

ARDENNES AVENUE AND CRAWFORD DRIVE INTERSECTION IMPROVEMENT REPORT

Ardennes Avenue and Crawford Drive Intersection

Twinbrook Safe Routes to School and Transit Access Feasibility Studies
City of Rockville Contract No. BCS 2017-01H

December 2024

Prepared For:

City of Rockville
111 Maryland Ave,
Rockville, Maryland 20850

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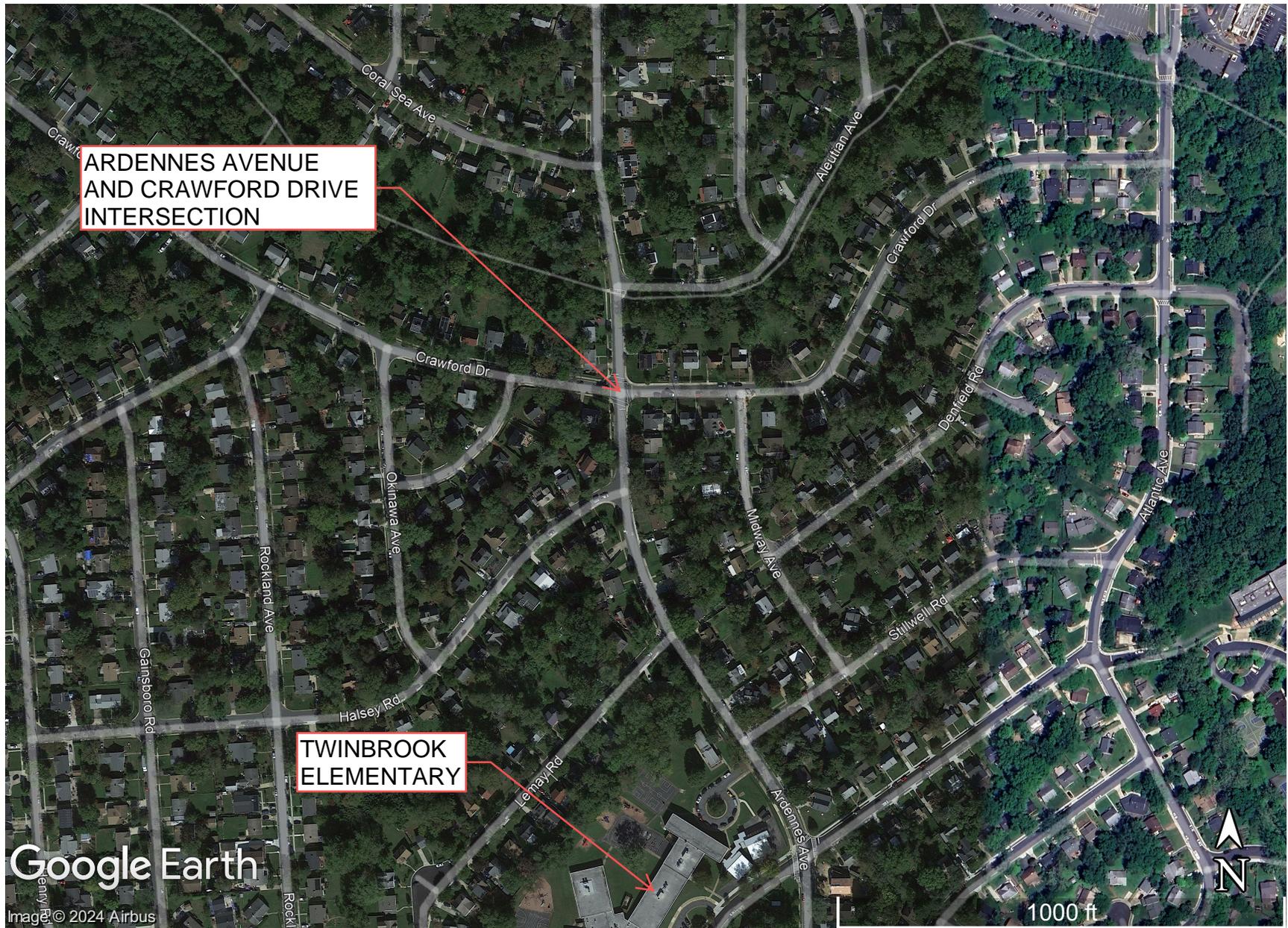
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FIGURE:

