Intersection Concept Alternatives Development Process

August 2019

HIGHWAY 41 CORRIDOR IMPROVEMENTS

Intersection Design Concepts

- The Highway 41 and Highway 17 intersection is a **critical piece of the regional traffic system**.

- The Highway 41 Corridor Improvements project team has evaluated intersection design concepts that meet the project's purpose and need to:
  - reduce traffic congestion
  - improve traffic flow
  - accommodate future traffic volumes
  - enhance safety at the intersection of Highway 41 and Highway 17

What we found from analyzing traffic operations in the Highway 41 corridor, specifically at the Highway 41 and Highway 17 intersection?

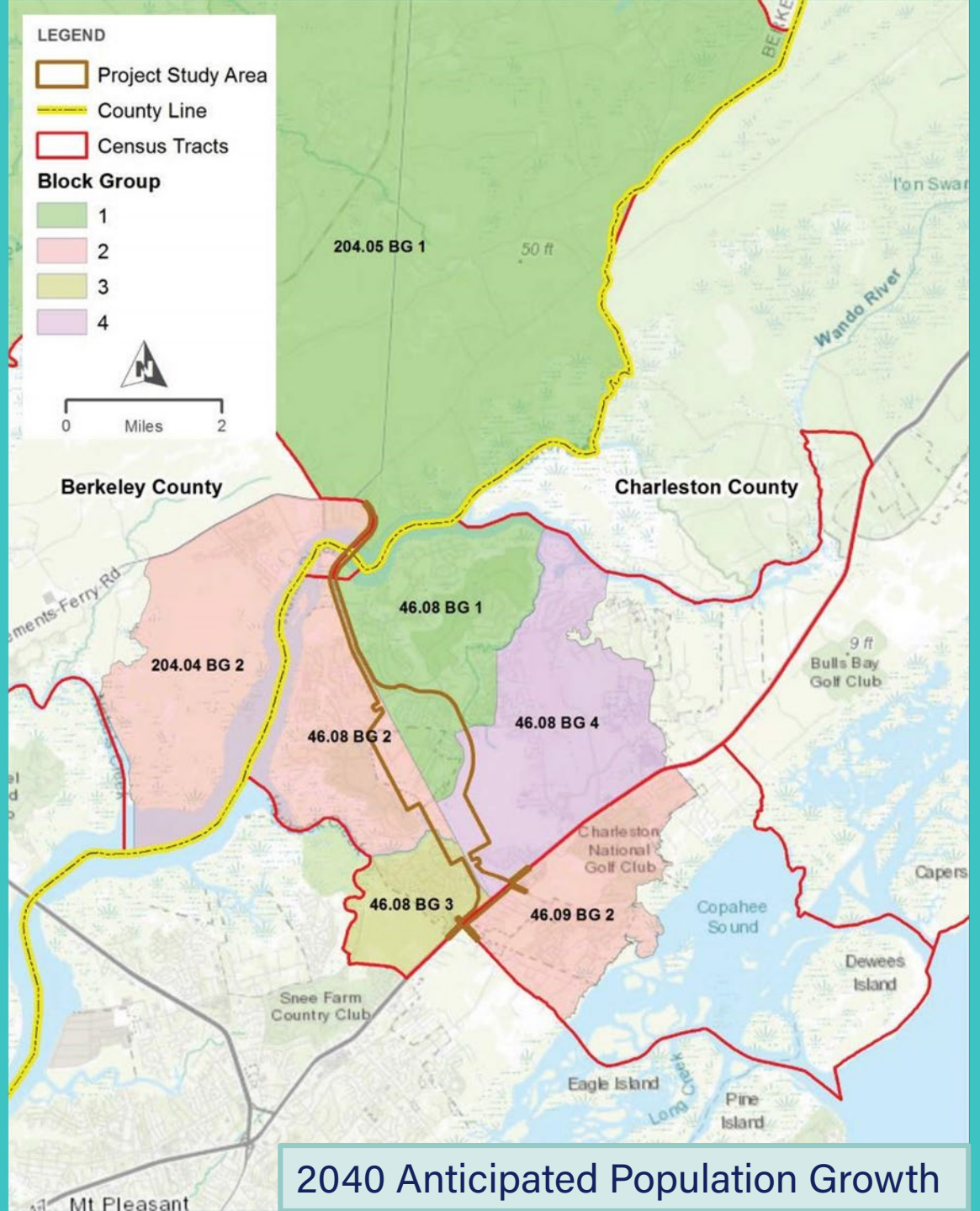
1. High anticipated population growth
2. Significant traffic growth forecast
3. Inadequate regional connectivity
4. Poor intersection traffic operations

High Anticipated Population Growth

The project team found that there is high anticipated population growth in the project study area.

