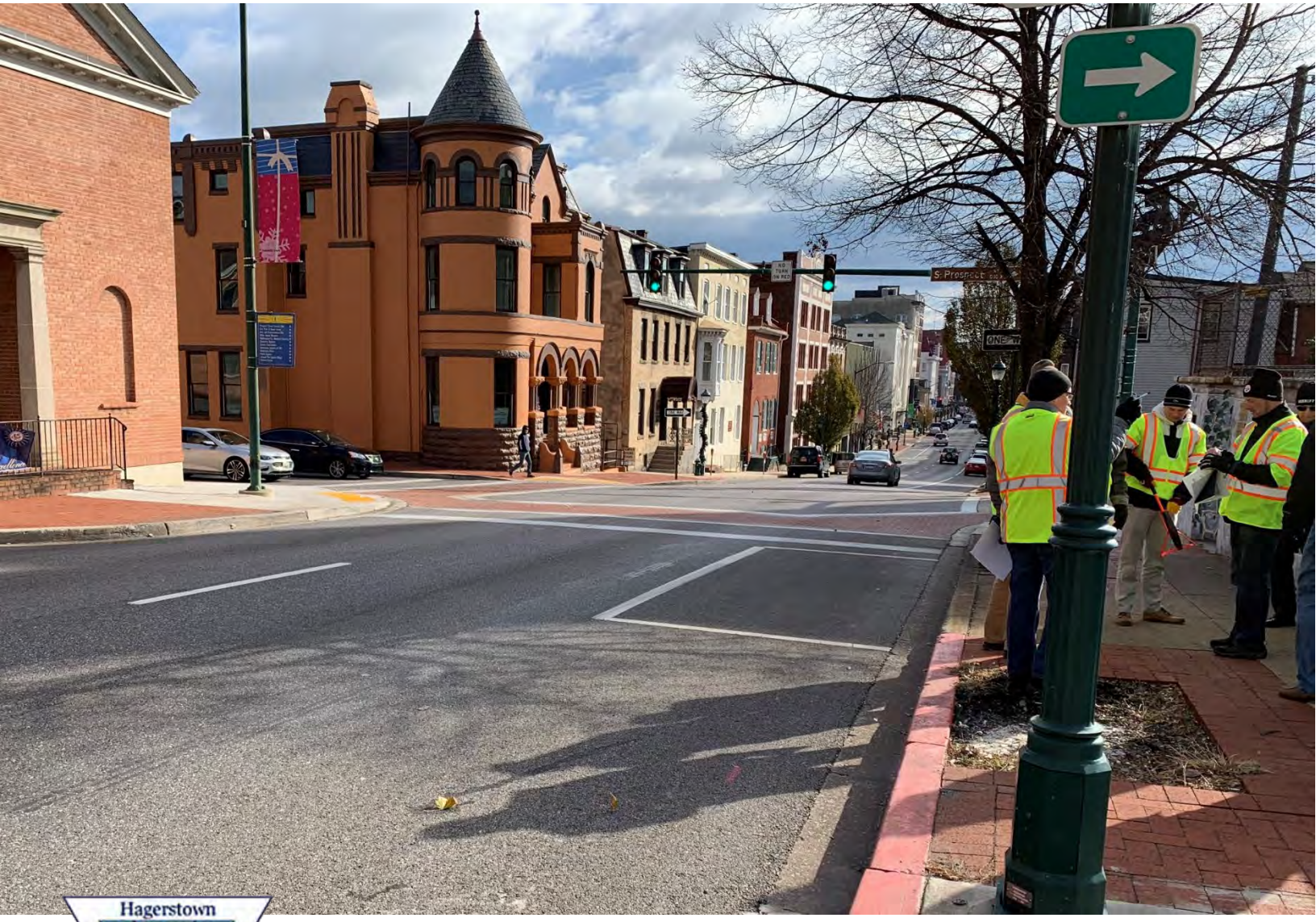

Road Safety Audit

Washington Street (US 40 Eastbound)

Burhans Boulevard to Cannon Avenue

Hagerstown, Maryland

Conducted on:

November 28, 2018

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Table of Contents

Overview

A Road Safety Audit (RSA) was conducted on Washington Street (US 40 Eastbound) between Burhans Blvd to Cannon Ave in Washington County, Maryland. An RSA is a formal safety review of a defined section of roadway in which most safety aspects are reviewed and evaluated. Once completed, the group's findings are documented in a report. The RSA team consisted of members representing HEPMPO, Hagerstown City Engineering, Maryland SHA District 6, Washington County Sheriff's Department, and Michael Baker International. The attending members are identified in **Table 1**.

The study area was a 0.8-mile-long section of Washington Street (US 40 Eastbound) that spanned from Burhans Blvd to Cannon Ave. The study area consists of an urban one-way corridor with multiple signalized intersections and includes on-street parallel parking throughout the section.

Washington Street has a 2017 Annual Average Daily Traffic (AADT) volume of 10,901 vehicles and a crash rate of 811 crashes per 100 million vehicle-miles of travel (MVMT) within the study area. This is higher than the 2017 Statewide Crash Rate of 168 crashes per 100MVMT (see Crash Data section chart). The highest number of intersection-related crashes occur at or near Jonathan Street. Aggregating crashes at or near the intersection and 2017 estimates of approach traffic volume, the resulting intersection crash rate is 1.2 crashes per million entering vehicles (MEV). This value is not significantly high but does warrant consideration of continued monitoring and/or low-cost safety improvements.

Upon completion of the review, suggestions and opportunities for improvement to safety were developed. General observations and corresponding recommendations related to traffic operations and the roadway/roadside features can be found in the Observations and Recommendations Sections. The suggestions were divided into three categories. Those categories were:

- **Short Term** – Improvements that could be accomplished in a relatively short timeframe with existing funds.
- **Intermediate** – Improvements that would require development of plans and identification of funding source. These improvements typically would not require permitting and would be constructed within existing right of way.
- **Long Term** – Improvements that require coordination outside of the department in addition to development of plans including permitting and/or right of way and are not currently funded.

Short Term Improvements

1. Evaluate all signalized intersections to provide consistent one way and no turn signing at similar intersections
2. Adjust all signs to reflect recommended lane configuration changes as applicable
3. Investigate restriction of LTOR onto Locust Ave
4. Add signing and pavement marking improvements (Detailed signing and pavement marking recommendations can be found in the Pavement Markings and Signing Recommendations Section)

Intermediate Improvements

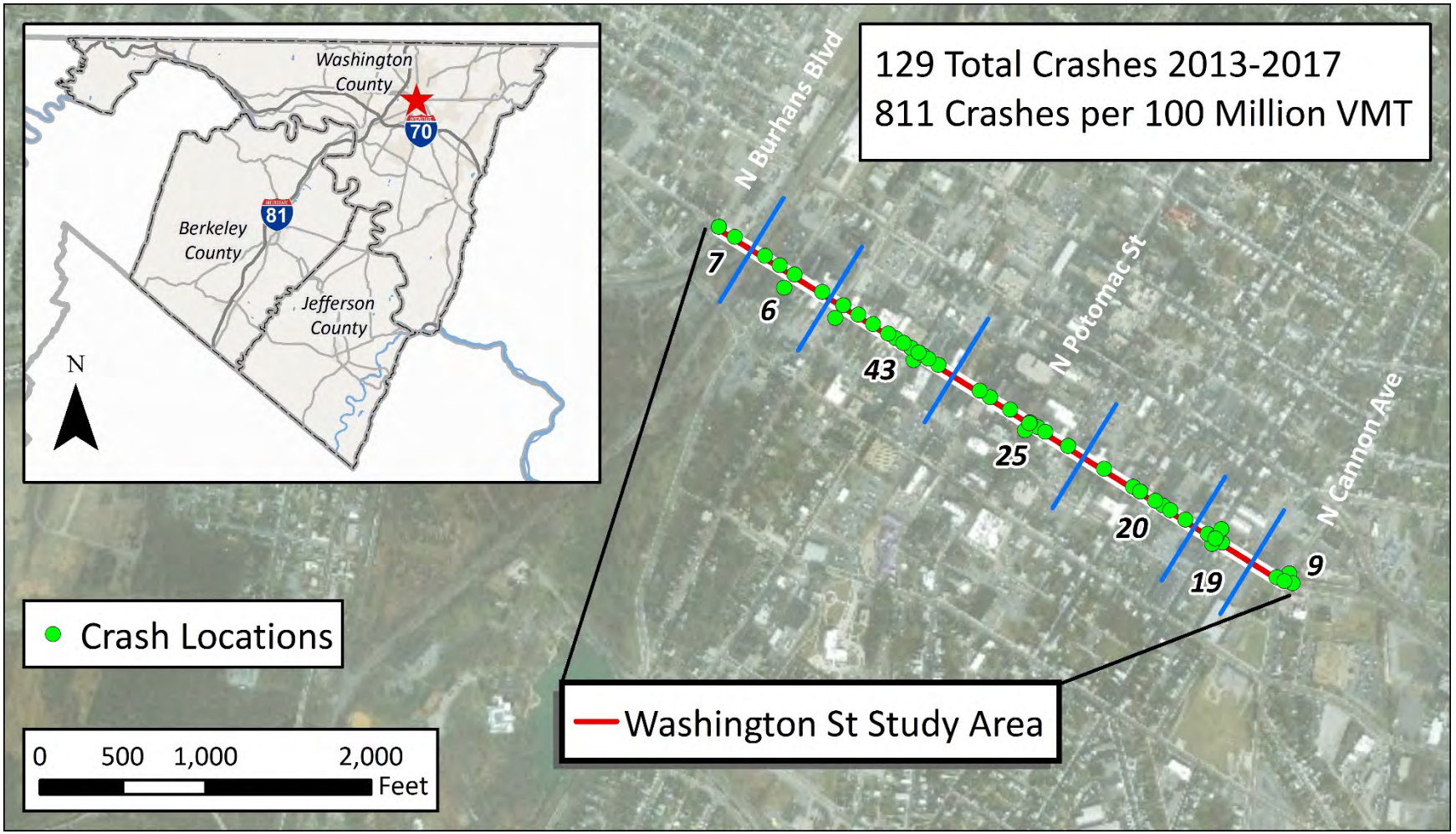
1. Provide backplates on all signal heads
2. Evaluate traffic signal timing and confirm yellow and all red clearance interval calculations and implementation
3. Consider adding red light cameras at intersections with higher crash rates

Long Term Improvements

1. Evaluate and reconstruct driveway entrances to public parking areas west of Locust Street to enable more fluid entry of vehicles into driveways
2. Add pedestrian pushbuttons, heads, and phasing/timing at all intersections where it doesn't currently exist

Crash Data

Figure 1: Washington Street Crash Data



RSA Team

The RSA team comprised of members representing HEPMPO, Hagerstown City Engineering, SHA District 6, Washington County Sheriff's Department, and Michael Baker International. The RSA team's various experience and safety concerns allowed for adequate discussion throughout the RSA process. **Table 1** lists the attendees and their organizations that were involved in the field study.

