

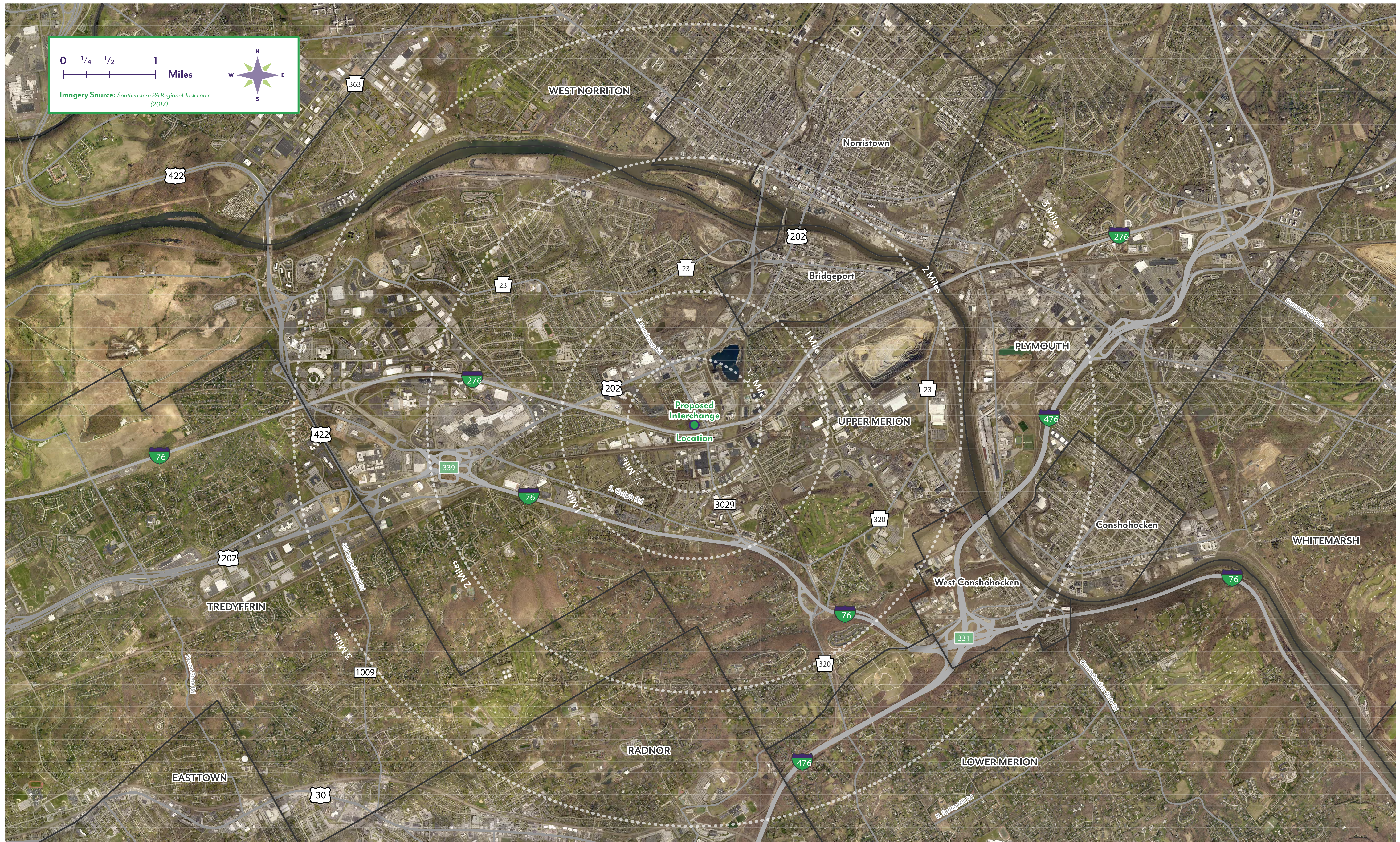
# STATION 01

PA Turnpike Interchange Study at HENDERSON ROAD

# Where Do You Live, Work, or Play?



DELAWARE VALLEY  
**dvrpc**  
REGIONAL  
PLANNING COMMISSION



# STATION 02

## PA Turnpike Interchange Study at HENDERSON ROAD

# Project Background



### PROJECT OVERVIEW

As part of Montgomery County's 2015 *Turnpike Corridor Reinvestment Project*, the county identified a need for seven new or modified PA Turnpike (I-276) interchanges. **The construction of new interchanges at these locations would increase PA Turnpike access for many communities and support economic revitalization.**

Several municipalities have expressed support for these new interchanges, while also articulating concerns about potential traffic impacts. DVRPC is studying two of the proposed new interchanges at Henderson Road in Upper Merion Township and Welsh Road in Upper Dublin Township.

#### The purpose of the PA Turnpike Interchange Study is to:

- Identify the potential impacts of the proposed new interchange on local traffic;
- Identify areas where traffic congestion may increase as a result of the proposed new interchange; and
- Develop recommendations to ease traffic congestion on local roads.