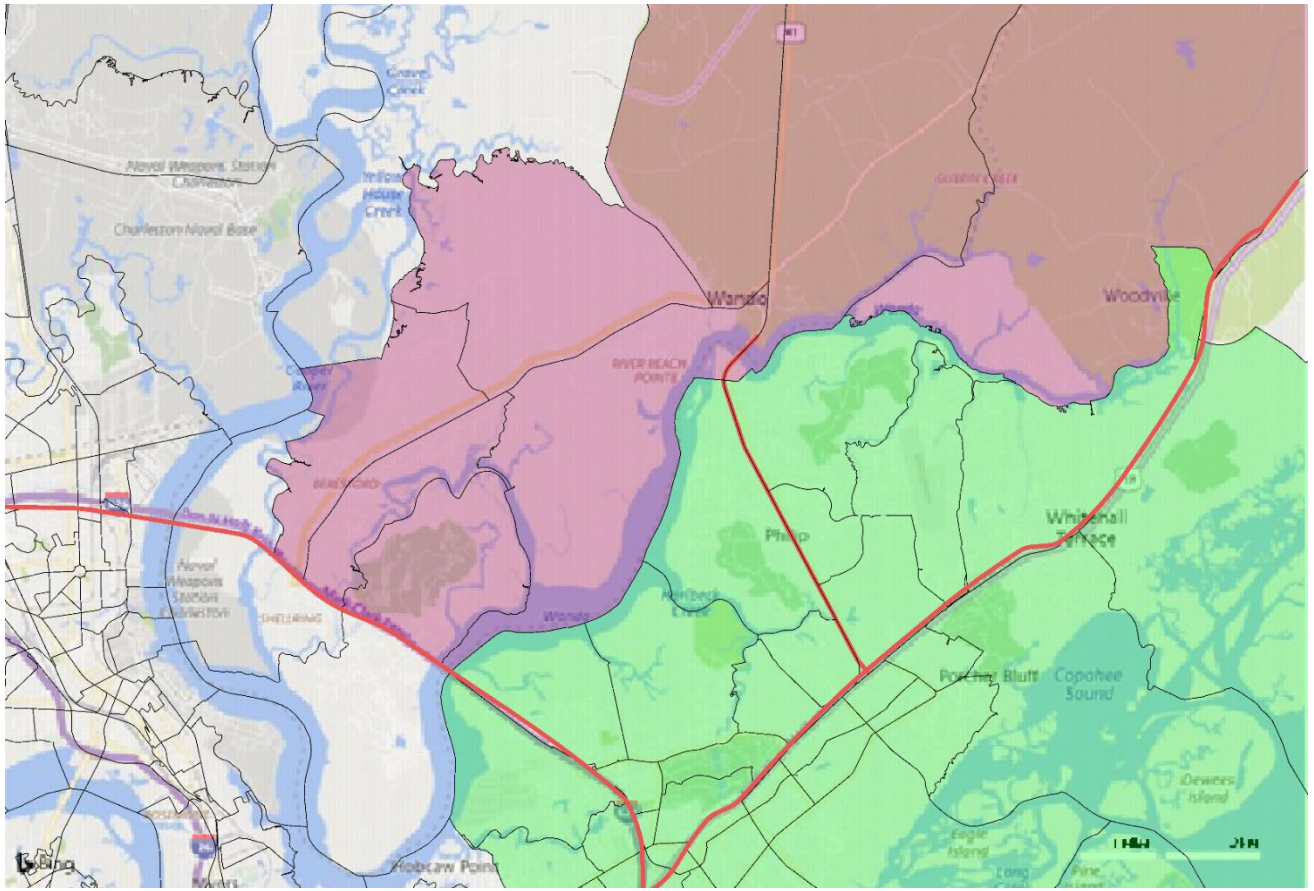
Within the project study area, the **anticipated population growth** for:

