



**Work Session Meeting Agenda
Monday, October 7, 2024
Town of Orange Community Meeting Room**

5:30 p.m.

DINNER

6:00 p.m.

- 1. Call to order by Mayor.**
- 2. Roll Call – Town Council:**

Mayor Martha B. Roby

Vice-Mayor Frederick W. Sherman, Jr.

Councilmember Jason R. Cashell

Councilmember Jeremiah V. Pent

Councilmember Donna Waugh-Robinson

- 3. Adoption of Agenda.**
- 4. Discussion of TEC Limited Phase 2 Environmental Site Assessment of 299 Berry Hill Road, the former Gardner Iron and Metal Works property.**
- 5. Discussion of request from John Reynolds for crosswalk traversing N. Madison Road.**
- 6. Discussion and status of Charters of Freedom Project.**
- 7. Town Council Adjournment.**



WORK SESSION SUMMARY
October 7, 2024

AGENDA ITEM: 4

**Discussion of TEC Limited Phase 2 Environmental Site Assessment of 299
Berry Hill Road, the former Gardner Iron and Metal Works property.
(Director of Community Development)**

SUMMARY:

- Please see attached memorandum and information from the Director of Community Development.



WORK SESSION SUMMARY
October 7, 2024

**Discussion of TEC Limited Phase 2 Environmental Site Assessment of 299
Berry Hill Road, the former Gardner Iron and Metal Works property.
(Director of Community Development)**

AGENDA ITEM: 4

SUMMARY:

- Please see attached memorandum and information from the Director of Community Development.



**Town of Orange
Department of Community Development**

119 Belleview Avenue, Orange, Virginia 22960 - 1401

Phone: (540) 672-6917 Fax: (540) 672-4435

Email – townplanner@townoforangeva.org

MEMORANDUM

TO: Mayor Roby and Town Council Members

FROM: John G. Cooley, Director of Community Development

DATE: 9-9-2024 (Updated 10-2-2024)

SUBJECT: TEC Limited Phase 2 Environmental Site Assessment

299 Berry Hill Road, former Gardner Iron and Metal Works property

Town staff contacted Total Environmental Concepts, Inc in late June 2023 to discuss the possibility of reviewing the work accomplished during the DEQ mandated cleanup of the property in the early 2000's. TEC was contacted as they were the firm that worked with the DEQ and Federal Agencies to document and clean up some environmental issues on the property.

The first project undertaken was a Phase 1 Environmental review of available reports, photos, aerial photographs and any other documents that could be located. From this Phase 1 environmental review it was determined that a limited Phase 2 study needed to be completed. As the first step in the Phase 2 environmental review, the property was scanned using ground penetrating radar to locate any utilities or other underground anomalies on the property. Once these utilities and anomalies were mapped, a grid was laid out for soil borings. Each soil boring would have samples taken at 5 and 10 feet. The first information we received concerning the analysis of the soil borings. Attached to this memo are maps showing the locations of the soil borings and the concentrations of contaminants at each location. At this time, the report recommends the site be voluntarily entered into the VDEQ Voluntary Remediation Program.

Staff has discussed the possibility of “encasing” the property with asphalt to create a Multi-use pad which could be used for different community activities. Staff has raised the question about the possibility of creating some tree wells so that there is some shade on the property with TEC personnel who, after reviewing the data, stated this would be possible.

UPDATE:

Staff has spoken with TEC staff who are putting together a proposal to take several soil samples inches below the surface to determine the level of contamination close to the surface, if any, which will help the design of the “encasement” of the property.



Figure
No.

1

SITE VICINITY MAP
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
Suite B
Lorton, VA 22079
Office: 703-567-4346



Image obtained from: Google Earth



Figure
No.

2

SOIL SAMPLE LOCATION
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
 Suite B
 Lorton, VA 22079
 Office: 703-567-4346



Image obtained from: Google Earth



● Soil Sample Location

● Soil Sample with elevated concentrations of PCBs

Figure
No.

3

PCBs 0'-5'
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
Bay B
Lorton, VA 22079
Office: 703-567-4346



Image obtained from: Google Earth



- Soil Sample Below the VDEQ VRP Tier III Residential Soil Screening Level for Arsenic
- Soil Sample Exceeding the VDEQ VRP Tier III Residential Soil Screening Level for Arsenic

Figure
No.

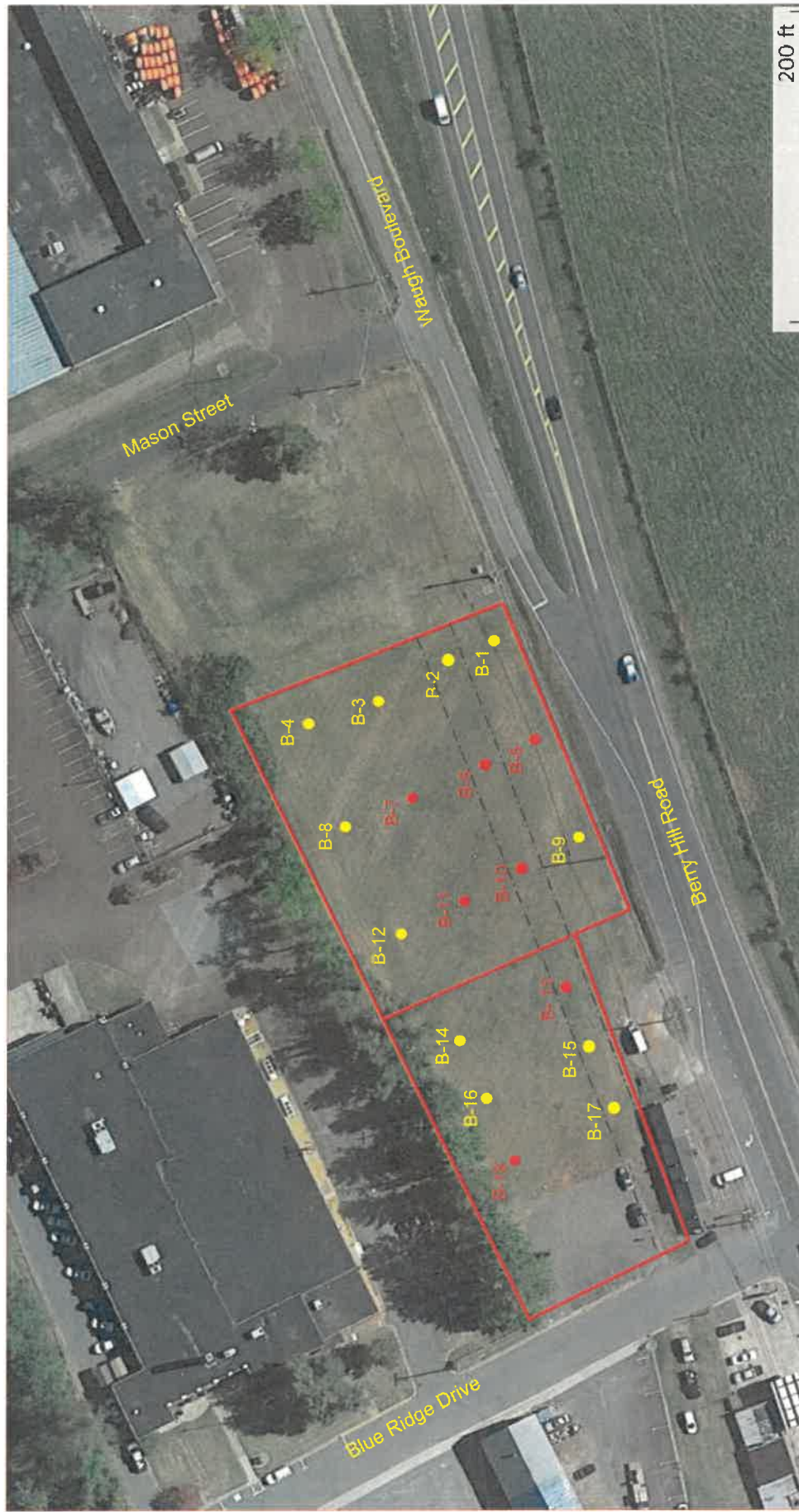
4

ARSENIC 0'-5'
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
 Bay B
 Lorton, VA 22079
 Office: 703-567-4346



Image obtained from: Google Earth



- Soil Sample Below the VDEQ VRP Tier III Residential Soil Screening Level for Cadmium
- Soil Sample Exceeding the VDEQ VRP Tier III Residential Soil Screening Level for Cadmium

Figure
No.

5

CADMIUM 0'-5'
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
 Bay B
 Lorton, VA 22079
 Office: 703-567-4346



Image obtained from: Google Earth



- Soil Sample Below the VDEQ VRP Tier III Residential Soil Screening Level for Lead
- Soil Sample Exceeding the VDEQ VRP Tier III Residential Soil Screening Level for Lead

Figure
No.

6

LEAD 0'-5'
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
 Bay B
 Lorton, VA 22079
 Office: 703-567-4346



Image obtained from: Google Earth



- Soil Sample Below the VDEQ VRP Tier III Residential Soil Screening Level for Mercury
- Soil Sample Exceeding the VDEQ VRP Tier III Residential Soil Screening Level for Mercury

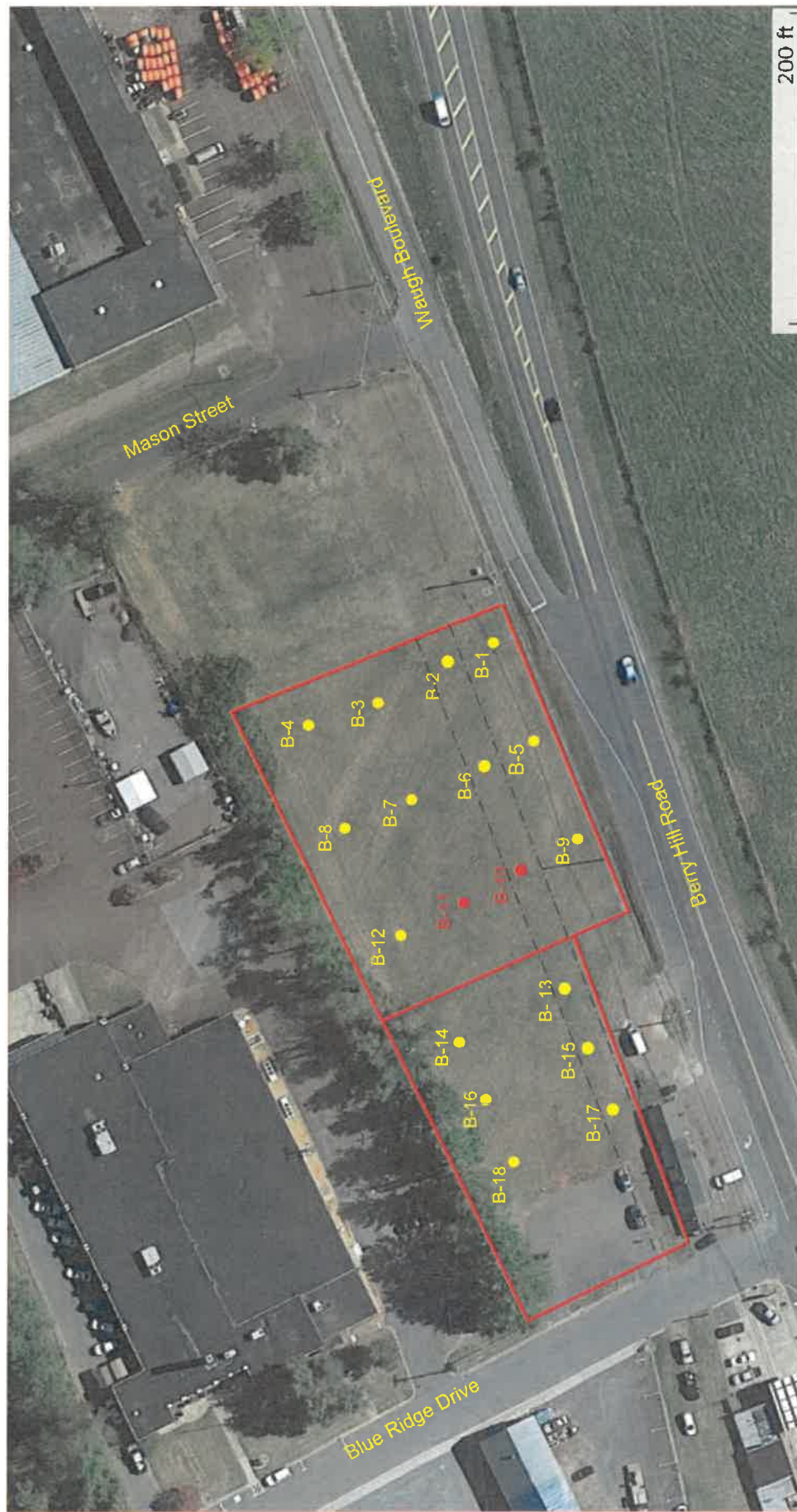
Figure
No. **7**

MERCURY 0' - 5'
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
Bay B
Lorton, VA 22079
Office: 703-567-4346



Image obtained from: Google Earth



- Soil Sample Below the VDEQ VRP Tier III Residential Soil Screening Level for Silver
- Soil Sample Exceeding the VDEQ VRP Tier III Residential Soil Screening Level for Silver

Figure
No.