Table 1: Washington Street RSA Field Team

Name	Organization
Matt Mullenax	HEPMPO
Steve Thomas	HEPMPO
John Wolford	Maryland State Highway Administration
Doug Mullendore	Washington County Sheriff
Jim Bender	City of Hagerstown, Assistant City Engineer
Rodney Tissue	City of Hagerstown, City Engineer
Rebecca Christman	Michael Baker International
Jim Frazier	Michael Baker International
Gary Greening	Michael Baker International
Dan Szekeres	Michael Baker International

Observations and Recommendations: Traffic Operations

During the field visit, the Audit team walked the study location while taking photographs and documenting general traffic observations related to operating speeds, traffic volumes, intersections, driveways, and the traffic mix. Recommendations are suggested based upon the general observations and issues. Each issue observed during the field visit is identified with further detail within this section. **Table 2** indicates the observations and corresponding recommendations related to traffic operations.

Table 2: Observations and Recommendations Related to Traffic Operations

Traffic Operation	Observations	Recommendations	Link to Issue
Operating Speeds	Traffic generally follows speed limit, except on the downhill east of the Potomac Street intersection. At the same location, vehicles slow down to turn into a public parking lot	• Evaluate and reconstruct driveway entrances to public parking areas west of Locust Street to enable more fluid entry of vehicles into driveways	1.1
	Traffic seems to be traveling too fast while approaching the Cannon Ave intersection for the available sight distance through the intersection	• Provide signing and pavement marking guidance through the Cannon Ave intersection	1.2
Volumes	Heavy, constant traffic volume	General observation – no recommendations	n/a
	Anecdotal evidence suggests traffic volume/congestion is negatively impacted by incident diversions from I-81 and I-70	• Improve one way signing and pavement markings for people unfamiliar with the corridor	2.1
	Parking spaces heavily utilized in central section, less so as distance increases from center of town.	• Install 10” parking lane pavement marking to emphasize delineation between travel lanes and parking areas	2.2

Traffic Operation	Observations	Recommendations	Link to Issue
Intersections	Traffic Signals at most intersections along study corridor	• Evaluate all signalized intersections to provide consistent one way and no turn signing at similar intersections • Provide backplates on all signal heads • Add pedestrian pushbuttons, heads, and phasing/timing at all intersections where it doesn't currently exist • Investigate restriction of LTOR onto Locust Ave • Replace existing 4-section signal heads with 5-section signal heads • Evaluate traffic signal timing and confirm yellow and all red clearance interval calculations and implementation • Consider adding red light cameras at intersections with higher crash rates	3.1
	Many vehicles straddle lane lines when using turn lanes	• Where possible – Eliminate 8' turn lanes and combine turn lane with through lane. Use available space to widen 2 through lanes to 11' lanes with a shoulder. Provide skip lines through intersection as warranted and taper back to meet two 10' receiving through lanes. Provide through and straight/turn arrow pavement marking on newly configured lanes at intersections where warranted. Conduct LOS analysis prior to making lane revisions • Adjust all signs to reflect recommended lane configuration changes as applicable	3.2
	Driver observed turning wrong way into one-way traffic flow	• Evaluate all signalized intersections to provide consistent one way and no turn signing at similar intersections • Provide thru and straight/turn arrow pavement markings to accentuate and reinforce traffic flow direction at problem intersections	3.3

Traffic Operation	Observations	Recommendations	Link to Issue
Driveways	Extreme slowing observed for vehicles entering newly built driveways into public parking areas	• Evaluate and reconstruct driveway entrances to public parking areas west of Locust Street to enable more fluid entry of vehicles into driveways	4.1
Traffic Mix	Typical urban section with expectation of pedestrians at every intersection. Heavy pedestrian use at Potomac intersection because of school children changing classes through intersection. A crossing guard is present at Potomac intersection to assist students	• Add pedestrian pushbuttons, heads, and phasing/timing at all intersections where it doesn't currently exist • Relocate crosswalks at Potomac intersection for visibility to turning vehicles	5.1
	Although no bicycle traffic was observed, the Hub City Loop crosses Washington St on Prospect and US Bicycle Route 11 uses Washington Street	General observation – no recommendations	n/a

Issue 1: Operating Speeds

1.1 Downhill East of Potomac Street

Observations

Traffic generally follows speed limit, except on the downhill east of the Potomac Street intersection. At the same location, vehicles slow down to turn into a public parking lot

Based on crash data from 2013 to May 2018, 43% of the reported crashes between Potomac St and Locust St were rear end midblock collisions

Suggestions

Long-term

- Evaluate and reconstruct driveway entrances to public parking areas west of Locust Street to enable more fluid entry of vehicles into driveways

1.2	Cannon Avenue Intersection Approach

Observations

Traffic seems to be traveling too fast while approaching the Cannon Ave intersection for the available sight distance through the intersection

Suggestions

Short-term

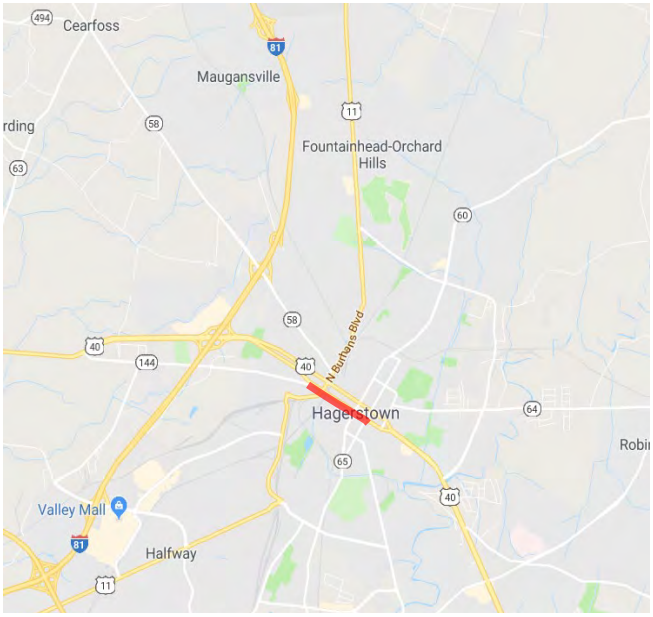
- Provide signing and pavement marking guidance through the Cannon Ave intersection

Issue 2: Volumes

2.1	Incident Diversions Impacting Volumes

Observations

Anecdotal evidence suggests traffic volume/congestion is negatively impacted by incident diversions from I-81 and I-70



Suggestions

Short-term

- Improve one way signing and pavement markings for people unfamiliar with the corridor

2.2	Parking Spaces

Observations

Parking spaces heavily utilized in central section, less so as distance increase from center of town

Based on crash data from 2013 to May 2018, 26% of reported crashes in the study section involved a parked vehicle

Suggestions

Short-term

- Install 10" parking lane pavement marking to emphasize delineation between travel lanes and parking areas

Issue 3: Intersections

3.1	Traffic Signals

Observations

Traffic signals at most intersections along study corridor

Suggestions

Short-term

- Evaluate all signalized intersections to provide consistent one way and no turn signing at similar intersections
- Investigate restriction of LTOR onto Locust Ave

Intermediate-term

- Provide backplates on all signal heads
- Evaluate traffic signal timing and confirm yellow and all red clearance interval calculations and implementation
- Consider adding red light cameras at intersections with higher crash rates

Long-term

- Add pedestrian pushbuttons, heads, and phasing/timing at all intersections where it does not currently exist
- Replace existing 4-section signal heads with 5-section signal heads

3.2 Vehicles Straddle Lane Lines

Observations

Many vehicles straddle lane lines when using turn lanes

Suggestions

Short-term

- Where possible – Eliminate 8’ turn lanes and combine turn lane with through lane. Use available space to widen 2 through lanes to 11’ lanes with a shoulder. Provide skip lines through intersection as warranted and taper back to meet two 10’ receiving through lanes. Provide through and straight/turn arrow pavement marking on newly configured lanes at intersections where warranted. Conduct LOS analysis prior to making lane revisions
- Adjust all signs to reflect recommended lane configuration changes as applicable

3.3 Wrong Way Driving

Observations

Driver observed turning wrong way into one-way traffic during RSA field view

Although a driver was observed turning the wrong way, there have been no reported head-on collisions from 2013 to May 2018

Google maps photos captured a wrong-way driver in 2017 in Washington St. west of Burhans Blvd (shown in photo)

Suggestions

Short-term

- Evaluate all signalized intersections to provide consistent one way and no turn signing at similar intersections
- Provide thru and straight/turn arrow pavement markings to accentuate and reinforce traffic flow direction at problem intersections

Issue 4: Driveways

4.1	Public Parking Areas

Observations

Extreme slowing observed for vehicles entering newly built driveways into public parking areas

Based on crash data from 2013 to May 2018, 50% of the reported crashes near the parking area driveways were rear end crashes.

Suggestions

Long-term

- Evaluate and reconstruct driveway entrances to public parking areas west of Locust Street to enable more fluid entry of vehicles into driveways

Issue 5: Traffic Mix

5.1	Typical Urban Section

Observations

Typical urban section with expectation of pedestrians at every intersection. Heavy pedestrian use at Potomac intersection because of school children changing classes through intersection. A crossing guard is present at Potomac intersection to assist school children

Based on crash data from 2013 to May 2018, there were 5 pedestrian related crashes and 3 bicycle related crashes within the study corridor. Of those crashes, 75% of them resulted in an injury

Suggestions

Long-term

- Add pedestrian pushbuttons, heads, and phasing/timing at all intersections where it doesn't currently exist
- Relocate two crosswalks at Potomac St intersection to be closer to corners to improve visibility of pedestrians

Observations and Recommendations: Roadway/ Roadside Features

During the field visit, the Audit team walked the study location while taking photographs and documenting the general roadway and roadside features. Recommendations are suggested based upon the general observations and issues. Each issue observed during the field visit is identified with further detail within this section. **Table 3** indicates the observations and corresponding recommendations related to roadway/roadside features.