- The Charleston County census tracts is 24.7% to 31.4%
- The Berkeley County census tracts is 74.6% to 1,084%



2040 Anticipated Population Growth

Traffic Growth Forecast



TOMP TAZ

Berkeley County TAZ

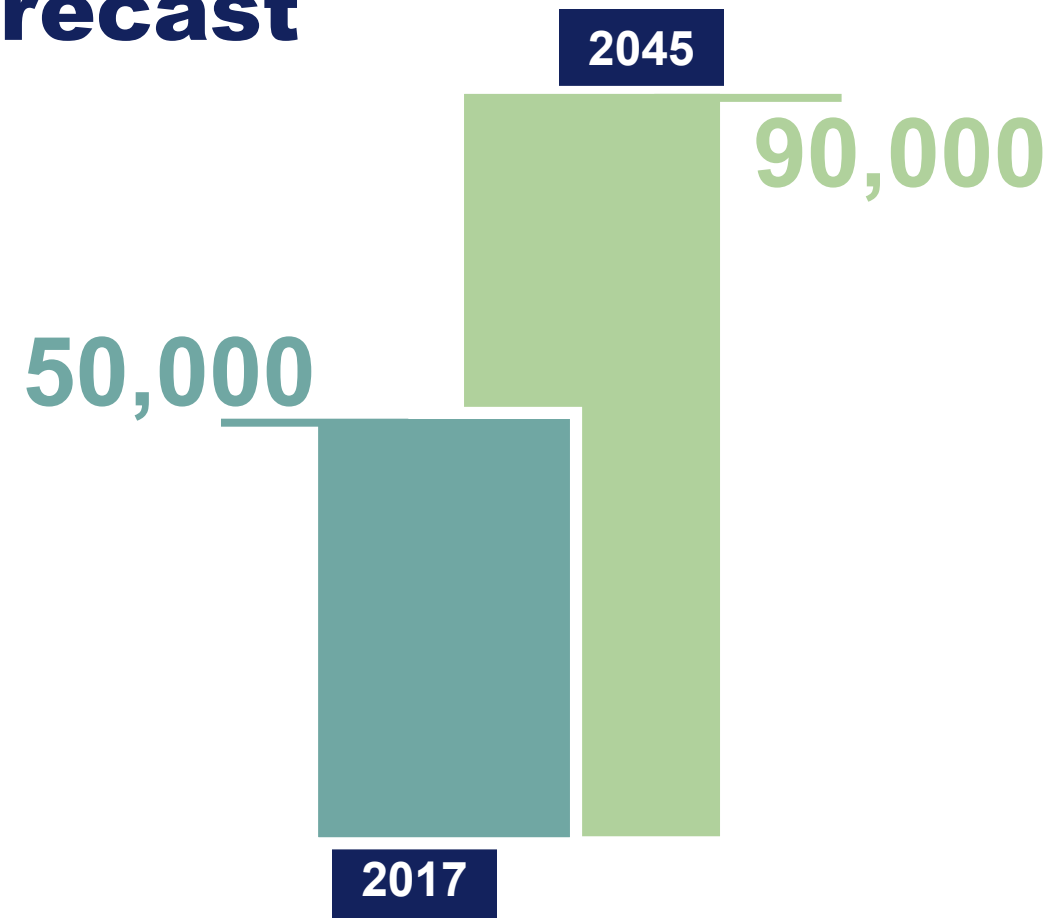
2018 Charleston Area Transportation Study Model Update

- Mega-Developments in Tri-County region
- Project team modified Traffic Analysis Zones (TAZs) to include planned growth based on Town and County input

Significant Traffic Growth Forecast

Through-traffic on Highway 17 is expected to **increase 80%** by 2045.

- Currently, the existing traffic volumes on Highway 17 is about **50,000 vehicles per day**.
- In 2045, the project traffic volume on Highway 17 is expected to be **90,000 vehicles per day**.



The 2045 projected traffic volume is considered comparable to traffic volumes of a freeway.

