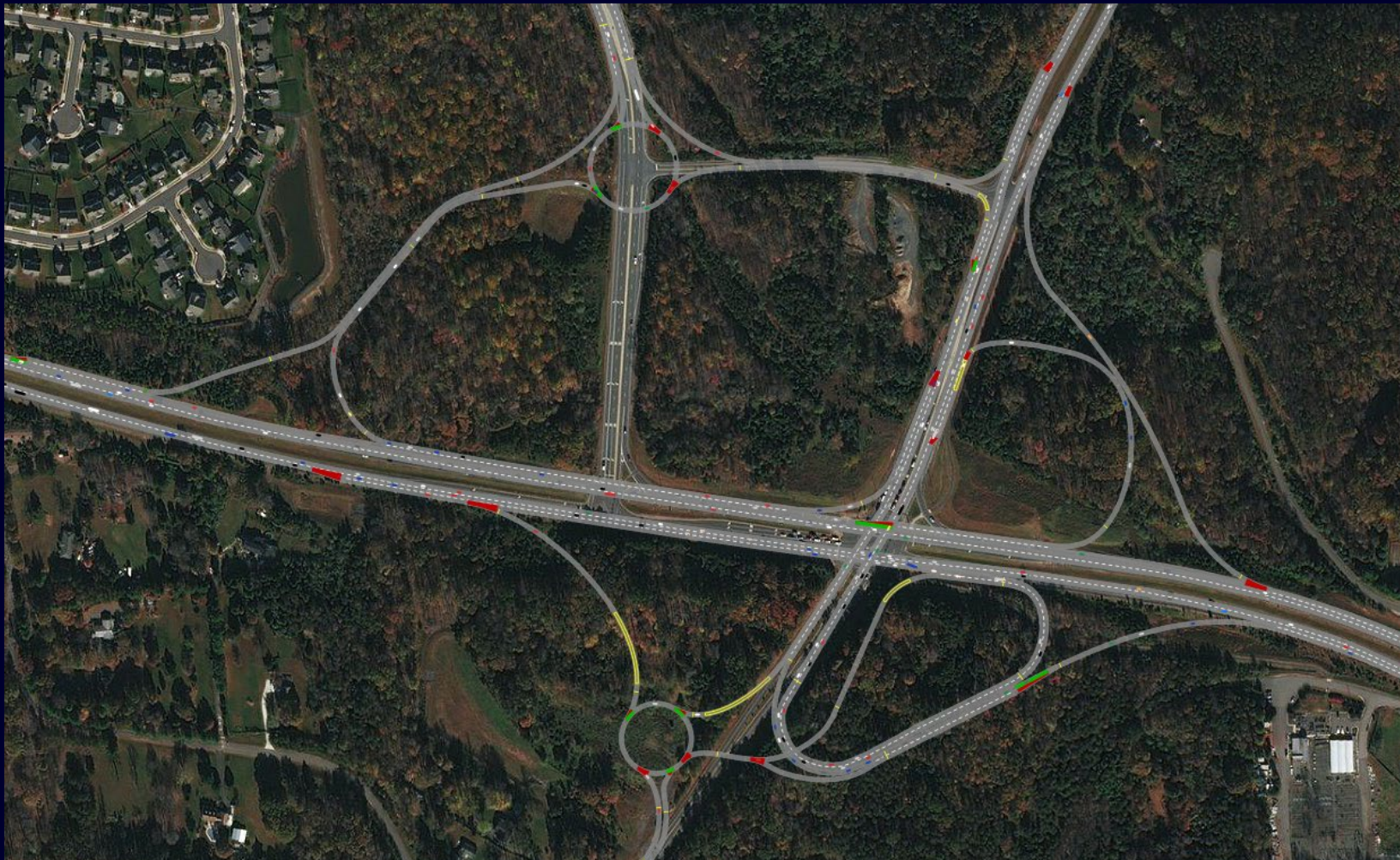




# Refinement of the Interchange



## Hybrid Halo/Roundabout/Spork Option

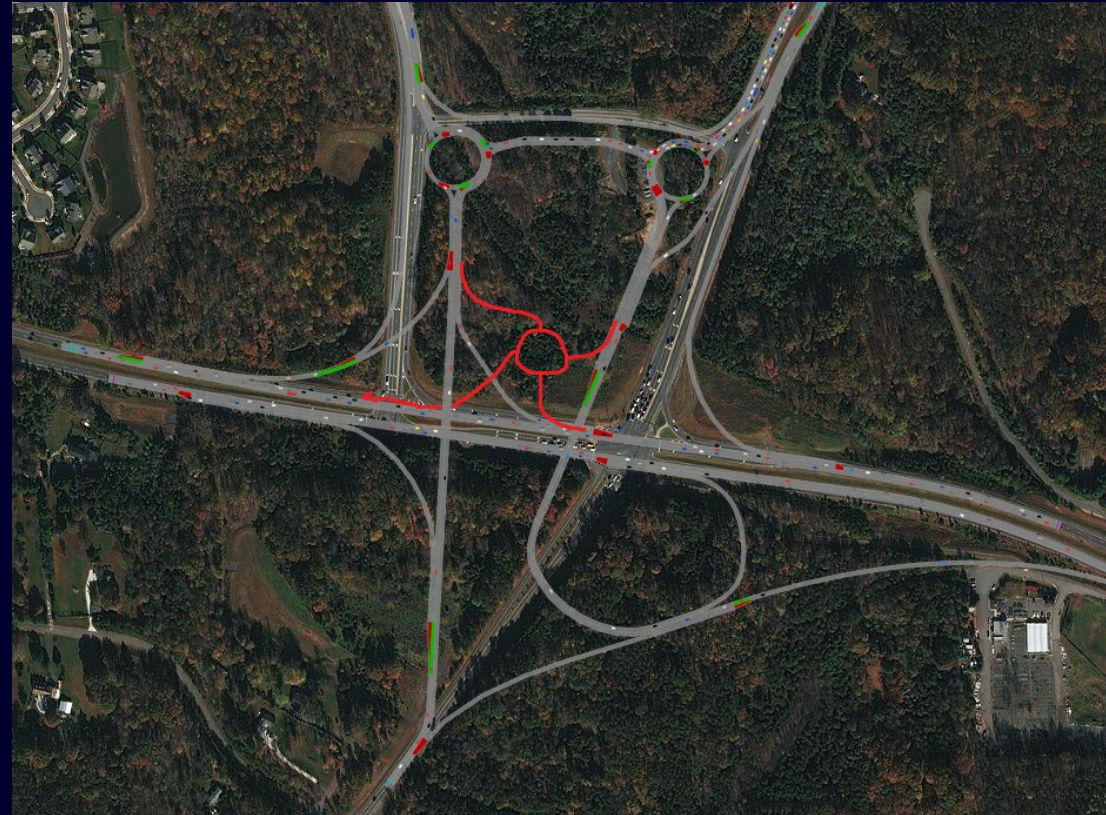