Table 3: Observations and Recommendations Related to Roadway/Roadside Features

Roadway/ Roadside Features	Observations	Recommendations	Link to Issue
General Roadway Features	One-way corridor	• Evaluate all signalized intersections to provide consistent one way and no-turn signing at similar intersections	1.1
	36’ curb to curb pavement width, less at bulb-outs/intersection	• Reconfigure SB approach lanes on Potomac Street north of intersection to combine left turn lane and through lane and thereby provide room to widen through lanes. Conduct LOS analysis prior to lane reconfiguration • Revise loading zone/parking, turn, and through lanes at Burhans Boulevard intersection (Begin approach lane revisions at Washington Avenue/Antietam Street split) • Adjust all signs to reflect recommended lane configuration changes as applicable	1.2
	Typical midblock sections are 2-10’ travel lanes and 2-8’ parking lanes	• Revise as suggested per signing and pavement marking recommendations	1.3
	Bulb-outs built at most intersections	General observation – no recommendations	n/a
	Typical intersection mainline approach provides 2-10’ travel lanes and 2-8’ parking lanes	• Where possible – Eliminate 8’ turn lanes and combine turn lane with through lane. Use available space to widen 2 through lanes to 11’ lanes with a shoulder. Provide skip lines through intersection as warranted and taper back to meet two 10’ receiving through lanes. Provide through and straight/turn arrow pavement marking on newly configured lanes at intersections where warranted. Conduct LOS analysis prior to making lane revisions	1.4

Roadway/ Roadside Features	Observations	Recommendations	Link to Issue
		• Adjust all signs to reflect recommended lane configuration changes as applicable	
	Painted crosswalks at signalized intersections	• Add pedestrian pushbuttons, heads, and phasing/timing at all intersections where it doesn't currently exist	1.5
	Sight distance problem/ can't see receiving lanes at Cannon Avenue intersection	• Provide signing and pavement marking guidance through the Cannon Ave intersection	1.6
Roadside Features	Urban setting – Sidewalks along both sides of study corridor	General observation – no recommendations	n/a
	Urban setting – Streetscape is typically urban with street furniture (lamp posts, tree wells, parking signs, fire hydrants, buildings at back of sidewalk, etc.)	General observation – no recommendations	n/a
	Entire study section has concrete curb and gutter with curb inlets	General observation – no recommendations	n/a
	Curbside parallel, metered parking is typical throughout the study corridor	• Revise parking lane edge lines to 10" • Add triangular/transverse hatching in advance of parking lanes where applicable • Revise loading zone/parking, turn, and through lanes at Burhans Boulevard intersection (Begin approach lane revisions at Washington Avenue/Antietam Street split) • Add and designate a loading zone in front of Washington County Planning and Zoning building west of Jonathan Street	2.1

Issue 1: General Roadway Features

1.1	One-way Corridor

Observations

US 40 is a one-way corridor through Hagerstown

Photo of EB US 40/Jonathan St intersection

Suggestions

Short-term

- Evaluate all signalized intersections to provide consistent one way and no-turn signing at similar intersections

1.2	Pavement Width

Observations

36’ curb to curb pavement width, less at bulb-outs/intersections

Suggestions

Short-term

- Reconfigure SB approach lanes on Potomac Street north of intersection to combine left turn lane and through lane and thereby provide room to widen through lanes. Conduct LOS analysis prior to lane reconfiguration
- Revise loading zone/parking, turn, and through lanes at Burhans Boulevard intersection (Begin approach lane revisions at Washington Avenue/Antietam Street split)
- Adjust all signs to reflect recommended lane configuration changes as applicable

1.3 Midblock Sections

Observations

Typical midblock sections are 2-10’ travel lanes and 2-8’ parking lanes

Photo of downhill section east of US 40/Potomac St intersection showing typical midblock section

Suggestions

Short-term

- Revise lane configurations as suggested per signing and pavement marking recommendations (see **Pavement Markings and Signing Recommendations**)

1.4 Typical Intersection Mainline Approach

Observations

Typical intersection mainline approach provides 2-10’ travel lanes and one 8’ turning lane

Suggestions

Short-term

- Where possible – Eliminate 8’ turn lanes and combine turn lane with through lane. Use available space to widen 2 through lanes to 11’ lanes with a shoulder. Provide skip lines through intersection as warranted and taper back to meet two 10’ receiving through lanes. Provide through and straight/turn arrow pavement marking on newly configured lanes at intersections where warranted. Conduct LOS analysis prior to making lane revisions
- Adjust all signs to reflect recommended lane configuration changes as applicable

1.5 Painted Crosswalks

Observations

Painted crosswalks at signalized intersections

Photo shows the US40/Walnut St intersection, where there are currently no pedestrian pushbuttons or pedestrian signal heads

Suggestions

Long-term

- Add pedestrian pushbuttons, heads, and phasing/timing at all intersections where it doesn't currently exist

1.6 Sight Distance at Cannon Ave

Observations

Sight distance problem/ can't see receiving lanes at Cannon Avenue intersection

Suggestions

Short-term

- Provide signing and pavement marking guidance through the Cannon Ave intersection

Issue 2: Roadside Features

2.1 Metered Parking

Observations

Curbside parallel, metered parking is typical throughout the study corridor

Based on crash data from 2013 to May 2018, 26% of reported crashes in the study section involved a parked vehicle

Suggestions

Short-term

- Revise parking lane edge lines to 10”
- Add triangular/transverse hatching in advance of parking lanes where applicable
- Revise loading zone/parking, turn, and through lanes at Burhans Boulevard intersection (Begin approach lane revisions at Washington Avenue/Antietam Street Split)
- Add and designate a loading zone in front of Washington County Planning and Zoning building west of Jonathan Street

Pavement Markings and Signing Recommendations

Signing and pavement marking improvements were recommended following the field visit and analysis of crash history. Generally, signing and pavement markings are suggested to be added throughout the study area to advise drivers of lane designations, one-way streets, and turn prohibitions. Table 4 indicates the recommended signing and pavement marking recommendations for each section of the study area.

Table 4: Washington Street Signing and Pavement Marking Recommendations

Signing and Pavement Marking Recommendations	Figures 2 to 11 Reference
• Where possible – Eliminate 8' turn lanes and combine turn lane with through lane. Use available space to widen the 2 through lanes. Provide skip lines through intersection as warranted and taper back to meet two 10' receiving through lanes. Provide through and straight/turn arrow pavement marking on newly configured lanes at intersections. Conduct LOS analysis prior to making lane revisions	All
• Reconfigure SB approach lanes on Potomac Street north of intersection to combine left turn lane and through lane and thereby provide room to widen through lanes. Conduct LOS analysis prior to lane reconfiguration	A.
• Add and designate a loading zone in front of Washington County Planning and Zoning building west of Jonathan Street	B.
• Revise loading zone/parking, turn, and through lanes at Burhans Blvd intersection (Begin approach lane revisions at Washington Avenue/Antietam Street split)	C.
• Revise parking lane edge lines to 10"	All
• Add triangular/transverse hatching in advance of parking lanes where applicable	All
• Provide advance turn lane pavement marking arrows on NB Summit Avenue at beginning of the lanes thereby providing guidance on lane choice for NB vehicles	D.
• Replace yellow on brown Police Entrance signs with white on blue signs at police parking lot at Burhans Blvd intersection	E.
• Install one-way and no-turn signs on mast arms consistently and thoroughly for all approaches at all signalized intersections	All
• Add backplates to all signal heads within study area	All

• Add reflectorized backplates per MD MUTCD, Section 4.d.12.21 at high nighttime and angle crash intersections
  • Johnathan St/Summit Ave (74% angle, 58% night)
  • Locust St (75% angle)
  • Mulberry St (69% angle)
	F.
	G.
	H.

Figure 2: Pavement Marking Recommendations at Washington Ave/Antietam St Intersection

