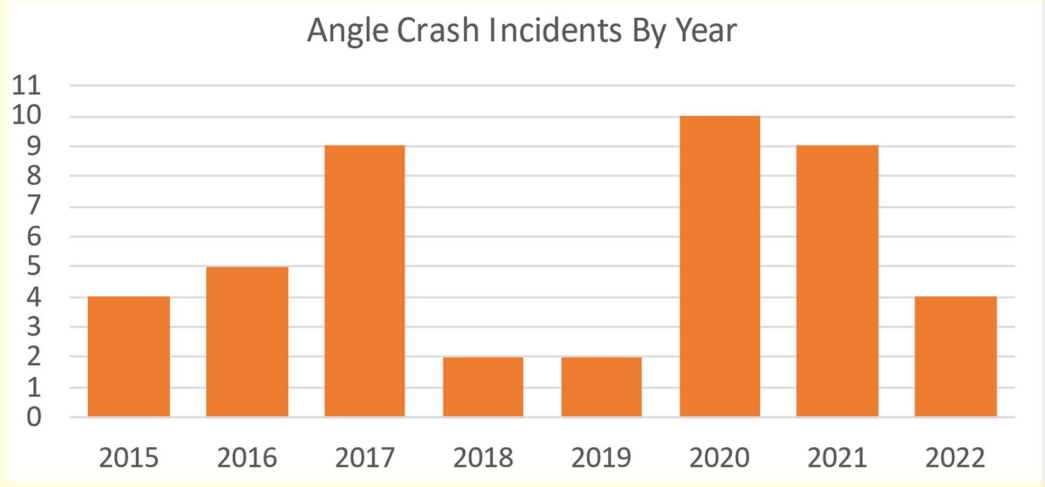


BLUESTONE DRIVE & PORT REPUBLIC ROAD

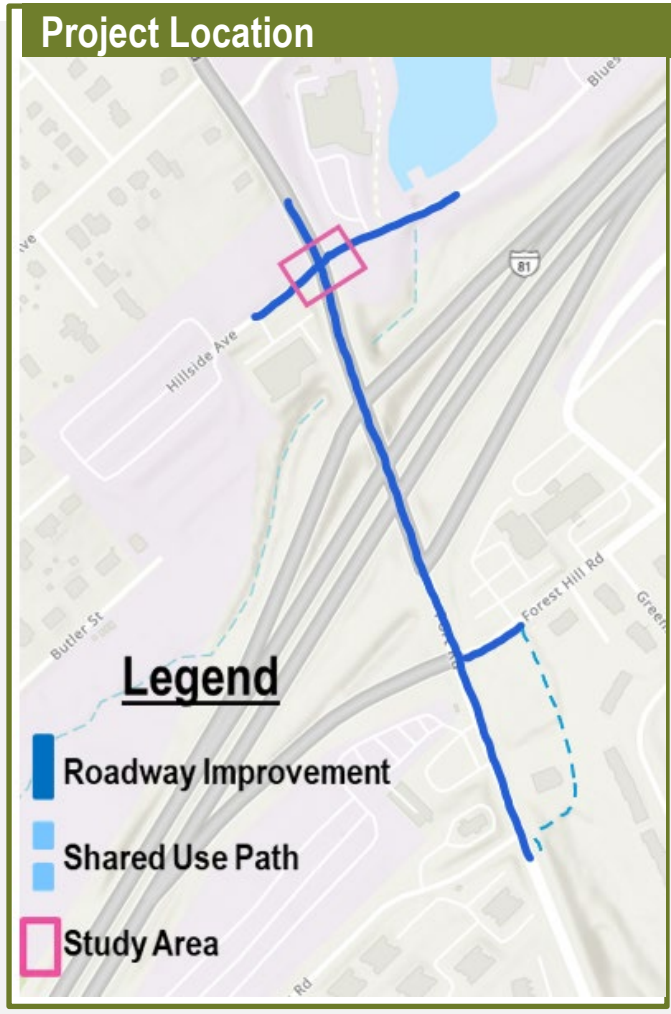
Recommended Improvements (Phase 2)



Safety Results

The lack of clarity due to the number of signals on Port Republic Road may confuse drivers traveling westbound on Port Republic Road. They may misinterpret the signal at the I-81 SB off-ramp for the signal at Bluestone Drive.