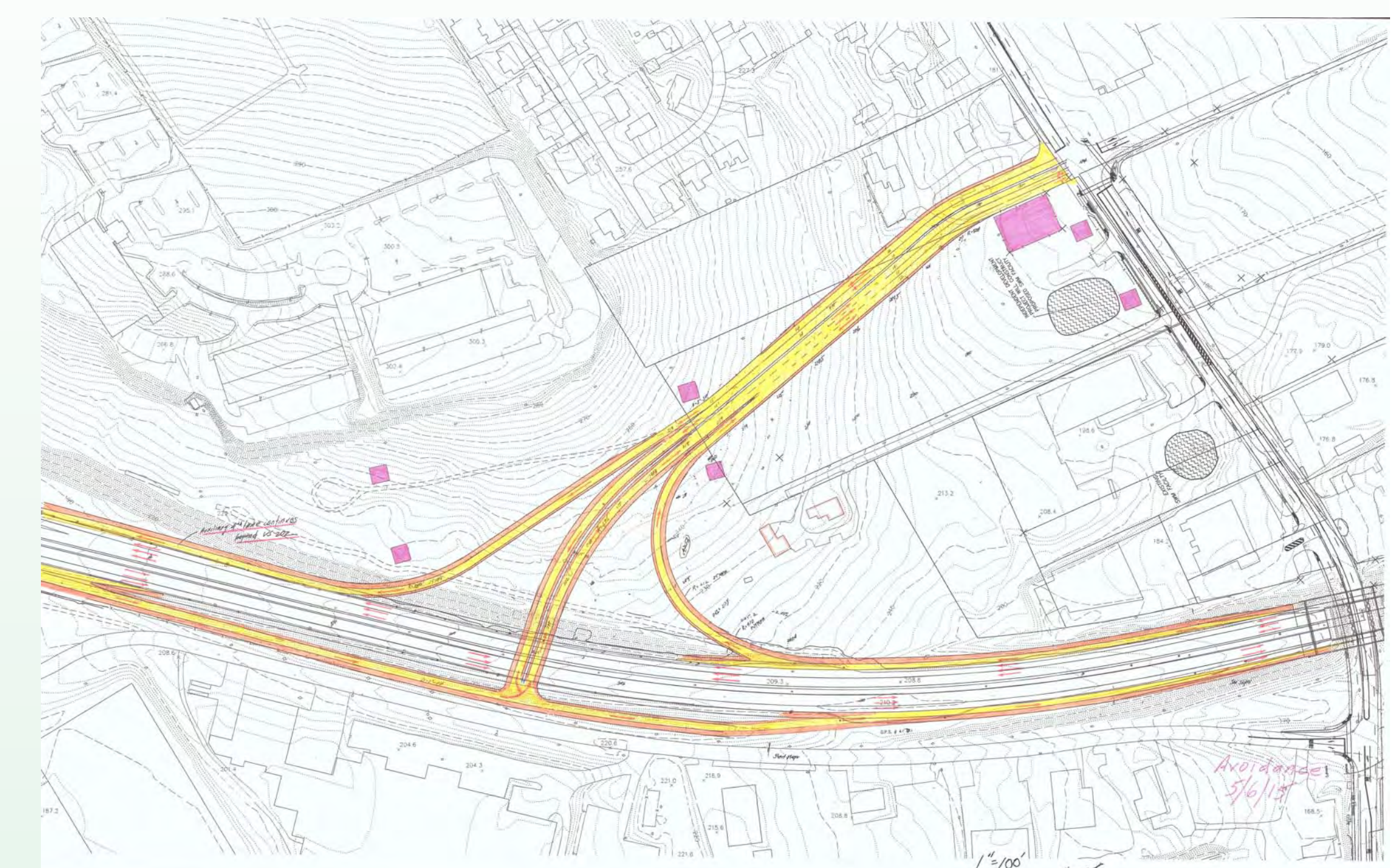
### PROJECT SCOPE

#### PHASE 1 (2017 - 2018)

A project steering committee was formed, traffic counts and field data were collected, and a base network of roads within the study area was prepared in traffic simulation software.

#### PHASE 2 (2018 - 2019)

Traffic operational modeling will be conducted, deficiencies in the transportation network will be identified and solutions modeled. Future scenarios will be shared with the steering committee and the public and finalized in a report.



Preliminary design sketch for proposed Henderson Road interchange. Source: Boles, Smyth Associates, Inc.

### Pennsylvania Turnpike Corridor Reinvestment Project

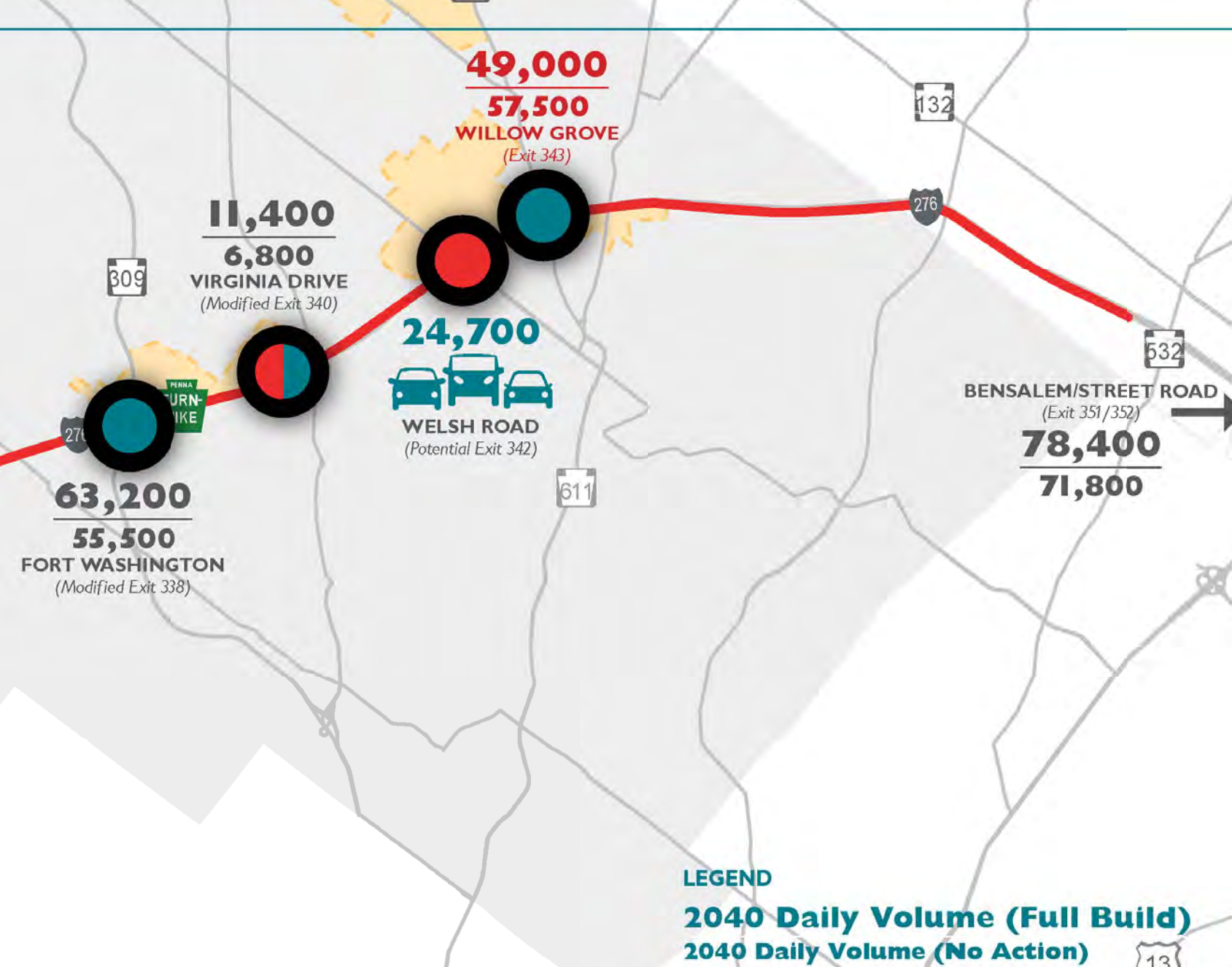


#### Full System Investment ("Full Build")

This scenario would provide three new interchanges at Henderson Road, Lafayette Street/Ridge Pike, and PA-63 Welsh Road; add east bound off and east bound on ramps at the current Virginia Drive interchange; and construct a new Commerce Drive connector ramp at the Fort Washington interchange. It would modernize the PA-611 Willow Grove interchange and the Valley Forge interchange by providing direct ramps to First Avenue in the King of Prussia Business Park both from the Turnpike and the Schuylkill Expressway.

Current Daily Volume = 389,300  
 2040 Volume (No Action) = 430,900 (+10.7% increase over Current)  
 2040 Volume (Full Build) = 516,200 (+19.8% increase over No Action)  
 2040 with Full Build  
 New Trips Each Day: 42,650  
 Cumulative Revenue: \$481 Million  
 Design and Construction Cost: \$232 Million