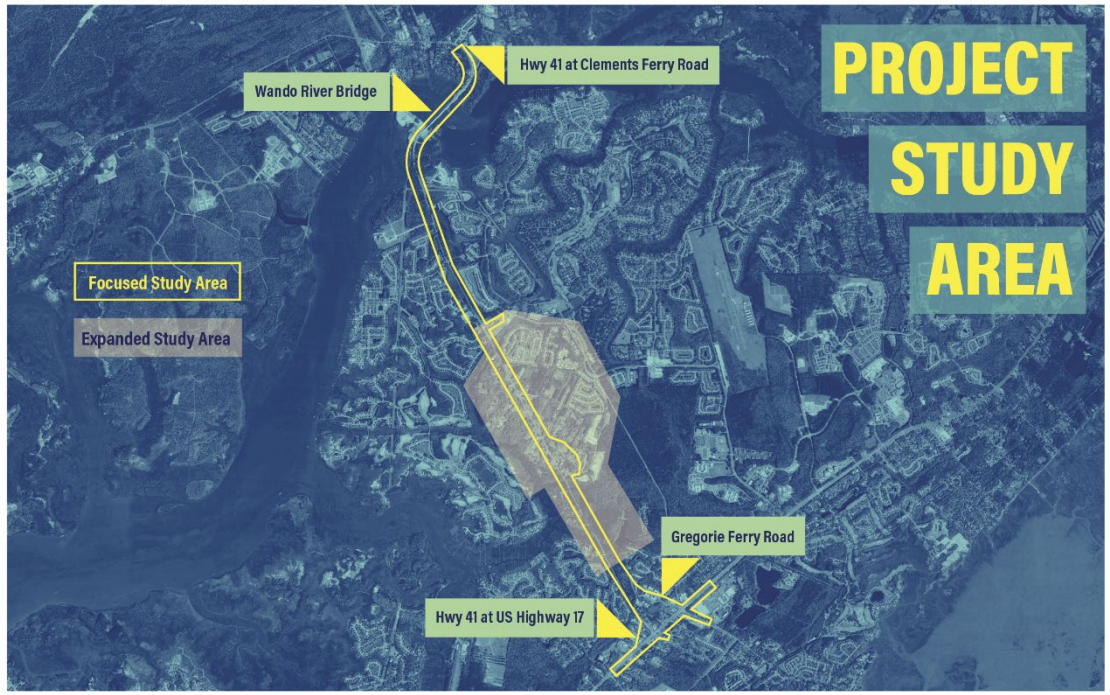
Inadequate Regional Connectivity

- There is currently limited regional connectivity in the project study area

- **Enhanced roadway connectivity** means there are multiple routes to get to and from destinations
- A highly interconnected roadway network is **more easily able to manage large traffic volumes** than a roadway network with inadequate regional connectivity

"Enhanced connectivity and access management must be a priority to protect key mobility corridors"

(BCDCOG, CHATS Plan)



Improving Regional Connectivity

Improving regional connectivity in the project study area is essential for managing projected traffic volumes.

- The intersection of Highway 17 and I-526 is an important factor for regional connectivity
- Improved connections to Billy Swails Boulevard is essential
- Planned roadway interconnections have the potential to make the Highway 41 and Highway 17 intersection traffic volumes more manageable

