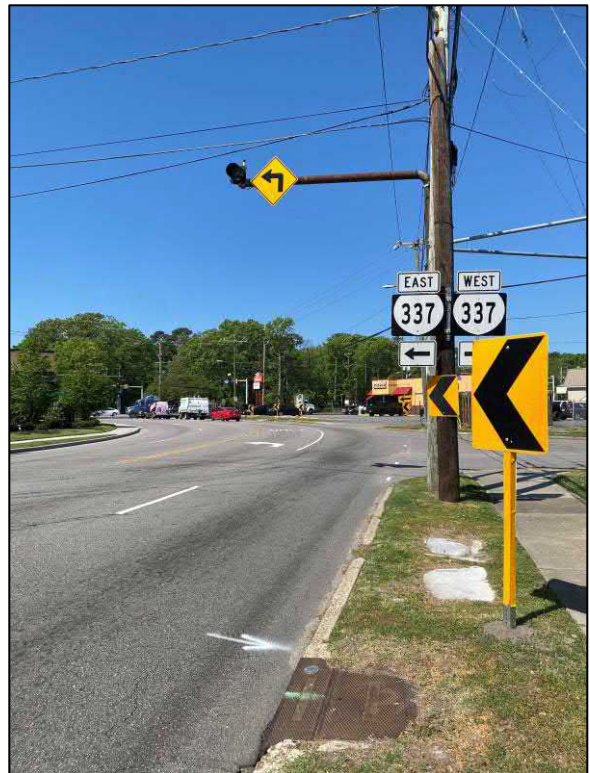


W LITTLE CREEK RD AT HAMPTON BLVD CURVE WARNING IMPROVEMENTS



July 2023
FINAL

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1 INTRODUCTION

The City of Norfolk requested planning-level concepts be developed to eliminate or reduce the run-off-road crashes along westbound W Little Creek Road at the curve approaching Hampton Blvd. This project also includes developing concepts at the intersection of W Little Creek Road at Gleneagles Road / Maury Arch to better channelize traffic approaching the intersection of W Little Creek Road and Hampton Blvd.

The existing project study areas are as follows and illustrated in **Figure 1-1**:

1. W Little Creek Road curve approaching Hampton Blvd
2. Gleneagles Road at W Little Creek Road and Maury Arch

FIGURE 1-1. PROJECT STUDY AREAS



Existing conditions at each study area were examined and a field investigation was performed on Wednesday, April 19, 2023. The concepts developed by WSP following the field investigation are depicted in the Appendix and discussed herein. Summary cost estimates for improvements at each study area were developed and are presented throughout the report. Each study area concept includes a full concept drawing and detailed item cost breakdown in the Appendix.

2 W LITTLE CREEK ROAD APPROACHING HAMPTON BLVD

2.1 Existing Conditions Evaluation

W Little Creek Road is a four-lane roadway classified as a Minor Arterial with a posted speed limit of 35 mph. W Little Creek Road measures forty-four (44) feet across throughout the project corridor and intersects with Hampton Boulevard about one hundred (100) feet west of the curve. The W Little Creek Road intersection approach measures fifty-seven (57) feet across with one (1) left turn lane, one (1) through/left turn lane, one (1) right turn lane, and two (2) receiving lanes. Each lane measures ten (10) feet and a striped gore channelizing the right turn lane measures seven (7) feet.

A commercial driveway for the Popeye's at 7700 Hampton Blvd is located on the north side of W Little Creek Road near the beginning of the curve. The parking lot of the business has a six (6) inch concrete curb-like retaining wall in poor condition separating the parking lot from the sidewalk as shown in Figure 2-1. Existing wall is 10' off the face of curb, According to VDOT Road Design Standards, Appendix A2, the clear zone distance is 14'. Harrison Road, as shown in Figure 2-1 meets in a Y-intersection with W Little Creek Road on the north side in a forty-five-degree angle at the point of curvature. White dotted lane lines (2' line with 8' gap) define the curve along W Little Creek Road across the intersection.

FIGURE 2-1. EXISTING FIELD CONDITIONS



Norfolk Fire Rescue Station 12 is located about one hundred and thirty (130) feet from the point of curvature on the south side of W Little Creek Road. The station is indicated with signals, signs, and Do Not Block the Box pavement markings. The corridor is observed as having moderate pedestrian traffic, with primarily commercial uses in the study area.