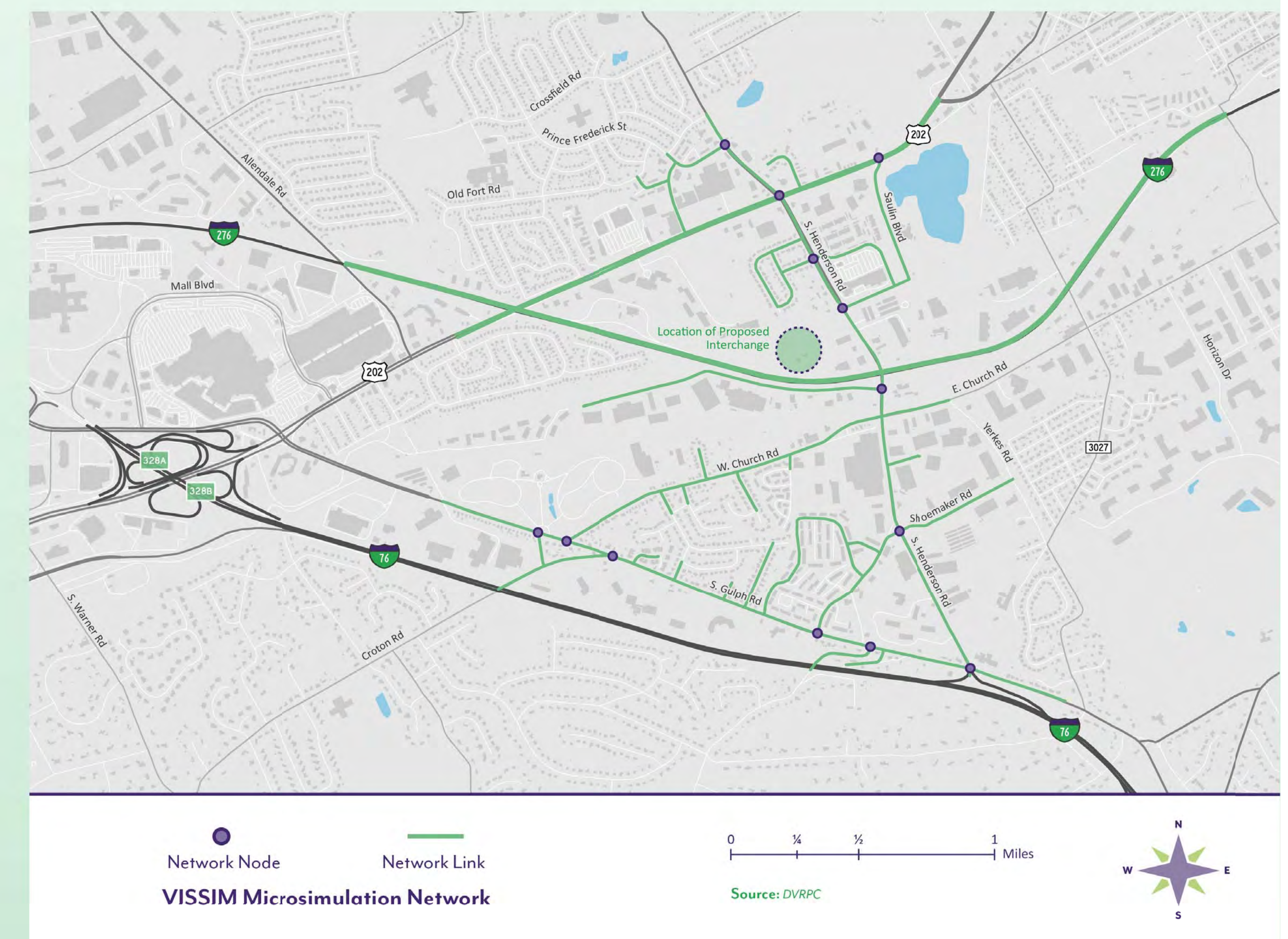
#### Southeastern Pennsylvania Interchanges



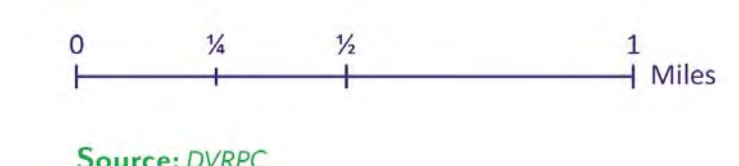
### STUDY AREA

The proposed new Henderson Road interchange will provide a two-way connection to I-276 at Saulin Boulevard.

Several major local roads and intersections connecting to Henderson Road will be evaluated for potential traffic impact.



