

# North Winchester Area Plan Phase I

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No-Build Conditions and Concept Testing

# Meeting Agenda

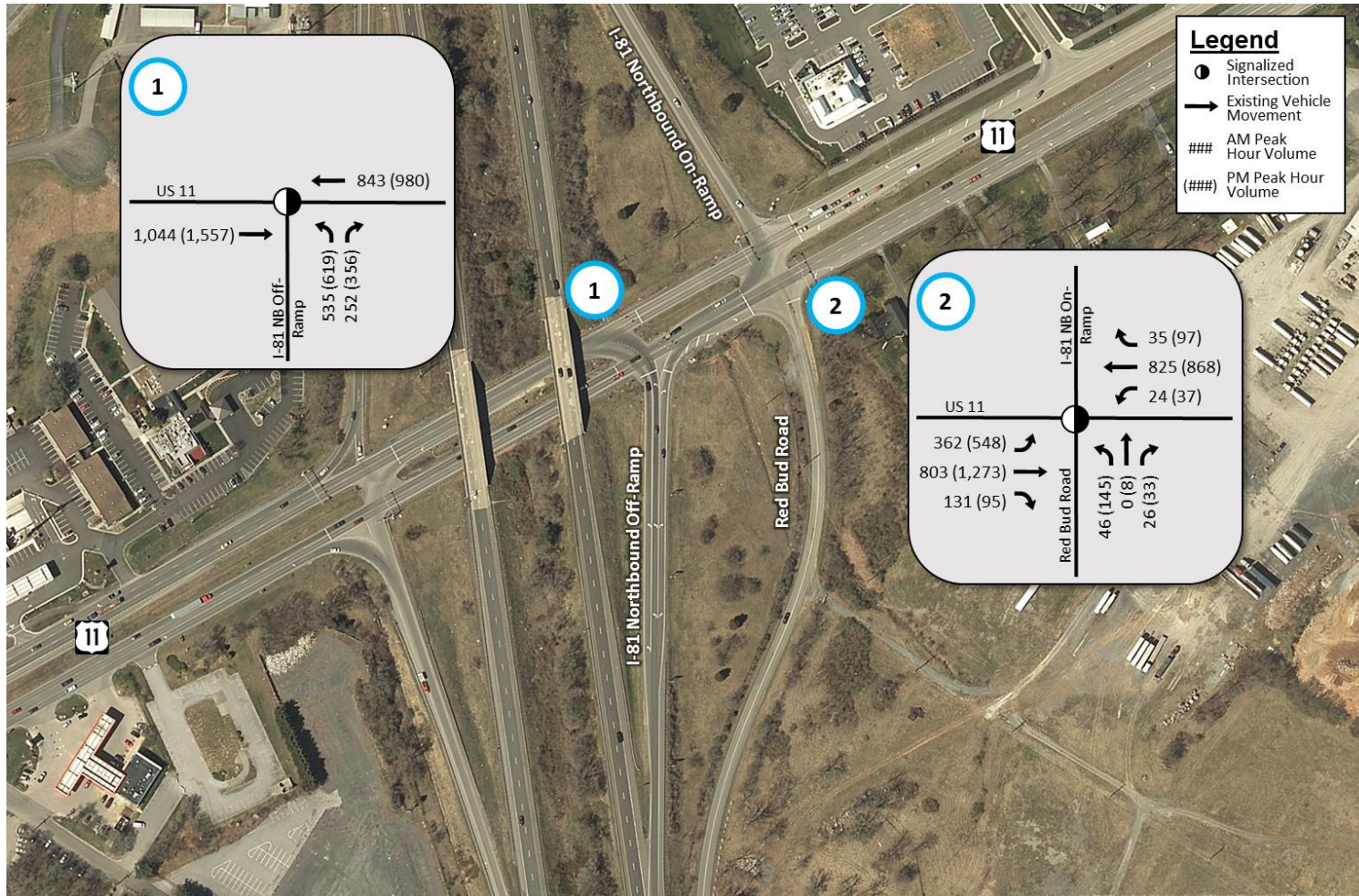
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- North Winchester Interchange 2030 No-Build Conditions
  - Peak Hour Traffic Volumes
  - Traffic Operations
- Alternatives Analysis
- Access Management Review

# North Winchester Area Plan Phase I 2030 No-Build Conditions

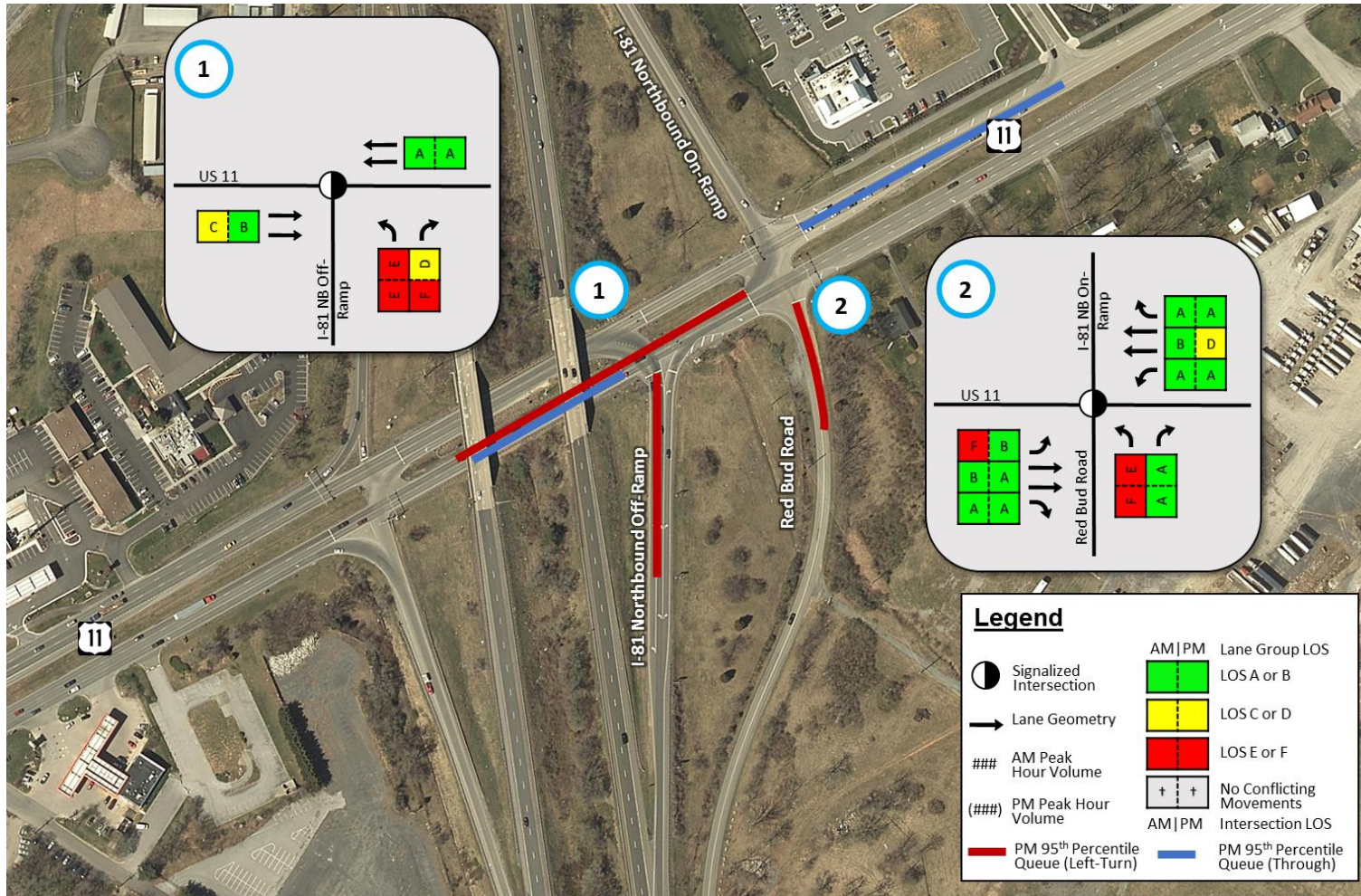
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# 2030 No-Build Peak Hour Traffic Volumes I-81 NB Ramp Intersections