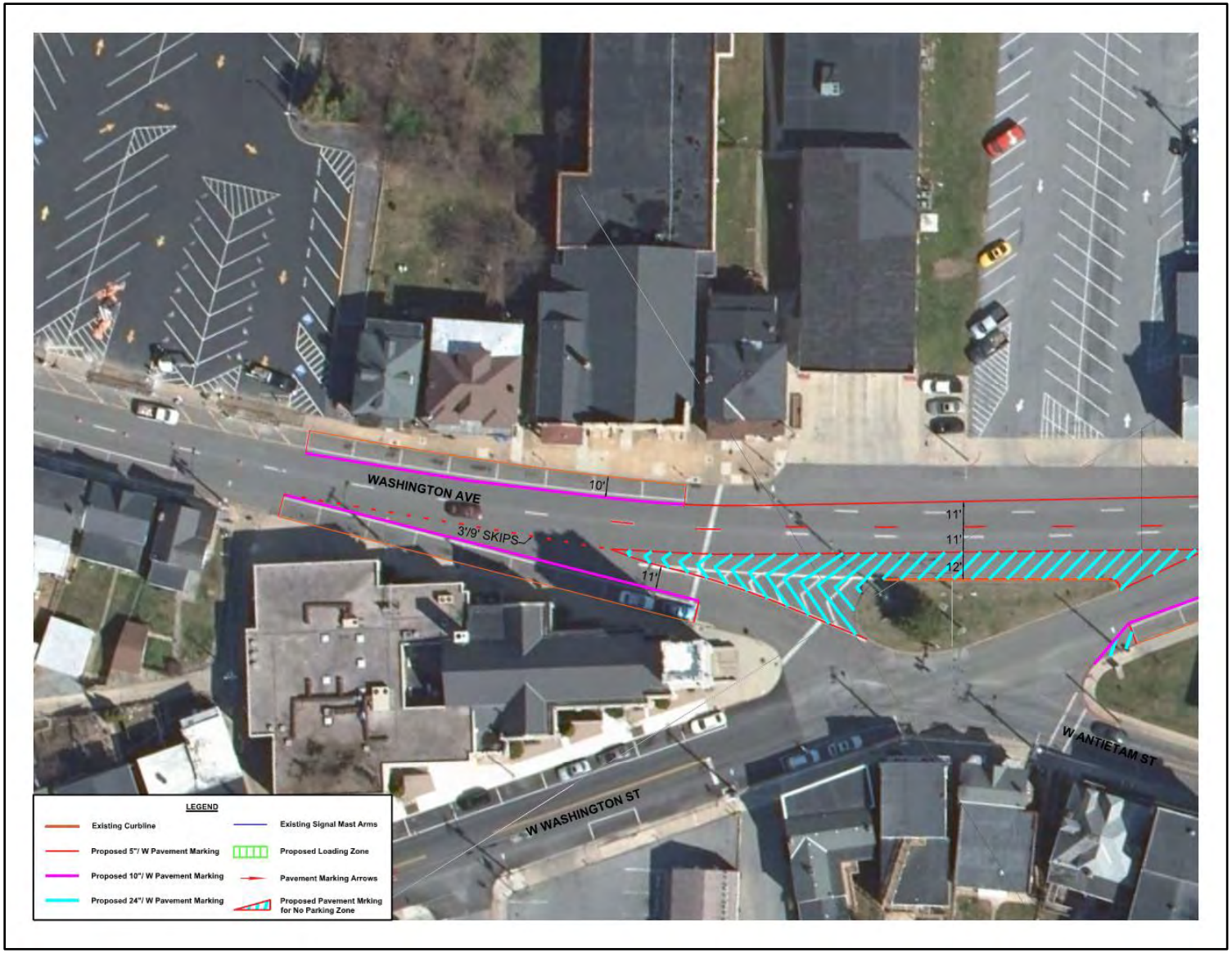


Figure 3: Pavement Marking Recommendations east of Washington Ave/Antietam St Intersection

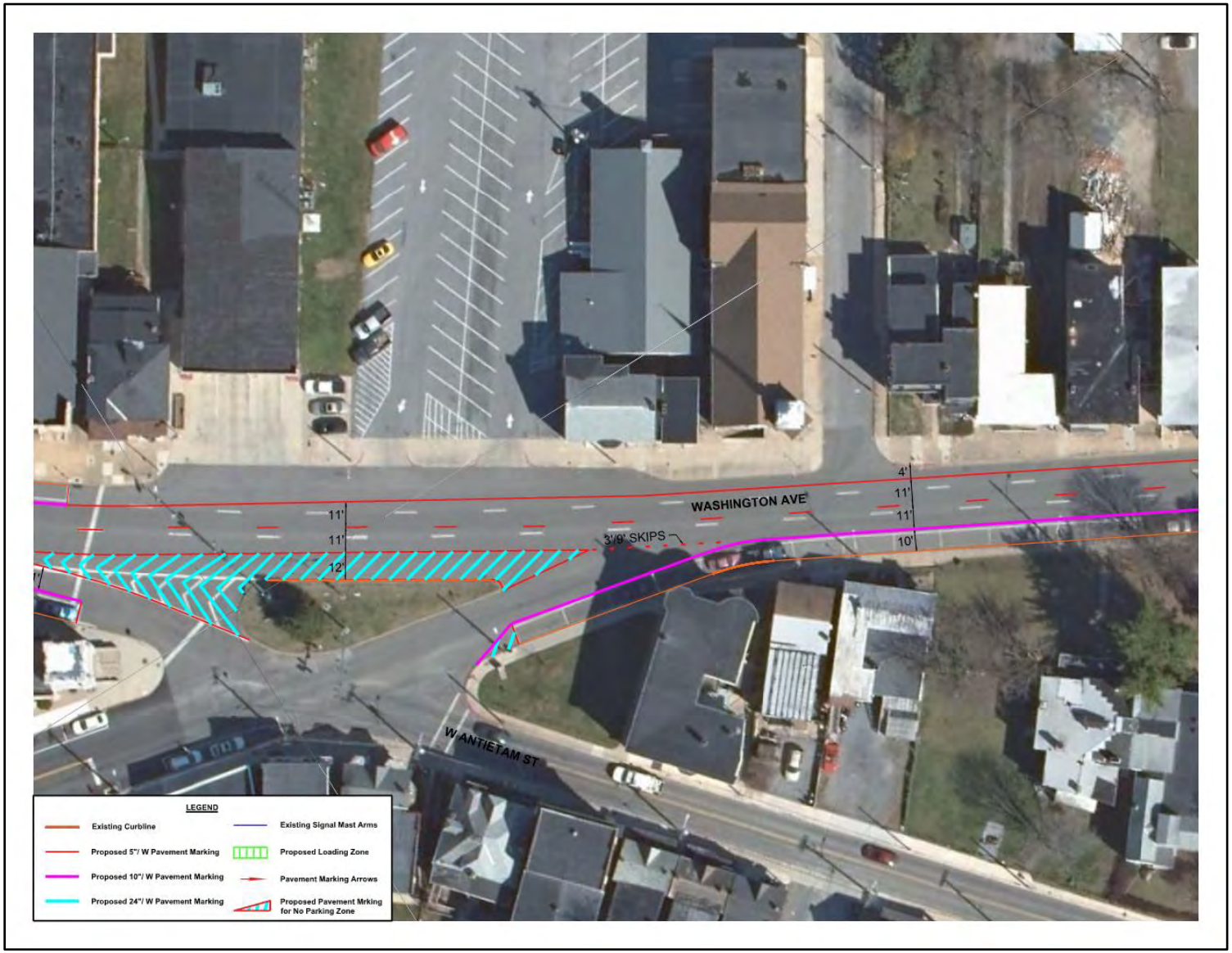


Figure 4: Pavement Marking Recommendations at Washington St/Burhans Blvd Intersection

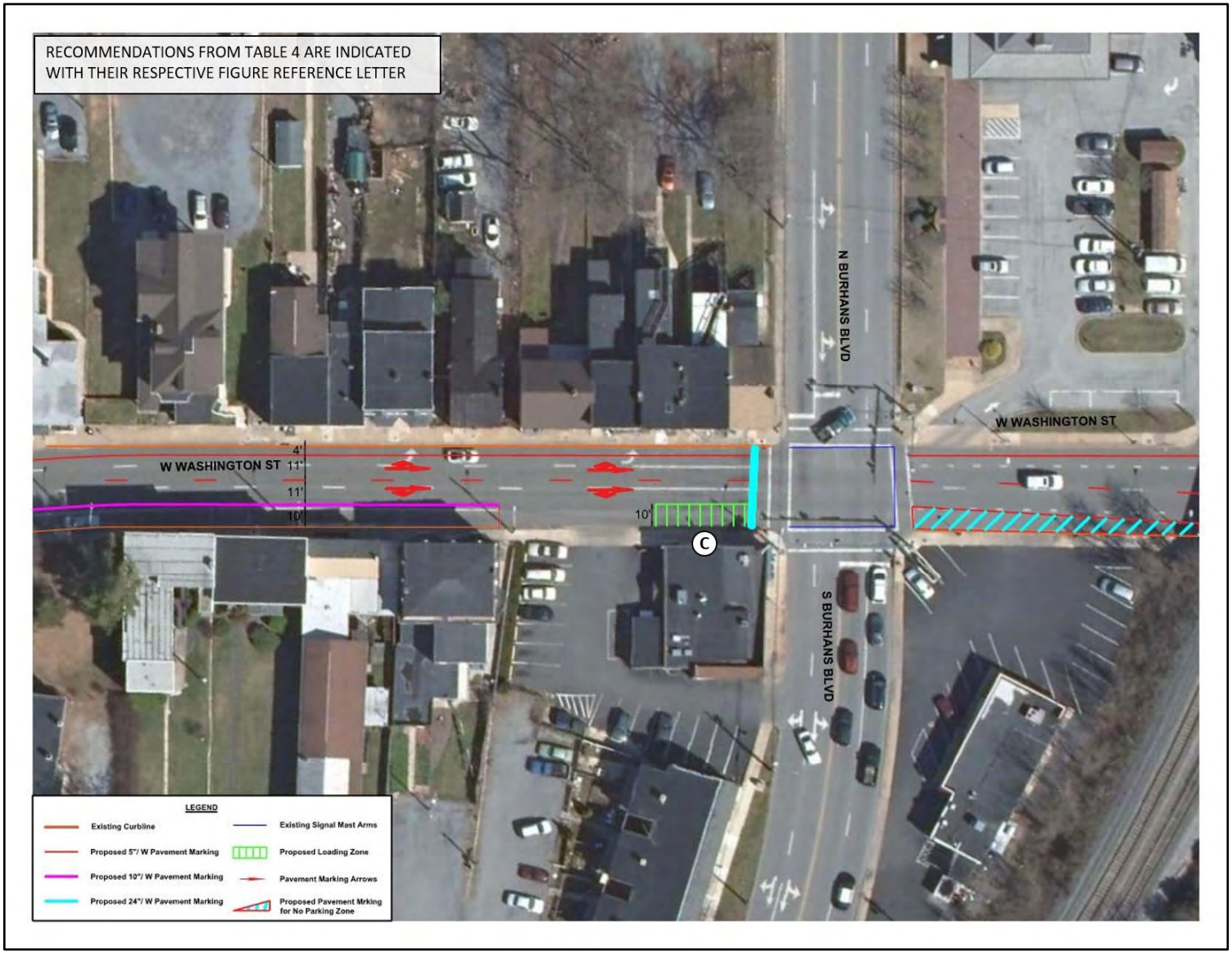


Figure 5: Pavement Marking Recommendations at Washington St/Walnut St Intersection