Network Node Network Link  
 VISSIM Microsimulation Network

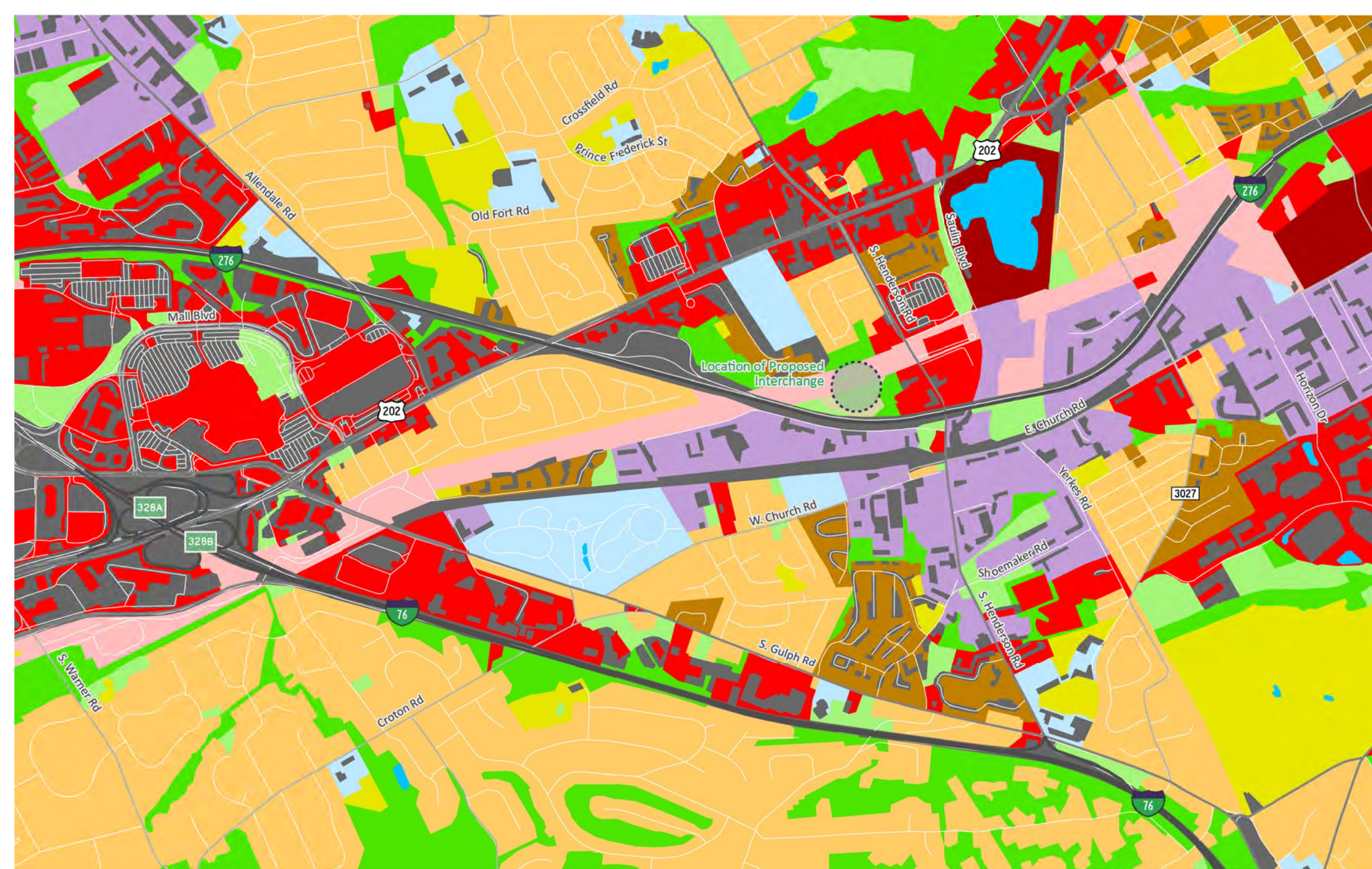


Source: DVRPC

# STATION 03

## PA Turnpike Interchange Study at HENDERSON ROAD

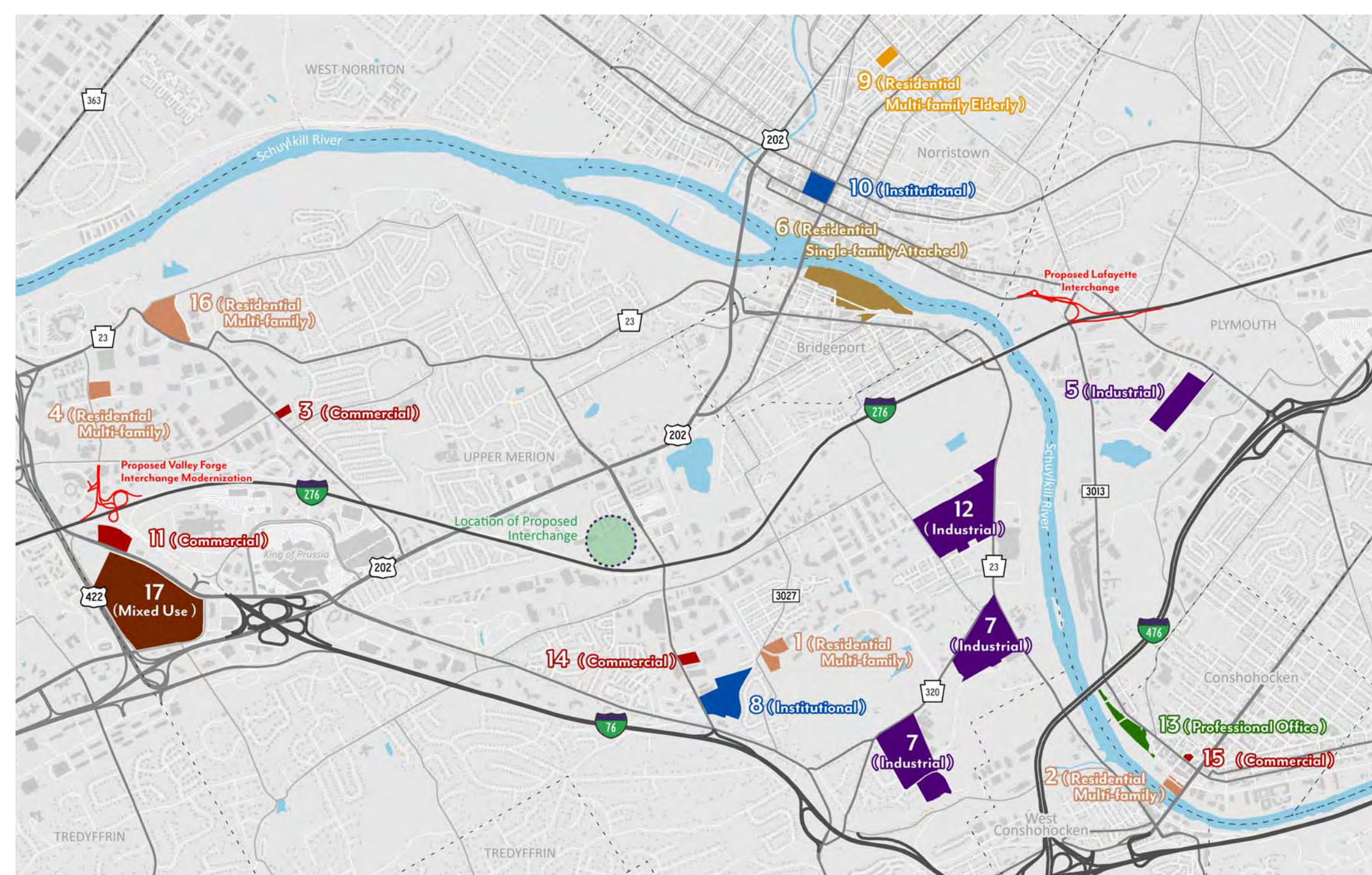
# Study Area Description



**DVRPC Land Use (2015)**

- Agriculture
- Commercial
- Community
- Industrial
- Mining
- Recreation
- Multifamily
- Raw Home
- Single-Family Detached
- Transportation
- Utility
- Vacant
- Water
- Wooded

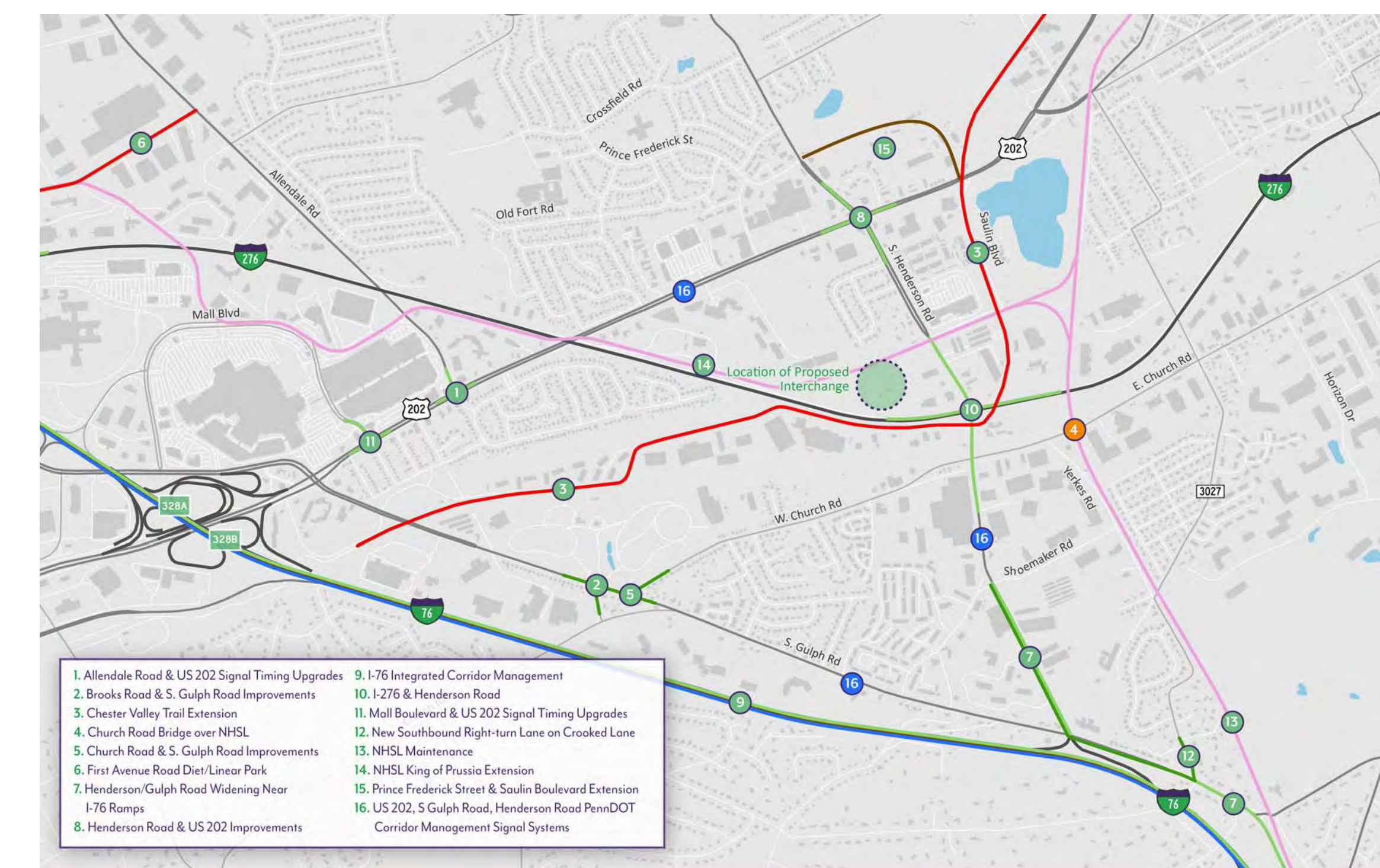
Source: DVRPC (2015)