8

SILVER 0' - 5'
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
Bay B
Lorton, VA 22079
Office: 703-567-4346



Image obtained from: Google Earth



- Soil Sample Below the VDEQ VRP Tier III Residential Soil Screening Level for Arsenic
- Soil Sample Exceeding the VDEQ VRP Tier III Residential Soil Screening Level for Arsenic

Figure
No.

9

ARSENIC 5'-10'
299 Berry Hill Road
Orange, Virginia 22960

8382 Terminal Road
 Bay B
 Lorton, VA 22079
 Office: 703-567-4346



Image obtained from: Google Earth



WORK SESSION SUMMARY
October 7, 2024

AGENDA ITEM: 5

**Discussion of request from John Reynolds for crosswalk traversing N.
Madison Road. (Director of Community Development)**

SUMMARY:

- Please see attached memorandum and information from the Director of Community Development.



**Town of Orange
Department of Community Development**

119 Belleview Avenue, Orange, Virginia 22960 - 1401
Phone: (540) 672-6917 Fax: (540) 672-4435
Email – townplanner@townoforangeva.org

MEMORANDUM

TO: Mayor Roby and Town Council Members
FROM: John G. Cooley, Director of Community Development
DATE: 6-10-2024 (Updated 10-2-2024)
SUBJECT: Request from John Reynolds for crosswalk traversing N Madison Road

In late 2022, John Reynolds contacted my office regarding the purchase of the former Catholic Church property located at 276 N Madison Road. As part of this discussion, John Reynolds put forward the idea of a crosswalk connecting the Reynolds dealerships and the Church property. The driver behind this request was that as numerous Reynold's employees and customers would be traversing N Madison Road daily, wouldn't it make sense to provide a crosswalk for safer passage (please see attached email from John Reynolds).

Over the next several months, emails were exchanged (see attached) regarding various aspects of the crosswalk project including location, look and lighting. During these discussion VDOT personnel were brought into the conversation to ensure compliance with VDOT standards. The conversation centered around the location of the crosswalk – Mid-block or the W Nelson St/Woodmark Dr/N Madison Road intersection. VDOT was not very receptive to funding any work at these locations as the traffic counts and accident data does not support additional facilities. VDOT personnel did say that if a non-signalized warrant study is completed and the appropriate Pedestrian Accommodations are determined, VDOT will meet with us to help determine how to move forward.

I requested our engineer provide the cost of a task order to create a VDOT non-signalized study of the intersection, which he did. The cost of this study is \$11,201.40. If the study determines there are changes which need to be made to the intersection, including upgrading all quadrants of the intersection to comply with ADA standards, the cost could be in the range of \$30,000 to \$50,000.

Town Council guidance on this is requested as there is no funding allocated in the current budget nor in the FY25 budget. Should Council wish to proceed with this project, funding will need to be appropriated.

UPDATED:

A Mid-block Pedestrian Crossing Study has been completed. The study does find that there is an appropriate location for a mid-block pedestrian crossing. The study determined that there are two recommended "Visibility Enhancements" which are:

1. Install a refuge Island; or,
2. Install Rectangular Rapid Flashing Beacon signs.

The study has been submitted to VDOT for their review and comment.

Mid-Block Pedestrian **Crossing Study at N. Madison Road**

For the following Locations:

1. Uncontrolled Mid-Block Crossing:

N. Madison Road
South of W. Nelson Street/ Woodmark Street

September 2024

Prepared for
Town of Orange



Prepared by
Rinker Design Associates, LLC.



RINKER DESIGN
ASSOCIATES



Table of Contents

Section 1: Introduction	1
Section 2: Location Characteristics	2
Section 3: Pedestrian Crosswalk Analysis	2
Section 4: Pedestrian Crosswalk Analysis Results	10
Section 5: Right of Way	12
Section 6: Conclusions	12
Appendices	13

Table of Figures

Figure A: Overall Study Area Map	1
Figure B: N. Madison Road Proposed Crosswalk Location	2
Figure C: Process Flow Chart	4
Figure D: Stopping Sight Distance Requirements	5
Figure E: N. Madison Road - Line of Sight Exhibit.....	6
Figure F: Pedestrian Generators and Attractors.....	7
Figure G: Recommended Countermeasures	9
Figure H: N. Madison Road Pavement Marking & Signage	11

APPENDICES

Appendix A: Proposed Design Layout Exhibit

Appendix B: VDOT Historical Traffic Data

Appendix C: VDOT's IIM TE-384.1 Pedestrian Crossing Accommodations at Unsignalized Locations

Section 1: Introduction

Purpose: This report presents the results of a formal unsignalized crosswalk study per the requirements of VDOT IIM-TE-384.1 *Pedestrian Crossing Accommodations at Unsignalized Approaches* to determine if the installation of a crosswalk on N. Madison Rd, south of the W. Nelson St/ Woodmark St intersection is warranted. The proposed location of the crosswalk is shown below in **Figure A**.

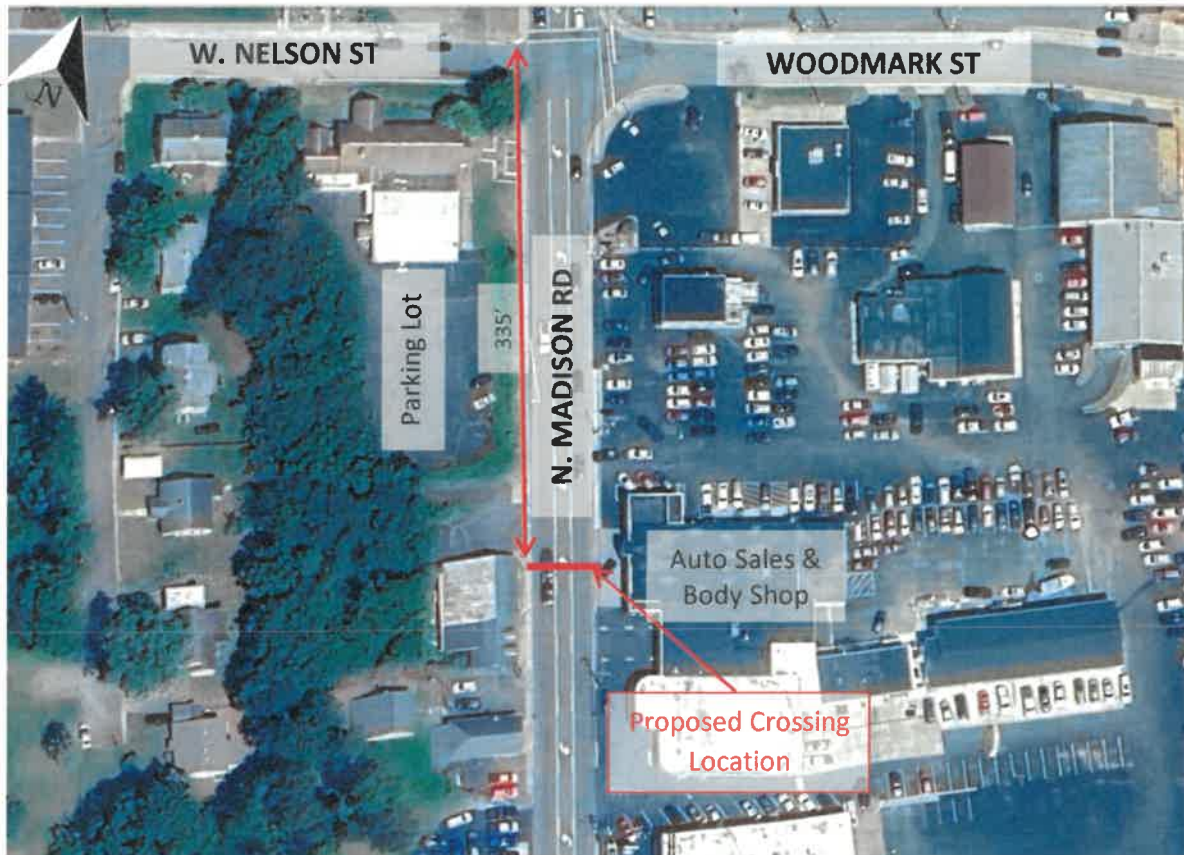


Figure A: Overall Study Area Map

Brief Background: The crosswalk analyzed in this report will provide pedestrian access within the Town of Orange community by adding a mid-block crossing of N. Madison Rd, a major road running through the Town of Orange. There are existing sidewalks in the area and at the proposed crossing location and would provide direct access from the employee parking area to the west side of N Madison Road to the Auto Sales & Body Shop on the east side where pedestrians will naturally cross. N. Madison Rd is located centrally to churches, car dealerships, and other businesses.

The northbound and southbound directions (N. Madison Rd) are free flowing and not stop or yield controlled. Traffic conditions and physical characteristics of the study location will be considered to determine if the proposed pedestrian crosswalk is viable. A layout of the proposed mid-block crossing location is shown in **Figure B**. A detailed layout of the proposed

design is shown in **Appendix A** which depicts the ADA compliant curb ramps and sidewalk connections/transitions to be installed in conjunction with the crosswalks.



Figure B: N. Madison Road Proposed Crosswalk Location

Section 2: Location Characteristics

The study crossing is at an uncontrolled leg of N. Madison Road and crosses one travel lane (north-south) in each direction with a two-way left-turn lane.

The posted speed limit along N. Madison Rd is 25 mph with an Average Daily Traffic (ADT) of 14,511 vehicles per day (vpd) for 2022 (The latest officially published data from VDOT). This ADT is used for evaluation of Table 3 in IIM-TE-384.1, shown in **Figure G**. See **Appendix B** for VDOT's Historical Traffic Data.

This crosswalk location will serve to improve pedestrian connectivity within the Town of Orange and connect the western and eastern sides of Madison Road, including the employee parking area on the west side of N. Madison Road to the Auto Sales & Body Shop on the east side where pedestrians will naturally cross.

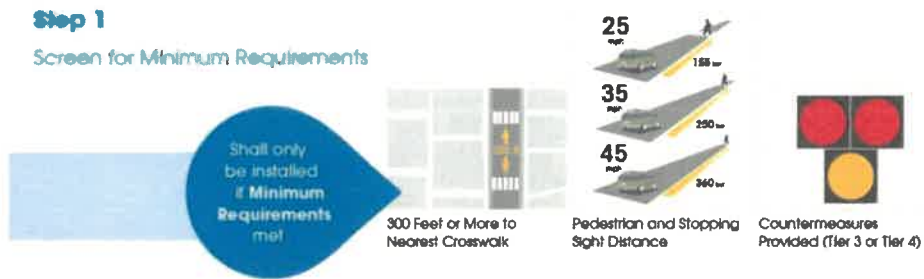
Section 3: Pedestrian Crosswalk Analysis

This section presents a detailed evaluation of the potential installation of a crosswalk across the southern leg of N. Madison Rd. The Virginia Department of Transportation's (VDOT) Instructional and Information Memoranda (IIM)-TE-384.1 *Pedestrian Crossing Accommodations at Unsignalized Locations* was used to evaluate the crossing. Appropriate excerpts can be found

in **Appendix C**. The IIM provides recommendations for ‘Considering Marked Crosswalks and Other Needed Pedestrian Improvements at Uncontrolled Locations’. The basic justifications for determining whether a crosswalk is recommended, and requisite countermeasures are provided in the IIM-TE-384.1 in the form of a flow chart shown in **Figure C** illustrating the four-step process. Each evaluation step and results of the analysis are presented below.