The installation of Optically Programmable signal heads aims to reduce red-light running on Port Republic Road.

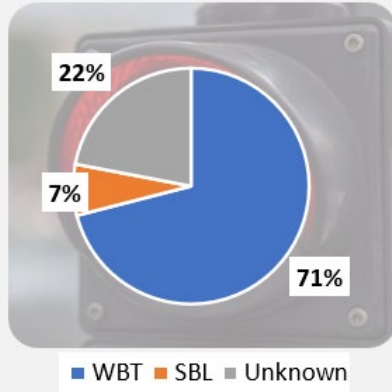


Countermeasure for Rear-End Crashes at Port Republic Road and Bluestone Drive

1. Replace signal heads at the westbound approach at the Bluestone Drive intersection with Optically Programmable signal heads.

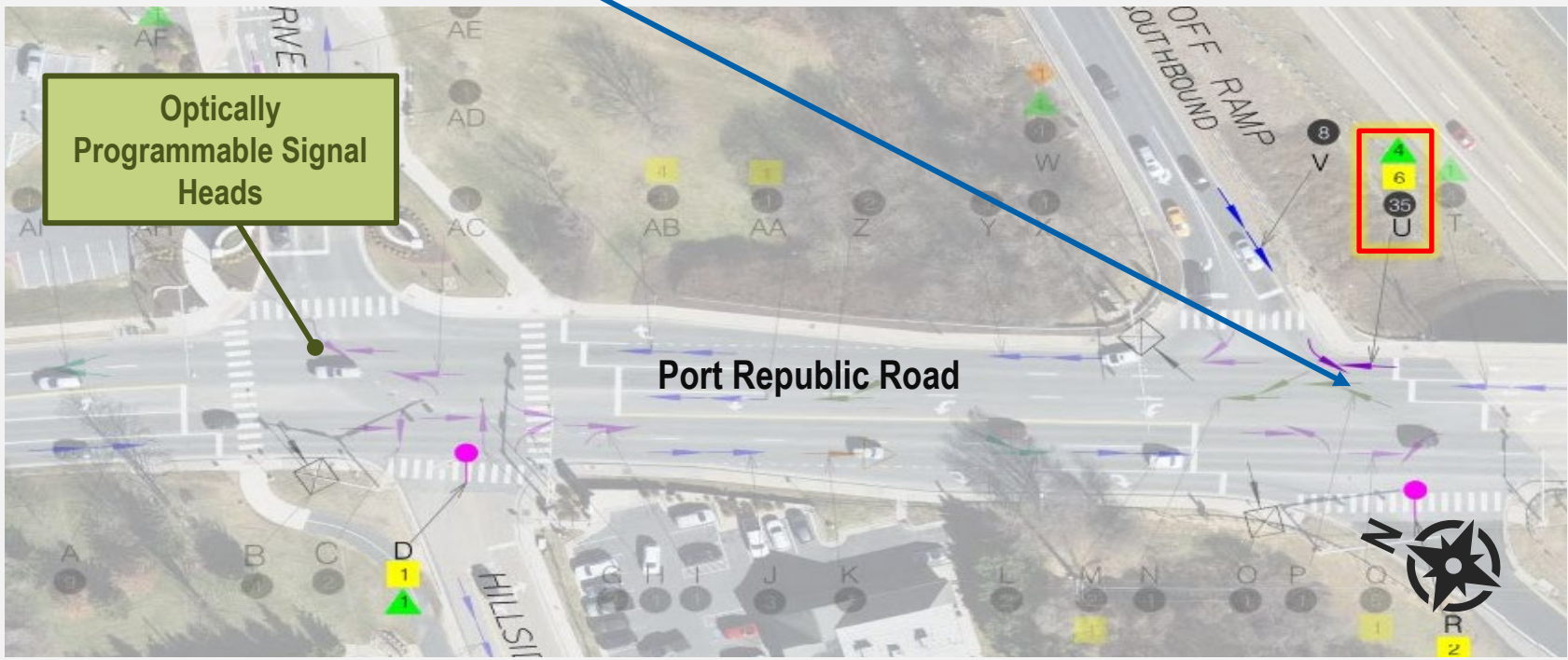


Proportion of Red Light Runners



Example of Countermeasure #1

| Existing | Proposed |
|----------|----------|
| | |