Multiple incidents of roadway departure crashes into the business at 7700 Hampton Blvd have been reported, including the most recent crash in June 2022 in which a vehicle ran off the road and crashed into the Popeye's restaurant. The alignment of Harrison Road and the business driveway within the curve do not allow critical space necessary for sufficient delineation. As a result, existing warning signs are not located with the recommended perception-response time or do not offer enough visibility to provide adequate warning. Existing delineation for the curve includes six (6) chevron signs, two (2) advanced curve warning signs, one (1) advisory speed sign, and one (1) continuous overhead flashing beacon. The westbound approach to the curve is shown in **Figure 2-2**.

FIGURE 2-2. WESTBOUND APPROACH TO W LITTLE CREEK ROAD CURVE



2.2 Proposed Alternative Concepts

Three alternative concepts were developed to improve visibility and delineation of the curve to enhance driver awareness and reaction to the curve through the use of roadway design, traffic design, as well as Intelligent Transportation Systems (ITS) elements. Each alternative is comprised of a number of elements that work together to better delineate and emphasize the warning approaching the curve.

Both alternatives include the implementation of a Dynamic Curve Warning System, which is a set of ITS devices intended to reduce the frequency of curve-related crashes by increasing visible cues of approaching curves. The proposed dynamic curve warning system consists of a series of flashing LED-beacon chevron signs activated by a Pole Mounted Speed Display (PMSD) placed in advance of the curve. A PMSD combines the regulatory or advisory speed limit sign with a radar speed feedback sign that displays the real-time, dynamic display of a driver's vehicular speed to indicate their actual speed in relation to the posted speed limit or advisory speed. These signs provide a mechanism to reduce vehicle speeds at locations where driving the posted speed or advisory speed limit is particularly critical. The dynamic curve warning system can draw power from standalone solar panel units or a traditional power source via wiring. Example dynamic curve warning system signs are illustrated in Figure 2-3.

FIGURE 2-3. EXAMPLE DYNAMIC CURVE WARNING SYSTEM SIGNS



Alternative 1

The location of the driveway at the beginning of the curve is a major element of the safety issues at this location. This driveway may visually appear to be a continuation of the roadway and unintentionally permits vehicles to exit the roadway if they miss the curve. Closing the driveway is an option to consider reducing the number or severity of run-off-road crashes, however, this impacts partial access to the business.

Alternative 1 includes the following items and is shown in Figure 2-4, with more detailed concept drawings provided in Appendix A.

FIGURE 2-4. EXISTING VS. PROPOSED W LITTLE CREEK ROAD AT HAMPTON BLVD – ALTERNATIVE 1



- The major element for this alternative proposes relocating the driveway to the adjacent lot on Harrison Road. Records indicate the adjacent Harrison Road lot and 7700 Hampton Blvd lot are both owned by the same titleholder. The existing driveway will be closed with curb, gutter, sidewalk, and green space to provide delineation of the travel way.
- Curb extension geometric improvements at Harrison Road help to reduce the pavement width to visually emphasize roadway limits and to enable sign placement at the beginning of the curve. This curb extension at Harrison Road will assist in providing a ninety-degree approach angle at the intersection. This improvement will shorten the crossing for pedestrians as well as provide better protection for the utility pole located just east of the driveway that has been struck by run-off-road vehicles multiple times.
- Replace the existing deteriorated curb along the curve with curb and gutter.
- Add enhanced and oversized pavement markings along the curve. Standard pavement marking widths are typically 4", however 6" width markings may be used to emphasize the edge of pavement. All curb and gutter are marked with six inch (6") solid white reflective pavement marking and six inch (6") dotted white reflective pavement marking crossing Harrison Road. Pavement markings on the W Little Creek Road intersection approach to Hampton Boulevard will be restriped to maintain minimum lane widths.
- Replace the existing concrete curb-like retaining wall separating the parking lot from the sidewalk. The existing damaged wall is located within the 14' clear zone for a design speed of 40mph. The height, type, and details of the retaining wall would be determined during design in

order to address the purpose and functionality of the wall as well as design conformance to clear zone requirements.

- Add a Dynamic Curve Warning System. Place the PMSD prior to the curve far enough in advance to provide the recommended perception-response time. Install PMSD-activated LED-flashing beacon chevron signs with reflective yellow posts along the curve and within the Harrison Road curb extension area.

Cost Estimate

The cost of improving W Little Creek Road at Hampton Blvd – Alternative 1 is shown in **Table 2-1** as a summary estimate. Detailed item estimates are shown in Appendix B.