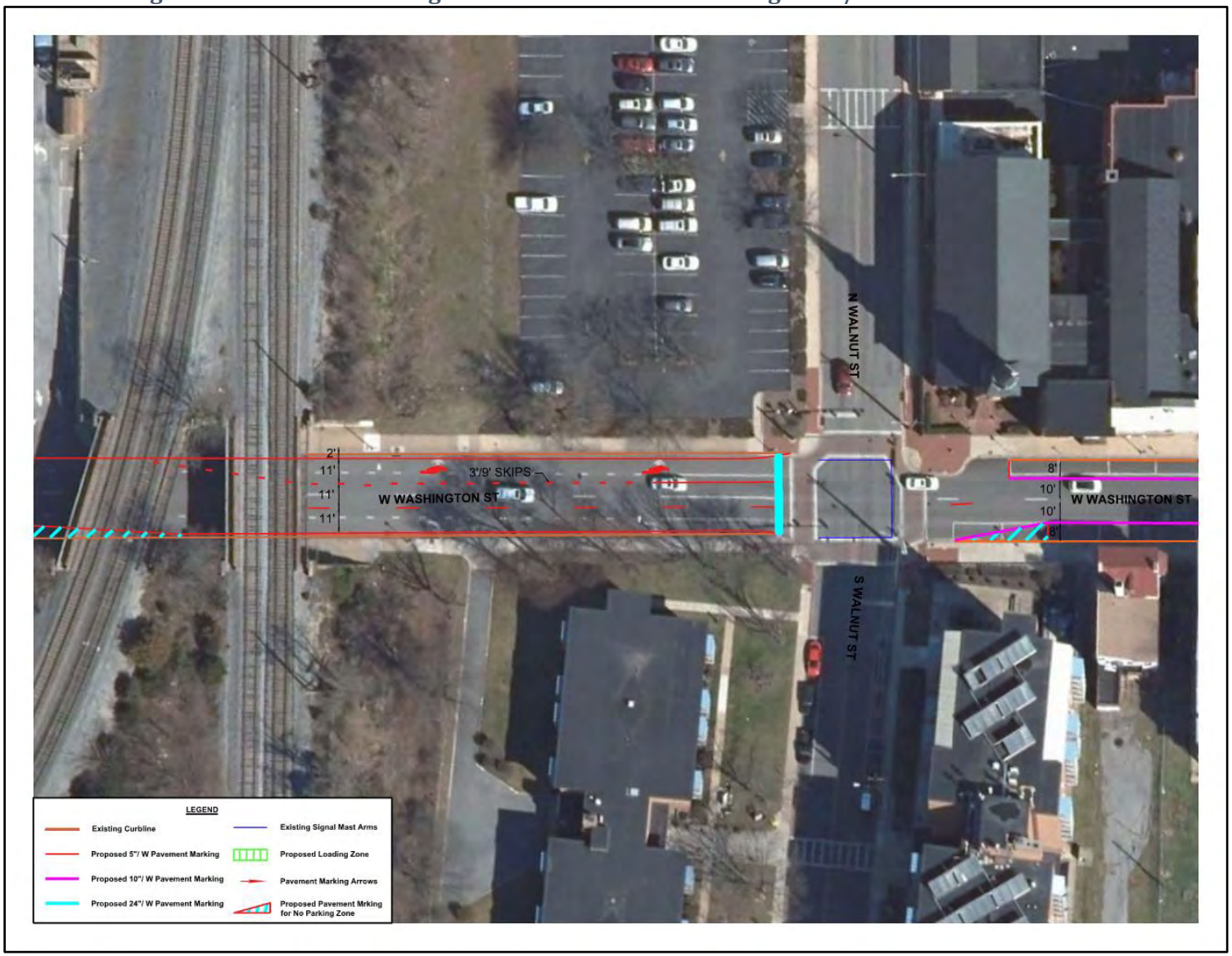


Figure 6: Pavement Marking Recommendations at Washington St/Prospect St Intersection

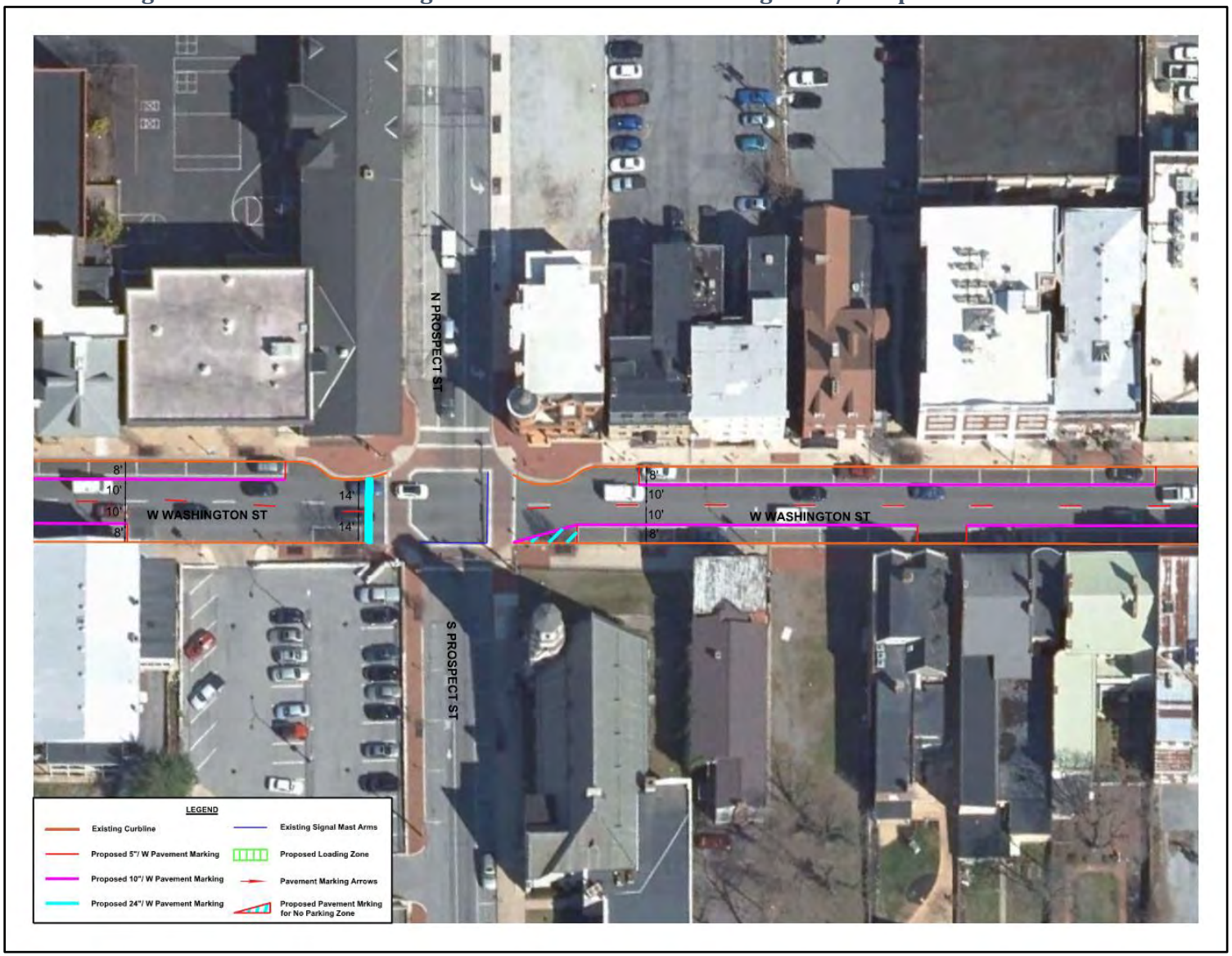


Figure 7: Pavement Marking Recommendations at Washington St/Jonathan St Intersection

Figure 8: Pavement Marking Recommendations at Washington St/Potomac St Intersection

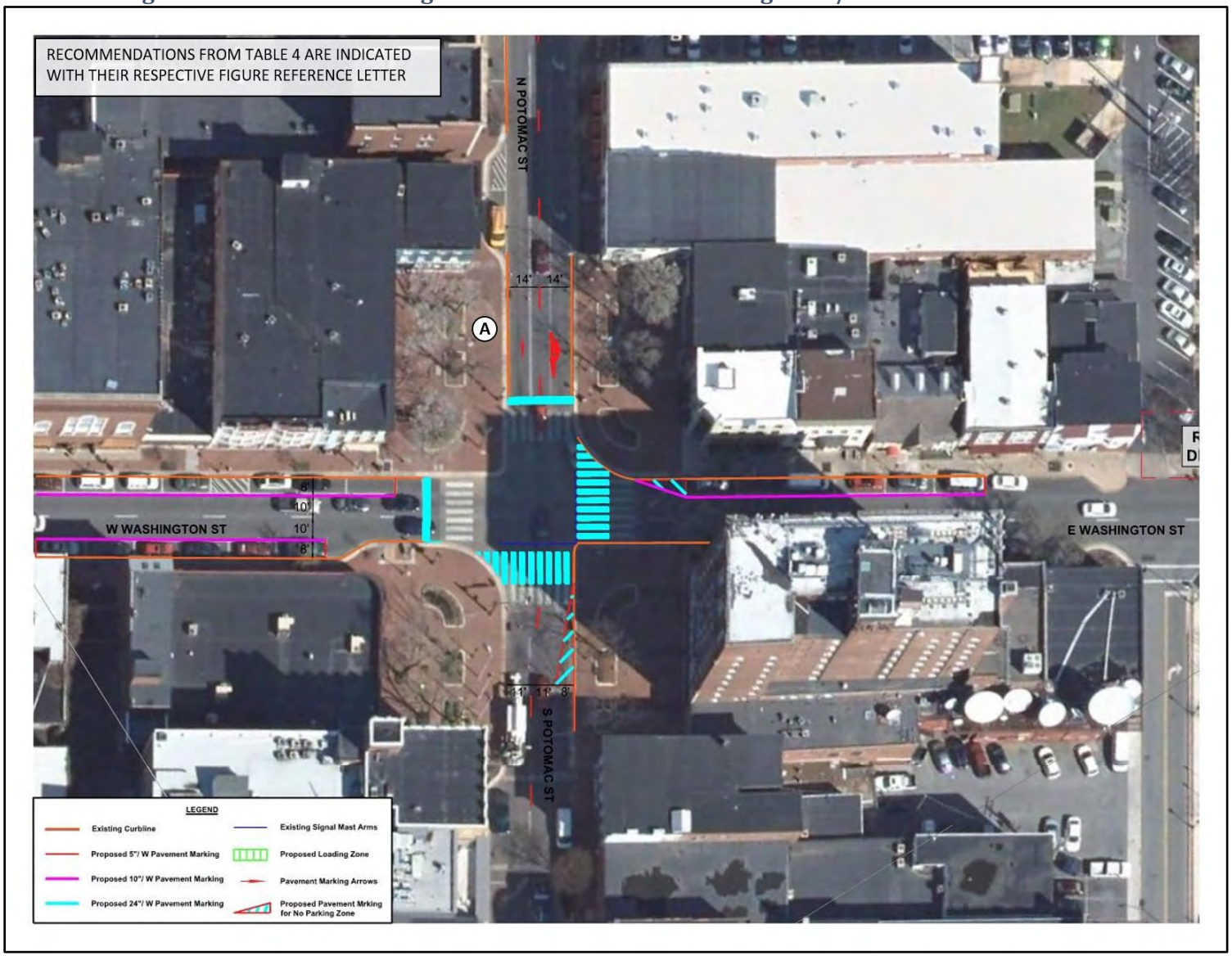


Figure 9: Pavement Marking Recommendations east of Washington St/Potomac St Intersection