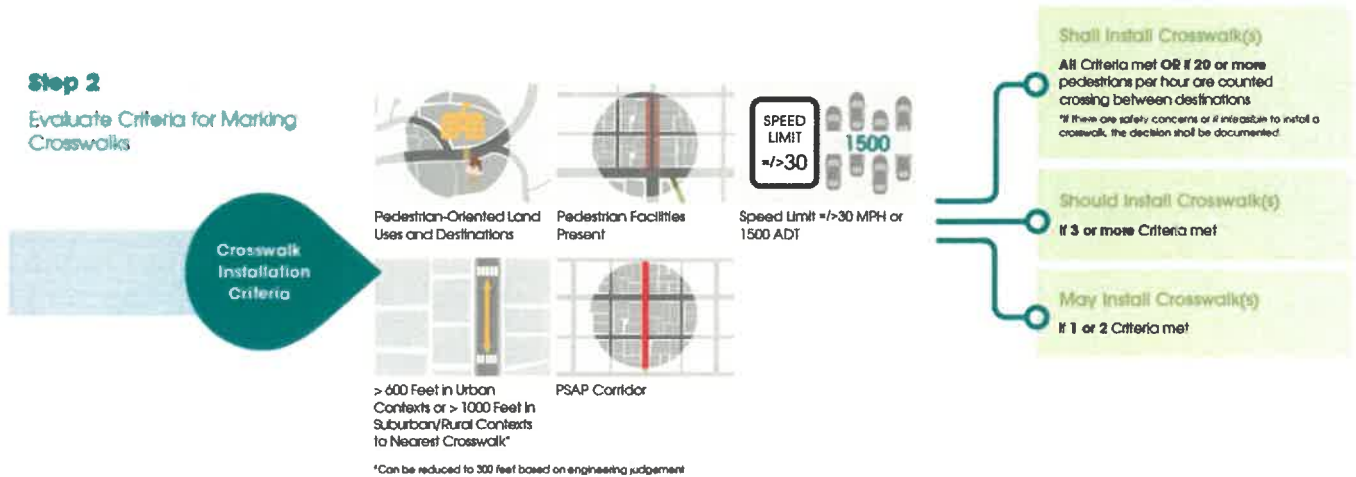
Step 1

Screen for Minimum Requirements



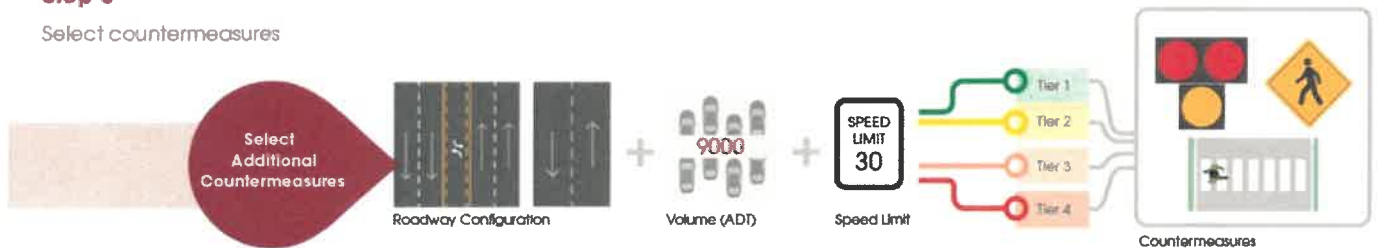
Step 2

Evaluate Criteria for Marking Crosswalks



Step 3

Select countermeasures



Step 4

Select marking pattern for crosswalks

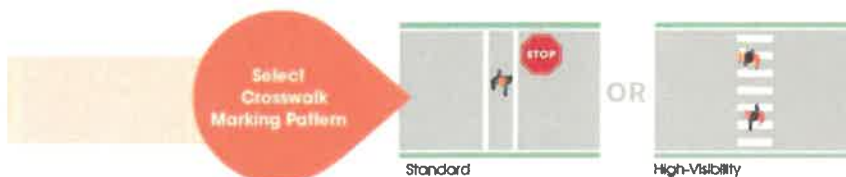


Figure C: Process Flow Chart

The following steps, as labeled in **Figure C**, were taken in accordance with the flow chart:

Step 1 – Screen for Minimum Requirements:

Distance to the Nearest Marked Crossing

- (1) Currently, the closest crosswalk on N. Madison Rd is about 335 feet north of the proposed crosswalk at the intersection of N Madison Rd and Woodmark St.

Sight Distance

- (2) Drivers have an unrestricted view of the entire proposed crosswalk and entry points to the crosswalk, based on stopping sight distance requirements from the VDOT Road Design Manual, shown in **Figure D**. Sight distance graphics are provided in **Figure E**. N. Madison Rd has a posted speed of 25 mph and has a 1.3% downgrade in the northbound direction and a 2% upgrade in the southbound direction. The posted speed limit + 7 mph was used to calculate the operating speed. A 32-mph operating speed was used to determine the stopping sight distance. Stopping sight distances were calculated through interpolation using the values circled in **Figure D** and their corresponding operating speeds.

A minimum sight distance of 223 ft is required for the northbound approach. A minimum sight distance of 217 ft is required for the southbound approach. Minimum pedestrian and stopping sight distance is present; therefore this requirement is met.

Table 2: Stopping Sight Distance Requirements Approaching Mid-Block Crosswalks or Crosswalks at Unsignalized Intersection Approaches (feet)

Operating Speed	Level Grade	Downgrades			Upgrades		
		-3%	-6%	-9%	+3%	+6%	+9%
25 mph	155	158	165	173	147	143	140
30 mph	200	205	215	227	200	184	179
35 mph	250	257	271	287	237	229	222
40 mph	305	315	333	354	289	278	269
45 mph	360	378	400	427	344	331	320
50 mph	425	446	474	507	405	388	375
55 mph	495	520	553	593	469	450	433
> 55 mph	Crosswalks should not be marked across uncontrolled approaches with operating speeds greater than 55mph.						

Figure D: Stopping Sight Distance Requirements

Location Tiers

- (3) Based on IIM-TE-384.1 Table 3 (**Figure G**), the location falls into Tier 2. This requirement is met.

Summary

Based on the above, the proposed crosswalk does meet all minimum requirements.

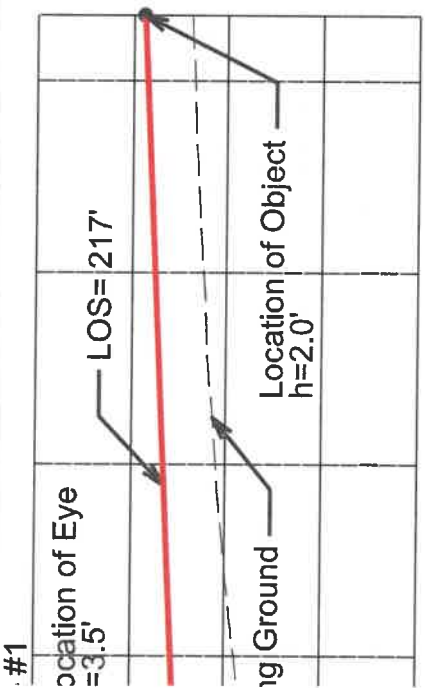
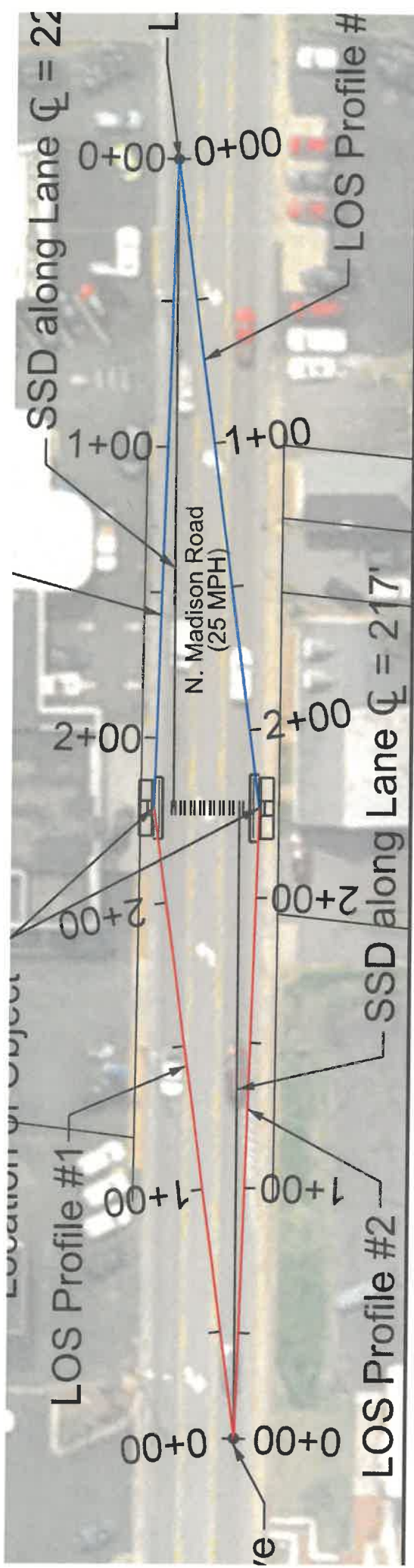
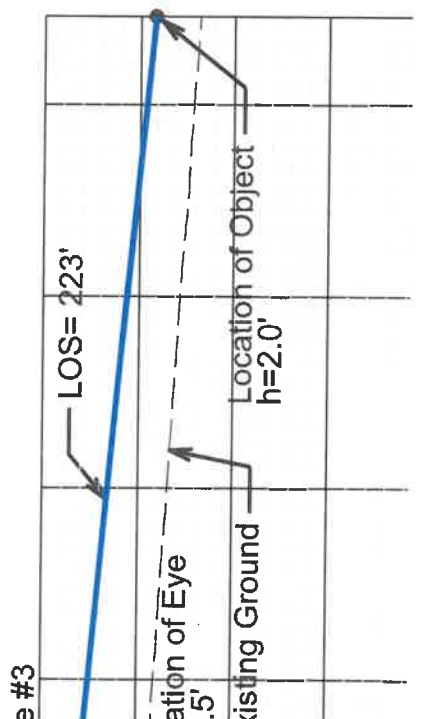
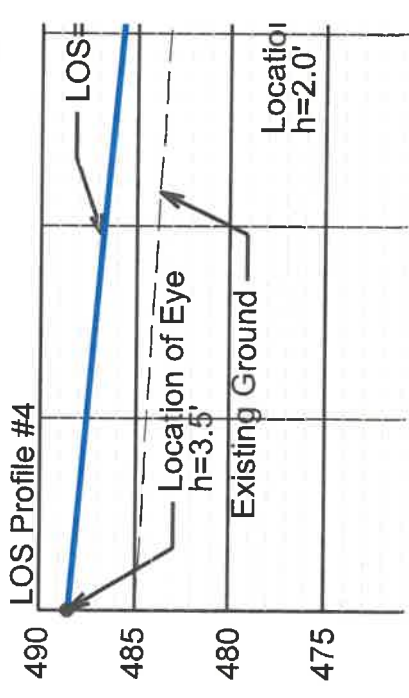


Table 3-2 Stopping Sight Distance on Grades was used to determine the stopping sight distance. Assuming a 32 mph design speed and a 2% upgrade to yield a more conservative distance, the sight stopping distance needed for this approach is 217 ft.



AASHTO Table 3-2 Stopping Sight Distance was used to determine the stopping sight distance. Assuming a 32 mph design speed and a 2% upgrade to yield a more conservative distance, the sight stopping distance needed for this approach is 217 ft.



Step 2 – Evaluate Criteria for Marking Crosswalks:

Pedestrian Oriented Land Uses and Destinations

- (1) The proposed crosswalk would connect the residential and parking areas on the west side of the crossing to car dealerships, physical therapy, bank, restaurants, and commercial businesses located on the east side of N. Madison Road; generators and attractors are shown in **Figure F**. Therefore, this location is between two pedestrian oriented land uses and meets this criteria.

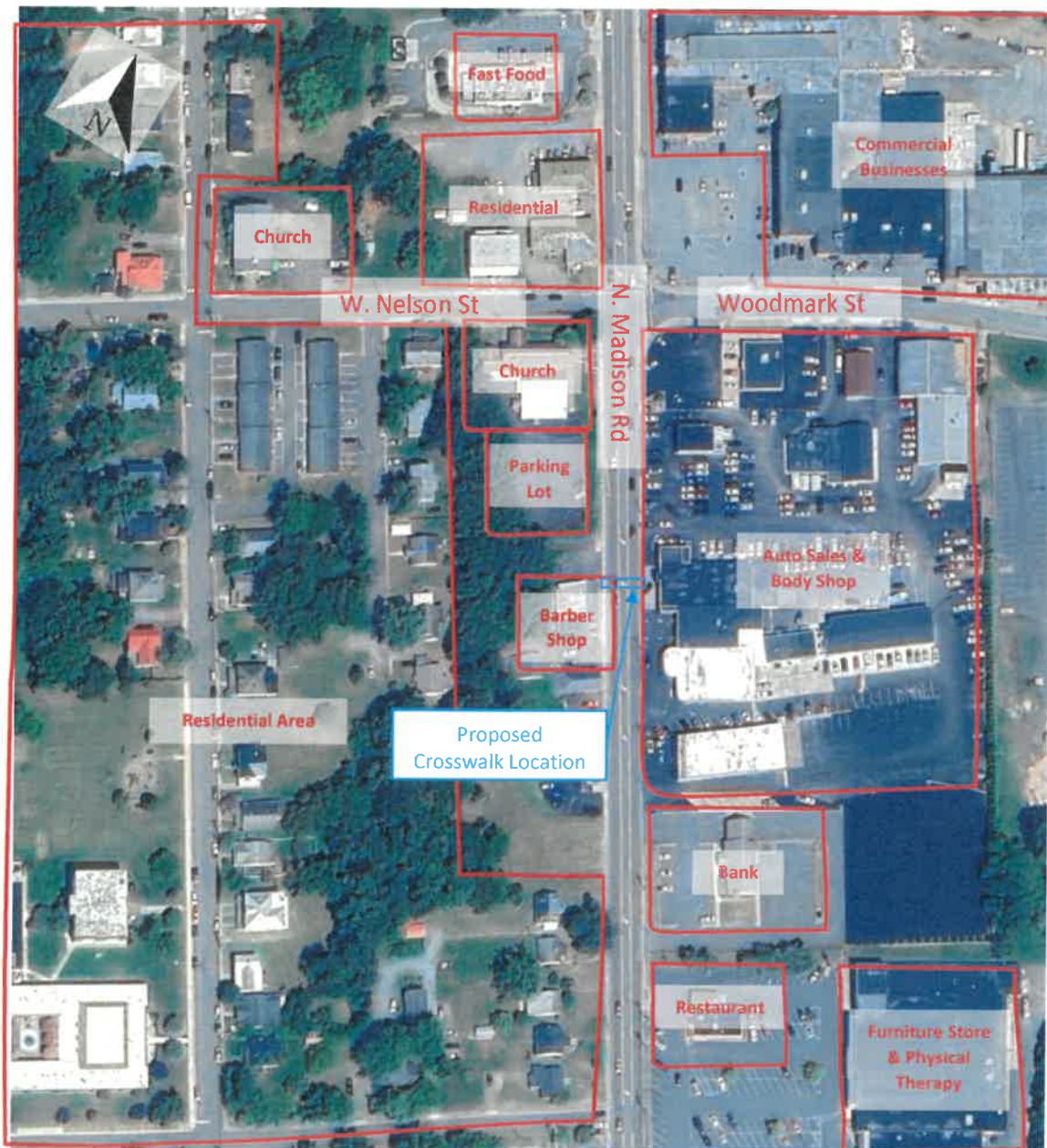


Figure F: Pedestrian Generators and Attractors

Pedestrian Facilities or Access Route

- (2) This crossing location is in a location with existing pedestrian facilities. Existing sidewalks are located on the eastern and western sides of N Madison Rd. ADA compliant ramps will be provided prior to the marked crosswalk. The crossing location is also central to multiple pedestrian-oriented land uses, including parking for the car dealership, commercial businesses, a bank, furniture store, physical therapy, and a restaurant. Therefore, this criteria is met.