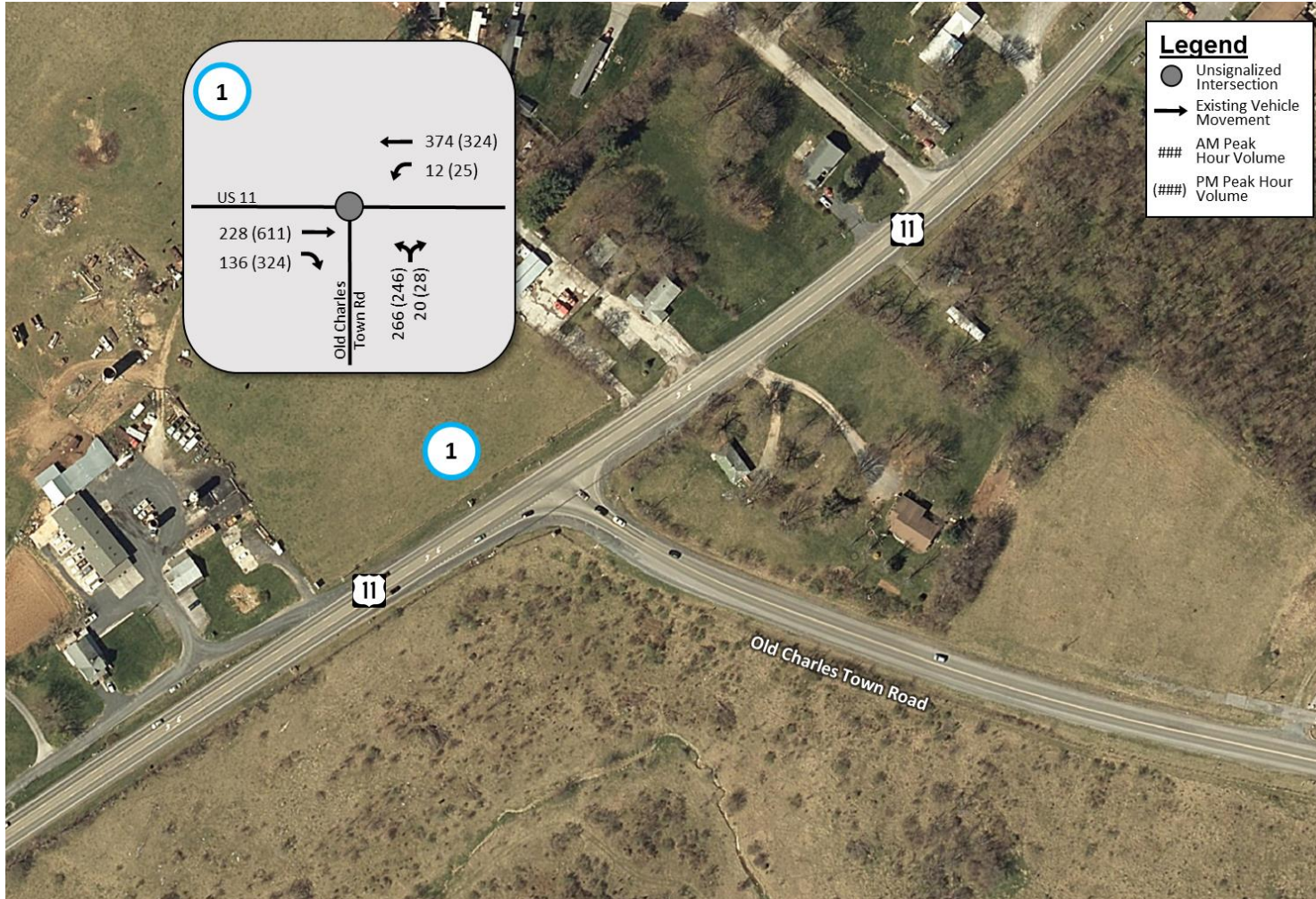
- Greater than 600 NB left turns at I-81 NB Off-Ramp in the PM peak hour
- Greater than 300 EB left turns at I-81 NB On-Ramp in the AM and PM peak hours

# 2030 No-Build Traffic Operations I-81 NB Ramp Intersections



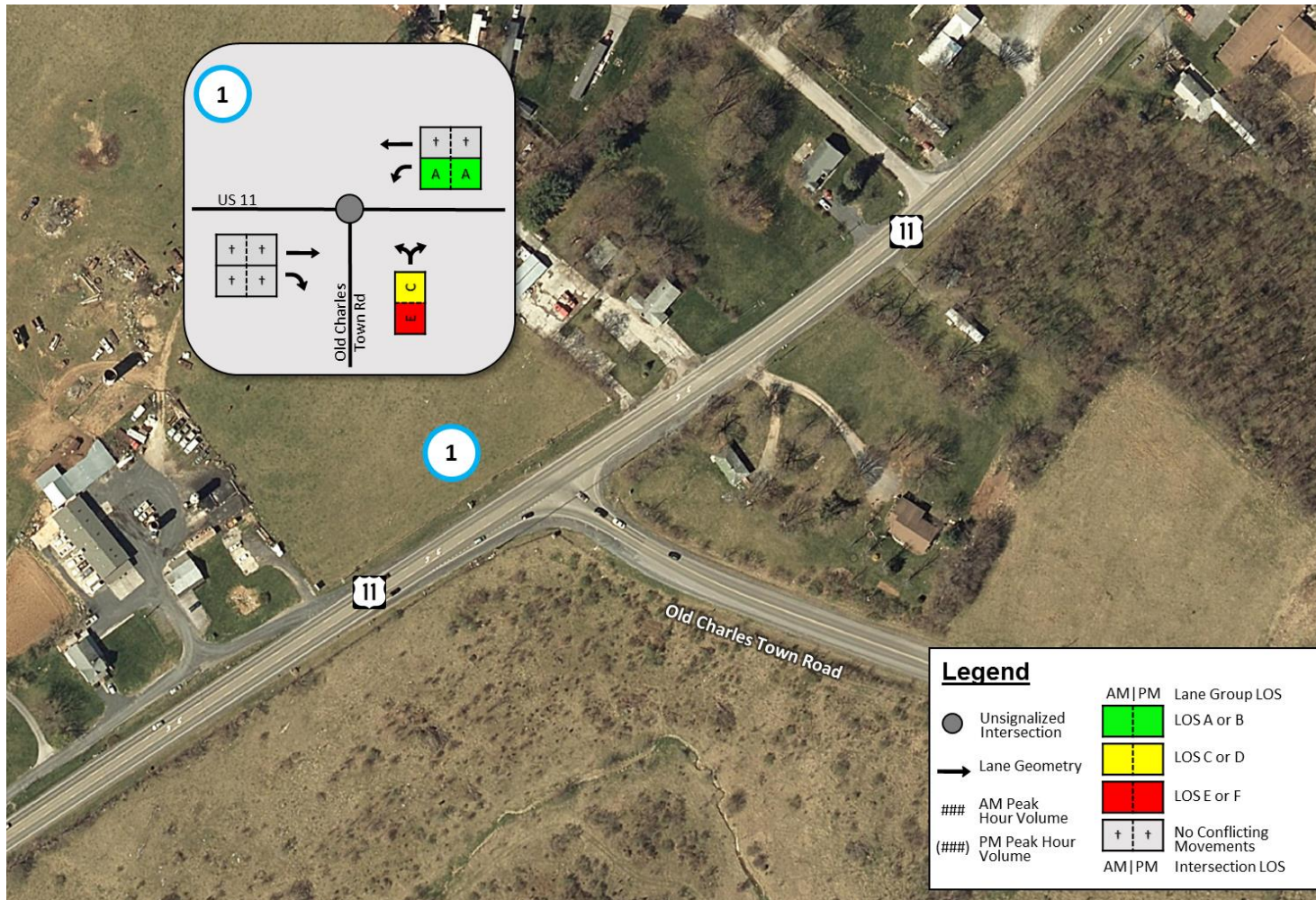
- LOS E for the NB left-turn at I-81 NB Off-Ramp in the AM and PM peak hours
- LOS F for the EB left-turn at I-81 On-Ramp in the PM peak hour
- EB left turn lane queue extends beyond storage lane at I-81 NB On-Ramp in the AM and PM peak hours

# 2030 No-Build Peak Hour Traffic Volumes Old Charles Town Road



- Traffic heavier in EB direction during the AM peak hour, including greater than 300 EB right turns in the AM peak hour
- Minimal WB left turns and NB right turns during the AM and PM peak hours

# 2030 No-Build Traffic Operations Old Charles Town Road



- LOS E for the NB approach in the PM peak hour
- Minimal delay for the WB left-turns during the AM and PM peak hours

# Alternatives Analysis 2030 Conditions

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# Alternatives Matrix

## I-81 NB Ramp Intersections

<b>Alternatives Matrix – I-81 NB Ramps</b>	
<b>Alternative</b>	<b>Intersection Improvements</b>
<b>1</b>	<b>Red Bud Road Relocation</b>
<b>2</b>	<b>Realign I-81 NB Off-Ramp + Dual EB Left-Turn Lanes</b>
<b>3</b>	<b>Realign I-81 NB Off-Ramp</b>
<b>4</b>	<b>Third EB Through Lane</b>
<b>5</b>	<b>Third EB Through Lane + Dual EB Left-Turn Lanes</b>
<b>6</b>	<b>Diverging Diamond Interchange</b>

# US 11 and I-81 Northbound Ramps

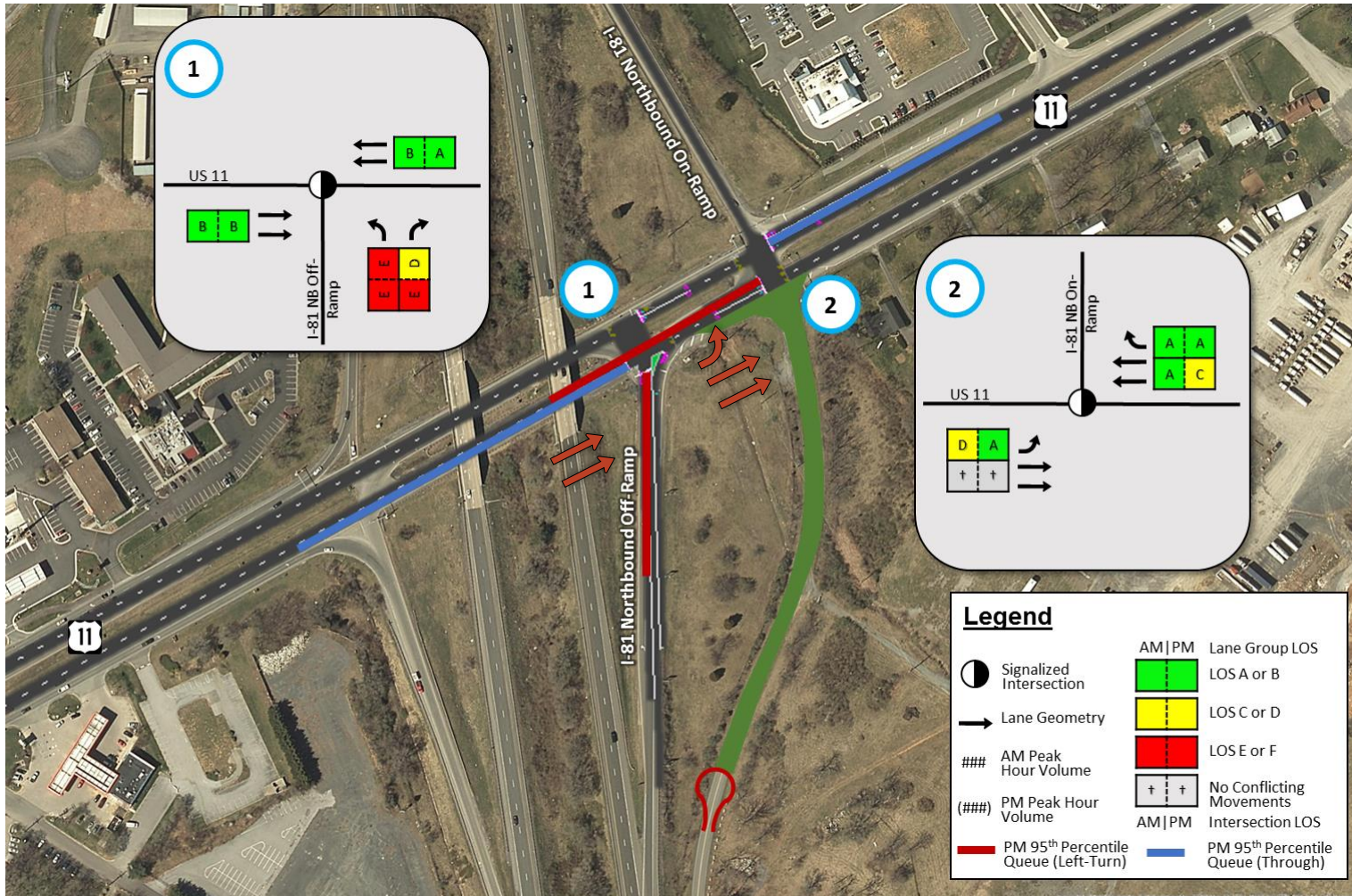
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# Potential Widening Under I-81