Preliminary Cost Estimate

Cost estimates were developed based on information available at the time of study and should be reassessed prior to submitting funding applications.

The cost estimate includes the installation of the signal head and related contingencies.

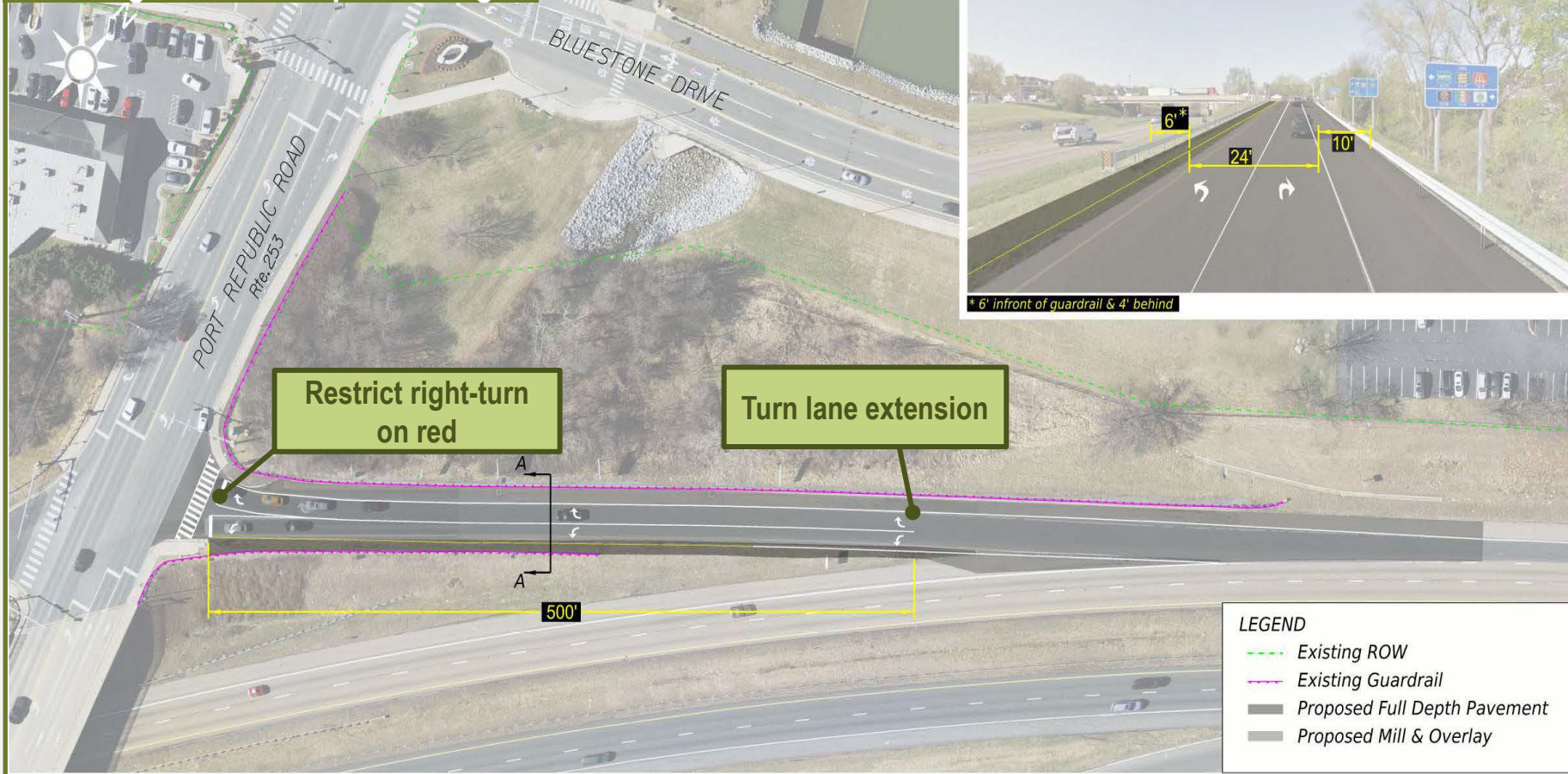
| Phase | Cost Estimate (2020 Dollars) |
|----------------------------|------------------------------|
| Preliminary Engineering | \$0 |
| ROW and Utility Relocation | \$0 |
| Construction | \$20,000 |
| Total Cost | \$20,000 |