Speeds and Traffic Volumes

- (3) The existing posted speed limit is 25 mph. N. Madison Road had an Average Daily Traffic (ADT) of 14,511 vehicles per day (vpd) for 2022. Therefore, this criteria is met since the ADT exceeds the 1500 vpd.

Crosswalk Proximity

- (4) There is a crosswalk located across N Madison Rd about 335 feet north of proposed crosswalk. Therefore, this criteria is not met.

Pedestrian Safety Action Plan (PSAP) Corridors and Crash Clusters

- (5) Using the VDOT Pedestrian Safety Action Plan (PSAP) Corridors and Crash Clusters tool, there have been no crashes in the area of the proposed crosswalk and Madison Rd is not a priority corridor. Therefore, this criteria is not met.

Summary

Based on the above, the proposed crosswalk meets 3 of the criteria and therefore the crosswalk should be installed.

Step 3 – Select Additional Countermeasures:

- (1) N. Madison Rd is an undivided two-lane roadway with a two-way-left-turn lane with a posted speed limit of 25 mph and an ADT of 14,511 vpd. Table 3 in IIM-TE-384.1 was utilized to determine recommended countermeasures. Table 3 results are shown in **Figure G**, and Tier 2 countermeasures were determined.

Table 3: Recommendations for Considering Marked Crosswalks and Other Needed Pedestrian Improvements Across Unsignalized Approaches (Undivided/Single-Lane Roads)
 Table 3 includes reference to the minimum and recommended countermeasures per Tier, and optional countermeasures that may be considered where the recommended is not appropriate to the context or site. Crossings located at Tier 3 or 4 locations require an engineering study to make final determination of countermeasures to be installed with the marked crosswalk.

Roadway Configuration (P is total P of lanes)		Roadway ADT and Speed Limit											
		1,500 to 5,000 VPD			5,000 to 12,000 VPD			12,000 to 15,000 VPD			More than 15,000 VPD		
		≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH
Single lane, one-way street		VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC
2 Lanes (undivided two-way street)		VE/TC	VE/TC	VE/RRFB	VE/TC	VE/TC	VE/RRFB	VE/TC	VE/RRFB	VE/RRFB	VE/RRFB	VE/RRFB	PHB
3 Lanes (center turn lane)		VE/TC	VE/RI	RI/RRFB	VE/RI	RI/RRFB	RI/RRFB	RI/RRFB	RI/RRFB	PHB/RO	RI/RRFB	PHB/RO	PHB/RO
4 Lanes (two-way street without median)		RD/RRFB	RD/RRFB	PHB/RO	RD/RRFB	RD/RRFB	PHB/RO	RD/RRFB	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO
5 Lanes (center turn lane)		RD/RRFB	PHB/RO	PHB/RO	RD/RRFB	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO
6 Lanes (two-way street without median)*		PHB/RO	PHB/RO	PHB/RO	RD	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO	PHB/RO

*all 15,000 vpd lane roadways with speeds 45 and 55 mph = Tier 4

Tier 1

High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and consideration of the following:

Recommended: Visibility Enhancements (VE)

Optional, if Recommended is not appropriate: Traffic Calming Measures (TC)

Tier 2

High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and consideration of the following:

Recommended: Refuge Island (RI), and/or

Recommended: Rectangular Rapid Flashing Beacon (RRFB)

Optional, if Recommended is not appropriate: Visibility Enhancements (VE)

Optional, if Recommended is not appropriate: Advance yield markings and R1-5 signs (ADV)

Tier 3

High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and inclusion of one or more of the following:

Recommended: Roadway Reconfiguration (RD), and/or

Recommended: Pedestrian Hybrid Beacon (PHB)

Optional, if Recommended is not appropriate: Advance yield markings and R1-5 signs (ADV)

Optional, if Recommended is not appropriate: Rectangular Rapid Flashing Beacon (RRFB)

Tier 4

High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and inclusion of one or more of the following:

Recommended: Pedestrian Hybrid Beacon (PHB), and/or

Recommended: Roadway Reconfiguration (RD)

Optional, if Recommended is not appropriate: Review for Signal

Figure G: Recommended Countermeasures

Step 4 – Select Crosswalk Marking Pattern:

- (1) A high-visibility crosswalk pattern with bar pairs shall be installed since the proposed crosswalk is at an unsignalized crossing.

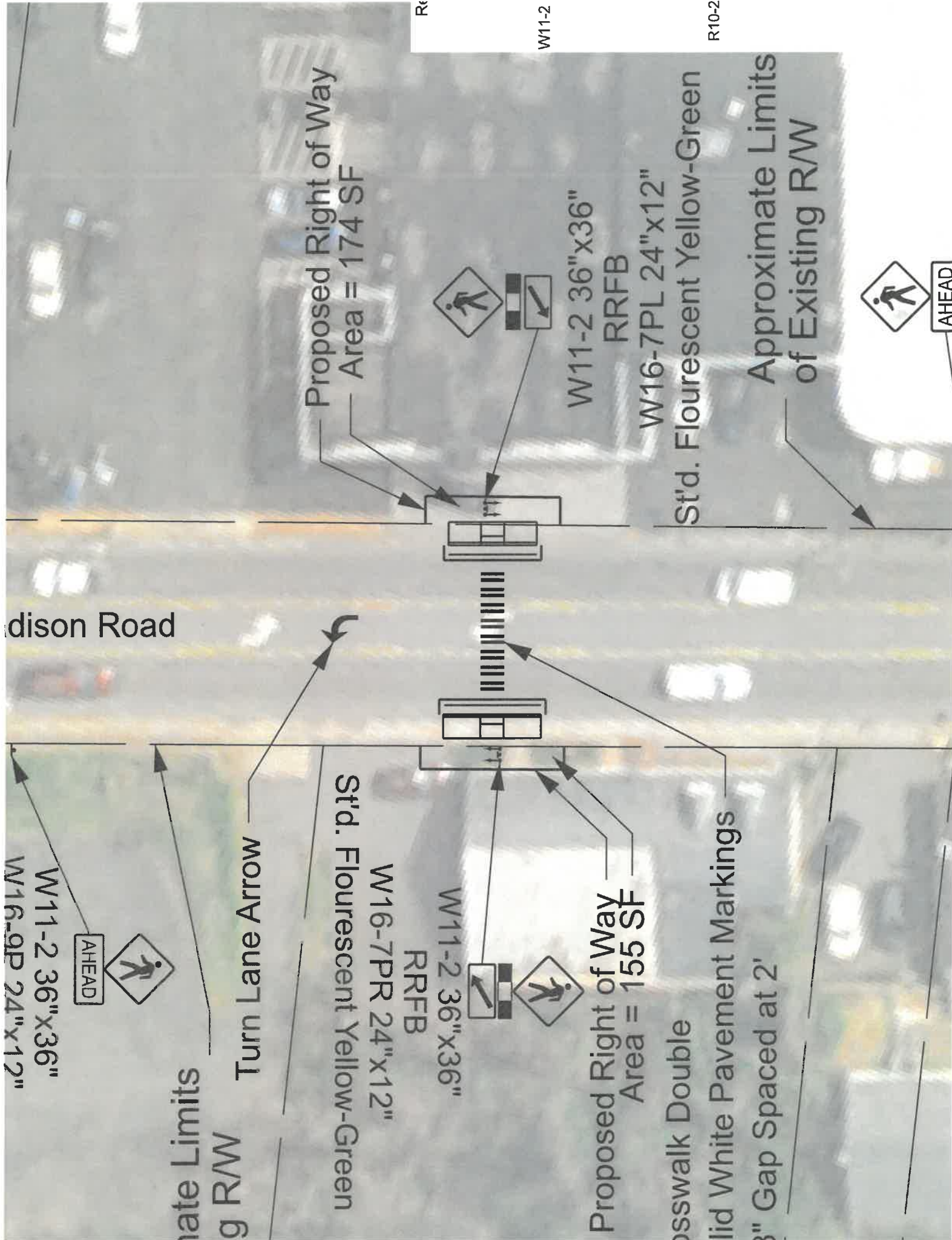
Section 4: Pedestrian Crosswalk Analysis Results

Based on the pedestrian crosswalk analysis, a crosswalk should be installed at the study area location. As shown in **Figure G**, a high visibility crosswalk with W11-2 (Pedestrian Crossing) and W16-7P (Diagonal Arrow) signage is required on each side of the crossing facing each direction. A high visibility crosswalk should have pairs of 8" lines with 8" gap that are spaced two feet apart and shifted to avoid the wheel paths of through vehicles.

The Tier 2 countermeasures recommend consideration of visibility enhancements.

A Rectangular Rapid Flashing Beacon (RRFB) is recommended for this crossing. RRFB were selected to best alert vehicles of pedestrians about the cross Madison Rd. It is also recommended to include advance crossing assembly signs (W11-2 and W16-9P (Ahead)). Advance crossing warning signs will be placed approximately 100 feet from the crosswalk in the northbound and southbound directions. Signing and Pavement Marking Layout is shown in **Figure H**.

The RRFB will run on solar power using a solar panel attached to the top of the RRFB pole and a pole mounted cabinet. A detail of the RRFB is included in **Figure H**.



Madison Road

W16-7PL 24"x12"
W11-2 36"x36"

AHEAD



Approximate Limits
of Existing R/W

Turn Lane Arrow

W16-7PPR 24"x12"
St'd. Fluorescent Yellow-Green

RRFB

W11-2 36"x36"



Proposed Right of Way
Area = 155 SF

Crosswalk Double

Solid White Pavement Markings

3" Gap Spaced at 2'

Proposed Right of Way
Area = 174 SF



W11-2 36"x36"

RRFB

W16-7PL 24"x12"

St'd. Fluorescent Yellow-Green

Approximate Limits
of Existing R/W



AHEAD

R10-2

W11-2

R10-2

Section 5: Right of Way

Existing right of way within the project limits was reviewed using the Town of Orange GIS data. Due to the existing right of way being directly behind the existing sidewalk, a permanent easement or permanent right of way will be required to install the flashing beacons. Approximately 329 square feet of right of way will be required. See **Figure H** for the required area on each parcel.