Figure 10: Pavement Marking Recommendations at Washington St/Locust St Intersection

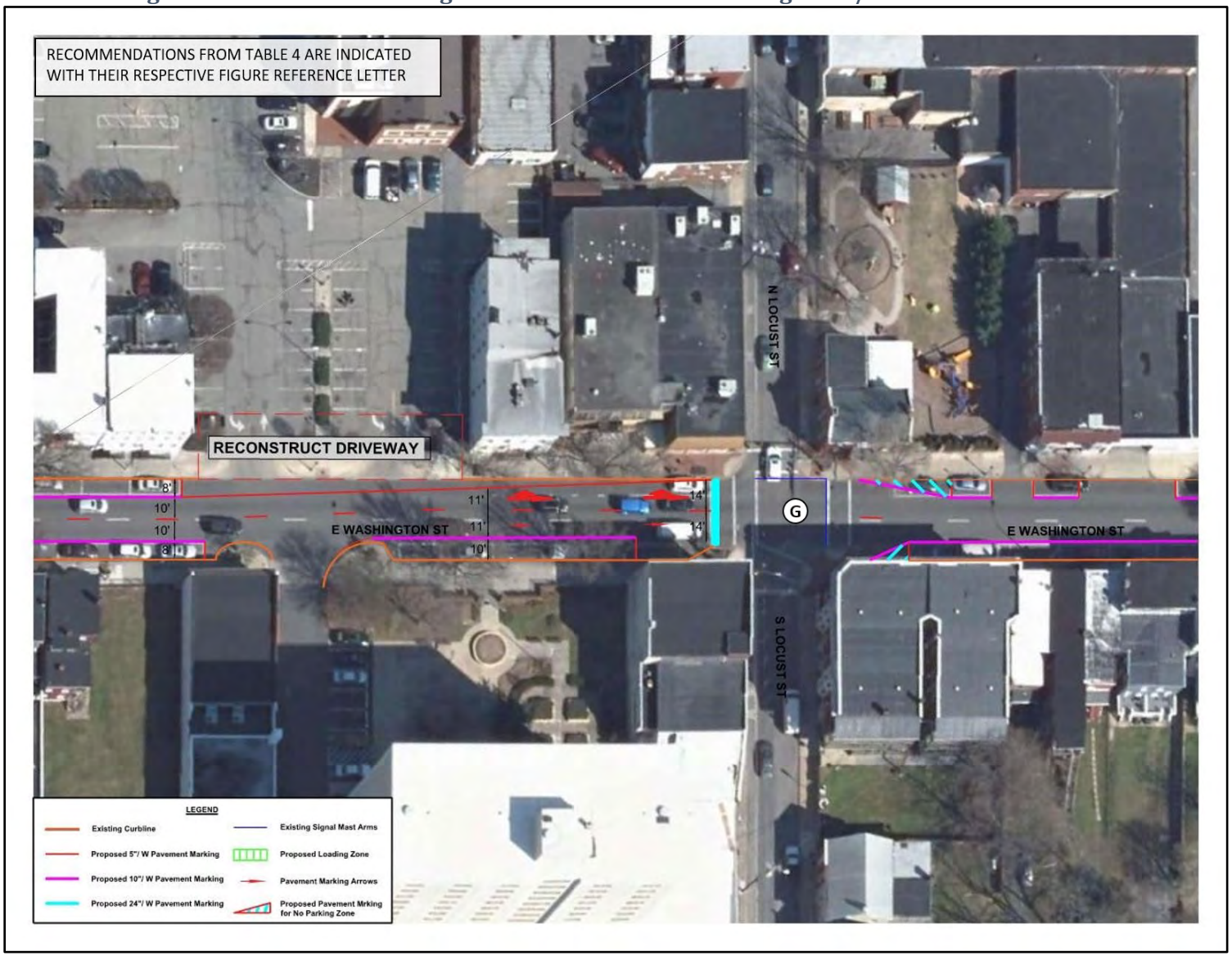


Figure 11: Pavement Marking Recommendations at Washington St/Mulberry St Intersection

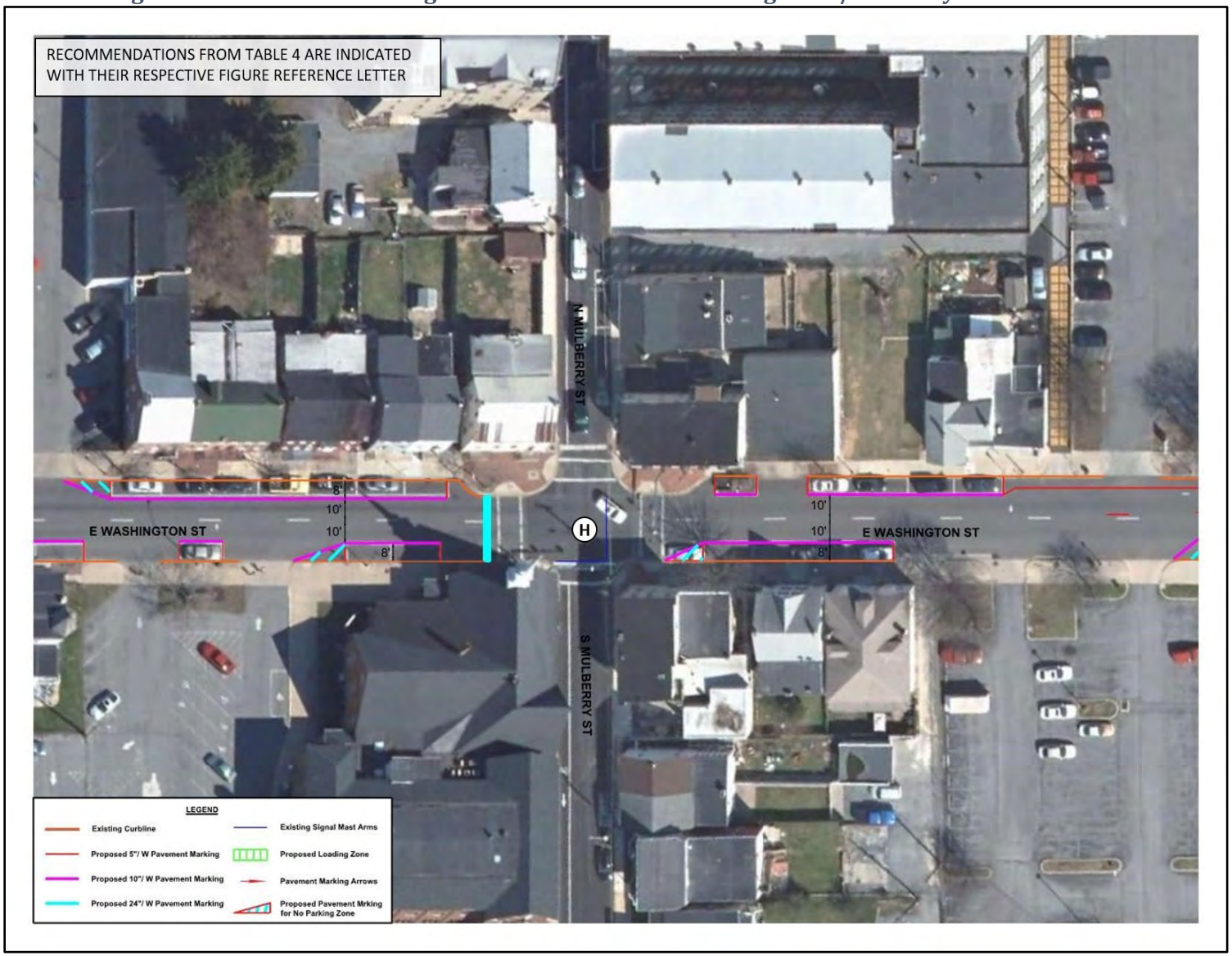


Figure 12: Pavement Marking Recommendations at Washington St/Cannon Ave Intersection

	STREET SIGN ←
	POLICE STATION ←
	PARKING
	PAVEMENT MARKING
	R3-1 (NO RIGHT TURN)
	R6-1 (ONE WAY)
	R10-11b (NO TURN ON RED)
	R3-2 (NO LEFT TURN)
	PEDESTRIAN HEAD SIGNAL
	R3-5R (RIGHT TURN ONLY)
	TRAFFIC LIGHT WITH BLACKPLATES (black, black with reflectorized strip)
	R10-15 (YIELD TO PEDESTRIANS SIGN)