I-81 SOUTHBOUND OFF-RAMP

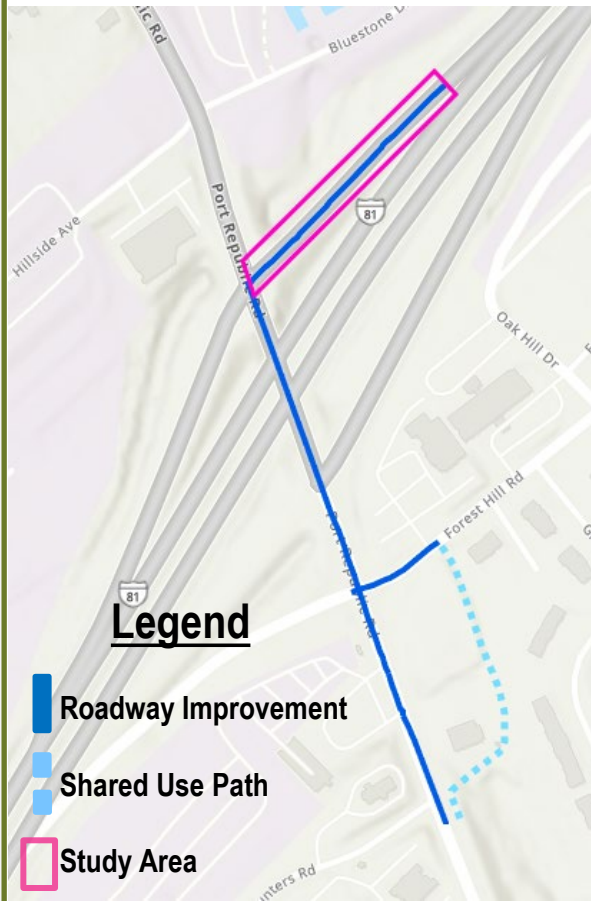
Recommended Improvements (Phase 2)



Planning-Level Conceptual Design



Project Location



Safety Results

Each improvement and countermeasure is expected to reduce the number of crashes and improve operations at the study intersection:

- Prohibit right turn on red for the southbound movement to reduce angle crash incidents turning right onto Port Republic Road
- Extend the right turn lane on the southbound off-ramp – reduce rear-end crash incidents for vehicles waiting to turn right onto Port Republic Road

These safety improvements are expected to target the rear-end crashes (8) on the southbound ramp and angle crashes (3) at the intersection, including one severe injury and one minor injury crash.

Improvements Description

The improvements proposed at this location include:

- Extension of the southbound right-turn lane to 500 feet along the I-81 southbound off-ramp
- Restriction of right turns on red from the southbound right-turn lane

The southbound right turn lane experiences queues that spill into the left turn lane. The right turn lane extension is expected to prevent queue spillback and improve operations. A right turn on red restriction is proposed for the southbound off-ramp to reduce conflicts due to poor visibility of oncoming traffic on Port Republic Road and to enhance pedestrian safety for those crossing the off-ramp on Port Republic Road.

