

Welcome

Public Workshop



I-95 & Marsh Road / Carr Road
Interchange Study

What are the current problems?

- Congestion on Marsh Road through the I-95 interchange
- High number of crashes at Marsh Road/Carr Road intersection
- Left-turn traffic on Marsh Road blocks the through lanes due to insufficient storage length for turning vehicles
- Difficult for left turn vehicles at Marsh Road/I-95 ramps and Marsh Road/Carr Road to clear intersection in one cycle of the traffic signal
- Long queues on eastbound Carr Road during evening rush hour
- Driver confusion and queuing on the northbound I-95 exit ramp at Carr Road
- Insufficient pedestrian and bicycle facilities within the study area

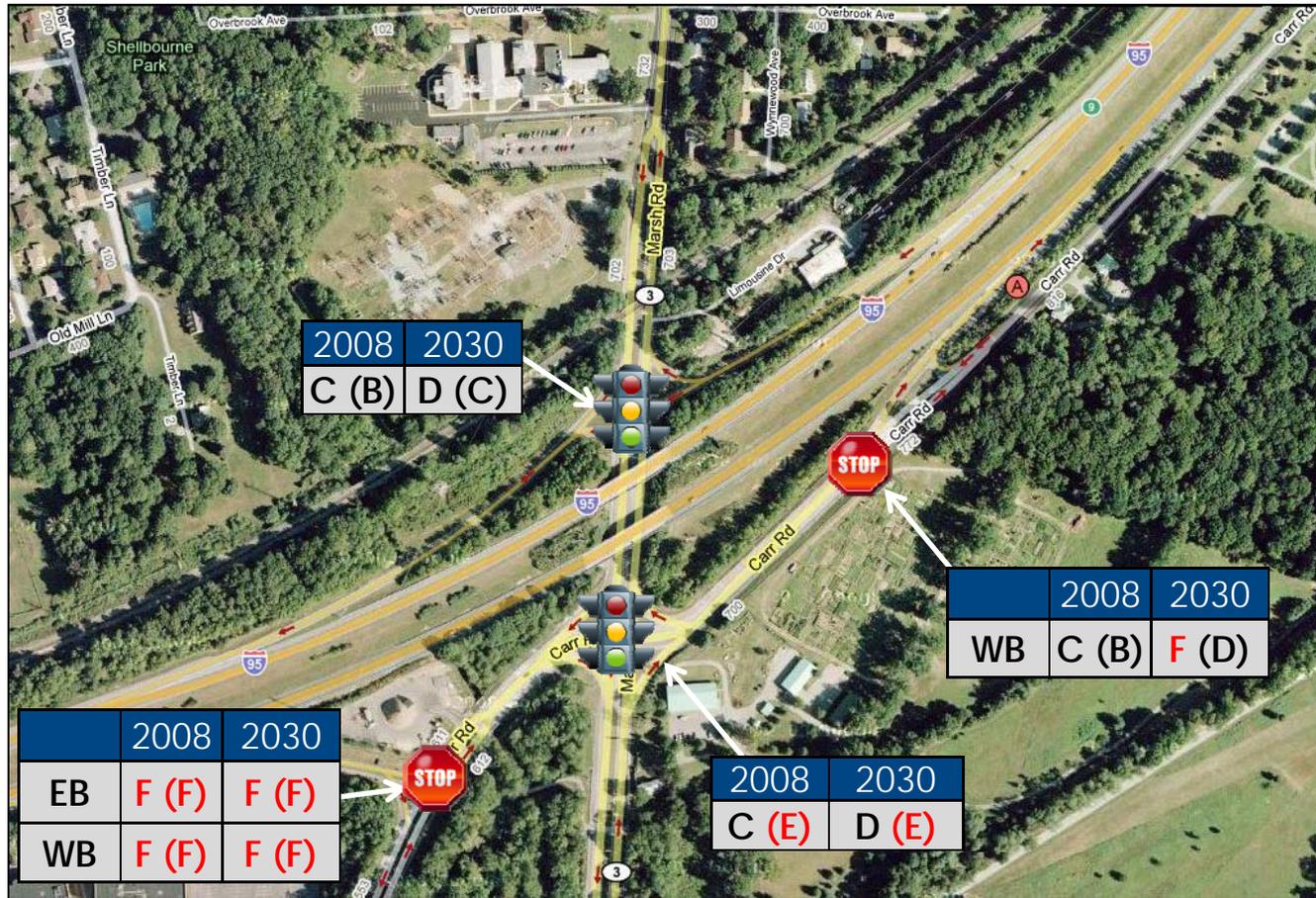
Capacity Analysis

- The intersections were evaluated for Level of Service (LOS)
- What is Level of Service ?
 - LOS is a method of describing how well traffic is moving through an intersection based on motorist delay

LOS	Control Delay (Second/Vehicle)		