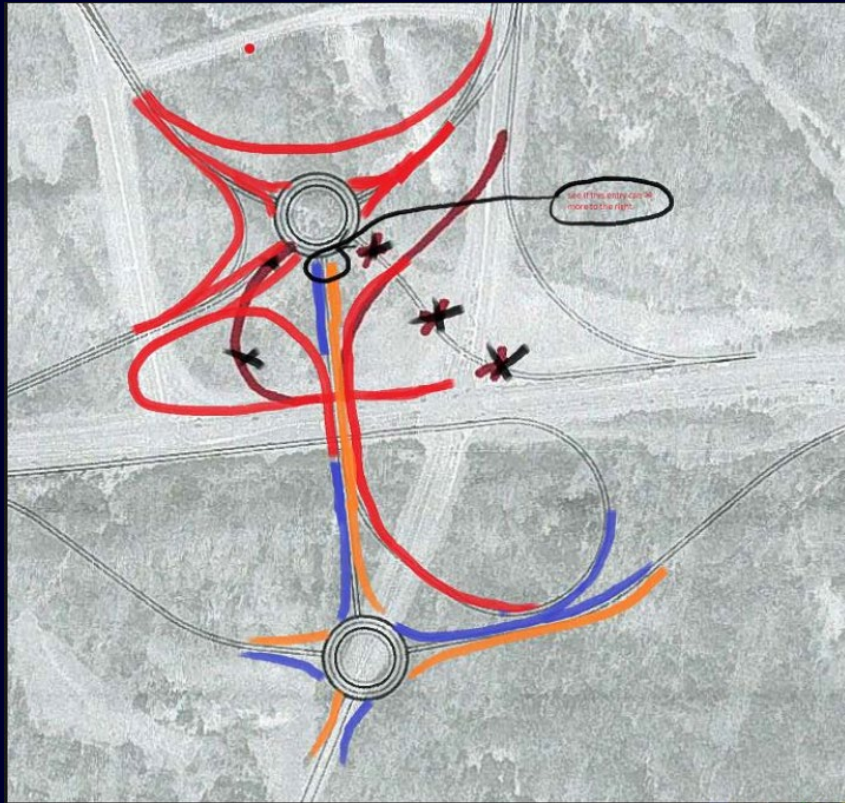




# Refinement of the Interchange



## Roundabouts





# Refinement of the Interchange



Honorable Mentions... [insert dramatic music here]