**New Land Developments**  
(Planned or Under Construction 2017–Present)

- 1. 2901 Renaissance Boulevard
- 2. 53 Washington Street Apartments
- 3. 550 Allendale Road
- 4. 750 Moore Road
- 5. Bimbo Bakeries Distribution Center
- 6. Bridgeview Townhomes
- 7. CSK Redevelopment
- 8. Gulph Elementary
- 9. Montgomery Park Development
- 10. Montgomery County Justice Center
- 11. Park Ridge Hotel Development
- 12. FedEx Ground Distribution Center
- 13. Proposed Office Development
- 14. Self Storage Facility
- 15. SCRA West
- 16. Park Square Apartments
- 17. Village at Valley Forge/KOP Town Center

Source: DVRPC, MCPC



1. Allendale Road & US 202 Signal Timing Upgrades  
2. Brooks Road & S. Gulph Road Improvements  
3. Chester Valley Trail Extension  
4. Church Road Bridge over NHSL  
5. Church Road & S. Gulph Road Improvements  
6. First Avenue Road Diet Linear Park  
7. Henderson Gulph Road Widening Near I-76 Ramps  
8. Henderson Road & US 202 Improvements  
9. I-76 Integrated Corridor Management  
10. I-276 & Henderson Road  
11. Mail Boulevard & US 202 Signal Timing Upgrades  
12. New Southbound Right-Turn Lane on Crooked Lane  
13. NHSL Maintenance  
14. NHSL King of Prussia Extension  
15. Prince Frederick Street & Saulin Boulevard Extension  
16. US 202, S Gulph Road, Henderson Road PennDOT Corridor Management Signal Systems

**Proposed Transportation Projects**

- Bicycle/Pedestrian Improvements
- Bridge Repair/Replacement
- Roadway New Capacity
- Roadway New Construction
- Signal/ITS Improvements
- Transit Improvements
- Utility

Source: DVRPC, PennDOT, Upper Merion CIP (2014)

## LAND USE

Land use surrounding the proposed new interchange is characterized by a mix of residential, commercial, and industrial uses. South of I-276 on both sides of Henderson Road, industrial uses are common, while commercial uses are prevalent near US 202 and south of S. Gulph Road. Single-family and multifamily residential uses are spread out throughout the study area.

The proposed new interchange would provide a faster route to I-276 for residents. Additionally, it would provide more direct connections to employment and shopping centers for customers and employees, potentially reducing cut-through traffic on local residential streets.

Understanding land use is critical to modeling transportation behavior, as residential, commercial, and other uses generate different numbers and types of trips.

## DEVELOPMENT

A number of significant developments have been approved in recent years. This map shows recent and upcoming developments with at least 50 residential units, or at least 50,000 square feet of industrial or commercial space (office or retail). Three developments are located in the immediate study area: a residential multifamily development at 2901 Renaissance Boulevard, Gulph Elementary School, and a self storage facility on Henderson Road. Additionally, several commercial, residential, and industrial developments are located near the study area and may generate additional local traffic.

Future residents, employees, and customers traveling to and from these new developments would likely utilize the proposed new interchange, reducing the potential impact of the new developments on local streets.

The land use category and number of residential units and industrial or commercial square feet are used to determine how much new traffic will be added to local streets due to these new developments.

## NEARBY TRANSPORTATION PROJECTS

The Henderson Road interchange is one of many transportation improvements proposed for the study area to improve traffic flow, safety, and transportation choice. Integrated corridor management strategies are planned for I-76 to ease congestion, and portions of Henderson and S. Gulph Road will be widened near the I-76 ramps. An extension of the Norristown High Speed Line to King of Prussia is planned, with a station across Henderson Road from the proposed interchange on Saulin Boulevard. The Chester Valley Trail will also extend through the study area, providing new connections for bicyclists and pedestrians.

Together with the proposed new interchange, these transportation improvements will ensure safe and efficient travel for the surrounding communities.

Proposed transportation projects are added to the model along with new developments to better understand how traffic will operate in the future.