Traffic Operations Results

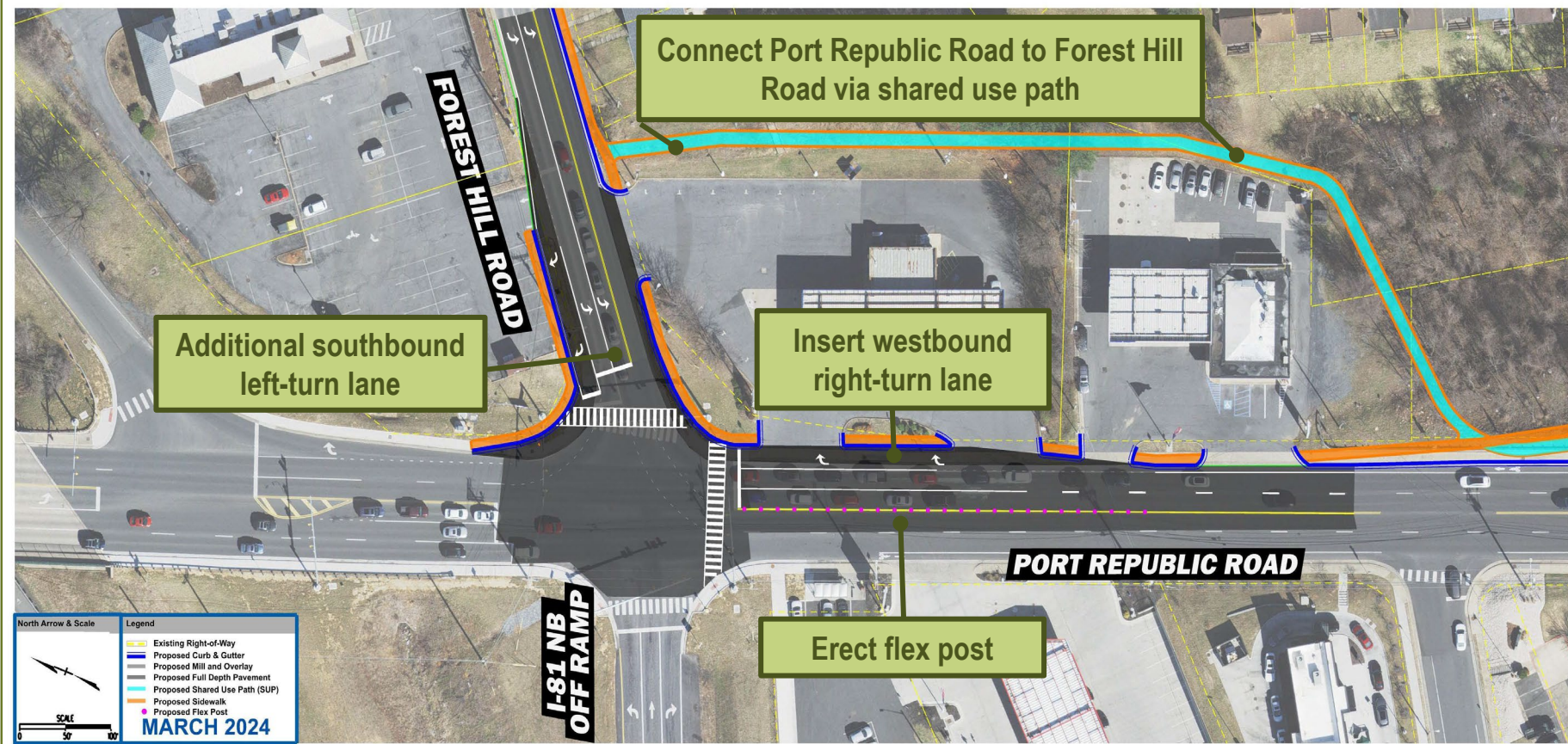
| I-81 Southbound Off-Ramp Intersection Delay | | |
|---|---------|---------|
| | AM Peak | PM Peak |
| No-Build (2034) | 17.2 s | 18.2 s |
| Build (2034) | 15.1 s | 17.0 s |