Section 6: Conclusions

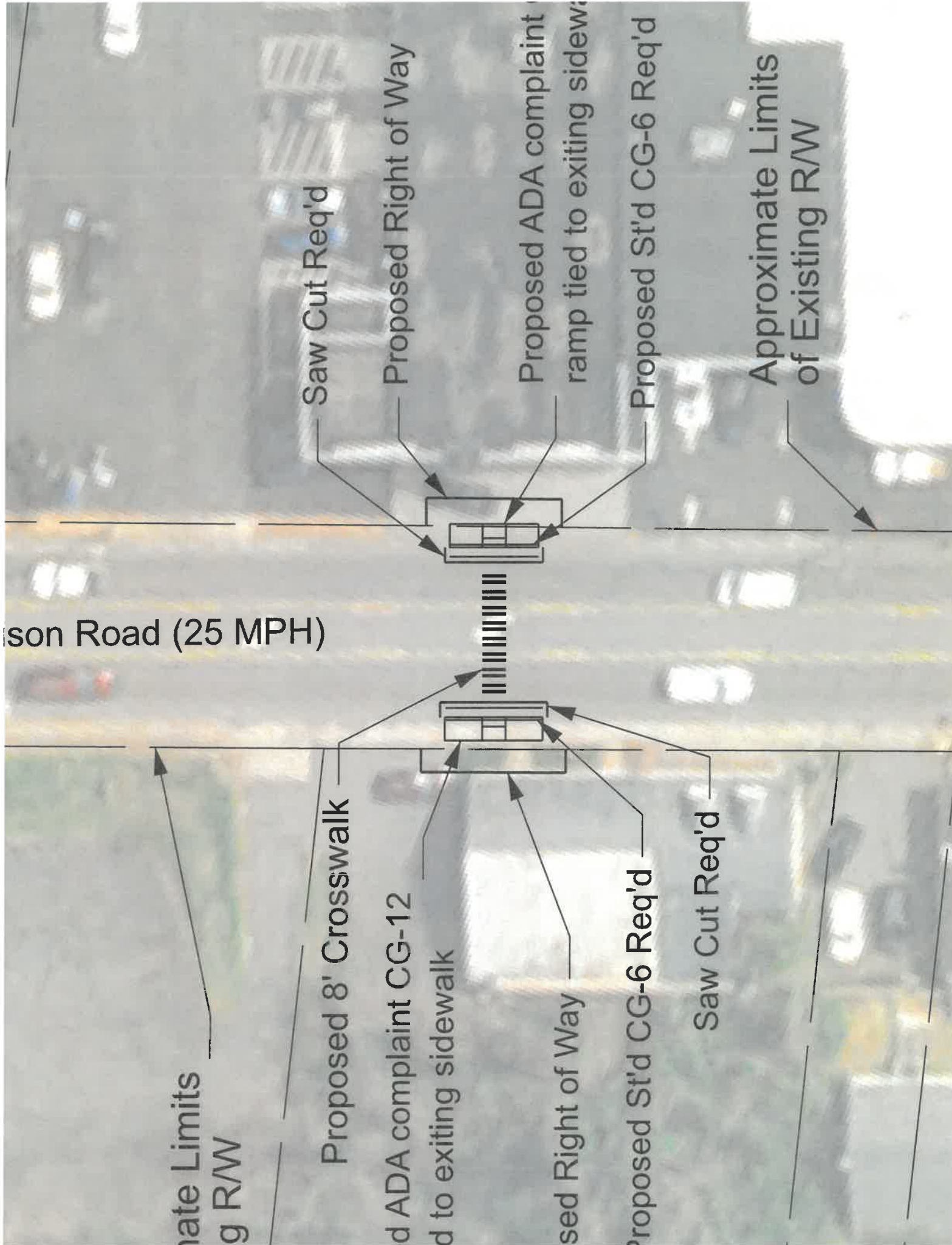
As shown by the crosswalk analysis prepared within **Section 2** of this report, the proposed high visibility crosswalk across the uncontrolled N. Madison Rd is recommended and will be designed with concurrence from VDOT, as it meets all the minimum requirements set forth by IIM-TE-384.1.

- The proposed crosswalk is on a direct route between significant pedestrian generators and attractors.
- There is not another existing marked crosswalk within 300 feet of the proposed crosswalk in the northbound or southbound direction.
- The proposed crosswalk will not produce an unacceptable safety hazard.
- Along N. Madison Road, the sight distance from the study intersection meets the requirements outlined in the IIM-TE-384.1 Table 2. IIM-TE-384.1 Table 2 is shown in **Figure D**. Line of Sight Exhibit can be found in **Figure E** to provide further representation of the sight distance at the study intersection.
- The proposed signing and pavement marking layout can be found in **Figure H**.

Appendices

Appendix A

Proposed Design Layout Exhibit



ate Limits
g R/W

Proposed 8' Crosswalk

d ADA complaint CG-12

d to exiting sidewalk

sed Right of Way

Proposed St'd CG-6 Req'd

Saw Cut Req'd

son Road (25 MPH)

Saw Cut Req'd

Proposed Right of Way

Proposed ADA complaint
ramp tied to exiting sidewalk

Proposed St'd CG-6 Req'd

Approximate Limits
of Existing R/W

Appendix B

VDOT Historical Traffic Data

-- 2022 AADT Report for Town of Orange --

UNID	SEQUENCE	REF	INX	INX2	REF	INX	INX3	REF	INX	INX4	REF	INX	INX5	REF	INX	INX6	REF	INX	INX7	REF	INX	INX8	REF	INX	INX9	REF	INX	INX10	REF	INX	INX11	REF	INX	INX12	REF	INX	INX13	REF	INX	INX14	REF	INX	INX15	REF	INX	INX16	REF	INX	INX17	REF	INX	INX18	REF	INX	INX19	REF	INX	INX20	REF	INX	INX21	REF	INX	INX22	REF	INX	INX23	REF	INX	INX24	REF	INX	INX25	REF	INX	INX26	REF	INX	INX27	REF	INX	INX28	REF	INX	INX29	REF	INX	INX30	REF	INX	INX31	REF	INX	INX32	REF	INX	INX33	REF	INX	INX34	REF	INX	INX35	REF	INX	INX36	REF	INX	INX37	REF	INX	INX38	REF	INX	INX39	REF	INX	INX40	REF	INX	INX41	REF	INX	INX42	REF	INX	INX43	REF	INX	INX44	REF	INX	INX45	REF	INX	INX46	REF	INX	INX47	REF	INX	INX48	REF	INX	INX49	REF	INX	INX50	REF	INX	INX51	REF	INX	INX52	REF	INX	INX53	REF	INX	INX54	REF	INX	INX55	REF	INX	INX56	REF	INX	INX57	REF	INX	INX58	REF	INX	INX59	REF	INX	INX60	REF	INX	INX61	REF	INX	INX62	REF	INX	INX63	REF	INX	INX64	REF	INX	INX65	REF	INX	INX66	REF	INX	INX67	REF	INX	INX68	REF	INX	INX69	REF	INX	INX70	REF	INX	INX71	REF	INX	INX72	REF	INX	INX73	REF	INX	INX74	REF	INX	INX75	REF	INX	INX76	REF	INX	INX77	REF	INX	INX78	REF	INX	INX79	REF	INX	INX80	REF	INX	INX81	REF	INX	INX82	REF	INX	INX83	REF	INX	INX84	REF	INX	INX85	REF	INX	INX86	REF	INX	INX87	REF	INX	INX88	REF	INX	INX89	REF	INX	INX90	REF	INX	INX91	REF	INX	INX92	REF	INX	INX93	REF	INX	INX94	REF	INX	INX95	REF	INX	INX96	REF	INX	INX97	REF	INX	INX98	REF	INX	INX99	REF	INX	INX100	REF	INX	INX101	REF	INX	INX102	REF	INX	INX103	REF	INX	INX104	REF	INX	INX105	REF	INX	INX106	REF	INX	INX107	REF	INX	INX108	REF	INX	INX109	REF	INX	INX110	REF	INX	INX111	REF	INX	INX112	REF	INX	INX113	REF	INX	INX114	REF	INX	INX115	REF	INX	INX116	REF	INX	INX117	REF	INX	INX118	REF	INX	INX119	REF	INX	INX120	REF	INX	INX121	REF	INX	INX122	REF	INX	INX123	REF	INX	INX124	REF	INX	INX125	REF	INX	INX126	REF	INX	INX127	REF	INX	INX128	REF	INX	INX129	REF	INX	INX130	REF	INX	INX131	REF	INX	INX132	REF	INX	INX133	REF	INX	INX134	REF	INX	INX135	REF	INX	INX136	REF	INX	INX137	REF	INX	INX138	REF	INX	INX139	REF	INX	INX140	REF	INX	INX141	REF	INX	INX142	REF	INX	INX143	REF	INX	INX144	REF	INX	INX145	REF	INX	INX146	REF	INX	INX147	REF	INX	INX148	REF	INX	INX149	REF	INX	INX150	REF	INX	INX151	REF	INX	INX152	REF	INX	INX153	REF	INX	INX154	REF	INX	INX155	REF	INX	INX156	REF	INX	INX157	REF	INX	INX158	REF	INX	INX159	REF	INX	INX160	REF	INX	INX161	REF	INX	INX162	REF	INX	INX163	REF	INX	INX164	REF	INX	INX165	REF	INX	INX166	REF	INX	INX167	REF	INX	INX168	REF	INX	INX169	REF	INX	INX170	REF	INX	INX171	REF	INX	INX172	REF	INX	INX173	REF	INX	INX174	REF	INX	INX175	REF	INX	INX176	REF	INX	INX177	REF	INX	INX178	REF	INX	INX179	REF	INX	INX180	REF	INX	INX181	REF	INX	INX182	REF	INX
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Appendix C

VDOT's IIM-TE-384 Pedestrian Crossing Accommodations at Unsignalized Location

VIRGINIA DEPARTMENT OF TRANSPORTATION

TRAFFIC ENGINEERING DIVISION

INSTRUCTIONAL & INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: Pavement Markings Signs Pedestrians	NUMBER: IIM-TE-384.1
	SUPERSEDES: IIM-TE-384.0
SPECIFIC SUBJECT: Pedestrian Crossing Accommodations at Unsignalized Approaches	DATE: August 12, 2022
	SUNSET DATE: None
	APPROVAL: /original signed by/ Raymond J. Khoury, P.E. State Traffic Engineer Richmond, VA Approved August 12, 2022

CONTENTS

Traffic Engineering Division Memorandum IIM-TE-384.1

Background and Purpose
Applicable Projects and Effective Date
Process Flow Chart for Determining Appropriate Pedestrian Crossing Accommodations at Unsignalized Approaches
Installation of Marked Crosswalks at Unsignalized Intersections
References and Terms

BACKGROUND AND PURPOSE

VDOT summarizes pedestrian crash trends for a five-year period in the Pedestrian Crash Assessment, describing the predominance of fatalities and serious injuries at midblock and unsignalized crossing locations. Based on the 2014-2018 Pedestrian Crash Assessment, two-thirds (2/3) of fatal and injury pedestrian crashes occurred at unsignalized intersections or midblock locations, and 87 percent of fatalities and 78 percent of injury crashes occurred at locations where no marked crosswalk was available. VDOT completed its first Pedestrian Safety Action Plan (PSAP) in 2018, calling for improved guidance for pedestrian crossings at unsignalized locations. The PSAP reported countermeasures and mapped locations (<http://bit.ly/VDOTPSAP>) are identified as priorities for improving pedestrian safety.

This Memorandum provides consistent, uniform guidance to designers for determining when to install marked crosswalks, what type of crosswalk to install, and what other traffic control devices or geometric improvements should potentially be considered in conjunction with the marked crosswalk at unsignalized intersection approaches and unsignalized mid-block locations. Unsignalized intersections can include stop sign controlled, yield sign controlled, and uncontrolled approaches. Pedestrian accommodations include marked crosswalks as well as any facility, design feature, operational change, or maintenance activity that improves the environment in which pedestrians travel. Marked crosswalks, by themselves or in conjunction with other traffic control devices and other pedestrian accommodations, such as curb

1 ramps or landings, can provide important safety benefits for crossing pedestrians. However, studies¹
2 have demonstrated that marked crosswalks placed alone at unsignalized approaches across multi-lane
3 roadways with high vehicular AADTs are not sufficient without additional geometric pedestrian safety
4 improvements or other traffic control devices. High visibility crosswalks are more visible and provide a
5 longer perception distance allowing drivers to react.

6
7 This Memorandum updates IIM-TE 384.0 "Pedestrian Crossing Accommodations at Unsignalized
8 Locations" issued in 2016. This updated Memorandum includes substantial changes to IIM-TE-384.0.
9 Major revisions include provisions for marked crosswalks and corresponding countermeasures for multi-
10 lane roadways with posted speed limits at or over 45 miles per hour; new criteria for establishing the
11 need for a marked crosswalk; and updated guidance on the installation of high-visibility crosswalk
12 markings. This updated Memorandum provides additional guidance beyond what is in the [2009 Manual](#)
13 [on Uniform Traffic Control Devices](#) (MUTCD) and the [2011 Virginia Supplement to the MUTCD](#), latest
14 version. This document focuses on pedestrian crossing guidance for unsignalized intersection crossings
15 and mid-block crossings and should be used in conjunction with a separate IIM established for pedestrian
16 accommodations at signalized intersections.

17 **APPLICABLE PROJECTS and EFFECTIVE DATE**

18
19
20 **This IIM applies to all VDOT-maintained roads, and to crosswalks on locality-maintained roads**
21 **that are being constructed with state or federal funds.** This IIM does not apply to activities on locally
22 maintained streets that are not funded with state or federal funds, however localities must still construct
23 all crosswalk improvements in accordance with the MUTCD. Applicable projects include:

- 24 • New roadway construction projects (VDOT-administered or VDOT-funded)
- 25 • Roadway widening or improvement projects (VDOT-administered or VDOT-funded)
- 26 • Land development or locality-led projects requiring a VDOT land use permit
- 27 • Revenue-sharing projects on VDOT system

28
29 Application of this IIM is not required for other projects, such as maintenance and alteration activities.
30 However, if decisions regarding unsignalized pedestrian crossings are made as part of other VDOT
31 activities, then those decisions shall be made in accordance with this Memorandum. Table 1 summarizes
32 the effective dates for application of this updated IIM-TE-384.1.

33
34

¹ Zegeer, Charles V., et. al. *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations* (FHWA: 2009),
<http://www.fhwa.dot.gov/publications/research/safety/04100/>

Table 1: Project Applicability & Effective Dates

Project Type	Applicability & Effective Date
Land Use Permit Projects	This updated IIM shall be in effect for all projects where the first draft of the study that recommends proposed crossing treatment(s) has not yet been submitted to VDOT as of the date of issuance for this IIM.
VDOT Construction Projects	Design-Bid-Build: This updated IIM shall be in effect for all projects for which the Public Hearing plans have not yet been finalized as of the issuance date of this updated IIM. Design-Build or PPTA: This updated IIM shall be effective for all projects for which the RFQ has not yet been published as of the issuance date of this updated IIM.
All Projects	For any of the above-referenced projects that are in development beyond the stages noted as of this updated IIM issuance date, this updated IIM may be applied if desired by the permittee (for Land Use Permit projects) or VDOT project manager (for Construction Projects). Documentation shall be provided to support any change in recommendation based on the revised criteria in this updated IIM.