# STATION 04

PA Turnpike Interchange Study at HENDERSON ROAD

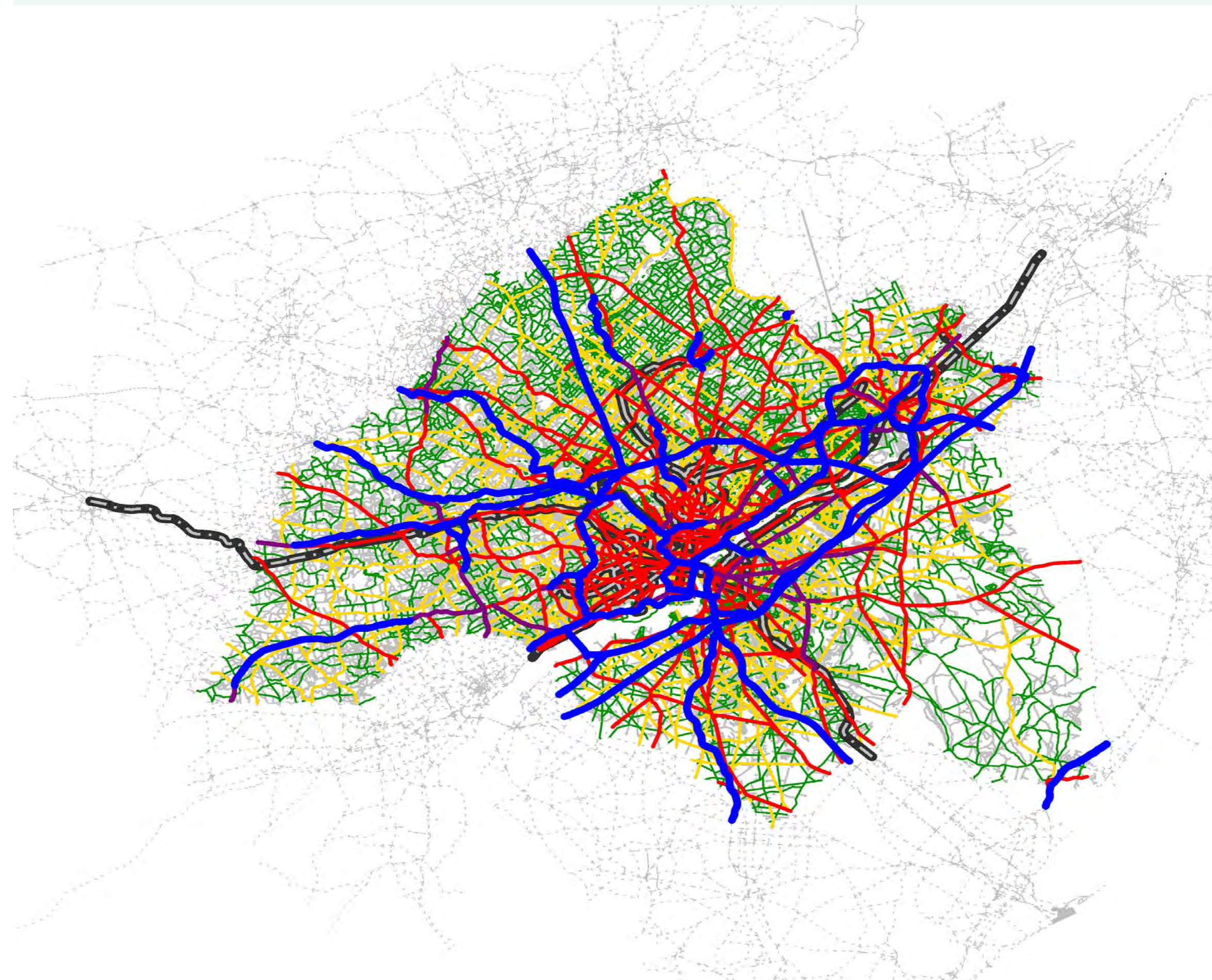
# Microsimulation Modeling



## DVRPC REGIONAL TRANSPORTATION MODEL

DVRPC uses a well-tested regional travel demand model to simulate the travel behavior of people in the 9-county region. This model is used to inform forecasts for future traffic patterns, long-range planning efforts, local traffic studies and other transportation planning work.

The model is guided by Federal Highway Administration guidelines and industry standards, and model forecasts are approved by the DVRPC Board.



## WHAT IS MICROSIMULATION MODELING?

Microsimulation is a method for evaluating the localized impacts of proposed improvements to the transportation system, such as the proposed new interchange at Henderson Road. Regional model outputs are calibrated using current local traffic counts. By modeling the future traffic in the study area with and without the proposed improvement, we can estimate how the improvement will affect traffic flow.

## IMPORTANCE OF LOCAL KNOWLEDGE

Input from members of the public, local officials, and other project stakeholders is crucial throughout the modeling process.

Feedback shared at public meetings and through project surveys helps DVRPC project teams better understand local issues and concerns, and ensure that traffic simulations realistically portray local conditions. DVRPC also partners with member governments and other stakeholders to continuously update and improve the regional and microsimulation models based on local growth and development projections.

## PERFORMANCE MEASURES

The microsimulation process produces a number of performance measures that help us understand traffic conditions.

**Volume** is the total number of vehicles approaching an intersection from a given street segment in a given time period.

**Delay** is the average amount of time, in seconds, that it takes a vehicle passing through an intersection beyond what would be experienced in a free-flow condition.

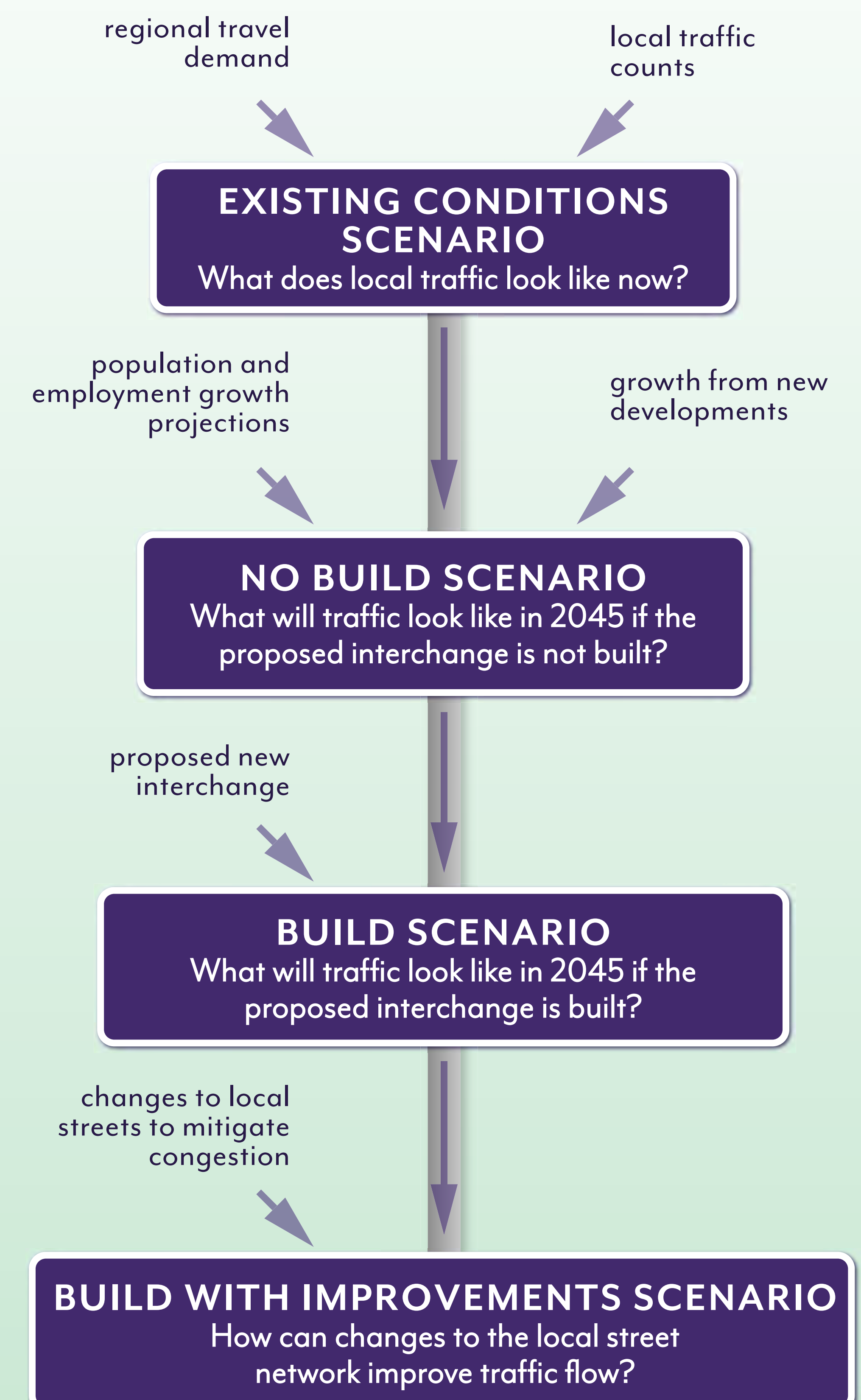
**Queue Length** describes the lineup of vehicles waiting to enter an intersection due to a red light, stop sign, or other obstruction. It is the distance between the intersection and the furthest vehicle waiting to enter.

**Level of Service (LOS)** values are letter grades assigned to various degrees of delay. An LOS of "A" corresponds with free-, or near free-flowing conditions, while an "F" score corresponds with a breakdown in traffic flow.

The goal in traffic operations is not to achieve an LOS of A, but to create conditions that maintain stable traffic flow that typically is achieved within the LOS range of A to C. If existing conditions are LOS D or lower the aim should be to improve conditions to achieve a C or better.