Figure 13: Burhans Blvd/Washington St Intersection – Eastbound Recommendations

Figure 14: Burhans Blvd/Washington St Intersection – Northbound Recommendations

Figure 15: Burhans Blvd/Washington St Intersection – Southbound Recommendations

Figure 16: Walnut St/Washington St Intersection – Eastbound Recommendations

Figure 17: Walnut St/Washington St Intersection – Northbound Recommendations

Figure 18: Walnut St/Washington St – Southbound Recommendations

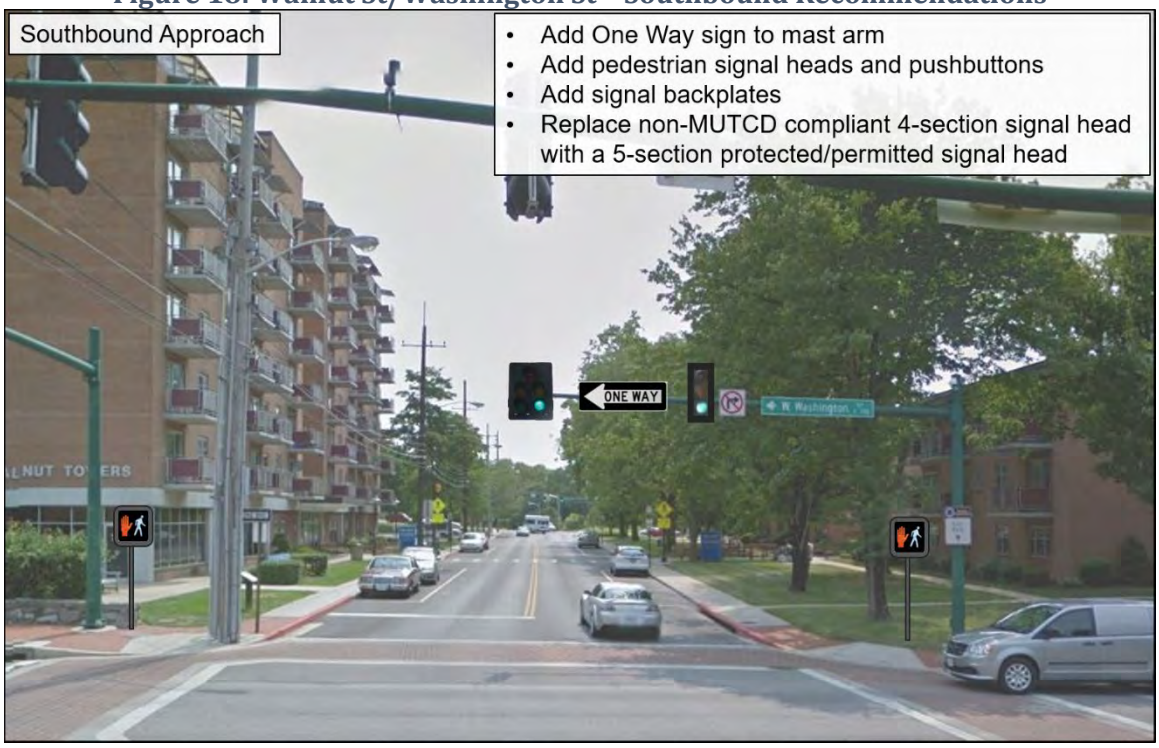


Figure 19: Prospect St/Washington St Intersection – Eastbound Recommendations

Figure 20: Prospect St/Washington St Intersection – Southbound Recommendations

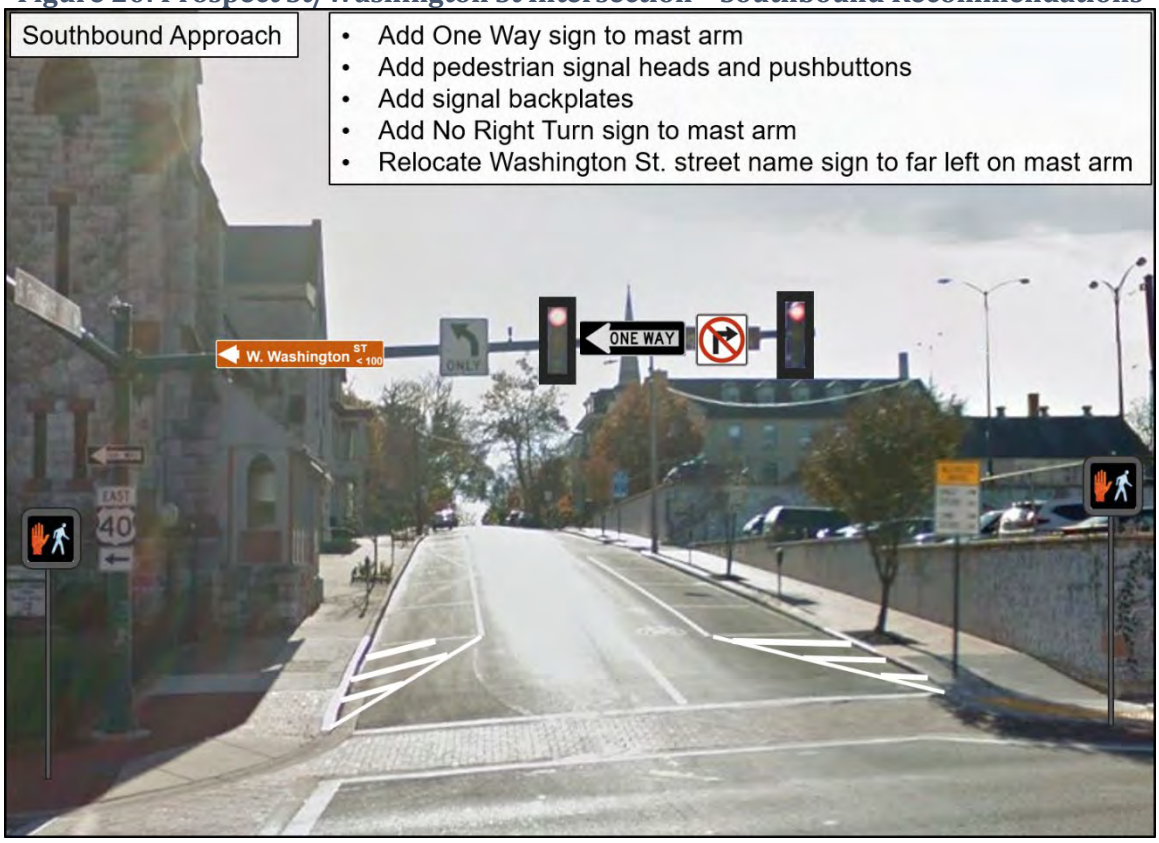


Figure 21: Johnathan St/Summit Ave/Washington St Intersection – Eastbound Recommendations

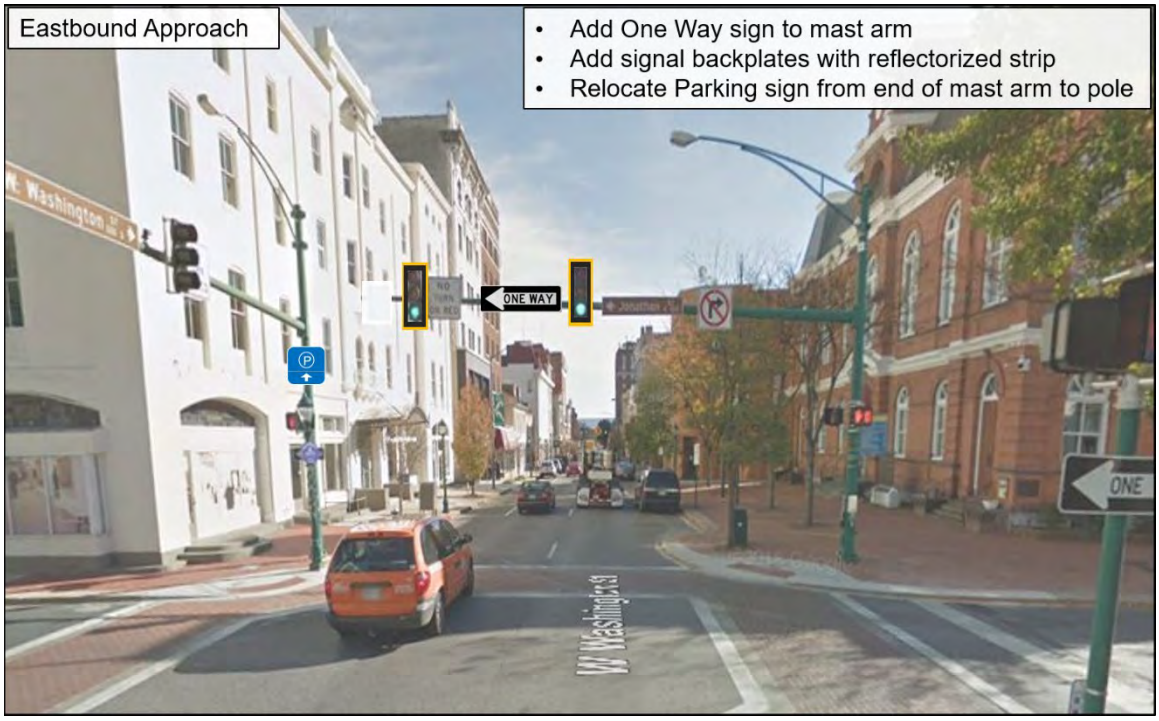


Figure 22: Johnathan St/Summit Ave/Washington St Intersection – Northbound Recommendations

Figure 23: Potomac St/Washington St Intersection – Eastbound Recommendations

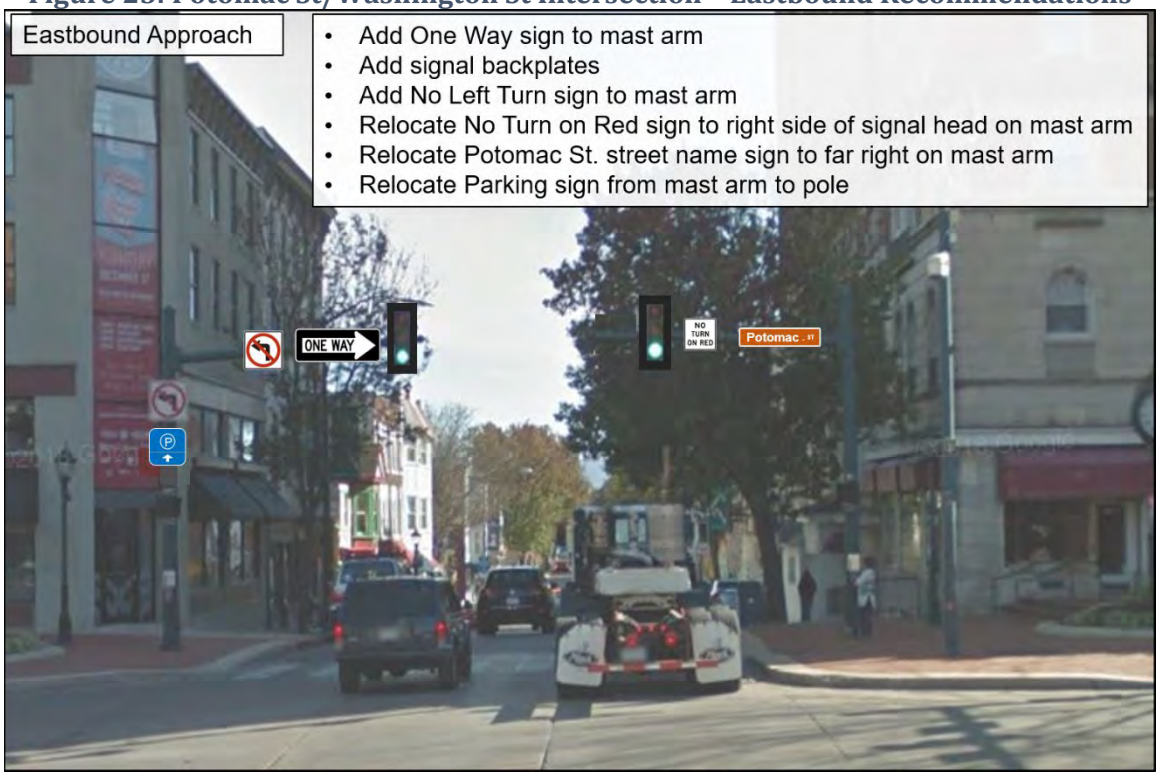


Figure 24: Potomac St/Washington St Intersection – Southbound Recommendations (view 1)