Public requests for crosswalks or other improvements are to be addressed as part of VDOT projects or activities, or as District funding resources allow for consideration and implementation. The focus of this Memorandum is crosswalk improvements. Please refer to the [VDOT Road Design Manual](#), Appendix A(1) and other IIMs and VDOT policies to determine if additional improvements related to the crosswalk are required. For additional information on application of this Memorandum, see VDOT's [IIM 384.1 Crosswalk Determination Form](#).

This Memorandum may be used, but is not required to be used, to proactively evaluate corridors or locations for potential crosswalk installation prior to the initiation of applicable project activities subject to this Memorandum. This Memorandum may be a resource for studies that include pedestrian crossing assessments in the study scope and when the proposed treatments are subsequently advancing to Project Implementation stages (reference Table 32 in this [VDOT Publication Traffic Operations and Safety Analysis Manual](#) for definitions and other information).

PROCESS FLOW CHART FOR DETERMINING APPROPRIATE PEDESTRIAN CROSSING ACCOMMODATIONS AT UNSIGNALIZED APPROACHES

The following flow chart illustrates a four-step process for determining if a marked crosswalk should be provided, whether other countermeasures are needed, and what type of marking pattern is used. Additional requirements for each step are explained in more detail in the following sections of this Memorandum. Crosswalk and countermeasure design should follow the most recent information found in the American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets, hereafter referred to as the "Green Book", and the [VDOT Road Design Manual](#).

PROCESS FLOW CHART FOR DETERMINING APPROPRIATE PEDESTRIAN CROSSING ACCOMMODATIONS AT UNSIGNALIZED APPROACHES

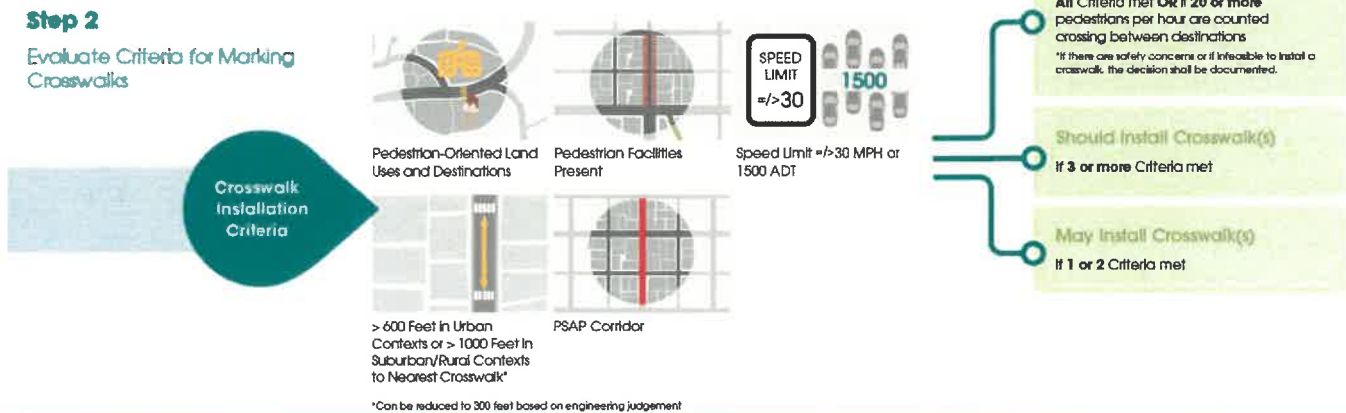
Step 1

Screen for Minimum Requirements



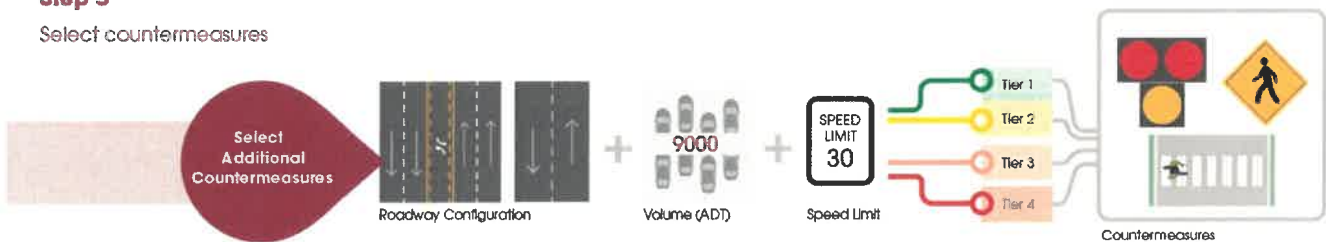
Step 2

Evaluate Criteria for Marking Crosswalks



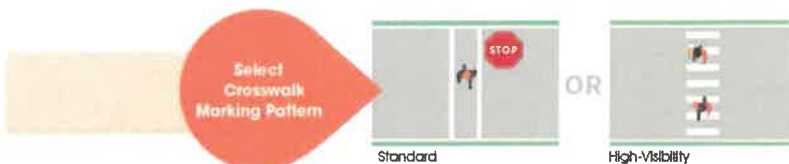
Step 3

Select countermeasures



Step 4

Select marking pattern for crosswalks



INSTALLATION OF MARKED CROSSWALKS AT UNSIGNALIZED APPROACHES

All unsignalized crossings at intersections and midblock locations within the bounds of applicable projects and activities are subject to this IIM. In general, sections of roadway outside of or between intersections are described as midblock locations. Crosswalks, whether marked or unmarked, at intersections without a traffic control signal are unsignalized crossings subject to this IIM. Intersections are defined in the [VDOT Road Design Manual](#) as the general area where two or more highways join or cross, and midblock locations are between intersections. Driveways are not considered intersections but may provide access to pedestrian-oriented land uses, and this IIM may be applied to those conditions.

Engineering judgement should be used to identify the potential candidate locations for individual crossings within the bounds of applicable projects and activities. The determination of these candidate locations should be based on pedestrian desire lines, field observations, and local input, in addition to the guidance in this Memorandum.

Crosswalks shall only be installed where a safety screening has been performed per Step 1, below. As such, all evaluations for a marked crosswalk shall first consider safety conditions of the candidate site. Locations that don't meet all of the safety screening requirements shall not be evaluated further for marked crosswalk installation. If a candidate location meets all of the safety screening requirements, it can then be further evaluated for the potential installation of a marked crosswalk per criteria described below in Steps 2 to 4 (See Process Flow Chart for Determining Appropriate Pedestrian Crossing Accommodations at Unsignalized Approaches on page 4).

An engineering study shall be performed under the following circumstances:

- At all midblock locations
- Where a PHB or RRFB is being considered for the crosswalk
- Where all of the safety screening (Step 1) requirements and all five of the crosswalk installation criteria (Step 2) are met at a location, but installing a crosswalk is considered infeasible.

An engineering study shall address each of the requirements and criteria within this Memorandum, to support the proposed recommendations. An engineering study may include traffic and pedestrian operations or in-depth crash analyses, depending on the potential implications of new traffic control devices or countermeasures. Engineering studies may also consider additional options, including or in addition to the countermeasures included in this IIM, that improve safety at crossings or restrict pedestrian crossing activity where crossing countermeasures are infeasible. The District Traffic Engineer or their designee is responsible for determining what conditions will be considered as part of the engineering study or evaluation. If the crossing locations pertain to a land use permit, the permit reviewer (Land Use Engineer) may conduct initial evaluations for the study location(s) prior to the DTE or designee's approval. Data collection templates may be used to facilitate crosswalk engineering studies, such as the [IIM 384.1 Crosswalk Determination Form](#).

Step 1: Screen for Minimum Requirements

Locations shall be screened, and all requirements met before any crosswalk can be installed at a candidate location. If any safety screening requirements are not met, a crosswalk shall not be installed, and no additional evaluation of the candidate location is necessary. When the safety screening is applied to a potential crosswalk location, adjacent sections of the corridor should also be reviewed to ensure that the best location for the potential crosswalk(s) is selected.

Marked crosswalks **may** be considered for installation at locations where **all** of the following safety screening requirements are true:

- The center of the area considered for a proposed crosswalk is at least 300 feet from the center of the closest marked crosswalk or signalized intersection stop bar. The closest marked crosswalk includes existing marked crosswalks, other marked crosswalks recommended for installation by this Memorandum, and the stop bar location at a signalized intersection (potential future signalized crosswalk location).
- Drivers have an unrestricted view* of the entire proposed crosswalk and entry points to the crosswalk, based on Stopping Sight Distance requirements. Sight distance calculations should follow the most recent information found in the AASHTO Policy on Geometric Design of Highways and Streets and [VDOT Road Design Manual](#). Pedestrians at the location of the proposed crosswalk should also have an unrestricted view of approaching vehicles, based on operating vehicle speed, traffic volumes and engineering judgement.
- If, based on the roadway configuration, operating speed, and traffic volume, the location falls into Tier 3 or Tier 4 (see Tables 3 and 4 of this ILM), other pedestrian safety countermeasures must already exist or must be provided at the time of the crosswalk installation. Implementation resources (i.e. capital project, SMART SCALE, HSIP) must be identified for additional countermeasures prior to installing crosswalks for Tier 3 or 4 locations.

*Unrestricted view should be equal to or exceeding the Stopping Sight Distance (SSD) requirements shown in **Table 2** and as per the latest effective version of [VDOT's Road Design Manual](#). If the sight distance requirements cannot be met and the crosswalk cannot be located at a place where sight distance requirements will be met, the crosswalk should not be installed except in conjunction with mitigation measures such as removing objects that obstruct sight distance, reduction of operating speed, or installation of PHB or RRFB. Special consideration should be made for locations where high pedestrian crossing is expected, such as at trail crossings and in urban contexts.

Table 2: Stopping Sight Distance Requirements Approaching Mid-Block Crosswalks or Crosswalks at Unsignalized Intersection Approaches (feet)

Operating Speed	Level Grade	Downgrades			Upgrades		
		-3%	-6%	-9%	+3%	+6%	+9%
25 mph	155	158	165	173	147	143	140
30 mph	200	205	215	227	200	184	179
35 mph	250	257	271	287	237	229	222
40 mph	305	315	333	354	289	278	269
45 mph	360	378	400	427	344	331	320
50 mph	425	446	474	507	405	388	375
55 mph	495	520	553	593	469	450	433
> 55 mph	<i>Crosswalks should not be marked across uncontrolled approaches with operating speeds greater than 55mph.</i>						

Source: This table is provided for convenience and is current as of November 2019, for the purposes of reviewing existing roadway conditions and crosswalks. For new construction, refer to Appendix A1 in the [VDOT Road Design Manual](#) to identify the correct values for stopping sight distance. Operating speed can refer to actual 85th percentile speed if speed data is available. Otherwise, operating speed can be estimated as the posted speed limit plus 7 mph or based on documented engineering judgment. For operating speeds not in 5 mph increments, users should interpolate from this table to find the minimum SSD requirements.

Step 2. Evaluate Criteria for Marking Crosswalks

Crosswalk installation criteria are used to determine whether or not a crosswalk is installed, after meeting the safety screening requirements in Step 1 (See Process Flow Chart for Determining Appropriate Pedestrian Crossing Accommodations at Unsignalized Approaches on page 4). The number of crosswalk installation criteria met after evaluation determines the requirements for installation of the crosswalk, as described below:

Crosswalks shall be installed when all crosswalk installation criteria are met or the location has 20 pedestrians or more per hour counted crossing between pedestrian-oriented land uses. Pedestrian counts are not required, but if collected, pedestrian counts should cover a section of corridor 200 to 300 feet in either direction from the location being reviewed for a new crosswalk. If there are safety concerns or other reasons why the crosswalk is not feasible, these shall be documented in an engineering study, and a crosswalk is not required.

Crosswalks should be installed where three or more of the crosswalk installation criteria are met.

Crosswalks may be installed where one or two crosswalk installation criteria are met.

Crosswalk Installation Criteria

There are five crosswalk installation criteria, for which more detail is provided in the sections that follow:

- A. Candidate location is located between two pedestrian-oriented land uses or destinations.
- B. Candidate location connects to at least one pedestrian facility or pedestrian access route.
- C. Candidate location is on a road with a posted speed limit equal to or greater than 30 mph OR on a road with more than 1,500 vehicles per day.
- D. Candidate location is more than 600 feet in urban contexts, or more than 1,000 feet in suburban or rural contexts, to the nearest crosswalk.
- E. Candidate location is on an identified Pedestrian Safety Action Plan (PSAP) priority corridor or within the functional area of an intersection within a PSAP crash cluster. (Refer to most current [VDOT PSAP location map](#))

In all cases, the [IIM 384.1 Crosswalk Determination Form](#) may be used to record determinations for these criteria. Additional documentation may be required where these criteria recommend marking a crosswalk(s) but an engineering study supports a decision to not mark a crosswalk(s) based on unsafe conditions or feasibility challenges.