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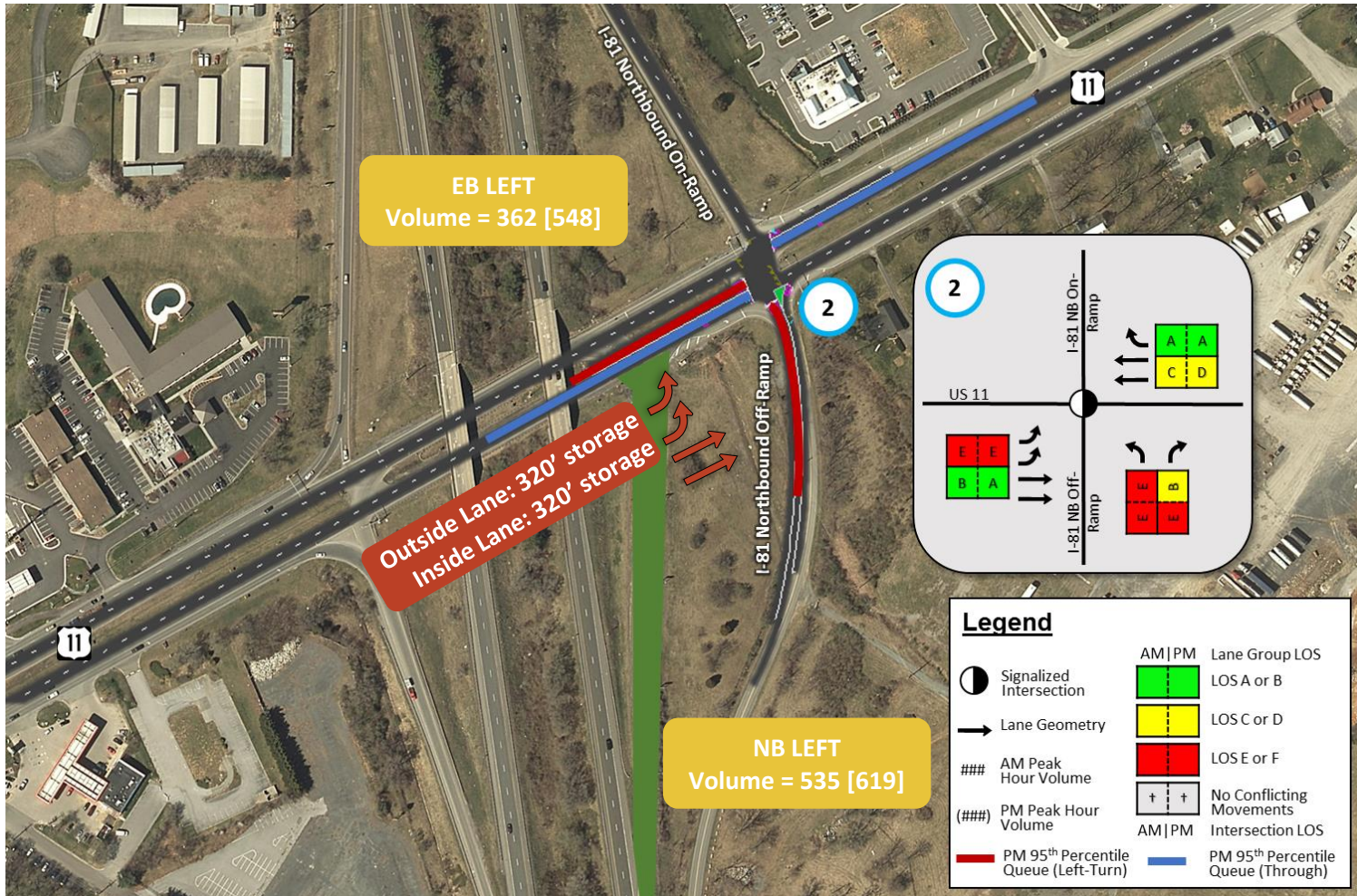
- Can be included in alternatives to provide additional left-turn storage
- Width from pier to pier on Route 11 under I-81 is 52 feet
- This width can likely accommodate three lanes on Route 11 with pier protection systems and a design exception for shoulder widths
- Widening to the left, right, or both would reduce the Route 11 vertical clearance under both I-81 bridges
  - I-81 Northbound (Existing: 14.7' over Eastbound Route 11)
  - I-81 Southbound (Existing: 15.3' over Westbound Route 11)
- Cannot reduce vertical clearance lower than existing, so profile of Route 11 would need to be lowered slightly

# Alternative 1 - Red Bud Road Relocation



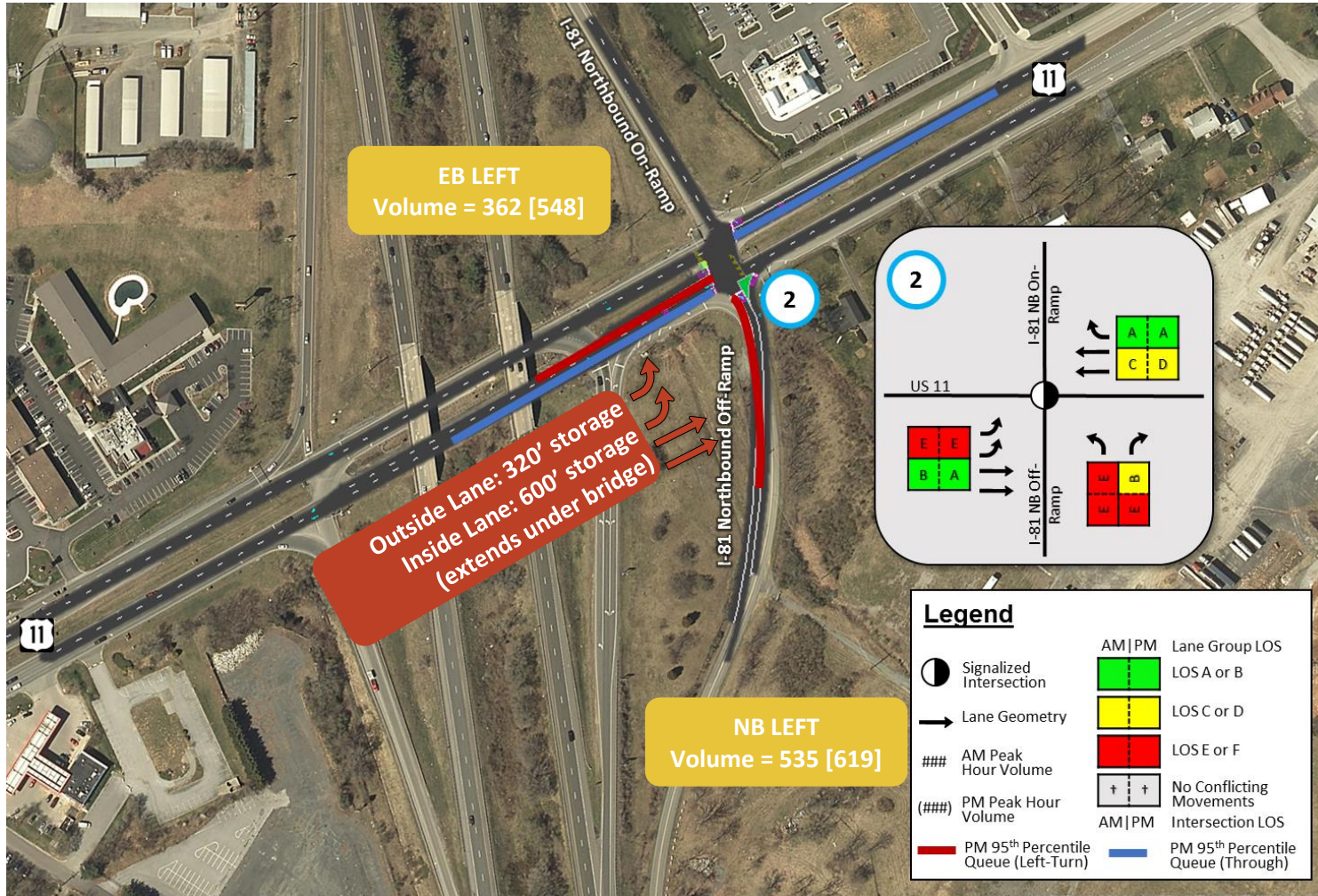
- Relocate Red Bud Road
- EB through at I-81 NB On-Ramp operates as free flow (no conflicting movements)
- LOS E for the NB left-turn at I-81 NB Off-Ramp in the AM and PM peak hours
- EB left turn lane queue extends beyond storage lane at I-81 NB On-Ramp in the AM and PM peak hours
- EB through extends beyond I-81 SB Ramps intersection