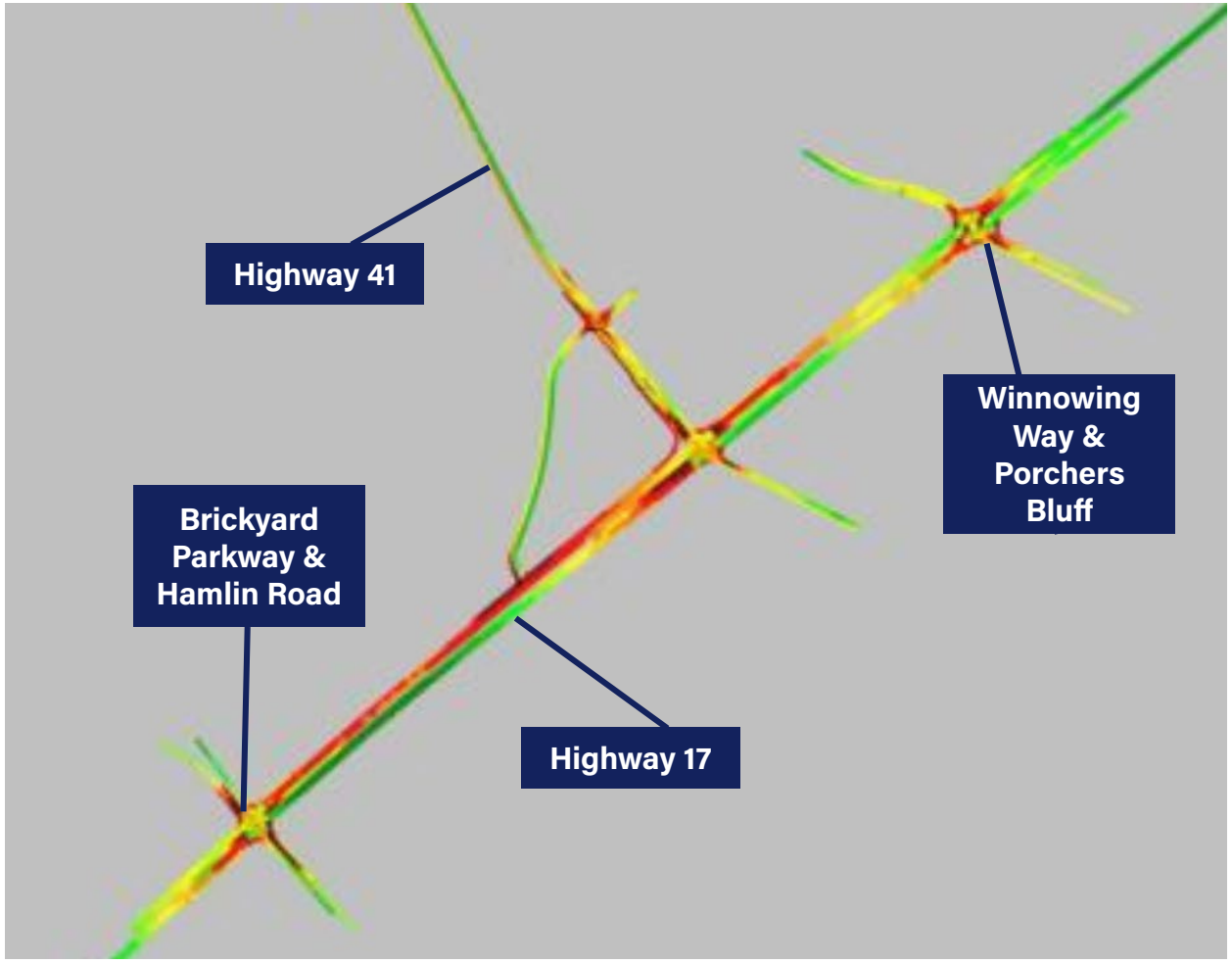
Poor Intersection Traffic Operations

The project team found that improvements focused only at the Highway 41 and Highway 17 intersection would not meet the project purpose and need because:

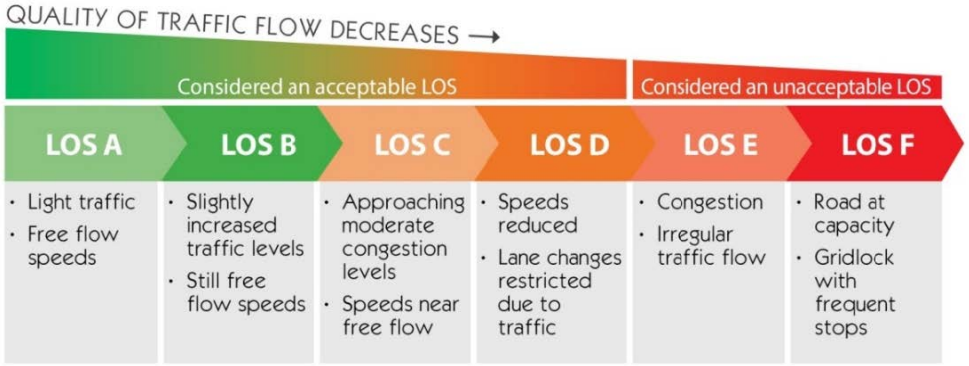
- The surrounding intersections at Hamlin Road & Brickyard Parkway and Winnowing Way & Porchers Bluff Road are operationally inadequate
- Due to poor operations, these surrounding intersections significantly contribute to traffic in the Highway 17 travel corridor and specifically influence congestion at the intersection of Highway 41 and Highway 17

In order to address Highway 41 at Highway 17, the project must also address the inadequate intersection designs at the Hamlin Road & Brickyard Parkway intersection and the Winnowing Way & Porchers Bluff Road intersection.