TABLE 2-1. W LITTLE CREEK ROAD AT HAMPTON BLVD – ALTERNATIVE 1 COST ESTIMATE

ITEM	COST
General Requirements	\$27,304
Roadway Improvements	\$57,775
Traffic Improvements	\$45,746
40% MOT CONTINGENCY	\$41,408
5% EROSION AND SEDIMENT CONTROL CONTINGENCY	\$5,176
20% STORMWATER MANAGEMENT CONTINGENCY	\$20,704
CONSTRUCTION SUBTOTAL	\$198,114
25% GENERAL CONTINGENCY	\$49,528
CONSTRUCTION TOTAL	\$247,642

NOTES:
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS

Alternative 2

Alternative 2 proposes maintaining the existing driveway and modifying other elements intended to reduce the number and severity of run-off-road crashes. Alternative 2 includes the following items and is shown in Figure 2-4, with more detailed concept drawings provided in Appendix A.

FIGURE 2-5. EXISTING VS. PROPOSED W LITTLE CREEK ROAD AT HAMPTON BLVD – ALTERNATIVE 2



- Install a parking lot median island with curb and gutter on the west side of the Popeye's entrance to provide better driveway delineation and provide a secondary barrier for run-off-road crashes. At a minimum, this island could be constructed within the area adjacent to the first parking space (as shown in the concept drawing). However, this island could also be constructed wider to include the area within the first parking space. This median island could be landscaped with low shrubs to provide additional vertical visual emphasis of the driveway.
- Curb extension geometric improvements at Harrison Road help to reduce the pavement width to visually emphasize roadway limits and to enable sign placement at the beginning of the curve. This curb extension at Harrison Road will assist in providing a ninety-degree approach angle at the intersection. This improvement will shorten the crossing for pedestrians as well as provide better protection for the utility pole located just east of the driveway that has been struck by run-off-road vehicles multiple times.
- Replace the existing deteriorated curb along the curve with curb and gutter.
- Add enhanced and oversized pavement markings along the curve. Standard pavement marking widths are typically 4", however 6" width markings may be used to emphasize the edge of pavement. All curb and gutter are marked with six inch (6") solid white reflective pavement marking and six inch (6") dotted white reflective pavement marking crossing Harrison Road. Pavement markings on the W Little Creek Road intersection approach to Hampton Boulevard will be restriped to maintain minimum lane widths.
- Replace the existing concrete curb-like retaining wall separating the parking lot from the sidewalk. The existing damaged wall is located within the 14' clear zone for a design speed of 40mph. The height, type, and details of the retaining wall would be determined during design in order to address the purpose and functionality of the wall as well as design conformance to clear zone requirements.

- Add a Dynamic Curve Warning System. Place the PMSD prior to the curve far enough in advance to provide the recommended perception-response time. Install PMSD-activated LED-flashing beacon chevron signs with reflective yellow posts along the curve and within the Harrison Road curb extension area.

Cost Estimate

The cost of improving the W Little Creek Road Curve Warning – Alternative 2 is shown in **Table 2-2** as a summary estimate. Detailed item estimates are shown in Appendix B.

TABLE 2-2. W LITTLE CREEK ROAD AT HAMPTON BLVD – ALTERNATIVE 2 COST ESTIMATE

ITEM	COST
General Requirements	\$ 24,870
Roadway Improvements	\$31,109
Traffic Improvements	\$43,826
40% MOT CONTINGENCY	\$29,974
5% EROSION AND SEDIMENT CONTROL CONTINGENCY	\$3,747
30% STORMWATER MANAGEMENT CONTINGENCY	\$22,481
CONSTRUCTION SUBTOTAL	\$156,007
25% GENERAL CONTINGENCY	\$39,002
CONSTRUCTION TOTAL	\$195,009

NOTES:
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS

Alternative 3

Alternative 3 proposes maintaining the existing driveway and modifying other elements intended to reduce the number and severity of run-off-road crashes. Alternative 3 is similar to Alternative 2, but also includes improvements on the Popeye's property. The major element for this alternative involves creating a landscaped island/buffer area on the Popeye's property to create a visual and physical vertical delineation of the curve. Alternative 3 includes the following items and is shown in Figure 2-6, with more detailed concept drawings provided in Appendix A.