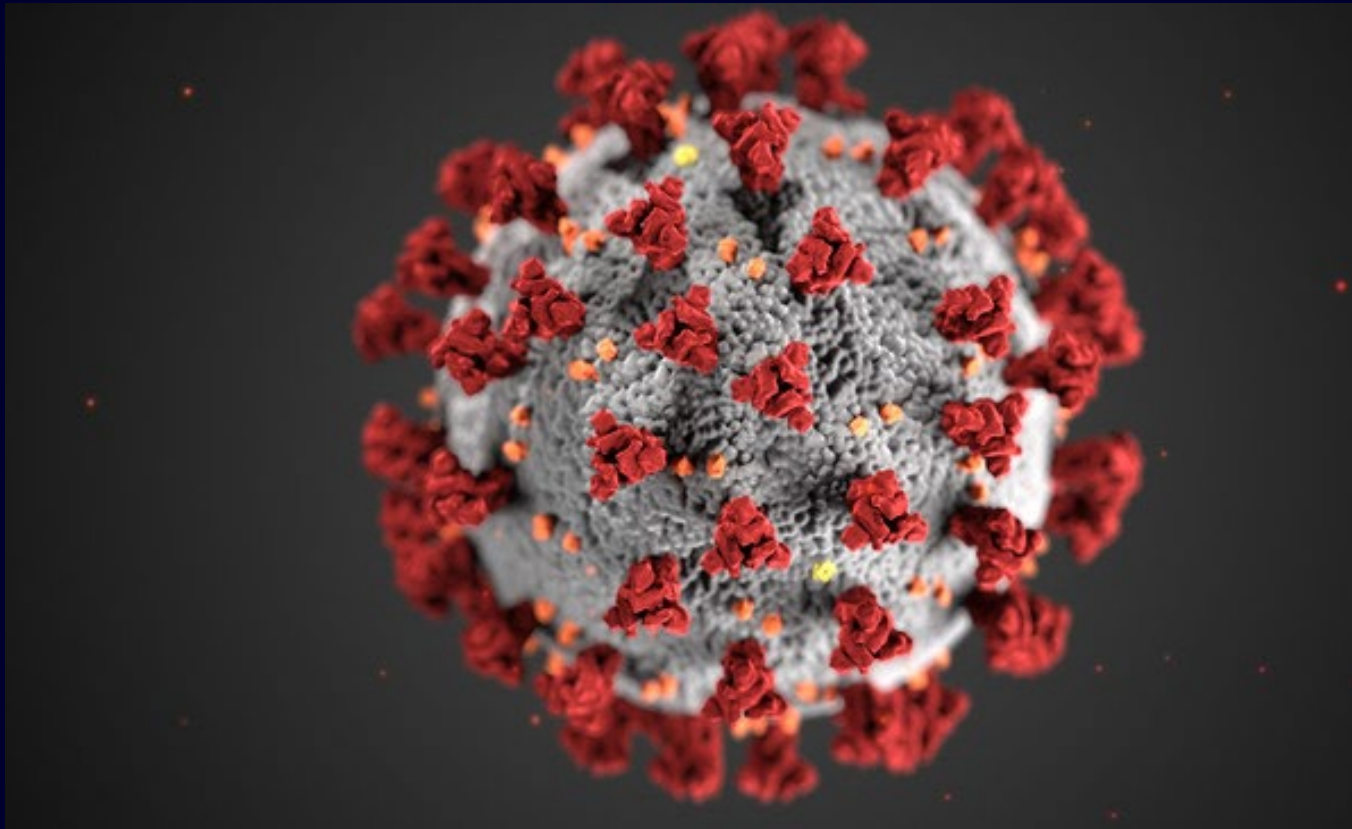
# Refinement of the Interchange



- From the STARS reports, the existing conditions were modeled in Synchro
- Measures of effectiveness were:
  - Average vehicle delay and 95<sup>th</sup> percentile queue
- Remember, this study was completed pre-COVID with traffic counts collected in 2017.
- Now that we had altered the design concept, we had to produce traffic analyses. IJR (now IARs), SJRs, etc. for the final condition
  - ...During COVID



# Operations of the Final Concept





# Operations of the Final Concept



**“It’s for your own good. You’ve got to stop touching your face.”**



When your holiday has been cancelled by the coronavirus but don't want to give up the dream





# Operations of the Final Concept



Some random person...IDK, I can't see their face because of the mask





# Operations of the Final Concept



- No IJR was completed to this point
- The County issued an approved IJR Framework Document with the design-build RFP document
- Upon Contract NTP, RDA then picked up the framework in March 2020 and approved in May 2021.

LD-459  
(10-26-2020)

VIRGINIA DEPARTMENT OF TRANSPORTATION  
LOCATION AND DESIGN  
INTERCHANGE ACCESS REPORT FRAMEWORK DOCUMENT

Page 1 of 4

Date:	4/14/2021	Submission From:	Prince William County Dept. of Transportation
Prepared By:	Rinker Design Associates, P.C. (Adam Weischenbach, P.E., PTOE)	State Project Number:	0334-076-323
Project Information:		City/County:	Prince William County
LPC:	138626	Project Name:	Itc 234 - Brentsville Inter.
District:	Northern Virginia		
Federal Project Number:	N/A		

**Need for Access Revision**  
Provide information that addresses the current and projected needs for the facility. Explain why the existing access points and the existing or proposed local system is unable to meet the future needs. Brief mention of history of the area pertinent to the project that led to the need for the project (example: population growth, recent/future development, land use, etc.), understanding that this will be discussed in more detail in the Report.

Please see separately prepared, revised framework document dated April 2021 for details.

**Project Description and Location**  
Provide information that includes a clear and detailed written description (including all components) of the project scope of work, include the precise location and boundaries of the proposed project, aerial photographs of the general project area and area of influence. Maps, aerial photos, schematic drawings should be to an appropriate scale and show approximate locations should be identified by major roads, and other key features. The subject interchange location should be identified by relation to adjacent interchanges and major roads in the system.

Please see separately prepared, revised framework document dated April 2021 for details.

**Operational and Safety Analysis**  
Provide information that supports the operational and safety performance of the proposed transportation system, as well as future no build and proposed alternative local transportation system, as well as the goals and objectives to be defined in the study area. It is recommended performance of the system. With that desired and acceptable operational performance, and future build alternatives, can be established as a base of comparison, and refer to TSMAM for goals and objectives of the stakeholders. Please refer to TSMAM for goals and objectives of the stakeholders. Please refer to TSMAM for goals and objectives of the stakeholders. Please refer to TSMAM for goals and objectives of the stakeholders.

Please see separately prepared, revised framework document dated April 2021 for details.

Route 234 at Brentsville Road  
Interchange  
Justification Report

Revised Framework Document for  
Interchange Justification Report

LPC 138626  
April 2021 (Revised)  
March 2021 (Revised)  
March 2020

Prepared for:  
Prince William County,  
Virginia

WAGMAN  
WAGMAN  
WAGMAN

VDOT  
Virginia Department  
of Transportation

Wagman Heavy Civil and Rinker Design Associates P.C.