Context is a key consideration for determining whether a location meets these criteria. Since the 7th edition of Green Book, a new approach for considering both functional and context classifications for designing roadways is included. The following describes each context classification (See section 1.5 for more information):

- Rural: Areas with lowest density, few houses or structures (widely dispersed or no residential, commercial, and industrial uses), and usually large setbacks.
- Rural Town: Areas with low density but diverse land uses with commercial main street character, potential for on-street parking and sidewalks, and small setbacks.
- Suburban: Areas with low to medium density, mixed land uses within and among structures (including mixed-use town centers, commercial corridors, and residential areas), and varied setbacks.
- Urban: Areas with high density, mixed land uses and prominent destinations, potential for some on-street parking and sidewalks, and mixed setbacks.
- Urban Core: Areas with highest density, mixed land uses within and among predominately high-rise structures, and small setbacks.

Criterion A: Pedestrian-Oriented Land Uses and Destinations

Pedestrian-oriented land uses and destinations, including transit stops, will generate pedestrian crossings regardless of whether a marked crosswalk exists or not. When pedestrian-oriented land uses exist adjacent to roadways where pedestrians are not prohibited, it is VDOT's policy to provide adequate pedestrian crossing opportunities and to direct pedestrians to those locations.

Pedestrian-oriented land uses and destinations include, but are not limited to, sidewalks, shared use paths, and trails; transit stops and rail stations; medium to high density residential; schools and university campuses; parks and recreation centers; hospitals and health centers; libraries and senior centers; shopping centers, convenience stores, and restaurants; hotels and tourist destinations; and parking garages and convention centers; and other pedestrian origins or destinations. For the purposes of this Memorandum, medium density residential development is approximately a minimum of 2 units per acre (gross number of housing units per acre).

These pedestrian-oriented land uses can be major generators for pedestrian trips where development density is high or where land uses are diverse. Pedestrians should be expected to cross roads where complimentary destinations (such as a hotel and restaurant) are sited on opposite sides of the roadway.

Pedestrians are more likely to walk along and cross the roadway where pedestrian-oriented land uses or destinations are visible and within close proximity. A ¼ mile distance between destinations is a frequently cited “walkable” distance and may indicate a higher pedestrian travel demand and need for marked crosswalks. However, pedestrian travel routes and travel may extend to land uses or destinations far beyond properties adjacent to the roadway. To the extent possible, marked crosswalks should match pedestrian desire lines by connecting pedestrian-oriented land uses using the shortest route that is practical. Additionally, District Land Use should request developers to consider strategic placement of developments and building entrances in locations to match pedestrian desire lines.

Installing marked crosswalks in areas where there is minimal likelihood of existing or future pedestrian activity (based on adjacent land uses) is not recommended. If pedestrian-oriented land uses do not currently exist on both sides of the roadway, the designer should consult with the District Planner, Land Use Engineer, and/or the locality to assess whether there is a potential for a pedestrian-oriented land use(s) in the near future. If the designer determines that future pedestrian-oriented land uses are planned, traffic control devices should be placed where they will not conflict with a future marked crosswalk.

Criterion B: Pedestrian Facility or Access Route

It is preferred that pedestrian facilities (such as sidewalks or shared use paths) or other pedestrian access routes parallel to the roadway be available on either end of a proposed crossing and along both sides of the roadway. However, pedestrian facilities or access routes on both sides of the roadway are not required to implement a crosswalk project. To satisfy this criterion, the crossing location should connect between at least one pedestrian facility or access route(s) and a pedestrian-oriented land use or transit service opposite the pedestrian access route.

Crosswalks may be considered in the absence of a pedestrian facility or access route on either side of the road in certain situations. The following conditions are examples of locations that may require a crosswalk, but don't include pedestrian facilities or access routes on both sides of the roadway. These locations should also be considered and prioritized for future sidewalk installation:

- A worn path or traversable shoulder is on one side of the roadway across from a pedestrian-oriented land use or transit stop(s).
- The side street approach(s) to the roadway connects to pedestrian-oriented land uses.
- The crossing is located at an accessible trail or shared use path crossing.

In accordance with the [VDOT Road Design Manual, Appendix A\(1\)](#), detectable warnings, and curb ramps or level landing areas, are required to communicate where the pedestrian is entering the roadway at a marked crosswalk.

If pedestrian facilities do not currently exist on both sides of the crossing, the designer should consult with the District Planner and/or locality to review plans for future pedestrian facilities. The District Traffic

1 Engineer should make final determination about the location of the crosswalk(s), consistent with planned
2 facilities on both approaches to the crosswalk.

3 4 *Criterion C: Speeds and Traffic Volumes*

5
6 Roads with a posted speed limit equal to or greater than 30 mph or where volumes exceed 1,500 vehicles
7 per day (AADT) pose more risk for severe injury pedestrian crashes. Marked crosswalks may be
8 considered for streets with lower posted limits, lower volume collector streets, or in non-residential areas
9 where pedestrians are expected or observed to cross frequently.

10 11 *Criterion D: Crosswalk Proximity*

12
13 Crosswalks should be placed in locations where drivers have opportunity to react and yield to a
14 pedestrian in the crosswalk, and in locations where pedestrians can be expected to cross. Pedestrians
15 are more likely to cross at a marked crosswalk that reduces time and increases their visibility when
16 travelling between destinations. Similarly, longer walking distances to marked crossings increase the
17 risks that pedestrians are willing to take to cross the roadway. Given the [MUTCD standard measure of](#)
18 [pedestrian walking speed of 3.5 ft/s](#), an additional 200 feet will add approximately one minute to a
19 pedestrian's travel time.

20
21 Per the Safety Screening Requirements in Step 1, candidate locations for crosswalks shall be more than
22 300 feet from the nearest crosswalk. Nearest crosswalk includes marked crosswalks at intersections and
23 midblock locations. This requirement does not limit the ability to mark a crosswalk on multiple legs of an
24 intersection. The distance between the candidate crossing location and the nearest intersection or
25 crosswalk should be no greater than 1000 feet. In urban contexts, the distance between the candidate
26 crossing and nearest crosswalks should be no greater than 600 feet, depending on block length. In
27 suburban or rural contexts, the distance between crosswalks will vary based on distance between
28 pedestrian-oriented land uses.

29
30 Crosswalk spacing should be determined where engineering judgement determines that the crossing(s)
31 are needed, based on destinations and context. Treatments that redirect pedestrian crossings (such as
32 landscaping or fences) may be considered where appropriate. The treatments shall be applied in
33 accordance with the [VDOT Road Design Manual](#).

34 35 *Criterion E: Pedestrian Safety Action Plan (PSAP) Corridors and Crash Clusters*

36
37 VDOT developed its first [PSAP](#) in 2018 to identify areas with significant pedestrian crash history and
38 corridors that bear characteristics of risk for pedestrian crashes (as determined by VDOT). Refer to the
39 most recently published version of the [PSAP](#) to identify crash clusters and priority corridors. Crossing
40 locations within crash clusters (within the functional area of intersections identified in a crash cluster) or
41 along priority corridors are key considerations for marking new crosswalks. The version of the PSAP that
42 is most recent at the time of initial draft study/design submittal may continue to be used for subsequent
43 submittals.

44 45 **Step 3. Select Additional Countermeasures**

46
47 Marked crosswalks across unsignalized approaches should be further evaluated for additional crossing
48 treatments or visibility enhancements at the crosswalk. The roadway configuration, posted speed limit,
49 and traffic volumes are important considerations when evaluating these treatments. Review those
50 conditions for the time when the crosswalk will be installed.

Engineering judgment is required to determine the number of approaches to an intersection that will be marked with a crosswalk. Table 3 includes a matrix identifying a recommended countermeasure per Tier for crosswalks at unsignalized approaches across undivided roadways (roads without a raised median) or single lane, one-way streets. Minimum requirements and recommended additional treatments are referenced per Tier below the matrix in Table 3. Table 4 includes a matrix identifying a recommended countermeasure per Tier for crosswalks at unsignalized approaches across roadways divided by a median or that are multi-lane, one-way streets. Minimum requirements and recommended additional treatments are referenced per Tier below the matrix in Table 4.

Tables 3 and 4 are informed by national guidance including [*Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations \(FHWA: 2009\)*](#) and the [*Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations \(FHWA: 2018\)*](#). On controlled approaches, the parallel facility speed and volume should also be a factor, especially the speed and volume of right and left-turning vehicles from the primary street.

Tables 3 and 4 identify required, recommended and optional countermeasures according to four (4) tier categories. Tier 1 includes countermeasures designed for roadways where drivers are more likely to yield to pedestrians in the crosswalk and crash risk is lowest. The tiers increase as countermeasures respond to conditions where the risk of pedestrian crashes or fatalities are highest, with Tier 4 including roadway configurations and conditions that may lead to increased crash risk. The countermeasures listed for each tier are listed in increasing order of effectiveness to reduce crash risk. The high-visibility crosswalk is recommended or required for most types of unsignalized crossings (per this IIM). Some countermeasures are installed in tandem with complimentary treatments or other countermeasures. For example, the in-street sign (R1-6) should be installed with refuge islands and raised crosswalks. Conversely, some treatments will be standalone, such as the PHB. Countermeasures recommended for the next highest Tier may be considered, per the findings of an engineering study.

By selecting Roadway Reconfiguration (Tiers 3 or 4), the decision-maker should consider the tier associated with the proposed roadway configuration (after a Roadway Reconfiguration would be implemented). For example, if the current configuration is a four-lane, undivided roadway, and the Roadway Reconfiguration is proposed as a three-lane (including a center turn lane); the proposed roadway configuration should be reviewed for recommended countermeasures, such as the refuge island.

Crossings located at Tier 3 or 4 locations require an engineering study to make final determination of countermeasures to be installed with the marked crosswalk. ADTs referenced in Tables 3 and 4 are based on the total volumes for all travel lanes associated with a combined roadway segment, as determined by VDOT. ADTs may be recorded separately for each direction of travel for a divided roadway. The designer should confirm the assignment of ADTs for divided roadways and combine ADTs for each direction of travel, as necessary. Tables 3 and 4 include reference to recommended countermeasures per Tier, and optional countermeasures that may be considered where the recommended is not appropriate to the context or site. The following notes explain each countermeasure and additional considerations for engineering review:

ADV: Advance yield markings and R1-5 signs (ADV). Advance yield markings and signs shall be used as per the MUTCD (3B.16).

PHB: Pedestrian Hybrid Beacon, should be installed with Refuge Island on 4- or 6- lane divided roads or 5-lane roads.

1 RD: Roadway Reconfiguration to 3-Lane or 2-lane divided roads, should be installed with Refuge
2 Island on Tier 3 or 4 roads. Refer to [FHWA and VDOT guidance for Roadway Reconfigurations \(Road](#)
3 [Diets\)](#) for additional considerations.
4
5 RI: Refuge Island should be installed with In Street Signs on 2-lane divided roads.
6
7 RRFB: Rectangular Rapid Flashing Beacon, should be installed with Refuge Island, where applied to
8 Tier 3 or 4 roads.
9
10 TC: Traffic Calming Measures, including raised crosswalks for roads with posted speed limit lower than
11 35 mph. Refer to [VDOT Traffic Calming Guide for Neighborhood Streets for more information and](#)
12 [specifications](#). Traffic calming measures and speed management techniques should be considered for
13 all locations, appropriate to the roadway type and development context. Speed management
14 techniques may be deployed along a corridor or at specific locations, using strategies such as
15 explained by [VDOT Bicycle and Pedestrian Treatments](#) resource information.
16
17 VE: Visibility Enhancements, including but not limited to In-street signs, parking restriction, or curb
18 extension. Parking restriction applies to roads with on street parking, and shall be used in compliance
19 with the MUTCD (2B and 3B). Curb extension may be used where on street parking or wide travel
20 lanes provide space.
21

Table 3: Recommendations for Considering Marked Crosswalks and Other Needed Pedestrian Improvements Across Unsignalized Approaches (Undivided/Single-Lane Roads)

Table 3 includes reference to the minimum and recommended countermeasures per Tier, and optional countermeasures that may be considered where the recommended is not appropriate to the context or site. Crossings located at Tier 3 or 4 locations require an engineering study to make final determination of countermeasures to be installed with the marked crosswalk.