1. LOCATION MAP



ARDENNES AVENUE AND CRAWFORD DRIVE INTERSECTION
FIGURE 1: LOCATION MAP

I. PROJECT INTRODUCTION

This report has been prepared for the City of Rockville as part of the Vision Zero program, a priority initiative of the Mayor and Council that seeks to eliminate serious injuries and fatalities that result from traffic crashes. This program is multimodal and aims to improve roadway safety for pedestrians, bicyclists, transit users, and motorists. The Twinbrook Safe Routes to School and Transit Access study will identify opportunities to improve intersection safety for all modes of transportation, especially for trips to and from Twinbrook Elementary School and the Twinbrook Metro Station. The intersections studied included:

1. Ardennes Avenue and Crawford Drive
2. Ardennes Avenue and Halsey Road
3. Ardennes Avenue and Halpine Road
4. Ardennes Avenue and Ridgway Avenue
5. Ardennes Avenue and Wainwright Avenue
6. Chapman Avenue and Bouic Avenue
7. Chapman Avenue and Twinbrook Parkway
8. Lemay Road and Ridgway Avenue

Additionally, as a separate effort, this project evaluated the feasibility of constructing a sidewalk along several street segments in Twinbrook including:

1. Brooke Drive between Lewis Avenue and Rockland Avenue
2. Crawford Drive between Rockcrest Circle and Hillcrest Park
3. Crawford Drive between Atlantic Avenue and Ardennes Avenue
4. Halsey Road between Henry Road and Ardennes Avenue
5. Lemay Road between Vandegrift Avenue and Ardennes Avenue
6. Midway Avenue between Crawford Drive and Stillwell Road
7. Wade Avenue between Edmonston Drive and Crawford Drive

This project was funded by a MDOT Transportation Alternatives (TA) Program grant, and the improvements and cost estimate are proposed by the project team consisting of Mercado Consultants and AECOM.

II. PROJECT DESCRIPTION

This report discusses the feasibility of improvements at the intersection of Ardennes Avenue and Crawford Drive. Please see Appendix A for the recommended feasible safety upgrades and cost estimate.

III. DESIGN CRITERIA AND ASSUMPTIONS

The design criteria used for intersection improvements include both intersection and sidewalk aspects. Intersection design criteria come from the AASHTO Geometric Design of Highways and Streets. This reference document outlines specific elements affecting the performance of pedestrians at intersections. The elements outlined include sidewalk and crosswalk width, crossing distances, conflicting traffic volumes, speed and visibility of approaching traffic, turning speeds, permissive right-turn-on-red, permissive left-turn movements, crosswalk lighting, and accessibility for persons with disabilities. Improving these elements was explored within this study.

The Maryland Manual on Uniform Traffic Control Devices (MD MUTCD) was referenced for the proposed signs, placement, pavement markings, and traffic control devices applicable to improving the intersections studied. Specifically, the MD MUTCD was referenced for choosing advanced warning signs and sign placement. This document was also used for proposing crosswalks, upgrading crosswalk style, and pavement markings for the crosswalk and stop bar. The MD MUTCD was also used for verifying warrants for additional proposed traffic controls at the intersections.

The NACTO Urban Street Design Guide was also used as a reference for intersection upgrades. Various design techniques are outlined in this document which improve pedestrian safety and mobility across intersections.

The sidewalk criteria for the intersection came from the ADA Standards for Accessible Design and the recently adopted Public Right-of-Way Accessibility Guidelines. A 5-foot minimum width sidewalk was proposed to meet this standard. The acceptable running slopes on the ramps are 12:1 maximum, and the proposed landing pads are a minimum of 5-foot x 5-foot with a 48:1 maximum cross-slope. The depressed landing pads located at crossings contain a 2-foot-wide minimum detectable warning surface.

The buffer between the proposed sidewalk and back of curb was set to a 2-foot minimum but could vary to avoid tree and utility impacts. Any proposed sidewalk was also set to tie into existing sidewalk where applicable.

It was assumed the proposed sidewalk is entirely within the City of Rockville's right-of-way. Impacted fences, mailboxes, and other resident belongings located within the City of Rockville's right-of-way are to be relocated. Impacted steps or resident walkways are to be reconstructed to tie into the proposed sidewalk. Utility impacts such as inlets, fire hydrants, and utility poles were avoided.