A	< 10	Little or No Delay	Acceptable LOS
B	> 10-20		
C	> 20-35		
D	> 35-55	Moderate Delay	
E	> 55-80		Unacceptable LOS
F	> 80	Excessive Delay	

Capacity Analysis

Existing and 2030 No Build LOS



2008	2030
AM(PM)	AM(PM)

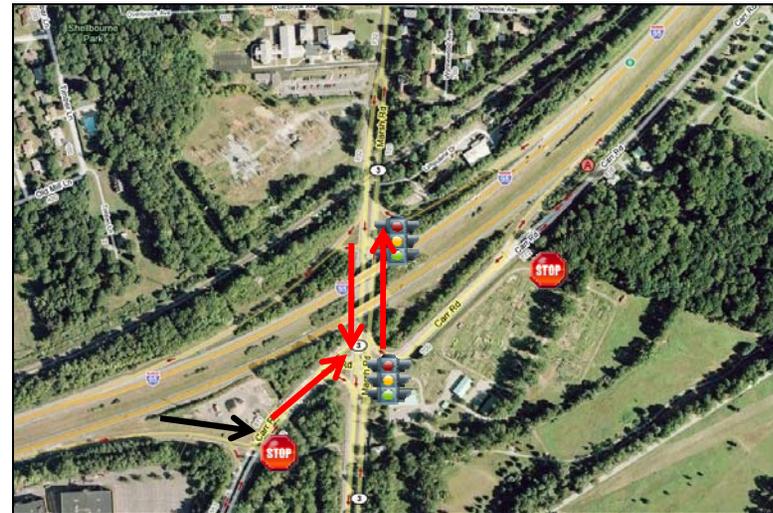
The intersection LOS shown in red indicates unacceptable LOS

Queuing



- One of the most significant problems is from left-turns that queue on Marsh Road beyond the left-turn lane and extend into the through lane
- This occurs in the area between the southbound ramps to/from I-95 and the Marsh Road/Carr Road intersection
- In addition, excessive queues also occur on Carr Road at the eastbound approach to Marsh Road

Roadway segment	Storage Length Provided	Actual Queue Length
NB Marsh Road left-turn at SB I-95 entrance ramp	160'	240'
SB Marsh Road left-turn at Carr Road	160'	240'
EB Carr Road left-turn at Marsh Road	400'	460'
NB I-95 off ramp at Carr Road	1200'	1050'



The 95th percentile queue lengths are based on the 2030 No Build Analysis.