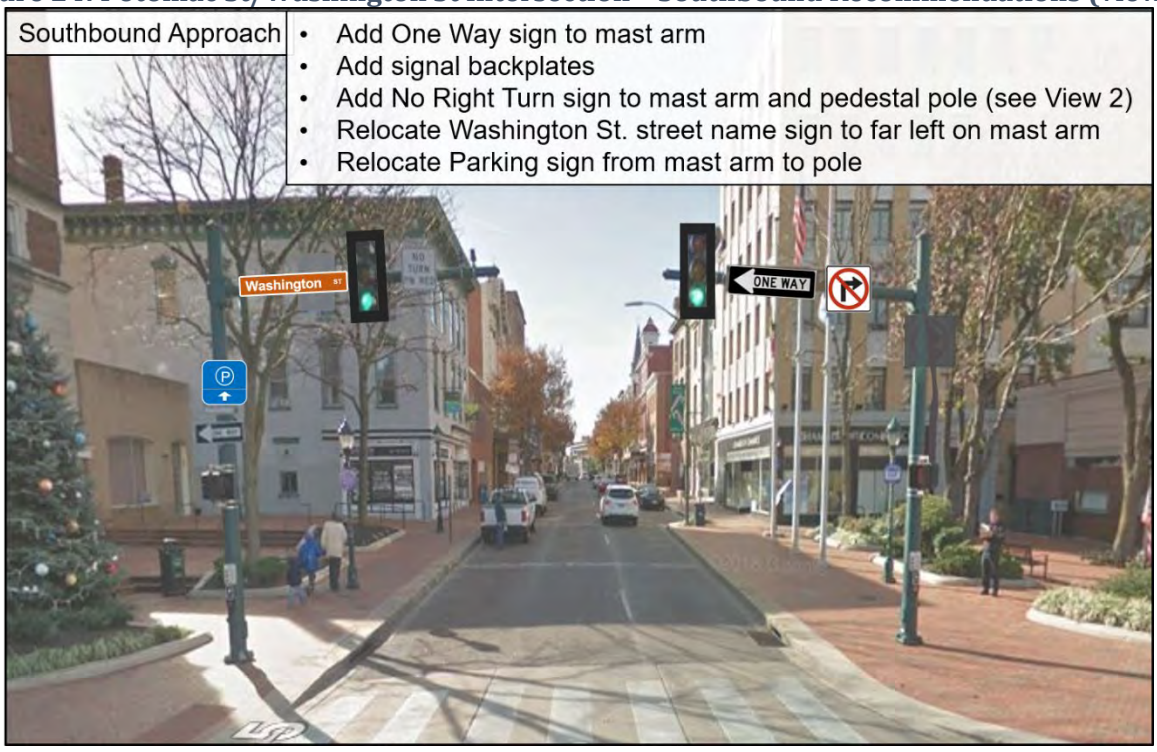


Figure 25: Potomac St/Washington St Intersection – Southbound Recommendations (view 2)

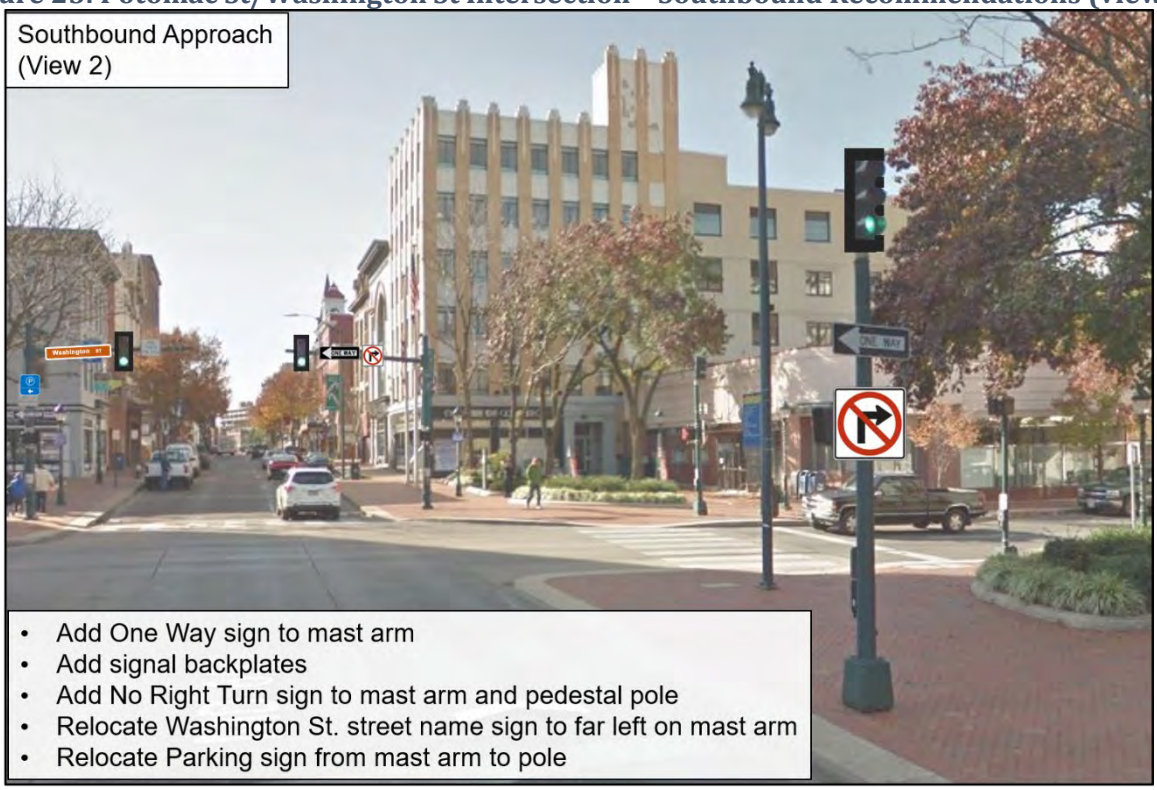


Figure 26: Locust St/Washington St Intersection – Eastbound Recommendations

Figure 27: Locust St/Washington St Intersection – Northbound Recommendations

Figure 28: Mulberry St/Washington St Intersection – Eastbound Recommendations

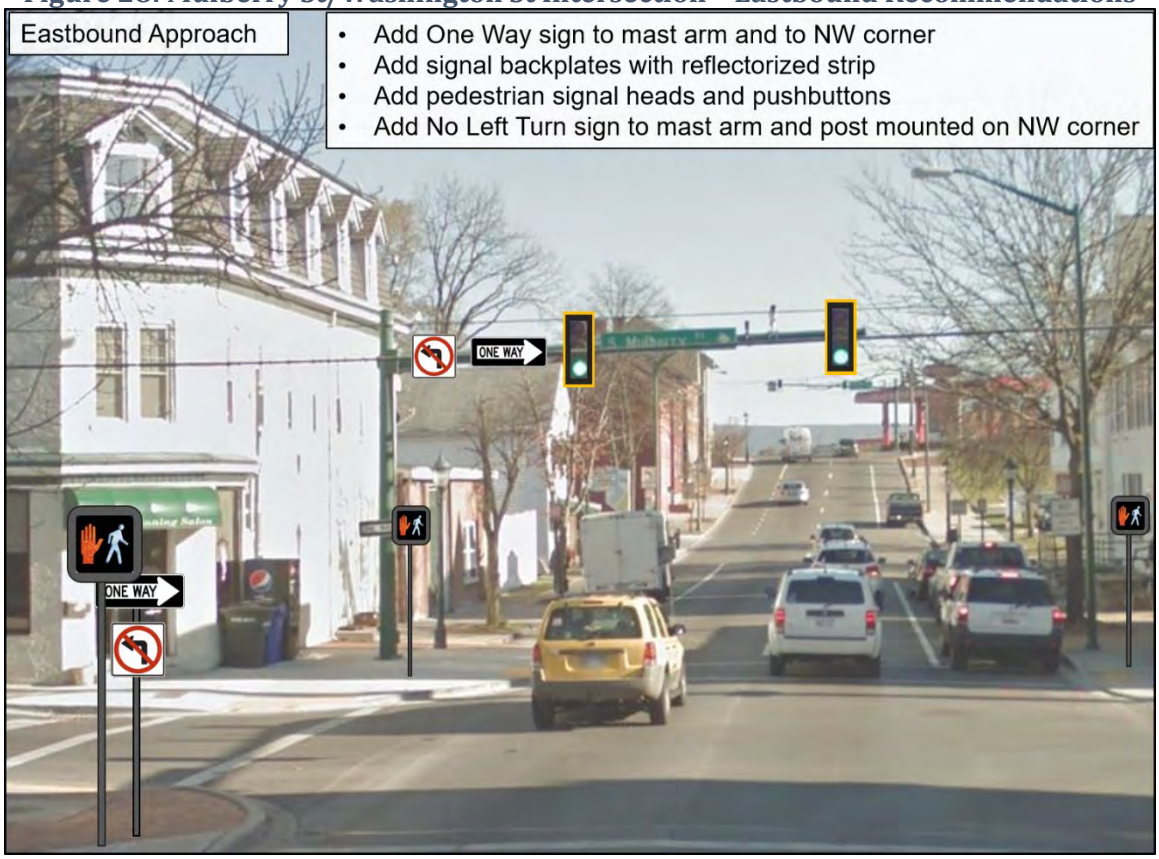


Figure 29: Mulberry St/Washington St Intersection – Southbound Recommendations

Figure 30: Cannon Ave/Washington St Intersection – Eastbound Recommendations

Figure 31: Cannon Ave/Washington St Intersection – Southbound Recommendations

Figure 32: Cannon Ave/Washington St Intersection – Northbound Recommendations