# Alternative 2 - Previous Alternative (Dual EB Left-Turn Lanes)



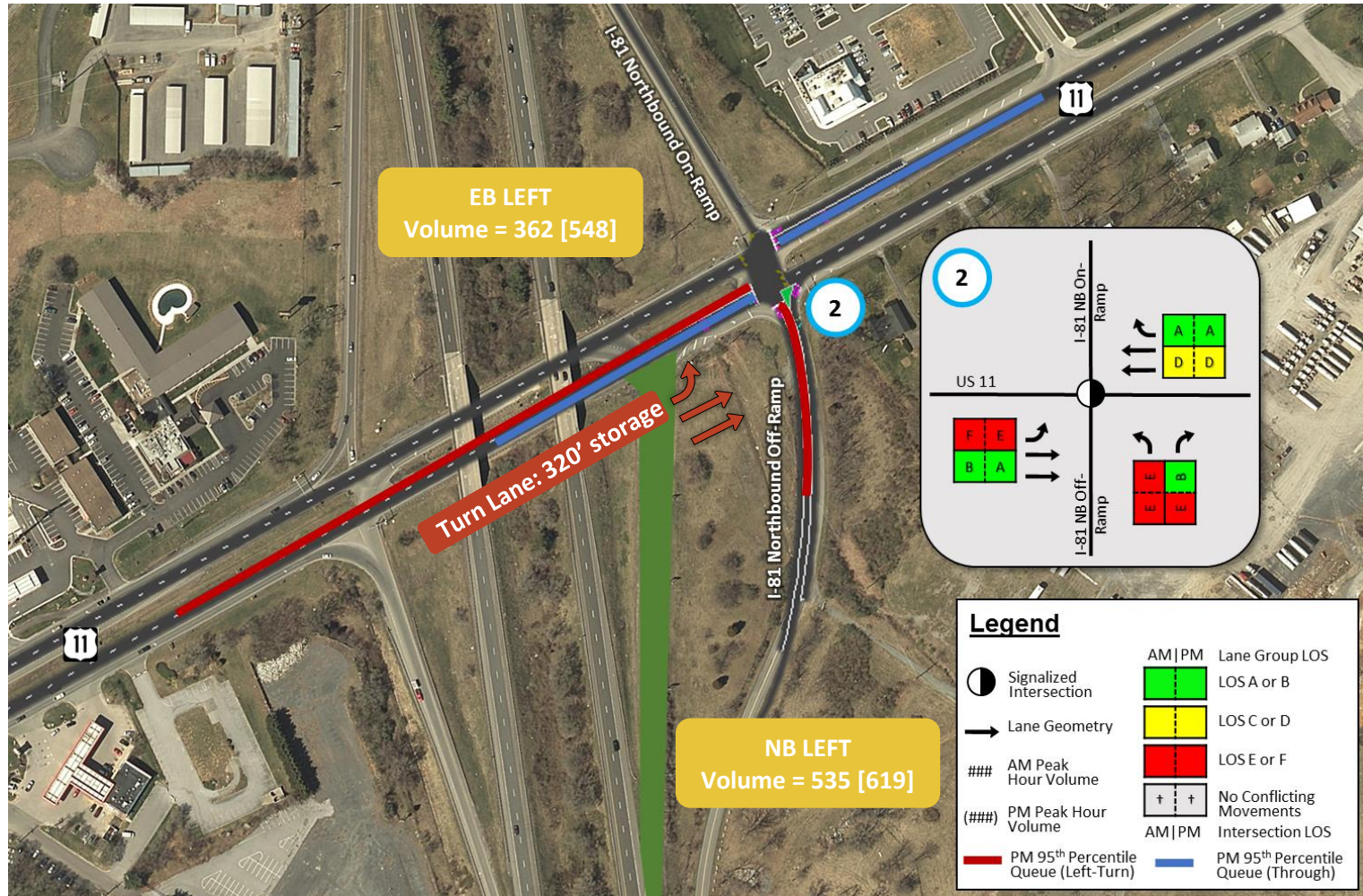
- Previous SMART Scale submission
- Relocate Red Bud Road
- Realign I-81 NB Off-Ramp
- Add second eastbound left turn lane at US 11/I-81 NB Ramps
- Widen I-81 NB On-Ramp
- PM queuing for eastbound left turn greater than storage length

# Alternative 2B - Previous Alternative (Dual EB Left-Turn Lanes) with 3 lanes under I-81 bridges



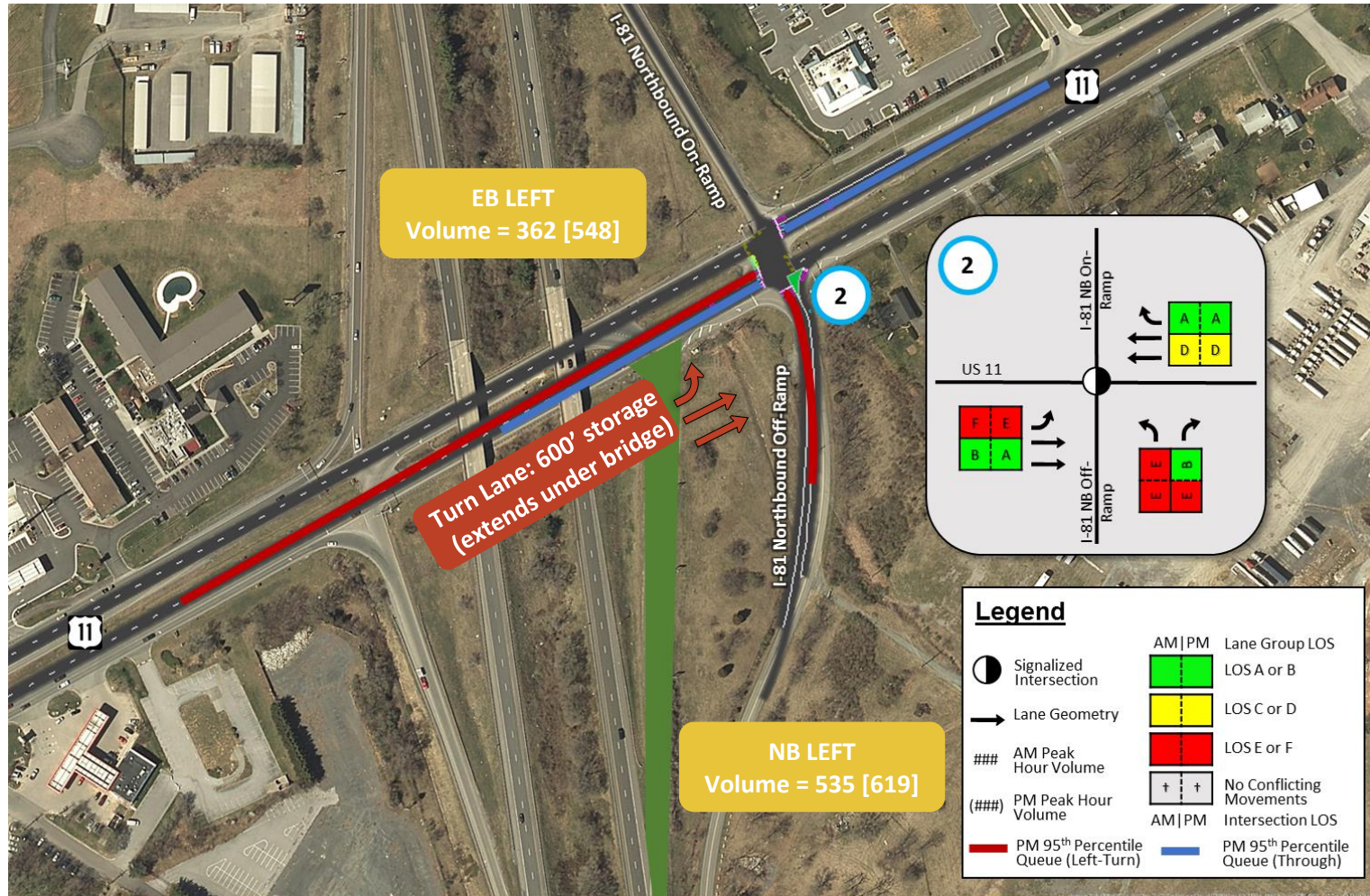
- Previous SMART Scale submission
- Relocate Red Bud Road
- Realign I-81 NB Off-Ramp
- Extend eastbound left turn lane underneath bridge
- Add second eastbound left turn lane at US 11/I-81 NB Ramps
- Widen I-81 NB On-Ramp
- PM queuing for eastbound left turn lane within proposed storage

# Alternative 3 - Previous Alternative (Single EB Left)



- Relocate Red Bud Road
- Realign I-81 NB Off-Ramp
- Single eastbound left turn lane at I-81 NB On-Ramp
- Failing operations for EB left turns in the PM peak hour with queuing >900 feet