The Fire Department Access Performance-Based Design Guide was also referenced for the intersection upgrades. This guide dictates the roadway clear width to be 20-feet minimum for emergency vehicles. The curb radius recommended at intersections is 25-feet minimum and was used to upgrade curb radii throughout the site.

The design vehicle recommended to be used to confirm turning movements for this intersection is a school bus (S-BUS-40) per the direction of the City of Rockville. It is also assumed the intersection will remain an all-way stop-controlled intersection with Crawford eastbound remaining one-way.

IV. EXISTING CONDITIONS

Ardennes Avenue is an undivided two-way road, classified by the city as a primary residential class 2 road. Crawford Drive is an undivided two-way road, classified by the city as a secondary residential road. The intersection of Ardennes Avenue and Crawford Drive is a four-way stop-controlled. The posted speed through the intersection is 25 MPH. This intersection is located 0.5 miles from Twinbrook Elementary School and 1.1 mile from the Twinbrook Metro Station.

Crawford Drive is one-way east of the Ardennes Avenue and Crawford Drive intersection. The Ardennes Avenue and Crawford Drive intersection has existing sidewalks on all quadrants of the intersection except the southeast quadrant where there is no sidewalk along Crawford Drive. There are existing utility poles on the southeast quadrant and existing inlets on the southeast and southwest quadrants.

The intersection and approaches are mostly level. The existing curb radii at this intersection are approximately 25-feet for all quadrants except the northwest quadrant which is greater.

Please see Appendix B for existing site photos.

V. CRASH DATA

There were no police-reported crashes at this location during the 2018-2022 study period.

VI. ALTERNATIVES CONSIDERED

Various strategies were considered for improving safety at the Ardennes Avenue and Crawford Drive intersection. Curb extensions or bulbouts are one effective traffic calming strategy that was considered for this intersection. This strategy is effective in slowing down traffic as it approaches the intersection because the roadway width is narrowed from its existing 25-feet to 20-feet. The crosswalk width is also decreased using this strategy. This strategy would require relocating the inlet in the southwest quadrant along the new proposed curblines and easements would be required for tying into the existing sidewalk.

Reducing curb radii is another effective strategy that can enhance pedestrian safety by forcing vehicles to slow down for turns.

Another safety improvement strategy that was considered is advanced warning signs on all approaches to the intersection. This simple method warns drivers of the upcoming pedestrian crosswalk ahead. This strategy works best in combination with upgrading all crosswalks to continental style crosswalks.

The project team also considered implementing double solid yellow pavement markings along Ardennes Avenue leading up to the Crawford intersection. Optional post-mounted delineators could be used along the proposed pavement markings to make sure drivers are not encroaching on vehicles headed in the opposite direction.

VII. PUBLIC INPUT

The in-person and virtual meeting to discuss proposed intersection improvements for all eight intersections took place on June 26th and July 1st, 2024. During these meetings improvements across all intersections were discussed and residents overall appeared to be in favor of the proposed improvements. The Twinbrook Community Association submitted formal comments. Please see Appendix C for comments and the project team's response.

VIII. RECOMMENDATIONS

The project team recommends upgrading all curb radii to 25-feet as a lower priority project, when budget resources permit. Quadrants with curb radii higher than 25-feet can promote higher turning speeds for motorists.

The crosswalks should be realigned to be more perpendicular and upgraded to continental style crosswalks for greater visibility. Double solid yellow pavement markings should also be used along Ardennes Avenue, the road with the higher classification, as currently there are no pavement markings along this road.

Advanced warning signs for the pedestrian crosswalk should be placed for the pedestrian crossing along Ardennes Avenue.

Lastly, the project team recommends a lighting survey to be conducted in the future for this intersection.

There are also no impacts outside of the City of Rockville's right-of-way for any of the recommended strategies. Easements are required to allow for the construction of a connection to the pre-existing sidewalk.

A. IMPACTS:

Easements required: 2

B. COST ESTIMATE:

Project cost was estimated using the unit cost method plus an overall 40% contingency to reflect the current level of study. Unit costs were gathered for proposed items and quantities were gathered. The unit costs used were derived from similar projects within Montgomery County. The approximate cost for constructing the recommended safety upgrades is \$58,000. Please see Appendix A for cost estimate breakdown.