Safety Analysis



- Identified as high crash corridor through Hazard Elimination Program (HEP)
- Marsh Road/Carr Road Intersection
 - 25 total crashes
 - Most crashes involve left turning vehicles

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Pedestrian and Bicycle Issues

■ Existing Facilities

- Sidewalks along Marsh Road from Carr Road to SB I-95 Ramps
- Pedestrians use shoulder outside this area
- No marked bicycle facilities along roads within study area
- Bringhurst Woods has internal trail with Marsh Road crossing 300 feet south of Carr Road intersection

■ Corridor Needs

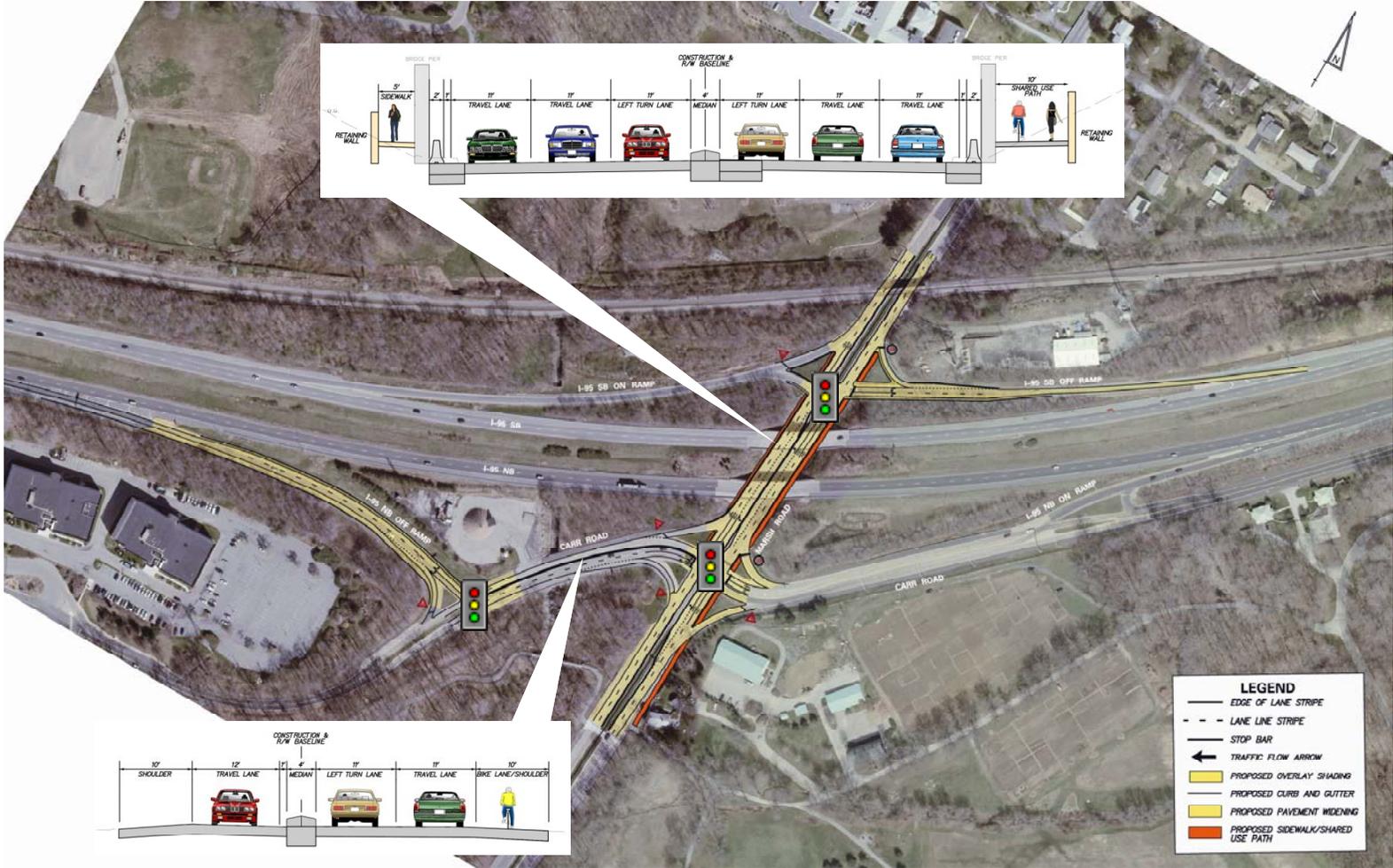
- Update crosswalks and curb ramps to meet current ADA requirements
- Add pedestrian signal and crosswalk at Marsh Road/Carr Road
- Create on road bike corridor along Carr Road
- Add Share the Road signs along Marsh Road and potential shared use path for bicycles
- Improve signage at mid-block crossing for Bringhurst Woods trail