Preliminary Traffic Conclusions



- Intersection design concepts were developed to provide an acceptable Level of Service (LOS) at the Highway 41 and Highway 17 intersection
- Additional capacity in the Highway 17 travel corridor will be needed (at least as far as Long Point Road) to accommodate future traffic projections



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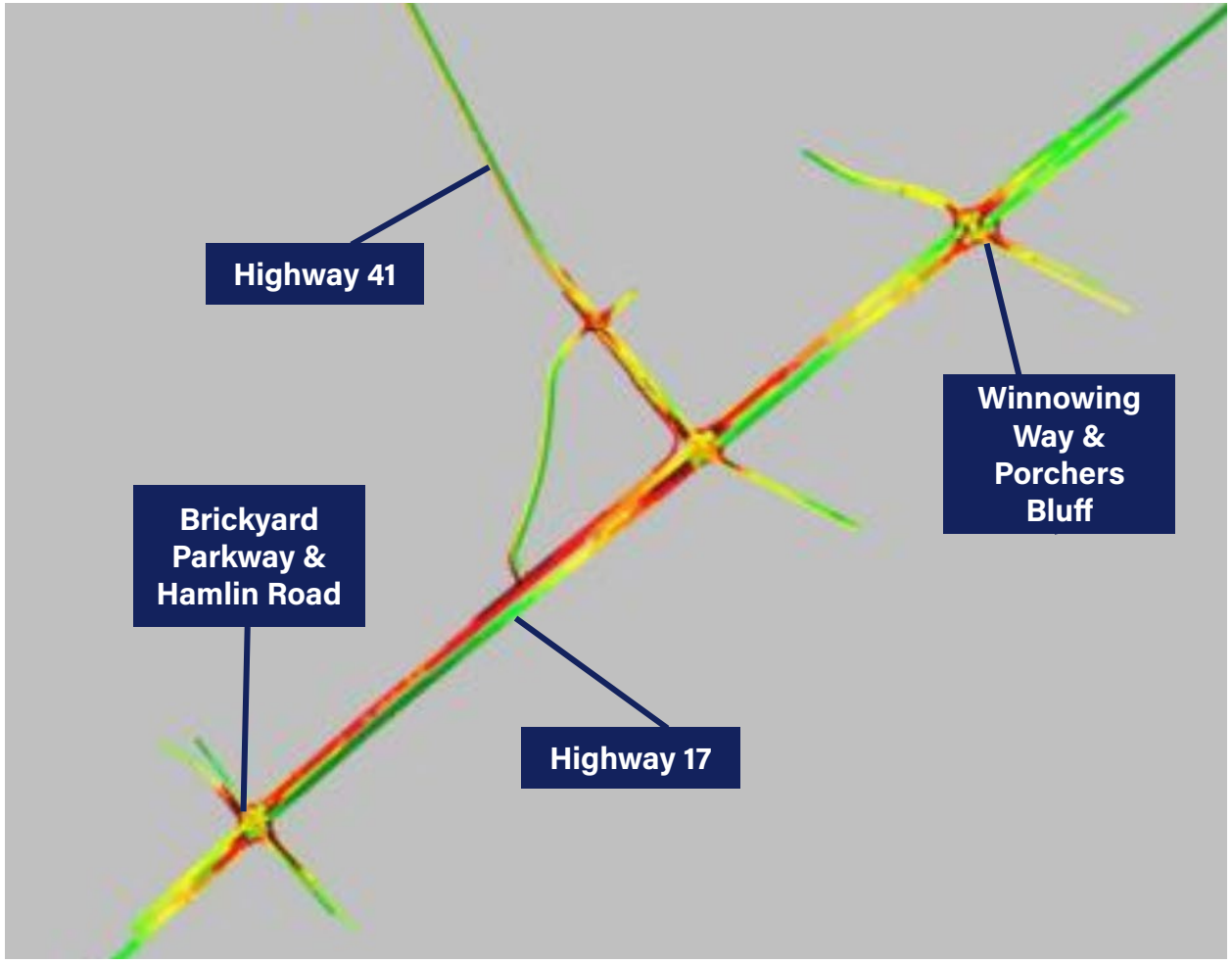


- The intersection of Highway 17 & Hamlin Road/Brickyard Parkway will fail (gridlock) early in the design life of the Highway 41 Corridor Improvements project if substantial intersection improvements are not constructed
- Failure of the Hamlin Road and Brickyard Parkway intersection during the morning peak traffic hour affects operations at the Highway 41 and Highway 17 intersection

Important Traffic Flow Considerations

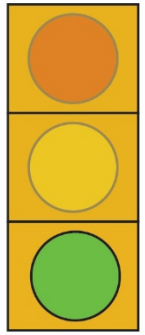
How turning movements are accommodated at an intersection impacts the intersection's efficiency and safety.