Prepared by:



# Operations of the Final Concept



- Modifications to the IJR Framework included:
  - Utilizing traffic data from the PWC Travel Forecasting Model for 2015 and 2040
  - Traffic volume data from the 2017/2018 STARS report will be utilized and projected to 2021 based on agreed best practices
  - New development will be captured from trip generation or new traffic studies
  - Queue length and travel times for the existing and future conditions were generated from VISSIM for AM and PM
    - Calibration was the biggest issue... COVID did not really allow us to field validate the model and theoretical defaults were utilized.
  - Crash data was limited in scope
  - Original Synchro files from the STARS study were utilized to help with base conditions



# Operations of the Final Concept



## VISSIM Simulations

- VISSIM was used for traffic simulation for Existing, No-Build 2025 & 2045, and Build 2025 & 2045 conditions.
  - VISSIM was also used for traffic operations analysis of alternative design concepts.
- VISSIM simulations show significantly improved traffic operations in both AM and PM Build Conditions.
  - Lower delays, shorter and fewer queues, shorter travel times, and less congestion.

## Density Heatmaps:

### No Build - AM



### No Build - PM

### Build - AM



### Build - PM





# Operations of the Final Concept




## SJR

- Signal Justification Reports

- SJRs were performed for all proposed signals as part of the IJR.
- Two of the three intersections did not meet signal warrants for the opening year or future design year.
- Traffic analysis showed adequate performance without signals.
- This created a unique situation with unsignalized Green Ts.

VDOT Signal Justification Report Template - Version 2.0 - December 2019

 Virginia Department of Transportation

**VDOT Signal Justification Report (SJR)  
NOVA District**


Note: Text in small gray font is sample text or placeholder text and should be removed from the final document before conversion to PDF. The full SJR, including appendices (A, B, and C as noted at the back of this template), should be submitted electronically as a PDF file to avoid unnecessary printing and allow for efficient review by VDOT.

Refer to the latest edition of [IMTE-387](#) for additional information about the application of the SJR process in various scenarios.


**Date: October 29, 2021**

**I. Study Intersection**

**Major Street Route # and Name:** Prince William Parkway (Route 294) Direction: North/South  
**Minor Street Route # and Name:** Proposed Roadway D Direction: East/West  
**County or Locality:** Prince William County  
**is the intersection on the Arterial Preservation Network (APN)?** Yes  
**Sketch Diagram/Aerial of the Intersection Geometry:** [Insert an image below | sketchDiagramAerial as a separate attachment](#)



**VDOT Signal Justification Report Template - Version 2.0 - December 2019**

 Virginia Department of Transportation

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NOVA District**


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Refer to the latest edition of [IMTE-387](#) for additional information about the application of the SJR process in various scenarios.

**Date: October 29, 2021**

**I. Study Intersection**

**Major Street Route # and Name:** Brentsville Rd (Route 649) Direction: North/South  
**Minor Street Route # and Name:** Proposed Ramp F Direction: East/West  
**County or Locality:** Prince William County  
**is the intersection on the Arterial Preservation Network (APN)?** Yes  
**Sketch Diagram/Aerial of the Intersection Geometry:** [Insert an image below by clicking on the image icon, or include the sketchDiagramAerial as a separate attachment](#)

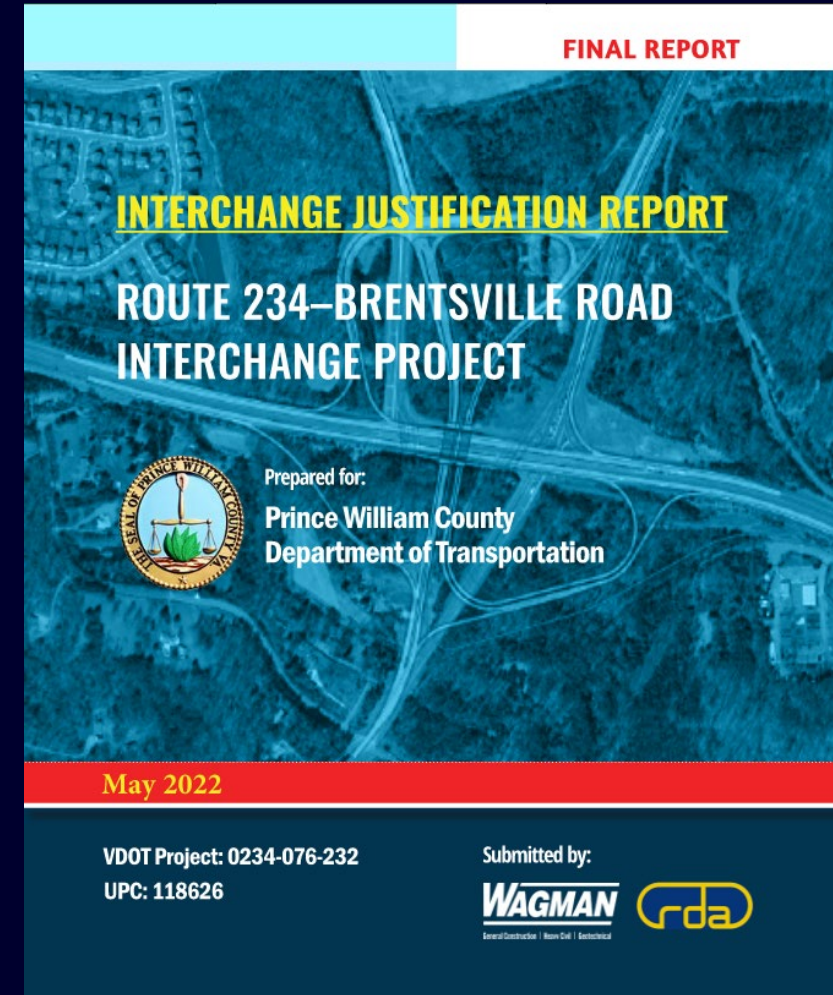




# Operations of the Final Concept



- A lot of coordination, discussion, agreement and concessions were made to get us to the finish line
  - Although not ideal as any of us would prefer we got to a defensible solution to validate the design