Alternative A

- Convert Marsh Road to six lane section with full length left-turn lanes
- Relocate sidewalk behind the bridge piers on the west side of Marsh Road
- Construct shared use path behind the bridge pier on the east side of Marsh Road
- Add a second left-turn lane to I-95 SB off ramp to Marsh Road
- Signalize Carr Road/I-95 NB off ramp intersection
- Add second left-turn lane from I-95 NB off ramp to Carr Road
- Cost: \$3.1M
 - Pros
 - Least impact of all alternatives
 - Reduce delay at Marsh Road/I-95 SB ramp intersection
 - Reduce queue at westbound left-turn at Marsh Road/I-95 SB off Ramp and SB left-turn at Marsh Road/Carr Road
 - Improve traffic operation at northbound I-95 off ramp at Carr Road
 - Cons
 - Does not address queue problem at EB Marsh Road/Carr Road Intersection
 - No more free flow movement for I-95 NB off ramp at Carr Road
 - Shared use path may impact park land at south end of project

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Alternative A

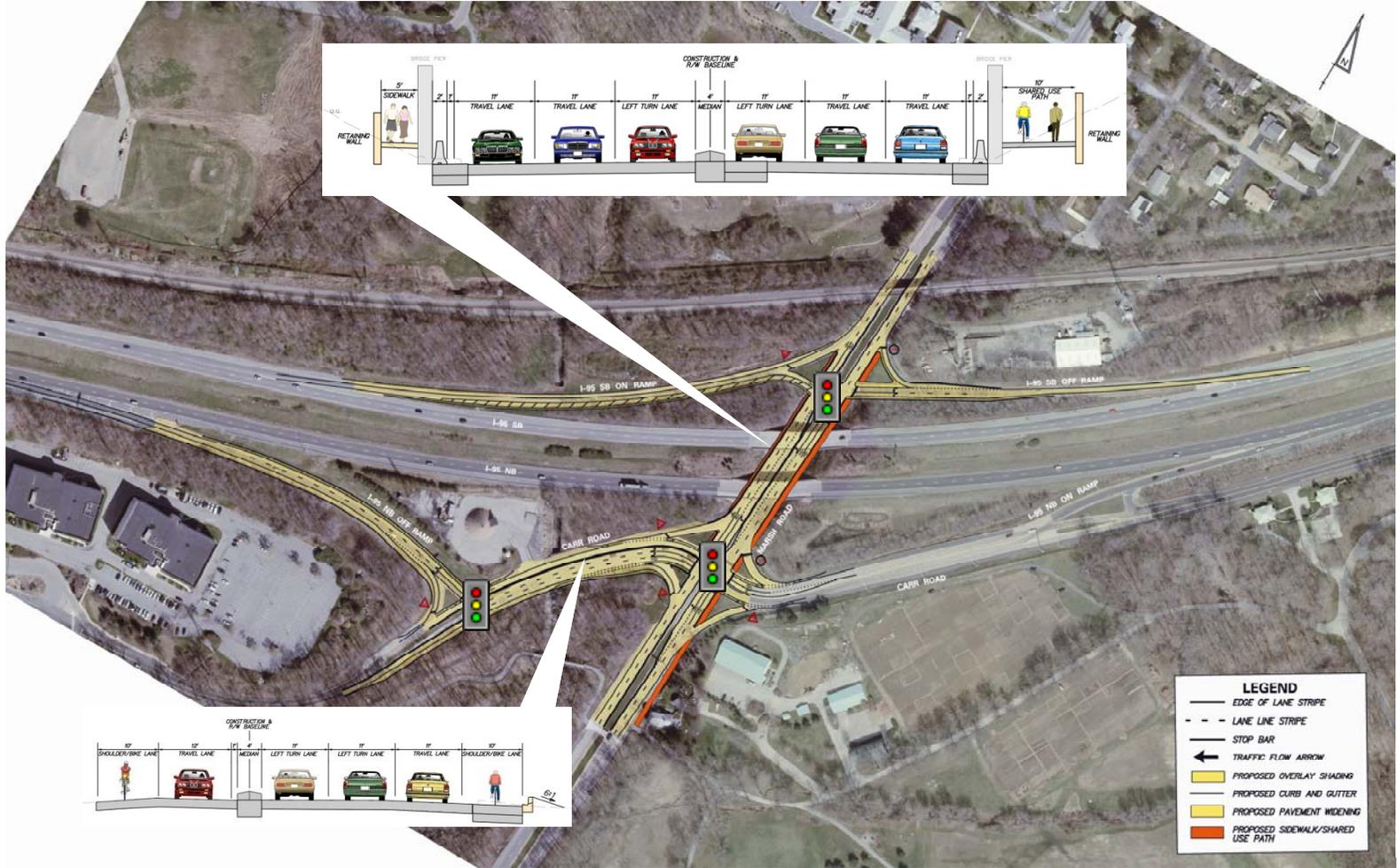


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Alternative B

- Includes all the improvements from Alternative A and;
- Add second exclusive eastbound left-turn lane at Marsh Road/Carr Road
- Widen I-95 SB on ramp to accommodate two receiving lanes in the future at the Marsh Road/I-95 SB Ramps
- Cost: \$3.5M
 - Pros
 - Reduce delay at Marsh Road/I-95 SB ramp intersection
 - Reduce queue at westbound left-turn at Marsh Road/I-95 SB off Ramp and SB left-turn at Marsh Road/Carr Road
 - Improve traffic operation at northbound I-95 off ramp at Carr Road
 - Reduce EB left-turn queues at Marsh Road/Carr Road
 - Reduce NB left-turn queues and SB right-turn queues at Marsh Road/I-95 Ramps
 - Cons
 - Widening creates need for additional/larger stormwater management facilities
 - Potential utility conflicts from Carr Road widening
 - Shared use path may impact park land at south end of project