Roadway Configuration (# is total N of lanes)		Roadway ADT and Speed Limit											
		1,500 to 9,000 VPD			9,000 to 12,000 VPD			12,000 to 15,000 VPD			More than 15,000 VPD		
		≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH*
Single lane, one-way street		VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC	VE/TC
2 Lanes (undivided two-way street)		VE/TC	VE/TC	VE/RRFB	VE/TC	VE/TC	VE/RRFB	VE/TC	VE/RRFB	VE/RRFB	VE/RRFB	VE/RRFB	PHB
3 Lanes (center turn lane)		VE/TC	VE/RI	RI/RRFB	VE/RI	RI/RRFB	RI/RRFB	RI/RRFB	RI/RRFB	PHB/RD	RI/RRFB	PHB/RD	PHB/RD
4 Lanes (two-way street without median)		RD/RRFB	RD/RRFB	PHB/RD	RD/RRFB	RD/RRFB	PHB/RD	RD/RRFB	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD
5 Lanes (center turn lane)		RD/RRFB	PHB/RD	PHB/RD	RD/RRFB	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD
6 Lanes+ (two-way street without median)*		PHB/RD	PHB/RD	PHB/RD	RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD	PHB/RD

*all 15,000 vpd lane roadways with speeds 45 and 55 mph = Tier 4

Tier 1

High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and consideration of the following:

Recommended: Visibility Enhancements (VE)

Optional, if Recommended is not appropriate: Traffic Calming Measures (TC)

Tier 2

High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and consideration of the following:

Recommended: Refuge Island (RI), and/or

Recommended: Rectangular Rapid Flashing Beacon (RRFB)

Optional, if Recommended is not appropriate: Visibility Enhancements (VE)

Optional, if Recommended is not appropriate: Advance yield markings and R1-5 signs (ADV)

Tier 3

High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and inclusion of one or more of the following:

Recommended: Roadway Reconfiguration (RD), and/or

Recommended: Pedestrian Hybrid Beacon (PHB)

Optional, if Recommended is not appropriate: Advance yield markings and R1-5 signs (ADV)

Optional, if Recommended is not appropriate: Rectangular Rapid Flashing Beacon (RRFB)

Tier 4

High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and inclusion of one or more of the following:

Recommended: Pedestrian Hybrid Beacon (PHB), and/or

Recommended: Roadway Reconfiguration (RD)

Optional, if Recommended is not appropriate: Review for Signal

Table 4: Recommendations for Considering Marked Crosswalks and Other Needed Pedestrian Improvements Across Unsignalized Approaches (Divided or One-Way Roads)

Table 4 includes reference to minimum and recommended countermeasures per Tier, and optional countermeasures that may be considered where the recommended is not appropriate to the context or site. Crossings located at Tier 3 or 4 locations require an engineering study to make final determination of countermeasures to be installed with the marked crosswalk.

Roadway Configuration (# is total N of lanes)		Roadway ADT and Speed Limit											
		1,500 to 9,000 VPD			9,000 to 12,000 VPD			12,000 to 15,000 VPD			More than 15,000 VPD		
		≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH	≤ 30 MPH	35 MPH	≥ 40 MPH*
2 Lanes with raised median		VE/TC	VE/RI	RRFB/RI	VE/TC	VE/RI	RRFB/RI	VE/RI	RRFB/RI	RRFB/RI	RRFB/RI	RRFB/RI	PHB
2 Lanes One-Way		VE/ADV	ADV/RRFB	RD/RRFB	VE/ADV	RD/RRFB	RD/PHB	ADV/RRFB	RD/RRFB	RD/PHB	RD/RRFB	RD/RRFB	RD/PHB
4 Lanes (two-way street with median)		RD/RRFB	RD/RRFB	RD/PHB	RD/RRFB	RD/RRFB	RD/PHB	RD/RRFB	RD/RRFB	RD/PHB	RD/RRFB	RD/PHB	RD/PHB
3 Lanes One-Way		RD/RRFB	RD/RRFB	RD/PHB	RD/RRFB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB
6+ Lanes (two-way street with median)		RD/RRFB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB	RD/PHB

Tier 1 High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and consideration of the following:
Recommended: Visibility Enhancements (VE)
Optional, if Recommended is not appropriate: Refuge Island (RI)
Optional, if Recommended is not appropriate: Traffic Calming Measures (TC)
Optional, if Recommended is not appropriate: Advance yield markings and R1-5 signs (ADV)

Tier 2 High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and consideration of the following:
Recommended: Rectangular Rapid Flashing Beacon (RRFB)
Optional, if Recommended is not appropriate: Refuge Island (RI)
Optional, if Recommended is not appropriate: Advance yield markings and R1-5 signs (ADV)

Tier 3 High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and inclusion of one or more of the following:
Recommended: Roadway Reconfiguration (RD), and/or
Recommended: Pedestrian Hybrid Beacon (PHB)
Optional, if Recommended is not appropriate: Advance yield markings and R1-5 signs (ADV) not to be considered for 5 or 6 lane roads.
Optional, if Recommended is not appropriate: Rectangular Rapid Flashing Beacon (RRFB) with Refuge Island on 4 lane divided roads.

Tier 4 High Visibility Crosswalk with W11-2, S1-1 (School), or W11-15 (Trail) signage is required and inclusion of one or more of the following:
Recommended: Pedestrian Hybrid Beacon (PHB), and/or
Recommended: Roadway Reconfiguration (RD)
Optional, if Recommended is not appropriate: Review for Signal

Step 4. Select Crosswalk Marking Pattern

Marked crosswalk patterns can be divided into two general categories: standard, transverse lines (two parallel lines) and high visibility crosswalks (HVCs). Standard, transverse lines crosswalks use the two parallel lines pattern. High-visibility crosswalks have bar-pairs or longitudinal lines. Permissible crosswalk marking patterns that may be used on VDOT-maintained roadways are shown Table 5.

According to [an FHWA study](#)², high-visibility crosswalks can have up to double the detection distance (for drivers approaching the crosswalk) compared to transverse or basic crosswalks - an 8 second increase in detection distance for a 30 mph approach. However, some high-visibility crosswalk marking materials can also become slick when wet, potentially resulting in a loss of traction for vehicles (particularly motorcyclists and bicyclists) in the travel lanes as well as for pedestrians crossing the crosswalk. High-visibility crosswalks can lose some of their enhanced effectiveness if they become worn by vehicle traffic. Consider long term maintenance when selecting crosswalk marking patterns.

A high-visibility crosswalk pattern **shall be** installed at all unsignalized crossings, with the exception of STOP controlled approaches. Standard, transverse lines (two parallel lines) crosswalks should be installed for STOP-controlled approaches, except where engineering judgment determines the need for high-visibility crosswalks.

Crosswalk markings shall be the same width as the pedestrian facility on either side of the roadway or at least six feet wide (per [MUTCD Section 3B.18 Crosswalk Markings](#)) Wider crosswalks than described above should be provided at locations with heavy pedestrian volumes during peak periods, to avoid creating situations where pedestrians are "crowded out" of the crosswalk.

² Fitzpatrick, K., et al. *Crosswalk Marking Field Visibility Study (FHWA: 2010)*, <http://www.fhwa.dot.gov/publications/research/safety/pedbike/10067/10067.pdf>

1 **Table 5 –Permissible Crosswalk Types on VDOT-maintained Roadways**

Type	Class	Design details	Sketch
Transverse Lines (two parallel lines)	Standard	- The transverse lines shall be between 6" and 12" in width. - Typically, VDOT uses 6" width, however 8", 10", or 12" widths can be used to increase the visibility of the lines.	
Longitudinal Lines ("continental")	High-Visibility	Longitudinal lines should be spaced to avoid the wheel paths of through vehicles.	
Bar Pairs	High-Visibility	- Identical to Longitudinal Lines crosswalk, but uses pairs of 8" lines with 8" gap (8/8/8 pattern) in lieu of a 24" longitudinal line. - Spacing between the 8/8/8 bar pairs shall be the same as the requirements of PM-3 for spacing between Longitudinal Lines. - The bar pairs should be spaced to avoid the wheel paths of through vehicles.	

2 *Source: Standard Drawing PM-3, VDOT 2016 Road and Bridge Standards*

3
4
5 Other high-visibility marking patterns, such as "ladder" or "zebra" markings, shall not be used except
6 when necessary to match the pattern of other adjacent marked crosswalks. **The recommended marking**
7 **pattern for high visibility crosswalks is the bar pair.**

8
9 Bar Pairs crosswalks have several advantages over Longitudinal Lines crosswalks:

- 10
- 11 • [An FHWA study](#) of the Bar Pairs pattern concluded that it behaves comparably with the Longitudinal Lines pattern in terms of driver recognition and behavior,
 - 12 • Similar cost as Longitudinal Lines crosswalks (although installation is slightly more complicated, the Bar Pairs crosswalk uses less marking material),
 - 13 • Easier for motorcyclist/bicyclist traffic to avoid traveling over the pavement marking material, which may be slippery when wet,
 - 14 • Easier for pedestrians to avoid stepping directly on the pavement marking material, which may be slippery.
- 15
16
17
18

19 If an existing standard crosswalk is upgraded to a high-visibility crosswalk independent of a roadway
20 resurfacing project, the transverse lines may be retained to eliminate the need for pavement marking
21 eradication. The transverse lines should not be restored when the roadway is resurfaced.

Aesthetic Treatments Between Crosswalk Lines

Aesthetic treatments do not meet high visibility crosswalk marking requirements unless retro-reflective materials are used with appropriate contrast. Aesthetic treatments are not eligible for HSIP or other project funds administered by VDOT.

Localities may request the use of aesthetic treatments, such as stamped concrete, brick pavers, or thermoplastic patterned inlays, between the crosswalk lines. Such requests will be evaluated as per the latest edition of L&D Instructional & Informational Memorandum [IIM-LD-218](#). Such aesthetic treatments by themselves do not constitute a marked crosswalk; they shall be edged by Standard, transverse (two parallel lines) white lines to legally establish the marked crosswalk and also to provide visual contrast between the pavement and the aesthetic treatment.

As per [Section 3G.01 of the 2009 MUTCD](#), aesthetic or colored pavement between crosswalk lines should not use colors or patterns that degrade the contrast of the white transverse crosswalk lines or that might be mistaken by road users as a traffic control application. In addition, as per [FHWA Official Interpretation 3\(09\)-24\(I\)](#), aesthetic treatments must consist of muted earth-tone colors, and cannot have random/unsystematic elements, pictographs, or multiple colors.

Additional Considerations for Unsignalized Crosswalks

Alternative intersections or interchange ramps, such as roundabouts and interchanges, have features that require additional consideration for pedestrian crossings. High visibility marked crosswalks shall be provided across all legs of a roundabout (both entrances and exits) where the location meets conditions described in Step 1 and 2 of this Memorandum. Note that neighborhood traffic circles that do not meet the design criteria for a modern roundabout (e.g. lack of splitter islands) are not required to include marked crosswalks. For information about interchanges with multiple merging and diverging ramps, refer to [NCHRP Research Report 948](#) and [VDOT Road Design Manual Appendix A\(3\)](#) for specific guidance.

References and Terms

KEY TERMS

crosswalk - the portion of roadway designated for pedestrians to use in crossing the street, including both marked and unmarked (implied) crosswalks

high-visibility crosswalk: a crosswalk marking pattern such as longitudinal lines (“continental”) or bar pairs

pedestrian access route – a continuous and unobstructed path of travel provided for pedestrians with disabilities within or coinciding with a pedestrian circulation path.

pedestrian crossing countermeasure(s) – safety treatments applied at crosswalks to increase driver yielding, pedestrian crossing compliance, or pedestrian visibility. Visual examples are available at [PEDSAFE \(Pedestrian Safety Guide and Countermeasure Selection System\)](#)

pedestrian facility – routes or access areas available for pedestrian travel outside the vehicle travelway between road crossings, including sidewalks, curb ramps, and wide shoulders.

standard crosswalk – a crosswalk marking pattern that consist of (2) parallel lines that are typically 6” in width, but can use 8”-12” widths

unsignalized approach – a part or leg of an intersection (of two roadways or a roadway and pedestrian facility) that is not controlled by a traffic signal

uncontrolled approach – a part of leg of an intersection (of two roadways or a roadway and pedestrian facility) that is not controlled by a regulatory sign (STOP or Yield) or traffic signal

uncontrolled crossing – a pedestrian crossing where the roadway approach is not controlled by a regulatory sign (STOP or Yield) or traffic signal

KEY REFERENCES

[2009 MUTCD with Revisions](#)

[2011 Virginia Supplement to the MUTCD With Revisions](#)

[VDOT Road Design Manual \(latest effective version\)](#)

[2016 VDOT Road and Bridge Standards](#)

[Instructional & Informational Memorandum IIM-LD-218, Latest Revision](#)

[FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations](#)

[FHWA Crosswalk Marking Field Visibility Study](#)

[VDOT PSAP](#)



WORK SESSION SUMMARY
October 7, 2024

AGENDA ITEM: 6

**Discussion and status of Charters of Freedom Project. (Director of
Community Development)**

SUMMARY:

- Please see attached memorandum from the Director of Community Development.



**Town of Orange
Department of Community Development**

119 Belleview Avenue, Orange, Virginia 22960 - 1401

Phone: (540) 672-6917 Fax: (540) 672-4435

Email – townplanner@townoforangeva.org

MEMORANDUM

TO: Mayor Roby and Town Council Members

FROM: John G. Cooley, Director of Community Development

DATE: 10-2-2024

SUBJECT: Update on Charters of Freedom Project

The Charters of Freed Project is inching closer to completion. The brick facia has been installed on the largest of the document pedestals. The Sterring Committee is readying another "Donation Request" letter to raise money to complete the following two projects:

1. Install the brick facia on the three remaining document pedestals as well as the Charters of Freedom Donor Plaque pedestals, and
2. Acid Stain of Epoxy paint retaining wall on three sides of the project.
3. Install the benches and planters

Once these two projects have been completed, The Charters of Freedom personnel will come install the documents, lights and clear covers. After the documents and lights are installed, the last item will be to determine when to hold the dedication.