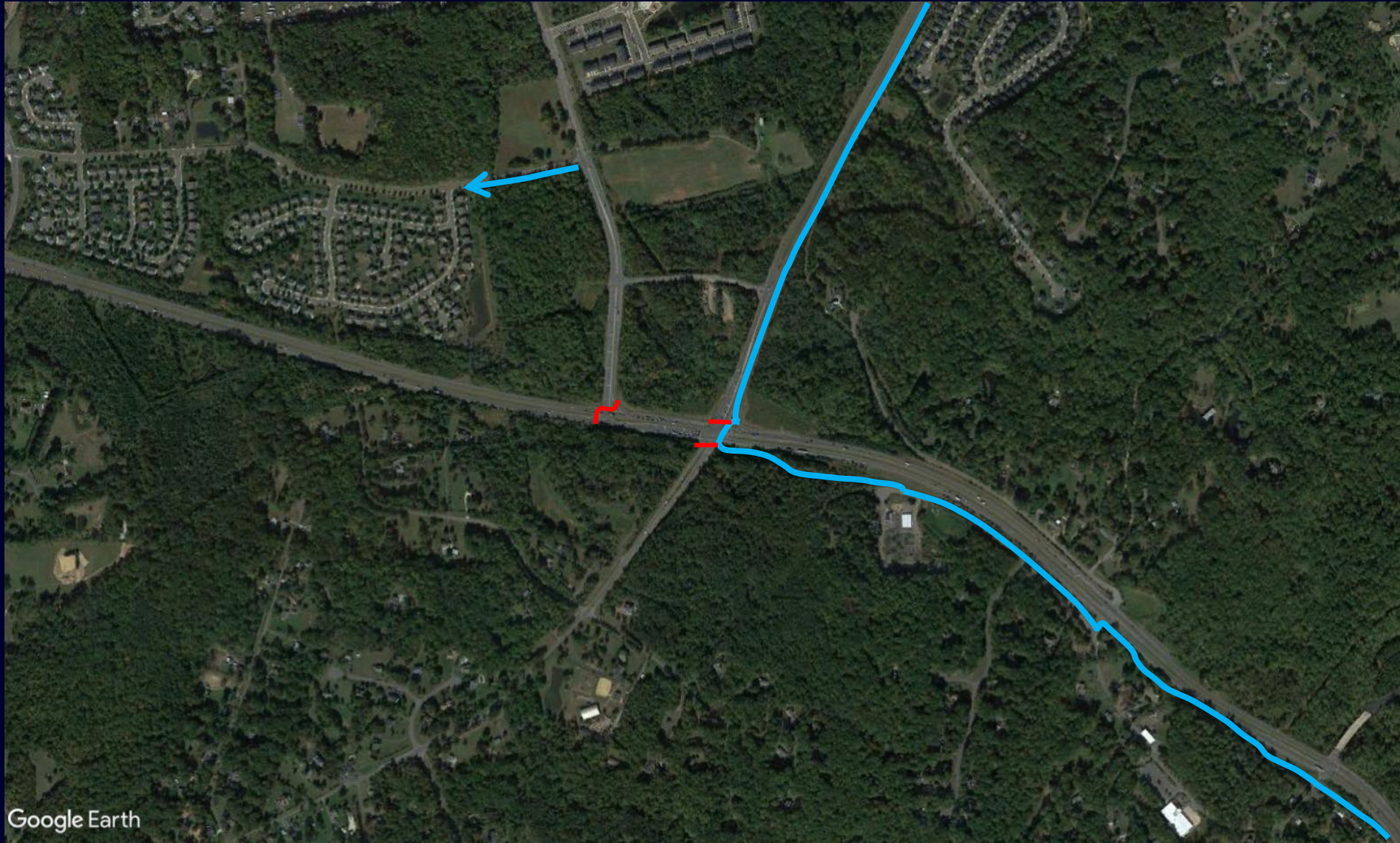
# Pedestrian Accommodations



- A Shared Use Path (SUP) was included in the overall design
  - Currently, a path exists along the east side of Route 294 – Prince William Parkway
- A Crosswalk Study was completed for the northern Green-T
  - Crosswalks are not usually present at Green-Ts
- A pedestrian bridge over 234 – Dumfries Road was developed later in the plan process