Alternative B



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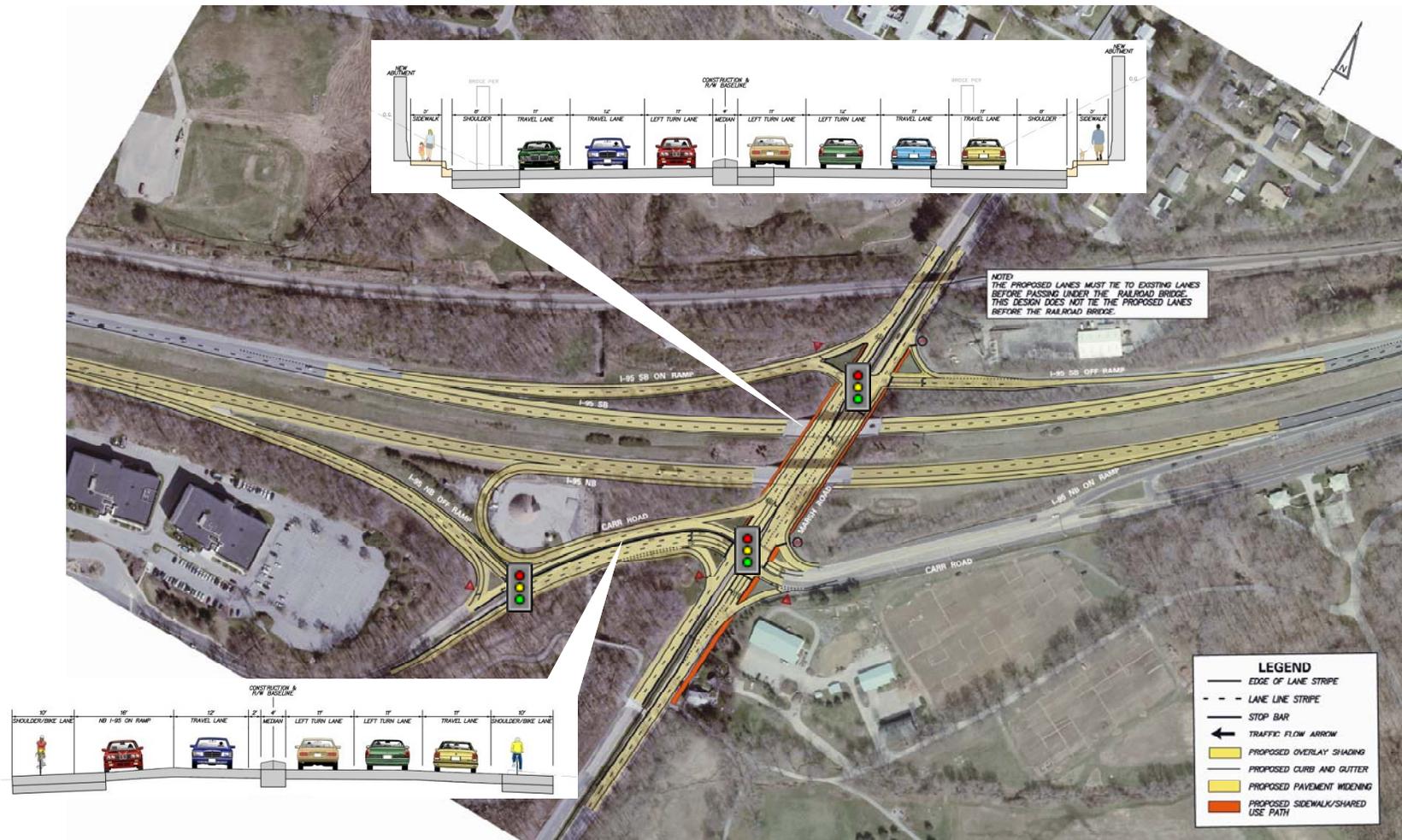
Alternative C

This alternative was developed to fully address all issues within the study area:

- Includes all improvements from Alternative B and;
- Seven lane section on Marsh Road between Carr Road and I-95 SB ramps
- Addition of a second exclusive left-turn lane from Marsh Road onto I-95 SB on ramp
- Reconstruction of I-95 bridge over Marsh Road due to Marsh Road widening
- Addition of a new ramp from Carr Road onto NB I-95
- Cost: \$11.9M
 - Pros
 - Reduce NB Marsh Road left-turn queue at I-95 ramps
 - Reduce SB Marsh Road queue at I-95 ramps
 - Reduce SB Marsh Road left-turn queue at Carr Road
 - Improve operation at existing Carr Road/I-95 NB on ramp by diverting traffic from SB Marsh Road to new I-95 NB on ramp
 - Improve overall capacity and efficiency at Marsh Road/Carr Road intersection
 - Cons
 - Most expensive improvement
 - Reconstruction of I-95 bridge section due to Marsh Road widening
 - I-95 traffic will be impacted during construction
 - Potential relocation of the DelDOT salt barn
 - Shared use path will impact park land at the south end of project