IX. SUMMARY

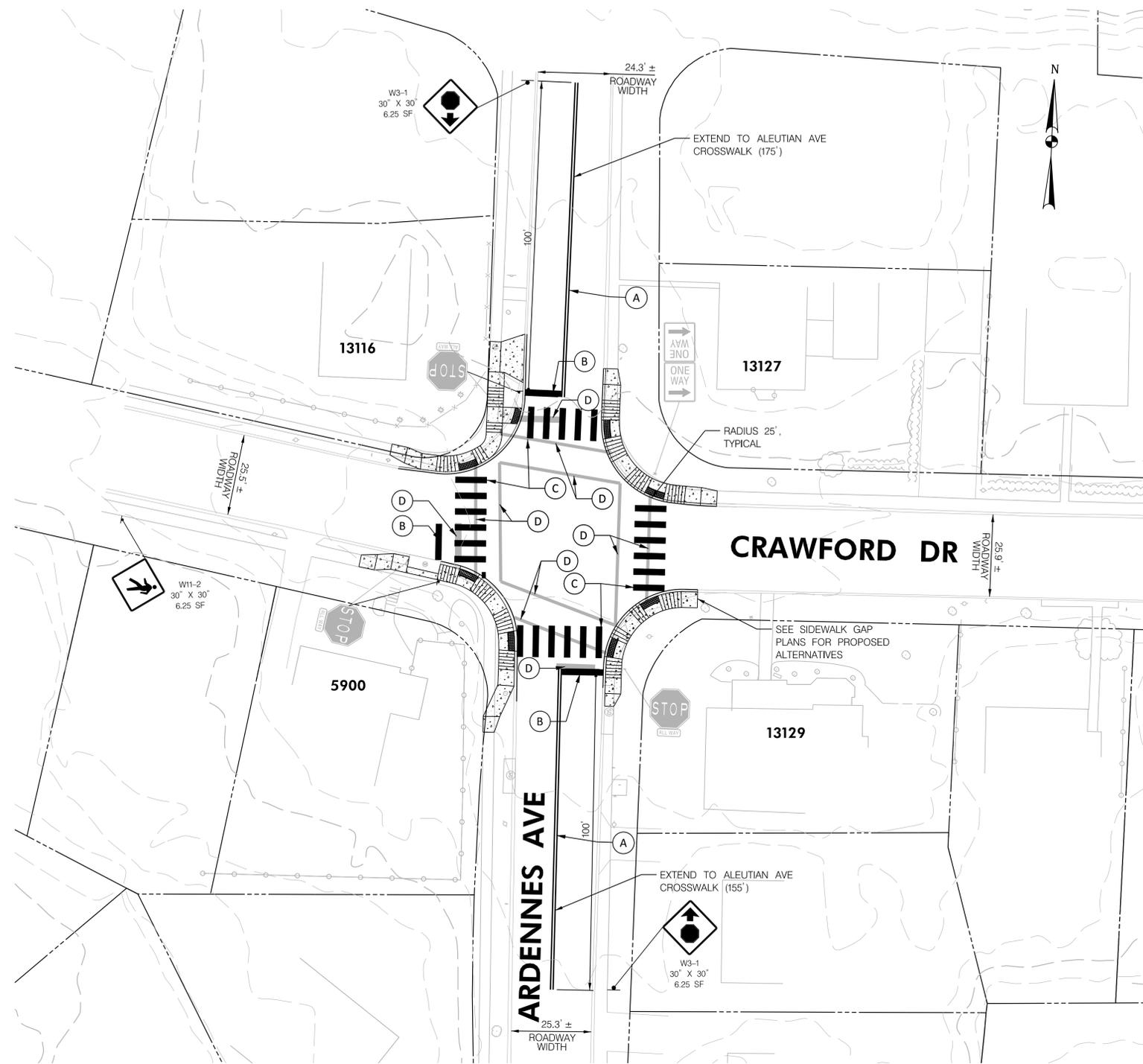
The project team proposes moving forward with several intersection improvement techniques for Ardennes Avenue and Crawford Drive. While feasible, the project team recommends upgrading the curb radii to 25-foot radii for each quadrant as a lower priority project to be carried out in a future fiscal year when budget resources permit.

The project team recommends upgrading the pavement markings at the crosswalks to the more visible continental style and making the crosswalks more perpendicular across the intersection.

The project team also finds it feasible to implement double yellow solid pavement markings along Ardennes Avenue and install advanced warning signs for the crosswalk along Ardennes Avenue. These upgrades should improve pedestrian safety across the Ardennes Avenue and Crawford Drive intersection.