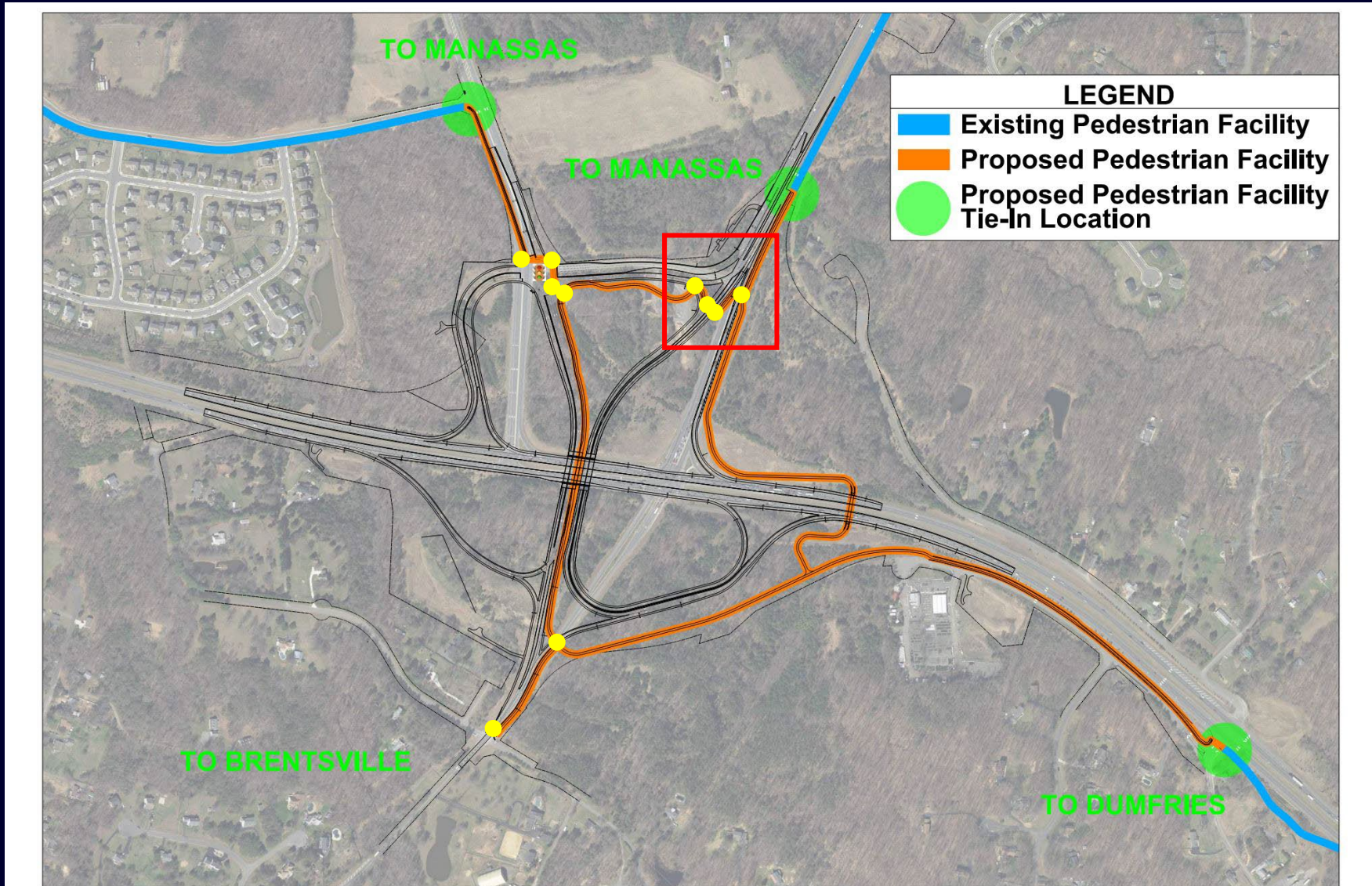


# Pedestrian Accommodations





# Pedestrian Accommodations





# Pedestrian Accommodations



### How to Navigate

Below shows how to navigate a CGT intersection. Click the image to view a [larger version](#) or watch the [video](#).

- Depending on their level of comfort, cyclists may navigate the intersection using vehicle or pedestrian paths
- To turn left from the side street, use the channelized lane to merge onto the major street
- To continue straight on the top of the "T", pass through the intersection

At CGTs, crosswalks are not provided across the major street. To cross the major street, pedestrians may use the nearest marked crosswalk (not shown)

At CGTs, crosswalks are not provided across the major street. To cross the major street, pedestrians may use the nearest marked crosswalk (not shown)