FIGURE 2-6. EXISTING VS. PROPOSED W LITTLE CREEK ROAD AT HAMPTON BLVD – ALTERNATIVE 3



- A landscaped island/buffer area will be provided between the existing sidewalk and parking lot, which will provide a buffer and separation from traffic and enable the removal of the damaged curb-like retaining wall. This area can be planted with low-to-medium height shrubbery which may provide a more vertical visual emphasis on the curve.
- In order to accommodate the landscaped area, parking spaces will be restriped towards the drive aisle, while still maintaining adequate drive aisle dimensions. The existing parking lot exceeds minimum standards and can accommodate a reduction in drive aisle width.
- The parking lot restriping and proposed buffer area is on private property, the private owner will need to agree to complete these improvements or provide the City of Norfolk right of way to make these improvements.
- Curb extension geometric improvements at Harrison Road help to reduce the pavement width to visually emphasize roadway limits and to enable sign placement at the beginning of the curve. This curb extension at Harrison Road will assist in providing a ninety-degree approach angle at the intersection. This improvement will shorten the crossing for pedestrians as well as provide better protection for the utility pole located just east of the driveway that has been struck by run-off-road vehicles multiple times.
- Replace the existing deteriorated curb along the curve with curb and gutter.
- Add enhanced and oversized pavement markings along the curve. Standard pavement marking widths are typically 4", however 6" width markings may be used to emphasize the edge of pavement. All curb and gutter are marked with six inch (6") solid white reflective pavement marking and six inch (6") dotted white reflective pavement marking crossing Harrison Road.

Pavement markings on the W Little Creek Road intersection approach to Hampton Boulevard will be restriped to maintain minimum lane widths.

- Remove the damaged concrete curb-like retaining wall separating the parking lot from the sidewalk.
- Add a Dynamic Curve Warning System. Place the PMSD prior to the curve far enough in advance to provide the recommended perception-response time. Install PMSD-activated LED-flashing beacon chevron signs with reflective yellow posts along the curve and within the Harrison Road curb extension area.

Cost Estimate

The cost of improving the W Little Creek Road Curve Warning – Alternative 3 is shown in **Table 2-3** as a summary estimate. Detailed item estimates are shown in Appendix B.

TABLE 2-3. W LITTLE CREEK ROAD AT HAMPTON BLVD – ALTERNATIVE 3 COST ESTIMATE

ITEM	COST
General Requirements	\$24,989
Roadway Improvements	\$31,634
Traffic Improvements	\$44,618
40% MOT CONTINGENCY	\$30,501
5% EROSION AND SEDIMENT CONTROL CONTINGENCY	\$3,813
30% STORMWATER MANAGEMENT CONTINGENCY	\$22,876
CONSTRUCTION SUBTOTAL	\$158,431
25% GENERAL CONTINGENCY	\$39,608
CONSTRUCTION TOTAL	\$198,038

NOTES:
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS

3 GLENEAGLES ROAD AT W LITTLE CREEK ROAD AND MAURY ARCH

3.1 Existing Conditions Evaluation

W Little Creek Road at Gleneagles Road and Maury Arch is a three-leg intersection located seventy-five (75) feet from the Hampton Boulevard and W Little Creek Road signalized intersection. Gleneagles Road and Maury Arch are both residential roadways with a posted speed limit of 25 mph. Gleneagles Road measures twenty-four (24) feet across. Maury Arch measures twenty-two (22) feet across. Both roadways meet at an eighty-four (84) foot wide intersection. The existing intersection does not provide adequate guidance for drivers; the intersection is unmarked and lacking traffic regulatory signs since none of the approaches includes a stop or yield sign. The study area includes two (2) residential driveways. The approaches of both roadways to the intersection are shown in **Figure 3-1**.

FIGURE 3-1. APPROACH TO W LITTLE CREEK RD /GLENEAGLES RD / MAURY ARCH INTERSECTION



3.2 Proposed Alternative Concepts

Two alternative concepts were developed to provide driver channelization and right-of-way guidance. Each alternative also includes landscaped green space, which enhances the traffic calming effect and beautifies the street.

Alternative 1

Alternative 1 proposes a mini-roundabout within the right-of-way of the existing intersection. Mini-roundabouts have the same operating principles and benefits as standard roundabouts but with a smaller radius. Mini-roundabouts are typically used in urban low-speed settings, and the center island and splitter islands are typically traversable. According to AASHTO Geometric Design of Highways and Street Design (2018, 7th Edition), mini-roundabouts have one entering lane per approach, a speed limit under 20 mph, and an inscribed circle diameter of 45 to 90 feet (overall outside diameter). They are inexpensive in retrofit applications because minimal additional pavement is typically needed.

The proposed mini-roundabout has an 84-foot inscribed circle diameter with a 44-foot diameter inner island, a 5-foot truck apron with mountable curb and raised splitter islands. Proper signage and markings are placed for adequate guidance. Community outreach efforts to educate the public on the purpose and use of mini roundabouts should be considered. Since the roundabout would be located in close proximity to the signalized intersection at Hampton Blvd and the splitter island will reduce storage for the approach to Hampton Boulevard, a traffic analysis with counts is recommended to determine queuing impacts from the intersection. See **Figure 3-2** for the proposed concept, with the detailed full concept shown in Appendix A.