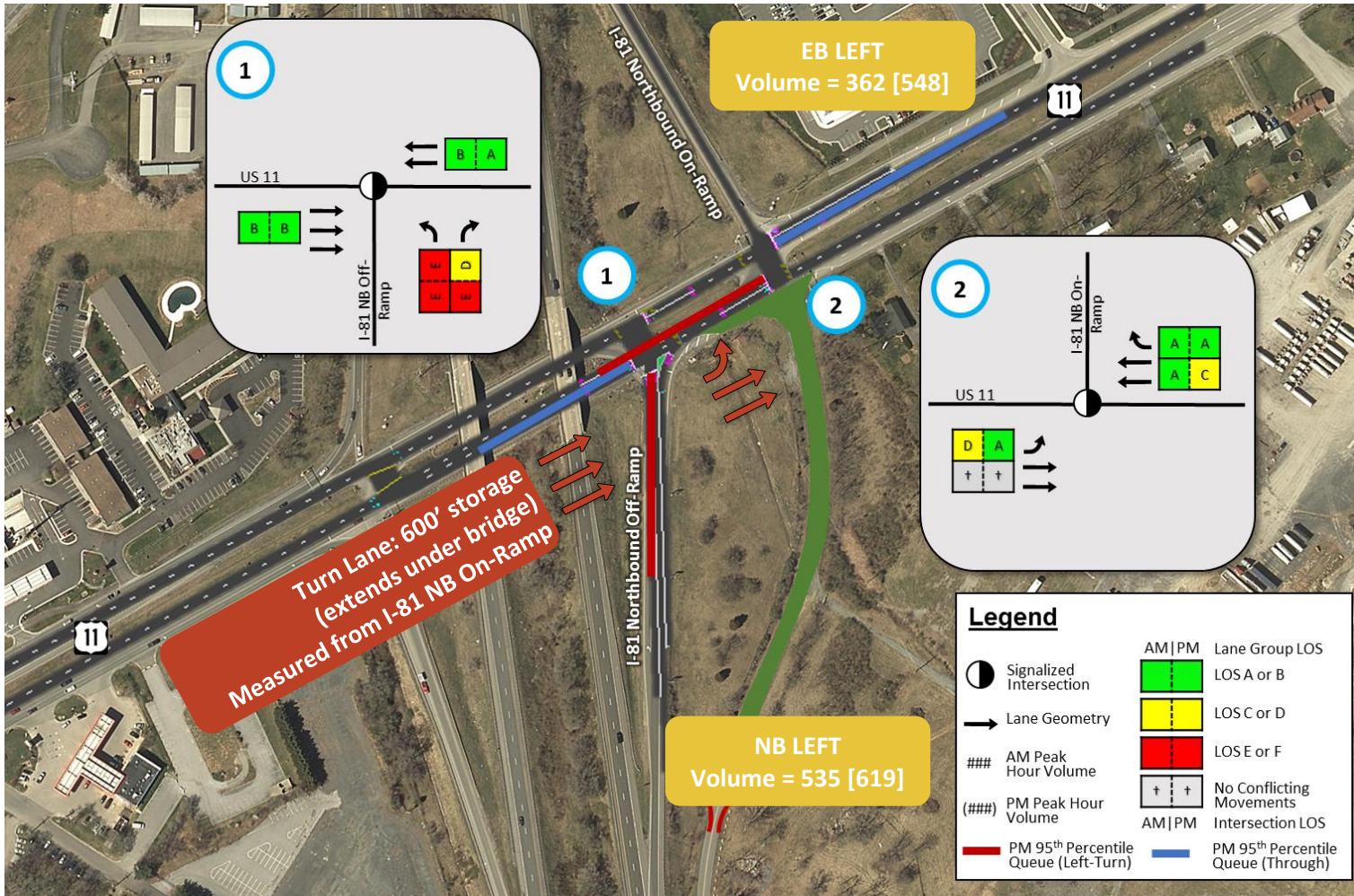
# Alternative 3B - Previous Alternative (Single EB Left) with 3 lanes under I-81 bridges



- Relocate Red Bud Road
- Extend eastbound left turn lane underneath bridge
- Realign I-81 NB Off-Ramp
- Failing operations for EB left turns in the PM peak hour with queuing >900 feet for eastbound left turn

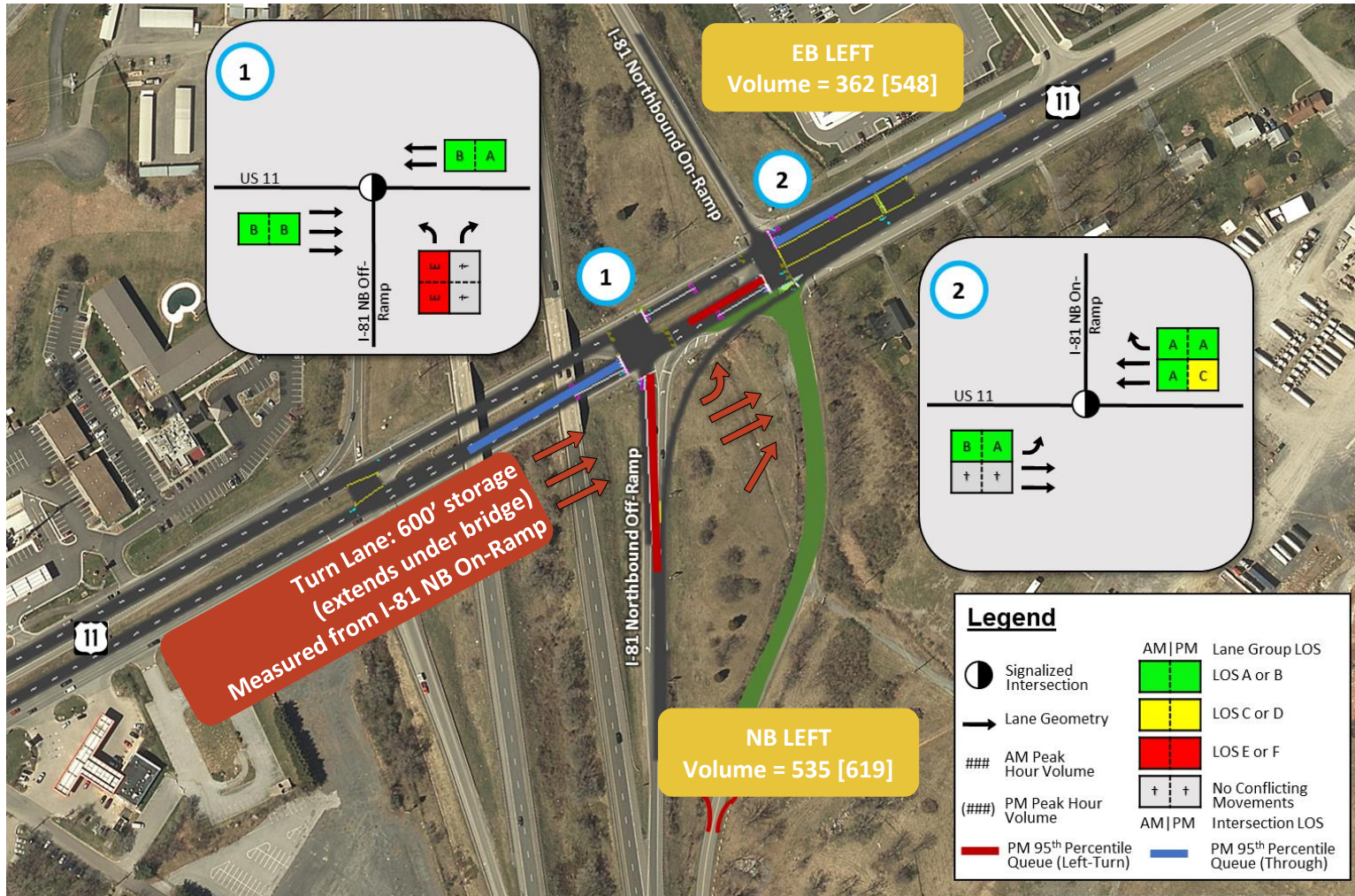


# Alternative 4 - Third EB Through Lane



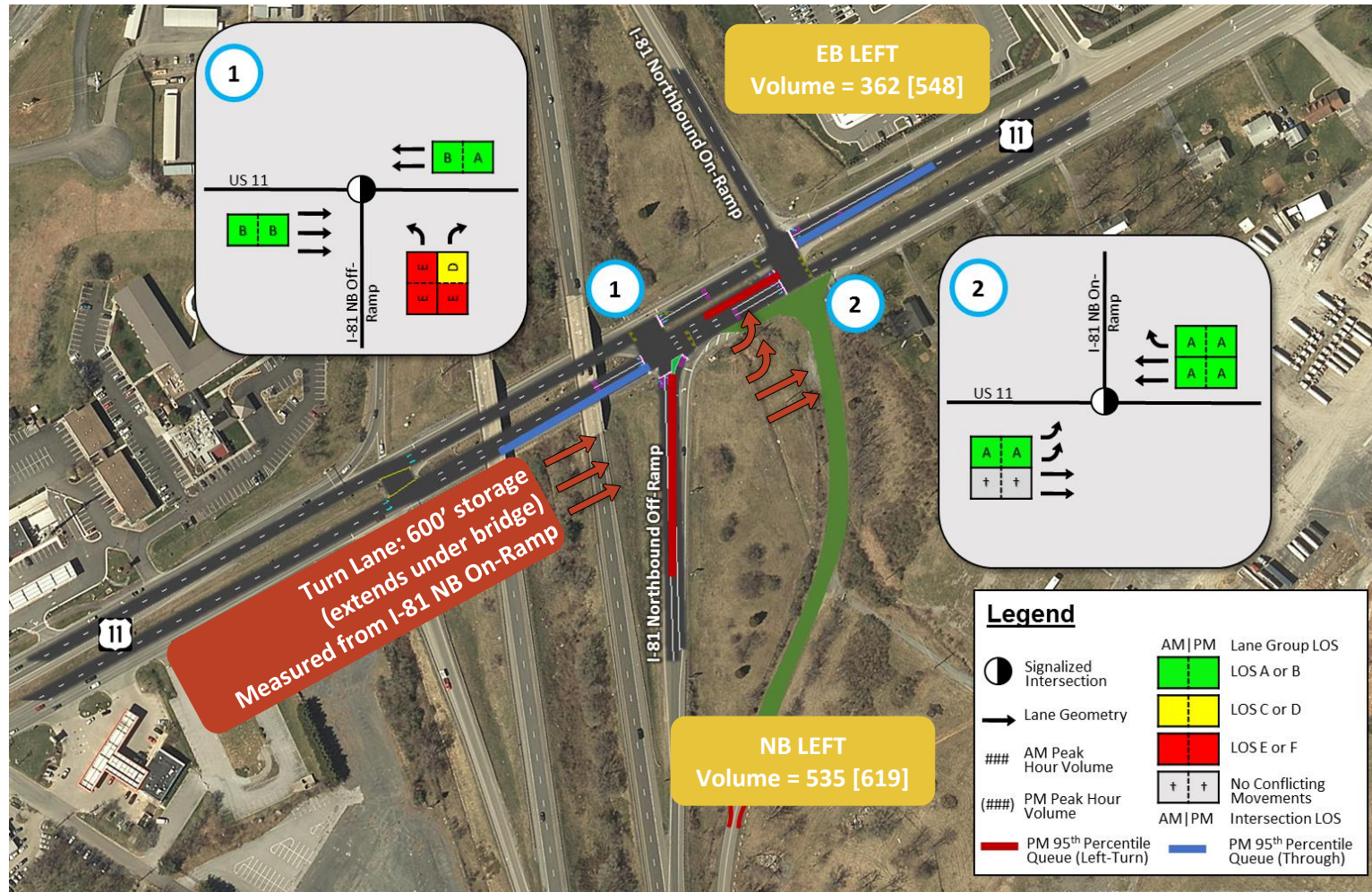
- Relocate Red Bud Road
- EB through at I-81 NB On-Ramp operates as free flow (no conflicting movements)
- Add third EB through lane to US 11 between I-81 SB Ramps and I-81 NB Ramps
- PM queuing ~300 feet for eastbound left turn at I-81 NB On-Ramp (extends through I-81 NB Off-Ramp intersection)