...e marked crosswalks  
...the side street

...street,  
...t  
...ersection

NOT TO SCALE



# Pedestrian Accommodations

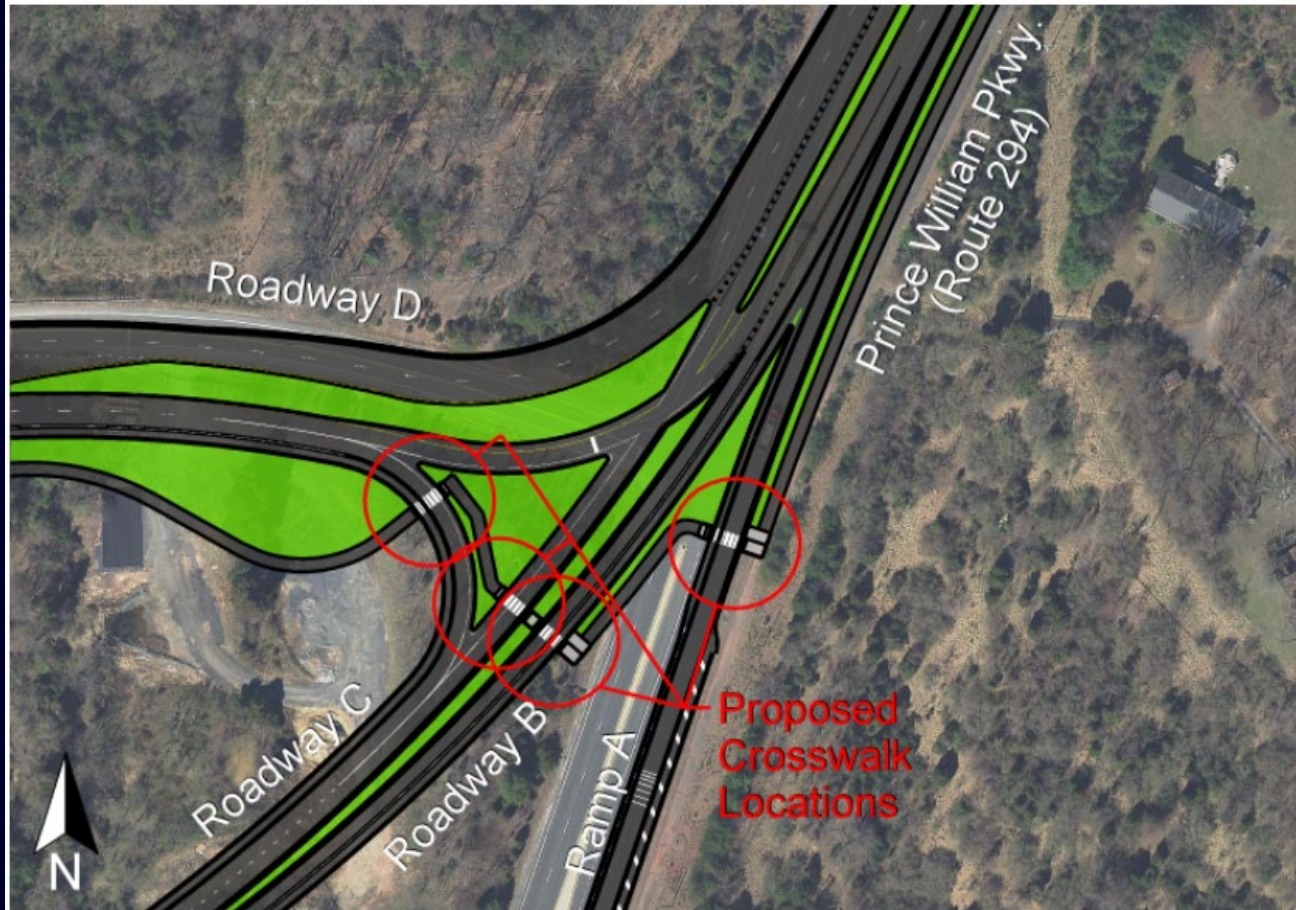


Figure A: Study Area Map

**Route 234-Brentsville Road**  
**Interchange Project**  
**Crosswalk Study**  
For the following Locations:

COMMONWEALTH OF VIRGINIA	
ADAM D. WELSCHENBACH	
Lic. No. 044359	
PROFESSIONAL ENGINEER	
Adam Welschenbach	2022.02.10
08:13:41 -05'00'	
Rinker Design Associates, P.C.	
Manassas, Virginia	
TRAFFIC ENGINEER	

- 1. Mid-Block Crossing:**  
Channelized Right Turn from Roadway D to Roadway C
- 2. Mid-Block Crossing:**  
Roadway C at Roadway D
- 3. Mid-Block Crossing:**  
Roadway B at Roadway D
- 4. Mid-Block Crossing:**  
Ramp A at Roadway D