FOREST HILL ROAD & PORT REPUBLIC ROAD

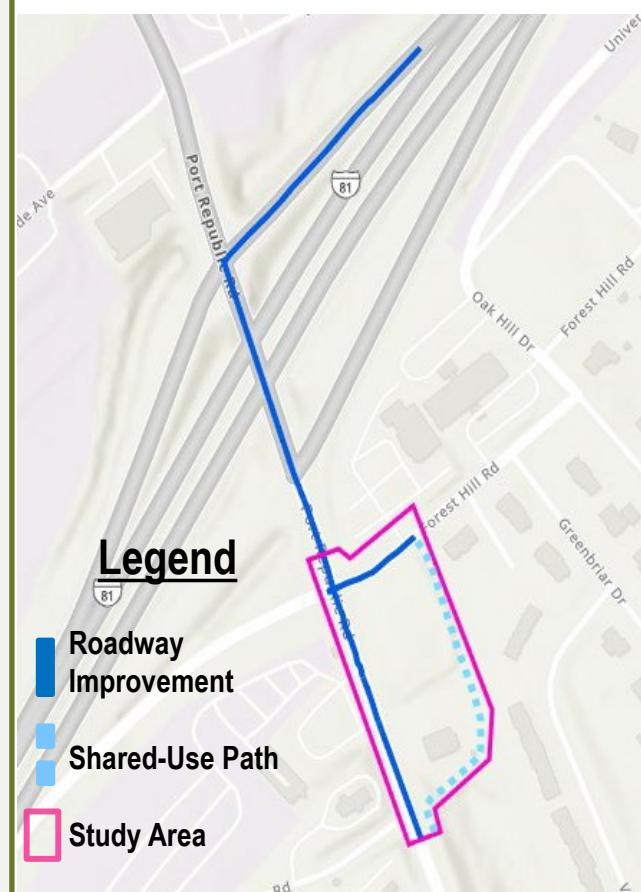
Recommended Improvements (Phase 2)



Planning-Level Conceptual Design



Project Location



Safety Results

Each improvement and countermeasure is expected to reduce the number of crashes and improve operations at the study intersection:

- Install additional Forest Hill Road Southbound left turn lane – reduce rear-end crash incidents on Forest Hill Road
- Install Port Republic Road westbound right turn lane – reduce rear-end crash incidents on Port Republic Road
- Prohibit left turns from Port Republic Road to nearby gas stations with flex post– reduce angle crash incidents on Port Republic Road, as multiple lanes of traffic will not be crossed at once
- Add shared-use path – reduce pedestrian conflict points along Port Republic Road and Forest Hill Road

These safety improvements are expected to target the rear-end crashes (45), angle crashes (5), head-on crashes (2), and bicycle crashes (3) that occurred at the intersection.

Improvements Description

The improvements proposed at this location include:

- A westbound right-turn lane on Port Republic Road to separate turning vehicles from the through lane
- An additional southbound left-turn lane on Forest Hill Road
- Flex post to prevent left turns to and from Port Republic Road to the adjacent gas stations
- A shared use path connecting Port Republic Road to Forest Hill Road

These improvements are expected to reduce crashes and improve operations and non-motorized access and safety. The additional southbound left-turn lane on Forest Hill Road is expected to prevent future delays caused by increasing left-turn volumes by approximately 50%.

Traffic Operations Results

| Forest Hill Road at Port Republic Road Average Delay | | | | |
|--|---------|---------|---------|---------|
| | AM Peak | | PM Peak | |
| | WB | SB | WB | SB |
| No-Build (2034) | 96.5 s | 103.9 s | 132.2 s | 146.3 s |
| Build (2034) | 36.7 s | 84.8 s | 33.2 s | 70.0 s |

Preliminary Cost Estimate

Cost estimates were developed based on information available at the time of study and should be reassessed prior to submitting funding applications.

| Phase | Cost Estimate (2020 Dollars) |
|----------------------------|------------------------------|
| Preliminary Engineering | \$1,203,000.00 |
| ROW and Utility Relocation | \$2,404,500.00 |
| Construction | \$6,015,246.64 |
| Total Cost | \$9,622,746.64 |