# Alternative 4B - Third EB Through Lane + Free NB Right



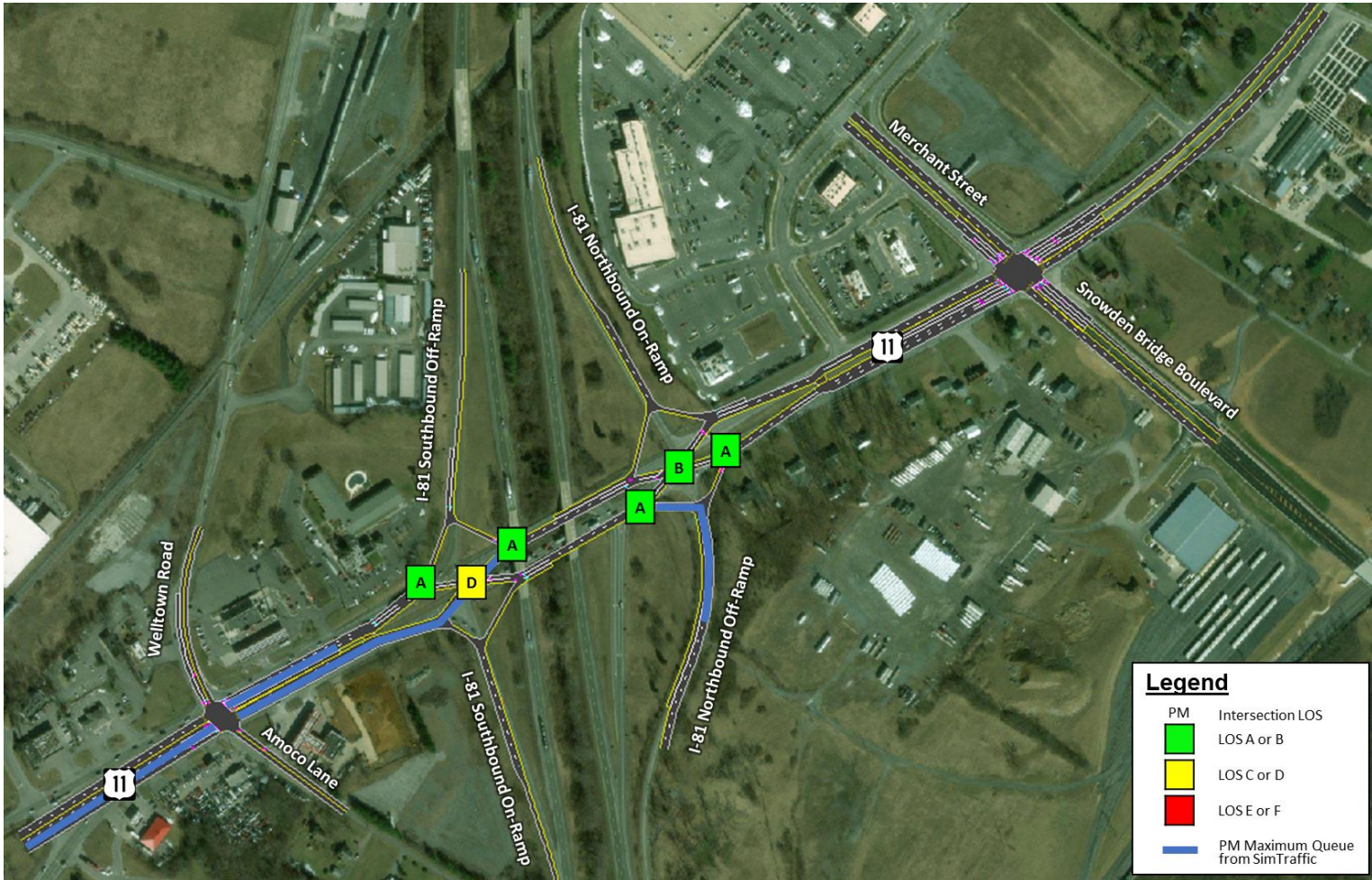
- Option for Alternative 4 (also can be added to Alternative 1, 4, or 5)
- Convert NB right-turn lane from I-81 NB Off-Ramp to a free flow movement that merges with US 11 east of the I-81 NB On-Ramp intersection
- Mitigates EB queues at I-81 NB On-Ramp

# Alternative 5 - Third EB Through Lane + Dual EB Lefts



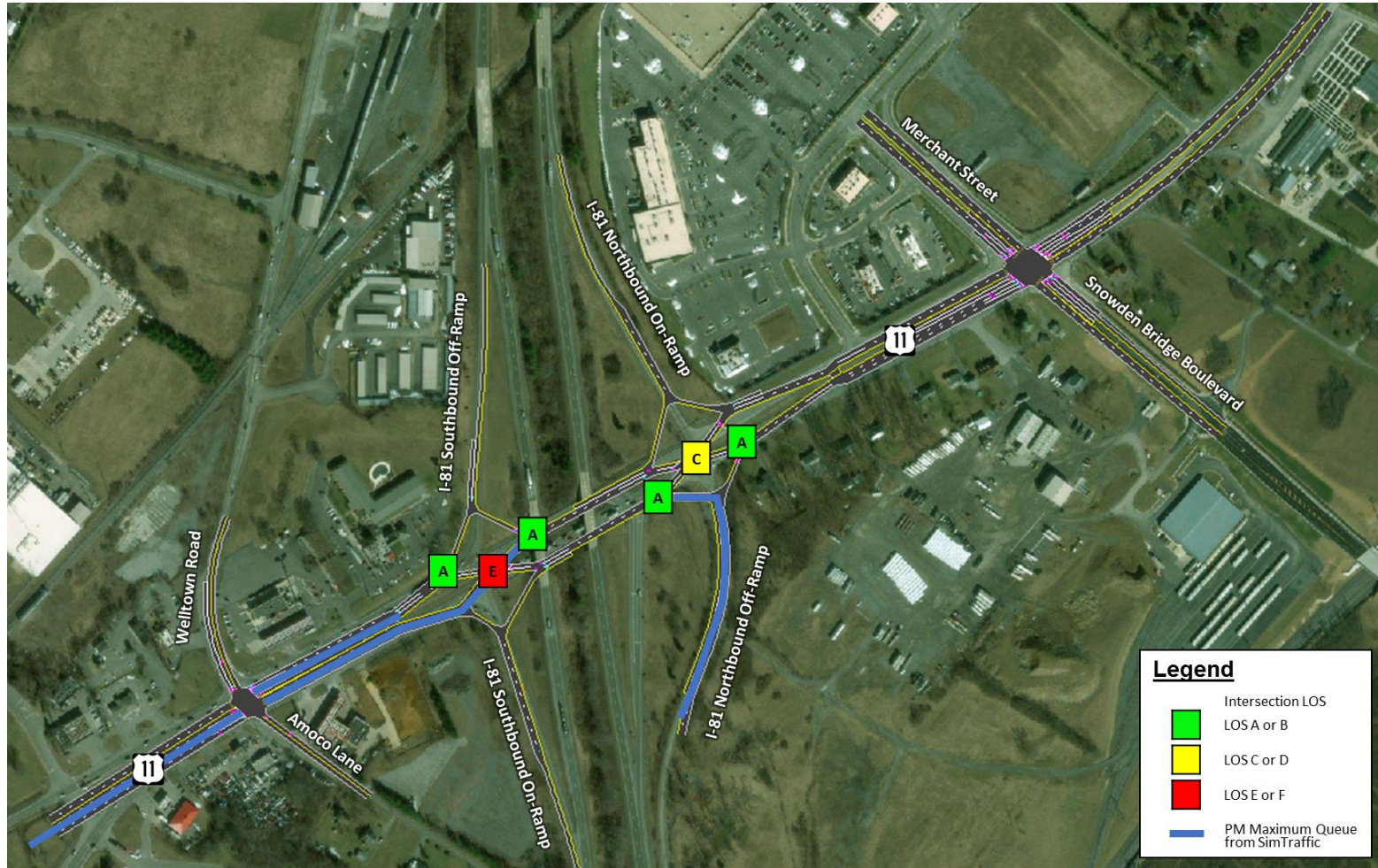
- Relocate Red Bud Road
- EB through at I-81 NB On-Ramp operates as free flow (no conflicting movements)
- Add third EB through lane to US 11 between I-81 SB Ramps and I-81 NB Ramps
- Add second EB left-turn lane at I-81 NB On-Ramp intersection
- Widen I-81 NB On-Ramp
- Minimal left-turn queues for EB left-turn