Prepared for  
Prince William County  
Department of Transportation

Prepared by  
Rinker Design Associates, P.C.  
February 2022



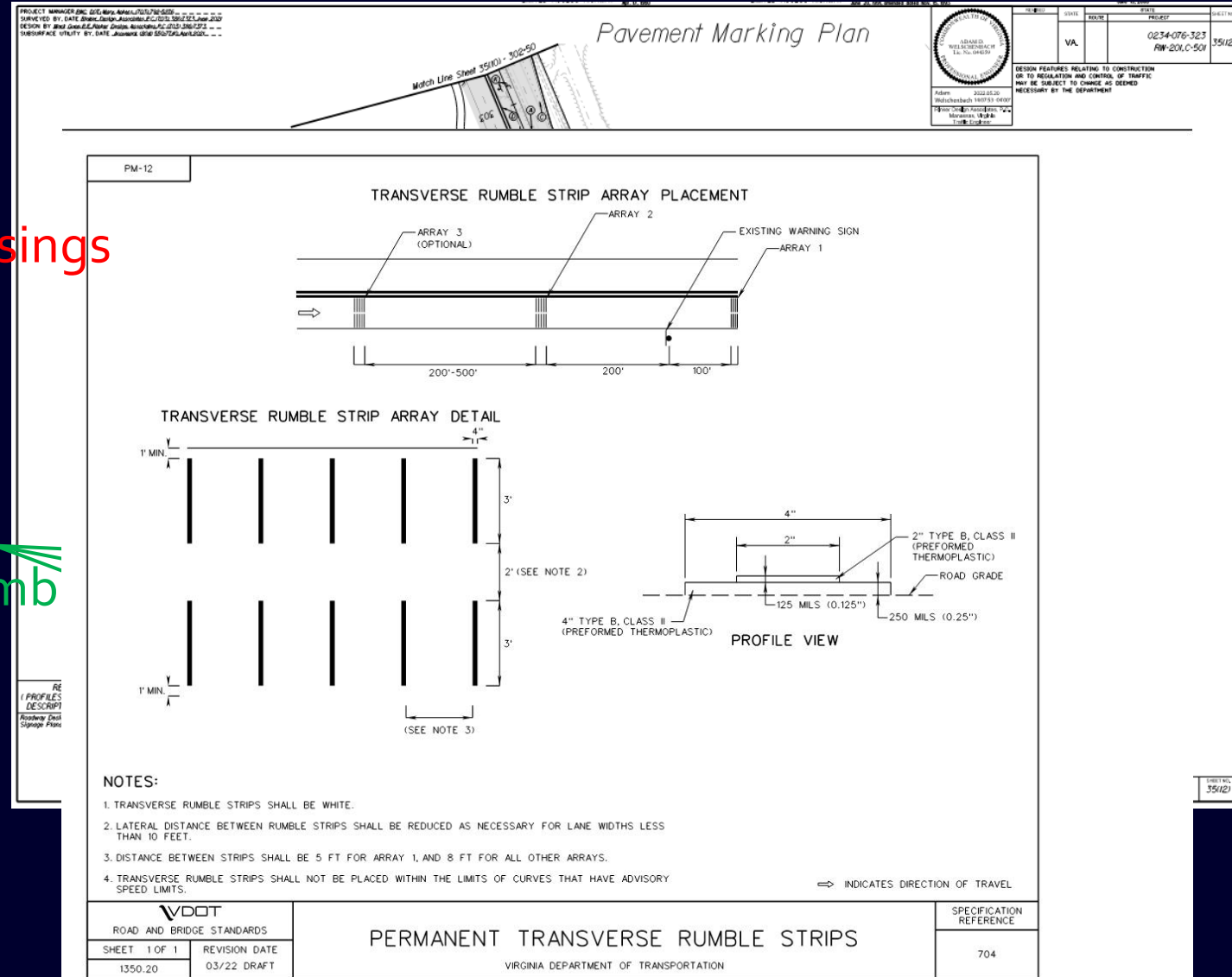
# Pedestrian Accommodations



Green-T Traffic Control Devices

Ramp Crossings

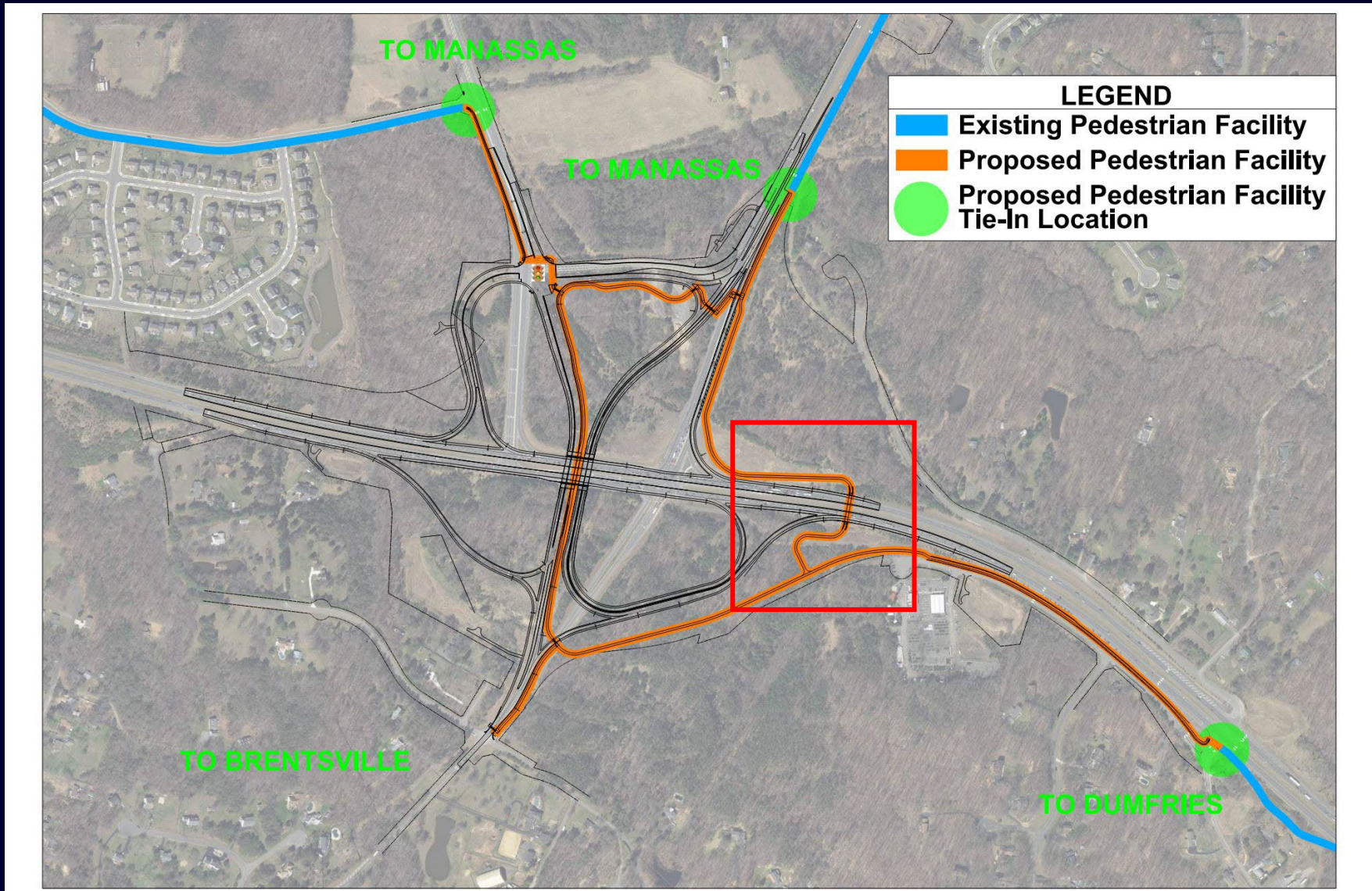
Transverse Pavement Marking Rumble Strips







# Pedestrian Accommodations





# Pedestrian Accommodations





# Why does this project matter to this group?



- Evaluation of many alternatives
- Ability to work through COVID
- Complex operational analysis
- Unique combination of an interchange with at-grade alternative intersections
- Safe accommodations of pedestrians through a complex network
- Provision of safe and efficient travel routes