## SCENARIO DEVELOPMENT

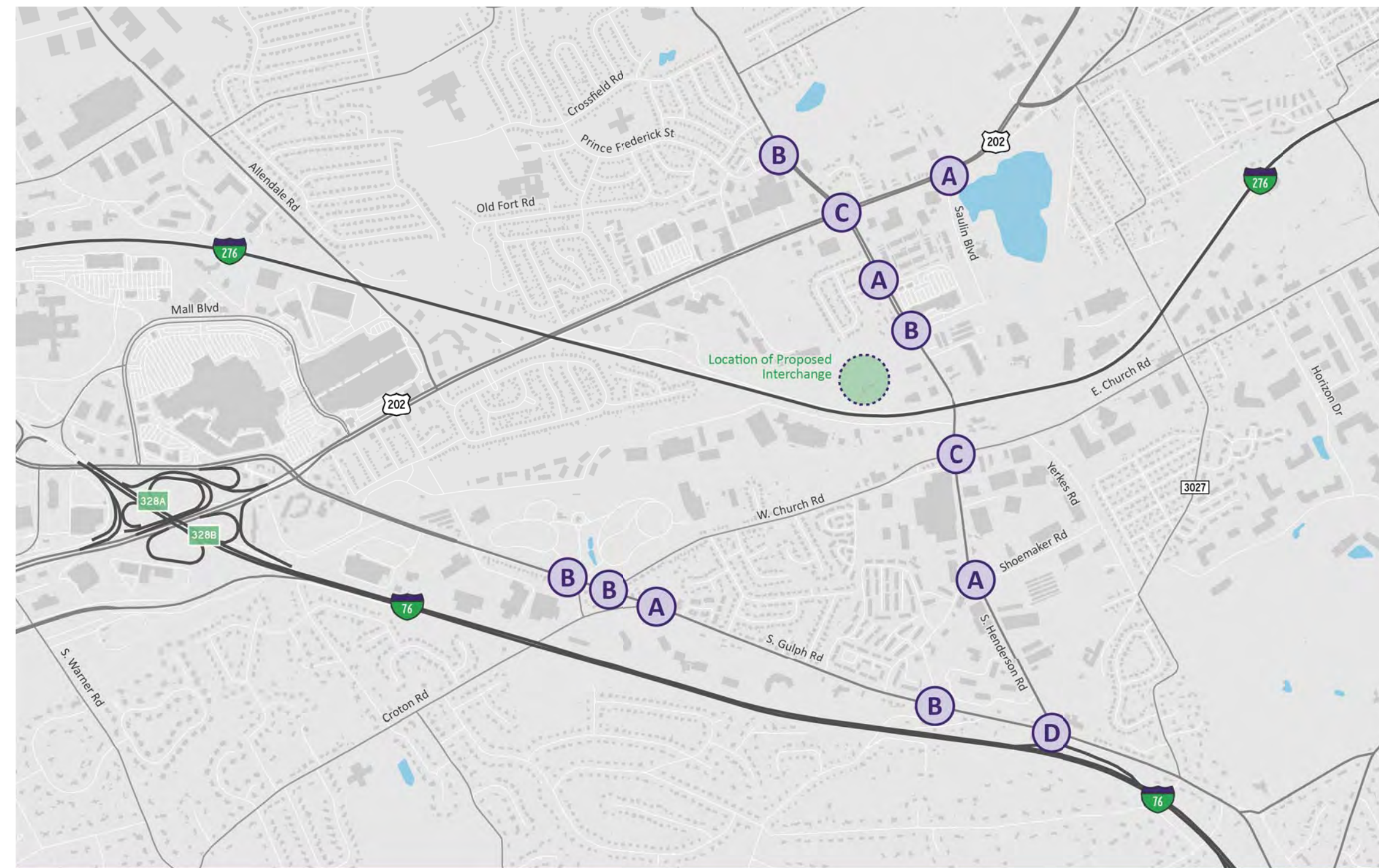
Four scenarios will be modeled using microsimulation. Each scenario will be evaluated for LOS and other performance measures to determine the impact of the proposed new interchange, identify areas in need of improvements, and develop congestion mitigation strategies at key intersections.