APPENDIX A:

PLAN SHEET(S) AND ESTIMATE



LEGEND

- 5 INCH CONCRETE SIDEWALK
- CONCRETE REMOVAL
- 8 INCH PORTLAND CEMENT CONCRETE DRIVEWAY
- 8 INCH ASPHALT DRIVEWAY
- DETECTABLE WARNING SURFACE
- NEW CURB
- APPROX. RIGHT OF WAY
- ADA RAMP
- PROPOSED SIGN
- EXISTING SIGN TO REMAIN

SIGNING AND PAVEMENT MARKING LEGEND

- (A) 5 INCH DOUBLE YELLOW THERMOPLASTIC PAVEMENT MARKINGS
- (B) 24 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS
- (C) 24 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS (SPACING: 20-36 INCH, TYPICAL 36 INCH)
- (D) REMOVAL OF EXISTING PAVEMENT MARKINGS

- NOTE: 1. ALL SIGNING AND MARKING SHALL BE DONE IN ACCORDANCE WITH THE LATEST VERSION OF THE MARYLAND MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MD MUTCD), MARYLAND'S STATE HIGHWAY ADMINISTRATION'S BOOK OF STANDARDS, SPECIFICATIONS, AND GUIDELINES.
2. ALL PAVEMENT MARKING SHALL BE DONE USING THERMOPLASTIC MATERIALS.
3. STOP LINES SHALL BE 24 INCH WIDE USING THERMOPLASTIC MATERIAL. THE SPACING BETWEEN THE STOP LINE AND THE CROSSWALK MARKING SHALL BE 4 FEET AT A MINIMUM.
4. SIGN HEIGHT SHALL BE MINIMUM 7 FEET FROM THE BOTTOM OF THE SIGN FACE TO THE GROUND.
5. FOR SIGN POST, USE EITHER 2# GALVANIZED U CHANNEL POSTS OR GALVANIZED BREAKAWAY TUBULAR STEEL SIGN POSTS BASED ON THE MD SHA STANDARD MD-802.04



DEPARTMENT OF PUBLIC WORKS
CITY OF
ROCKVILLE
111 MARYLAND AVE. ROCKVILLE, MARYLAND

NOTE: 1. TOPOGRAPHY BASED ON MOBILE LIDAR SCAN
2. DESIGN VEHICLE FOR THIS INTERSECTION IS A SCHOOL BUS (S-BUS-40).



INTERSECTION IMPROVEMENT PLAN
ARDENNES AVE-CRAWFORD DR INTERSECTION

TWINBROOK SAFE ROUTES TO SCHOOL AND TRANSIT
ACCESS FEASIBILITY STUDIES
City of Rockville, Maryland

DATE SUBMITTED: 12/2024	SCALE 1"=20'	SHEET NO. 1 OF 1
CONTRACT NO. BCS 2017-01H		

DRAFT



Engineer's Cost Estimate

Contract No. BCS 2017-01H
 Twinbrook Safe Routes to School and
 Transit Access Feasibility Studies
 Ardennes Avenue and Crawford Drive Intersection
 December 16, 2024

ITEM NO.	CATEGORY CODE	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
CATEGORY 1						
		MAINTENANCE OF TRAFFIC	LS	1	\$5,000.00	5,000.00
		REMOVAL OF EXISTING PAVEMENT LINE MARKINGS, ANY WIDTH	LF	340	\$1.00	340.00
CATEGORY 1 TOTAL						\$5,340.00
CATEGORY 2						
		CLASS 1 EXCAVATION	CY	23	\$60.00	\$1,380.00
CATEGORY 2 TOTAL						\$1,380.00
CATEGORY 3						
CATEGORY 3 TOTAL						\$0.00
CATEGORY 4						
CATEGORY 4 TOTAL						\$0.00
CATEGORY 5						
		5 INCH YELLOW THERMOPLASTIC PAVEMENT MARKINGS	LF	660	\$3.00	\$1,980.00
		24 INCH WHITE THERMOPLASTIC PAVEMENT MARKINGS	LF	298	\$5.00	\$1,490.00
CATEGORY 5 TOTAL						\$3,470.00
CATEGORY 6						
		5 INCH CONCRETE FOR SIDEWALK	CY	20	\$650.00	\$13,000.00
		7 INCH CONCRETE FOR DRIVEWAY	CY	3	\$650.00	\$1,950.00
		TYPE A COMBINATION CURB AND GUTTER ANY HEIGHT OR DEPTH	LF	250	\$60.00	\$15,000.00
CATEGORY 6 TOTAL						\$29,950.00
CATEGORY 7						
CATEGORY 7 TOTAL						\$0.00
CATEGORY 8						
		SHEET ALUMINUM SIGN	SF	19	\$45.00	855.00
		RELOCATE SIGN	SF	13	\$30.00	390.00
CATEGORY 8 TOTAL						\$1,245.00
SUBTOTAL						\$41,385.00
40% CONTINGENCY						\$16,554.00
TOTAL						\$57,939.00