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Alternative C



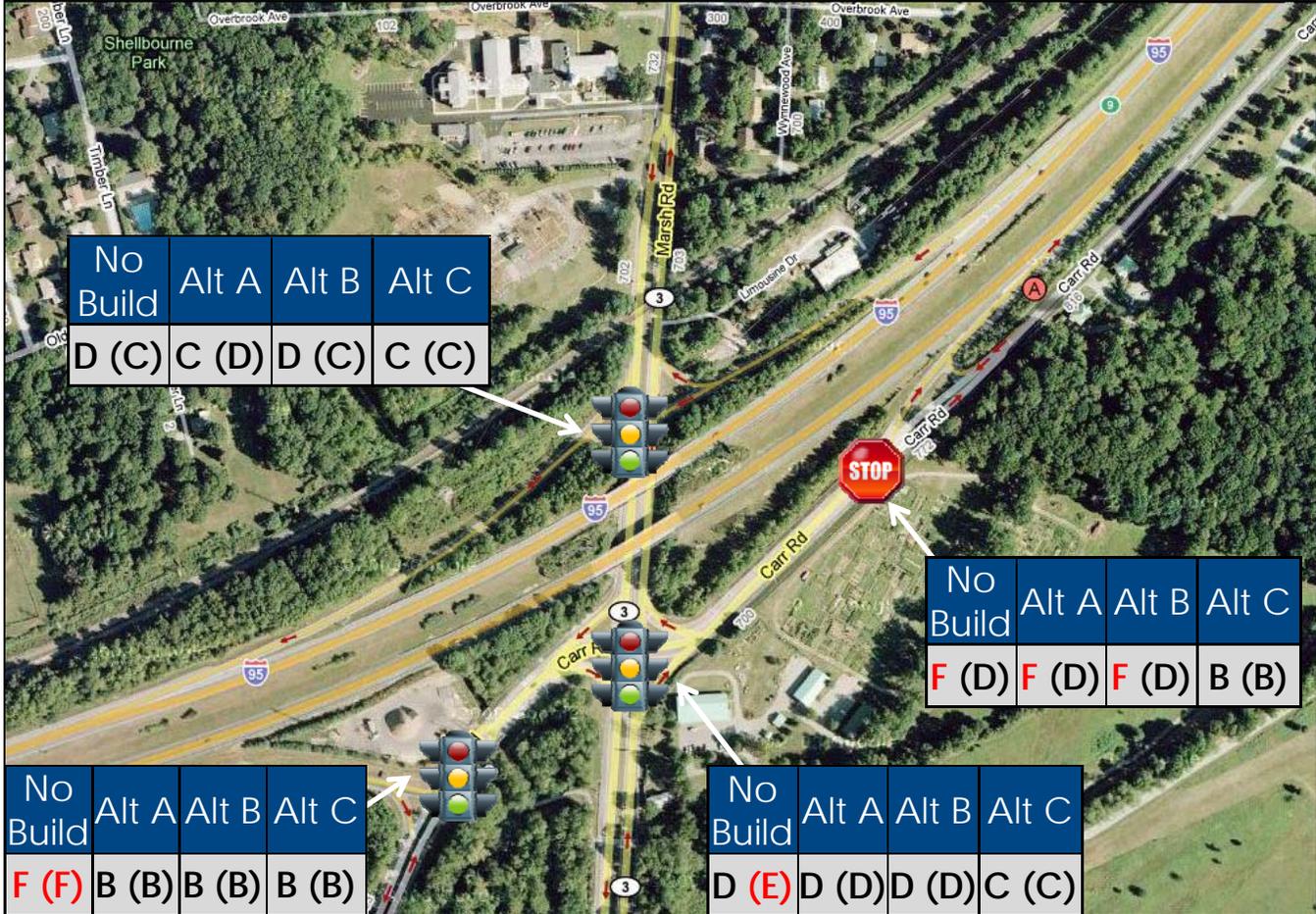
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Recommendation

- Proceed with Alternative B
- This alternative will address most of the congestion issues on Marsh Road through the I-95 interchange
- The left-turn queues at Marsh Road/Carr Road and Marsh Road/I-95 SB off ramp will be within storage limits
- Capacity improvements will help reduce intersection crashes
- Will address pedestrian and bicycle deficiencies
- Improve intersection operation at Carr Road/I-95 NB off ramp
- Most cost effective solution

Alternatives

Intersection LOS



The intersection LOS shown in red indicates unacceptable LOS. Intersection LOS is based on 2030 projected volumes.