# Alternative 6 - Diverging Diamond Interchange (DDI)



- Relocate Red Bud Road
- Realign I-81 NB Off-Ramp
- Convert I-81 NB Ramps and I-81 SB Ramps intersections to DDI
- EB queue in PM extends to Welltown Rd/Amoco Lane
- NB queue at I-81 NB Off-Ramp is ~350 feet

# DDI Sensitivity Analysis - 2040 Conditions



- EB queue in PM extends to Welltown Rd/Amoco Lane
- WB queue at Welltown Rd extends almost to DDI
- EB queue at Welltown Rd >700 feet
- NB queue at I-81 NB Off-Ramp is ~770 feet

# DDI Sensitivity Analysis – 2040 Conditions

## Three EB Through Lanes



- Add a third EB through lane between SB and NB Ramp intersections
- Third through lane alleviates EB queue (does not extend to Welltown Road)
- EB queue at Welltown Road is ~690 feet
- NB queue at I-81 NB Off-Ramp is ~700 feet

# Alternative Evaluation

## I-81 NB Ramp Intersections

Critical Output	No-Build	Alternative 1 <i>Red Bud Road Relocation</i>	Alternative 2 <i>Realign Off-Ramp + Dual EB Left-Turn</i>	Alternative 3 <i>Realign Off-Ramp</i>	Alternative 4 <i>Third EB Through Lane</i>	Alternative 5 <i>Third EB Through Lane + Dual EB Left-Turn</i>
<b>Queue</b>						
EB Left-Turn onto I-81 NB On-Ramp	565'	355'	340'	990'	300'	80'
EB Through at I-81 NB Off-Ramp	635'	600'	465' <sup>1</sup>	465' <sup>1</sup>	325'	325'
WB Through at I-81 NB On-Ramp	495'	405'	490'	490'	405'	210'
NB Left-Turn from I-81 NB Off-Ramp	360'	360'	355'	355'	360'	360'
<b>Level of Service</b>						
EB Left-Turn onto I-81 NB On-Ramp	F (98.7)	D (39.2)	E (69.8)	F (138.9)	D (39.0)	A (6.8)
NB Left-Turn from I-81 NB Off-Ramp	E (59.9)	E (60.2)	E (61.7)	E (61.7)	E (60.2)	E (60.2)

<sup>1</sup>EB through queues for Alternative 2 and 3 are measured from the realigned I-81 NB Off-Ramp location

Comparison to No-Build	Improvement	Minimal Change	Deterioration
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# US 11 and Old Charles Town Road

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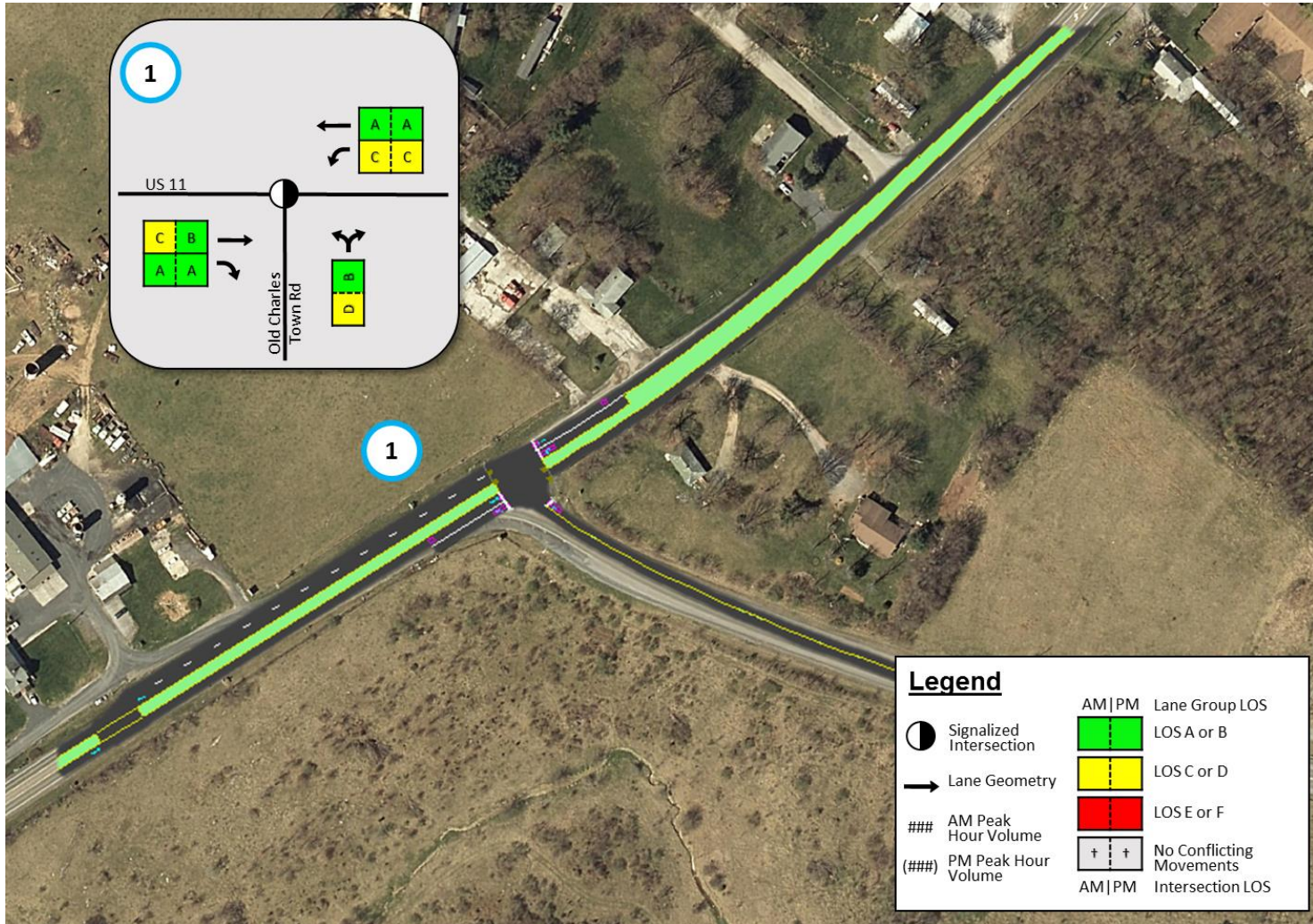


# Alternatives Matrix Old Charles Town Road

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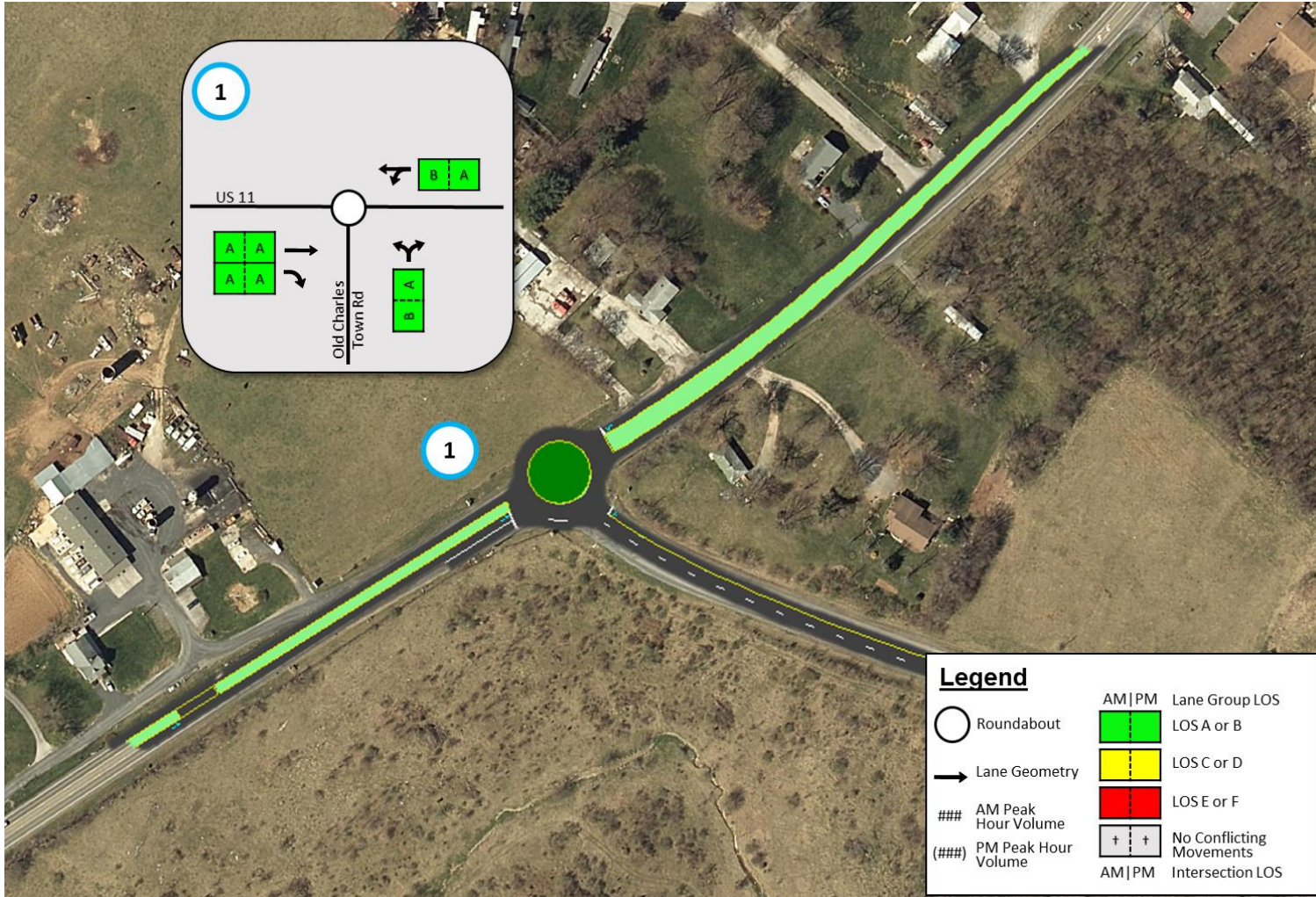
<b>Alternatives Matrix – Old Charles Town Road</b>	
<b>Alternative</b>	<b>Intersection Improvements</b>
<b>1</b>	<b>Continuous Green T</b>
<b>2</b>	<b>Roundabout</b>