APPENDIX B:

SITE PHOTOS



West of Ardennes Avenue and Crawford Drive Intersection – Looking Northeast



West of Ardennes Avenue and Crawford Drive Intersection – Looking Southeast



East of Ardennes Avenue and Crawford Drive Intersection – Looking Northwest



East of Ardennes Avenue and Crawford Drive Intersection – Looking Southwest

APPENDIX C:

RESIDENT COMMENTS AND RESPONSES



TCA Support for Safe Routes to School

July 5, 2024

City of Rockville
111 Maryland Avenue
Rockville, MD 20850

Dear Bryan Barnett-Woods,

On behalf of the Twinbrook Community Association, I am writing to express our strong support for the city's "Safe Routes to School" project. We commend your efforts to enhance pedestrian safety at targeted intersections in Twinbrook, which will greatly benefit our community's residents, particularly our children.

We are pleased to see the city taking proactive steps to improve road safety and encourage walking and cycling to school.

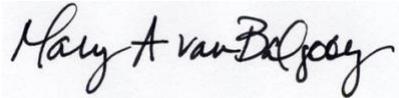
While we fully support the current plans, we would like to respectfully suggest a few additional considerations that we believe would further enhance the project's impact:

1. **Mini Traffic Circle:** We propose the installation of a mini traffic circle at the intersection of Halpine Road and Ardennes Avenue. This would help calm traffic and improve safety at this busy intersection, which is frequently used by students. If possible, the mini circle should incorporate landscaping (e.g. potted plants/trees and/or public art).
2. **Pedestrian-Level Lighting Assessment:** We request a comprehensive assessment of pedestrian-level lighting at all intersections being studied under this project. Adequate lighting is crucial for pedestrian visibility and safety, especially during early morning and evening hours when many students are traveling to and from school-related activities. This would serve as an additional benefit for low-wage workers traveling during off-peak work hours.
3. **Slip Lane Elimination:** We strongly advocate for the elimination of the slip lane on the northwest corner of Twinbrook Parkway and Chapman Avenue. Removing this slip lane would significantly improve pedestrian safety by reducing vehicle speeds and decreasing the number of pedestrian vehicle conflict points.

The Twinbrook Community Association is committed to working collaboratively with the City of Rockville to ensure the success of this important project. We would be happy to provide any additional input or assistance as needed.

Thank you for your consideration of these suggestions and for your ongoing commitment to improving pedestrian safety in our community. We look forward to seeing the positive impact of the “Safe Routes to School” project in Twinbrook.

Sincerely,

A handwritten signature in black ink, reading "Mary A. van Balgooy". The signature is written in a cursive style with a light gray background behind it.

Mary A. van Balgooy
President, Twinbrook Community Association

In response to the Twinbrook Community Associate comments please see below

1. A mini-traffic circle is only recommended for intersections without stop-control. The intersection of Halpine Road and Ardennes Avenue is an all-way stop control intersection, and has a stop sign on each leg of the intersection. Motorists are required to make a complete stop at this intersection. Staff has reached out to Rockville City Police Department to provide additional traffic enforcement at this intersection.
2. The Transportation Alternatives project did not include an assessment of lighting conditions. Most of the streetlights in Twinbrook are owned and maintained by Pepco. Staff will separately request Pepco to evaluate lighting levels at each intersection.
3. A comprehensive traffic study was not included to evaluate whether the northeast slip lane could be removed. However, the post for the existing signals is installed on the northeast corner refuge island and would require relocation to the new corner if the slip lane were removed. This would be too expensive to implement without being a separate CIP item. Additionally, this intersection is currently subject to an adequacy evaluation and improvements per a county development. Staff is coordinating with MNCPPC regarding this project.