- How **left turn movements** will be accommodated at an intersection is a KEY FACTOR that is considered when designing intersection improvements.
- Traditional left turn lanes/movements are **not always feasible at every intersection** because:
  - Signalized left turn lanes add one additional light phase to every stoplight signal cycle—**significantly contributing to roadway congestion problems**.

Fewer Stoplight Phases = More Green Light Time

Standard Intersection

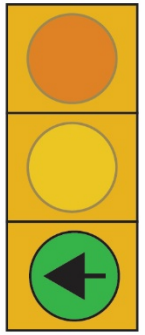
25 SECONDS



Green signal for Brickyard Parkway and Hamlin Road.

x

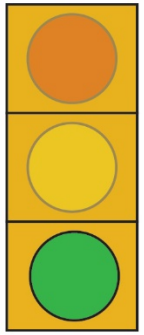
15 SECONDS



Left turn signal for Brickyard Parkway and Hamlin Road.

x

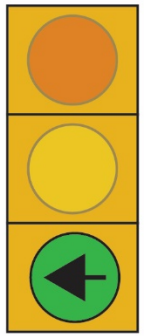
90 SECONDS



Green signal for Highway 17.

x

20 SECONDS



Left turn signal for Highway 17.

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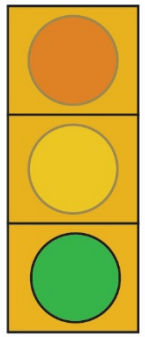
A Full Traffic Light Cycle is 150 Seconds.

Eliminating left turns off of Highway 17 onto Brickyard Parkway and Hamlin Road will remove one stoplight phase from the signal cycle.

Intersection with No Left Hand Turns

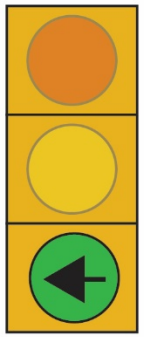
30 SECONDS



Green signal for Brickyard Parkway and Hamlin Road.

x

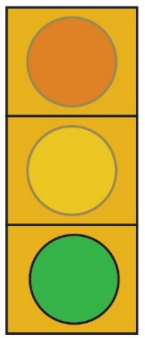
20 SECONDS



Left turn signal for Brickyard Parkway and Hamlin Road.

x

100 SECONDS



Green signal for Highway 17.

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A Full Traffic Light Cycle is 150 Seconds.

<u>Additional left and right turn lanes</u> will be added to Brickyard Parkway and Hamlin Road to further accommodate traffic volumes.

Stoplight phase time estimations are approximate.

Traffic Flow Considerations

How left turn movements will be accommodated at an intersection is a KEY FACTOR that is considered when designing intersection improvements.

- To **minimize/resolve congestion problems** at a busy four-approach intersection, traffic engineers may need to eliminate certain left turn movements from the main intersection.
- Traffic engineers may divert certain left turn movements away from the main intersection in order **to minimize disruption to the major road's through-traffic**.
- The project team determined that it is **necessary to eliminate left hand turns** off of Highway 17 onto Hamlin Road and Brickyard Parkway to accommodate current and future traffic volumes along the Highway 17 travel corridor.

The Critical Issue

- Projected 2045 traffic volumes **cannot be handled without significant changes** to the Highway 41 and Highway 17 intersection, as well as surrounding intersections.

- **Intersection improvements are necessary** to alleviate current and future traffic congestion and to improve traffic operations for drivers entering and exiting the Highway 41 travel corridor.

The Critical Issue

- To alleviate congestion and improve traffic flow, the project team considered intersection improvements at:
    - **Brickyard Parkway & Hamlin Road intersection**
    - **Winnowing Way & Porchers Bluff Road intersection**
    - **New roadway connections to Highway 41 from old Highway 41, Gregorie Ferry Road and Winnowing Way**