# Alternative 1 – Continuous Green-T



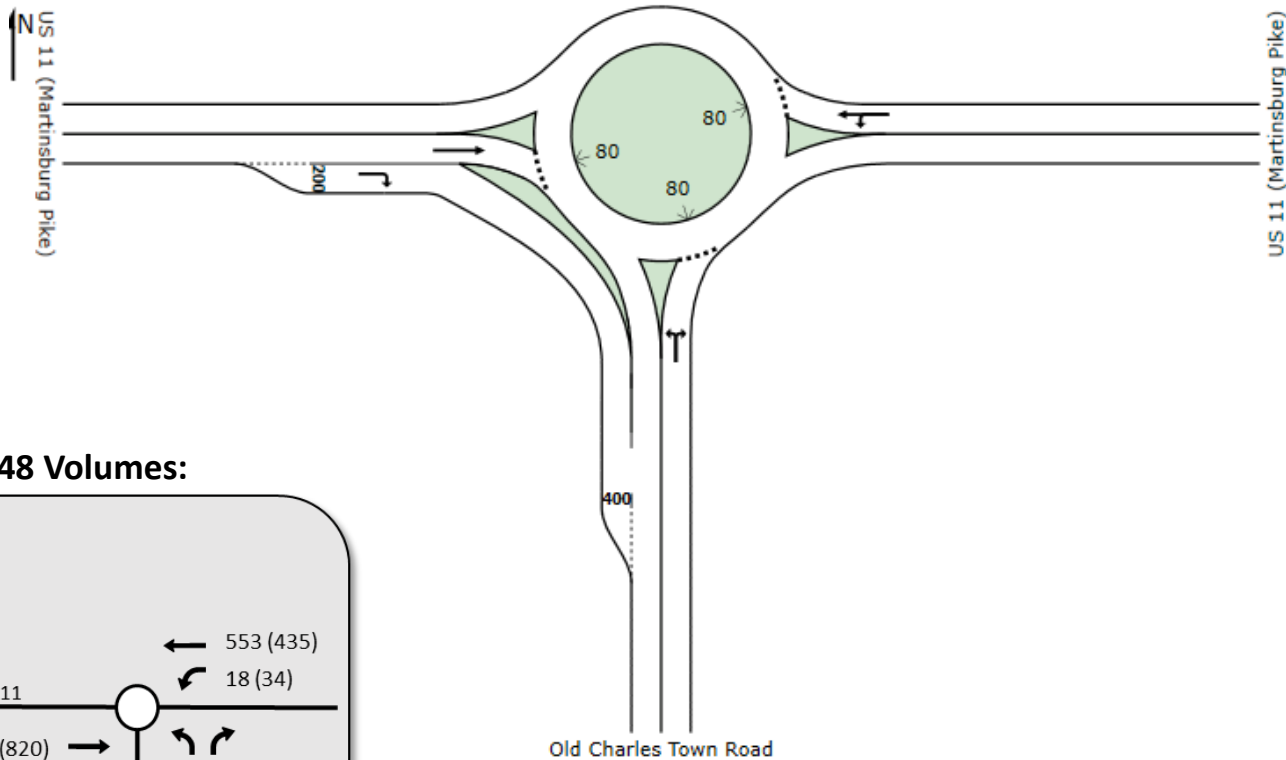
- Convert intersection to a signalized Continuous Green-T (CGT)
- Operational deficiencies for NB left-turn during the PM peak hour

# Alternative 2 - Roundabout

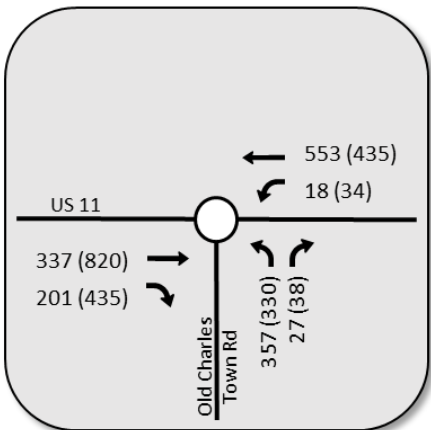


- Convert Old Charles Town Road to a single lane roundabout with an EB right-turn slip lane
- All movements operate at LOS B or better

# Roundabout Sensitivity Analysis



## 2048 Volumes:



## Sensitivity Analysis

Configuration maintains LOS C until approximately 2048 traffic conditions, which includes the following increases in volume in the AM peak hour from 2030 conditions:

- + 110 EB throughs
- + 65 EB right turns
- + 5 WB left turns
- + 180 WB throughs
- + 90 NB left turns
- + 10 NB right turns

# Alternatives Matrix

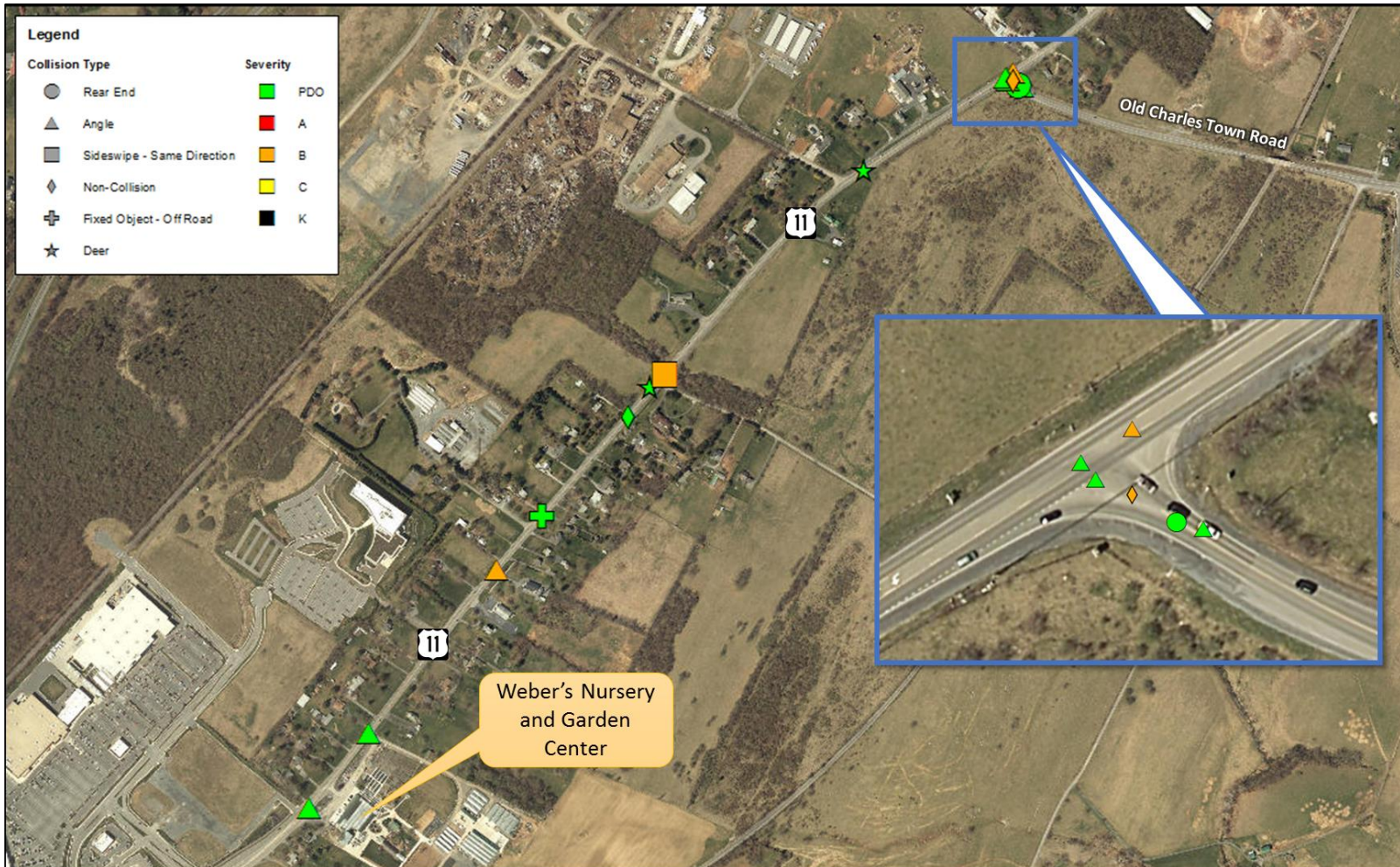
Alternatives Matrix – I-81 NB Ramps		
Alternative	Intersection Improvements	Consider?
1	Red Bud Road Relocation	✗
2	Realign I-81 NB Off-Ramp + Dual EB Left-Turn Lanes	✓
3	Realign I-81 NB Off-Ramp	✗
4	Third EB Through Lane	✓
5	Third EB Through Lane + Dual EB Left-Turn Lanes	✓
6	Diverging Diamond Interchange	✓

Alternatives Matrix – Old Charles Town Road		
Alternative	Intersection Improvements	Consider?
1	Continuous Green T	✗
2	Roundabout	✓

# Access Management Review

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# Access Management Review - Crash History



- 14 total crashes between Weber's Nursery and Old Charles Town Road from 2013-2017 (five years)
- 6 of the 14 crashes occurred at the Old Charles Town Road intersection
- Crash history does not indicate high crash trends associated with TWLTL along US 11 (only 2 angle crashes occurred where TWLTL is located)