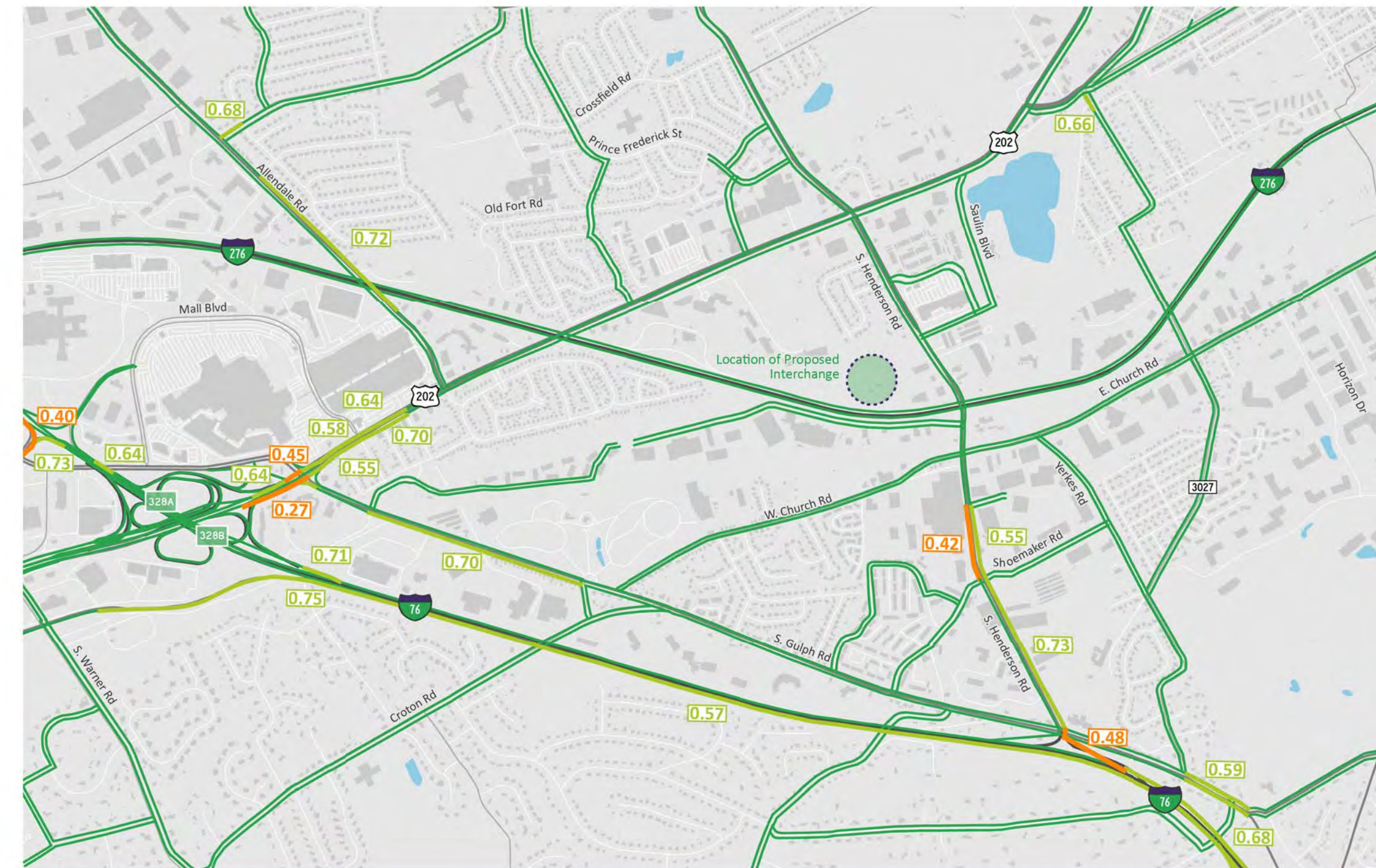
# STATION 05

## PA Turnpike Interchange Study at HENDERSON ROAD

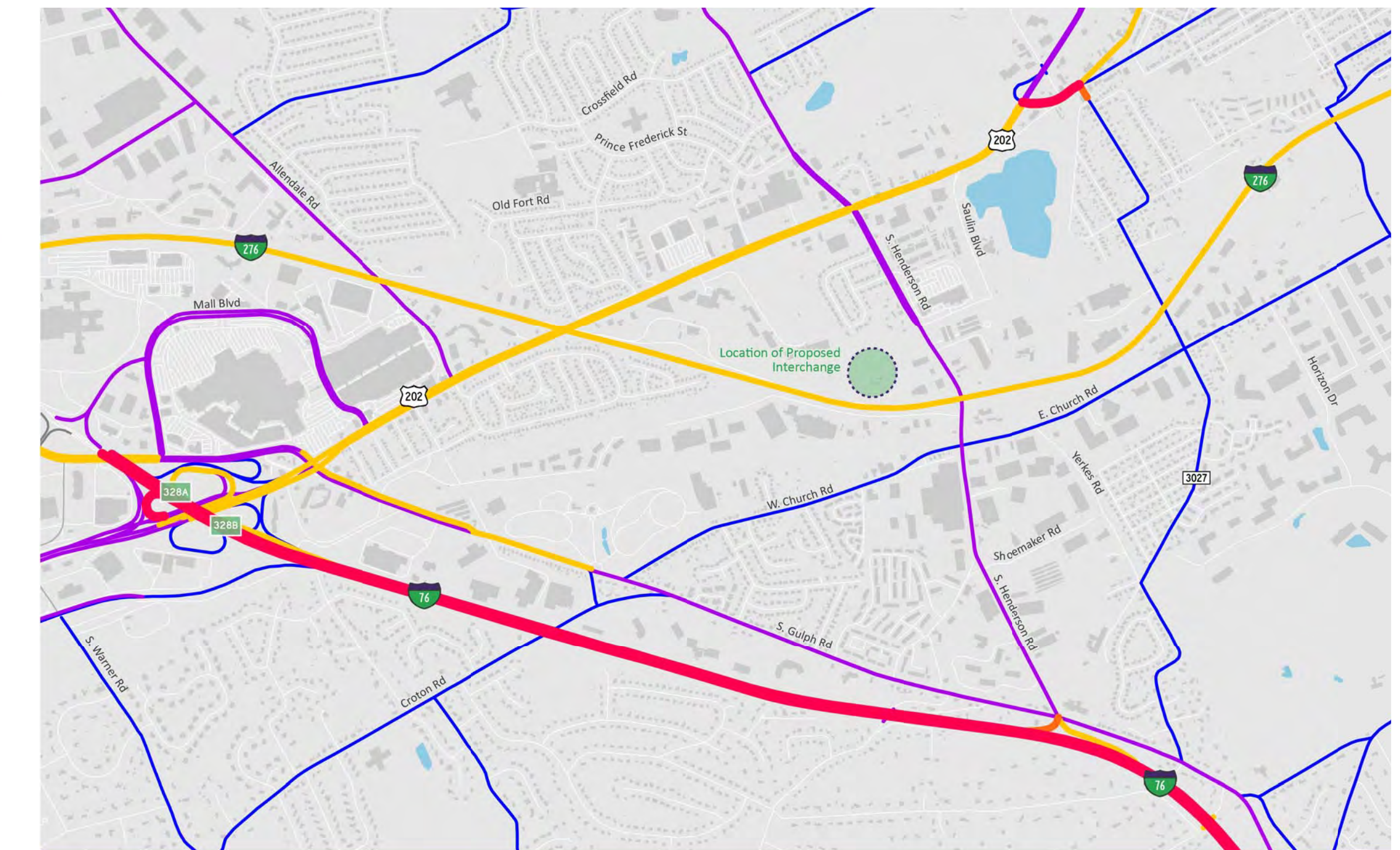
# Existing Conditions



**Morning Intersection Level of Service**  
 Legend: A (Stable and Predictable), B, C, D (Predictable, but Approaching Unstable), E, F (Unstable and Unpredictable).  
 Source: DVRPC



**Morning Peak (6-10AM) Speed Ratio**  
 Legend: 1 (0.75 to 1.0), 0.75, 0.50, 0.25, 0.  
 Source: DVRPC



**Crash Rate by PennDOT RMS Segment**  
 Legend: Average Annual Crashes per Mile (0 to 31).  
 Source: PennDOT (2012-2017)

### LEVEL OF SERVICE

The above map shows intersection-level LOS during the morning peak (8-9 AM), on a typical weekday. Most intersections along Henderson Road operate at a stable and predictable level of service. The exception is the intersection with S. Gulph Road, which is approaching unstable. None of the intersections evaluated currently operate at an unstable and unpredictable level of service.

As the future scenarios are developed, existing LOS provides a useful benchmark for understanding traffic operations.

LOS	DELAY (SECONDS PER VEHICLE)	DESCRIPTION OF TRAFFIC OPERATIONS
A B C	<10 >10-20 >20-30	STABLE AND PREDICTABLE
D	>35-55	PREDICTABLE, BUT APPROACHING UNSTABLE
E F	>55-80 >80	UNSTABLE AND UNPREDICTABLE

### SPEED RATIO

A street segment's AM peak speed ratio is the average speed of drivers during the morning peak compared to the observed speed on the same roadway during times with no traffic congestion.

A value of 1 means that drivers can drive at their desired speed and are not slowed down by other vehicles. A value of 0.75 means that drivers are traveling at 75% or less of their desired travel speed due to moderate traffic congestion. Values less than 0.5 mean that drivers are traveling less than half of their desired speed due to traffic congestion. The lower the speed ratio, the more significant the slowdown.

During morning peak hours, drivers currently experience the lowest speed ratios southbound on Henderson Road between Queens Drive and Shoemaker Road. Slowdowns also occur on the I-76 off-ramp at Henderson Road and S. Gulph Road, as well as by the US 202 and I-76 Valley Forge Interchange.

By identifying existing traffic slowdowns, speed ratios help identify streets that may be sensitive to future traffic growth. Significant slowdowns in future scenarios can be addressed when developing recommended improvements.

### CRASH RATE

From 2012 to 2017, I-76 had the highest number of annual average crashes per mile among major roads and highways in the study area. This may be due in part to the high volumes of vehicles traveling on I-76. I-276 and US 202 also had a relatively high number of crashes, followed by Henderson Road and S. Gulph Road.

Recommendations for the study area will take crash rates and related safety issues into account.

### NEXT STEPS

- Complete Existing Conditions scenario (PM peak).
- Model No Build scenario.
- Model Build scenario.
- Identify areas with future congestion.
- Develop recommendations to mitigate future congestion.
- Share findings with public.
- Summarize findings in a written report (fall 2019).

**STATION**  
**06**

PA Turnpike Interchange Study at **HENDERSON ROAD**

# Feedback



How do you believe the proposed new interchange would impact your commute or daily travel?

What do you believe are the possible benefits of the proposed new interchange?

What concerns do you have about the proposed new interchange?

Do you have any remaining questions or comments about the PA Turnpike Interchange Study at Henderson Road?

STATION  
**02**

PA Turnpike Interchange Study at **HENDERSON ROAD**

# Project Background



PRELIMINARY DESIGN SKETCH FOR PROPOSED HENDERSON ROAD INTERCHANGE. SOURCE: BOLES, SMYTH ASSOCIATES, INC.