FIGURE 3-2. EXISTING VS. PROPOSED GLENEAGLES ROAD AND MAURY ARCH INTERSECTION –
ALTERNATIVE 1



Cost Estimate

The cost of improving the W Little Creek Road at Gleneagles Road / Maury Arch Intersection – Alternative 1 is shown in **Table 3-1** as a summary estimate. Detailed item estimates are shown in Appendix B.

TABLE 3-1. W LITTLE CREEK ROAD AT GLENEAGLES ROAD/MAURY ARCH – ALTERNATIVE 1 COST ESTIMATE

ITEM	COST
General Requirements	\$ 27,205
Roadway Improvements	\$90,500
Traffic Improvements	\$11,830
40% MOT CONTINGENCY	\$40,932
5% EROSION AND SEDIMENT CONTROL CONTINGENCY	\$5,117
STORMWATER MANAGEMENT CONTINGENCY	\$20,466
CONSTRUCTION SUBTOTAL	\$196,049
25% GENERAL CONTINGENCY	\$49,012
CONSTRUCTION TOTAL	\$245,062

NOTES:
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS

Alternative 2

Alternative 2 proposes a roadway modification into a more traditional T-intersection through the addition of curb extensions. The alternative will establish Maury Arch as the major street and Gleneagles Road as the minor street. Proper signage and markings will be placed for adequate guidance. Existing guide signs at the W Little Creek Road and Hampton Boulevard intersection are replaced to support Maury Arch as the major street. The curb extension and increased green space also reduces the impervious pavement area. Curb extensions, residential driveway lengthening, and modified curb and gutter to create increased green space are included in the overall cost estimate and could be implemented as a construction add alternative. See **Figure 3-3** for the proposed concept with the detailed full concept shown in Appendix A.

FIGURE 3-3. EXISTING VS. PROPOSED GLENEAGLES ROAD AND MAURY ARCH INTERSECTION –
ALTERNATIVE 2



Cost Estimate

The cost of improving the W Little Creek Road at Gleneagles Road / Maury Arch Intersection – Alternative 2 is shown in **Table 3-2** as a summary estimate. Detailed item estimates are shown in Appendix B.

TABLE 3-2. W LITTLE CREEK ROAD AT GLENEAGLES ROAD/MAURY ARCH – ALTERNATIVE 2 COST
ESTIMATE

ITEM	COST
General Requirements	\$ 21,283
Roadway Improvements	\$12,175
Traffic Improvements	\$5,980
40% MOT CONTINGENCY	\$13,885
5% EROSION AND SEDIMENT CONTROL CONTINGENCY	\$1,736
STORMWATER MANAGEMENT CONTINGENCY	\$20,827
CONSTRUCTION SUBTOTAL	\$92,443
25% GENERAL CONTINGENCY	\$23,111
CONSTRUCTION TOTAL	\$115,554

NOTES:
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS

4 FIELD OBSERVATIONS

General observations were made regarding improvements to apply throughout the project area. Several portions of sidewalk contain uneven slabs or obstructions, several signs are obscured by overgrowth or from being spaced too closely together, and several light poles on private property are either damaged or bent. A few of these field observations are illustrated in **Figure 4-1**.

FIGURE 4-1. GENERAL FIELD OBSERVATIONS



WSP recommends inspecting sidewalks and curbs to ensure consistent and maintained access is provided throughout the corridor. Ensure walkways are even and free from obstructions and remove or replace damaged items and overgrowth should be trimmed back to ensure visibility of signage.

5 CONCLUSION

The W Little Creek Road at Hampton Boulevard Curve Warning Improvements project aims to promote safety for motorists and pedestrians by offering improved warning and driver guidance through enhanced curve delineation, modifying curb and intersection geometry, improved signage and pavement marking, and ITS applications.















Several alternatives have been identified for the study areas with a summary cost estimate comparison of each alternative in Table 5-1. See Appendix A for the detailed Concept Plans and Appendix B for a detailed cost breakdown.

TABLE 5-1. COST ESTIMATE COMPARISON

ALTERNATIVE	COST ESTIMATE
W Little Creek Road at Hampton Blvd Curve Warning – Alternative 1	\$247,642
W Little Creek Road at Hampton Blvd Curve Warning – Alternative 2	\$195,009
W Little Creek Road at Hampton Blvd Curve Warning – Alternative 3	\$198,038
W Little Creek Road at Gleneagles Road / Maury Arch – Alternative 1	\$245,062
W Little Creek Road at Gleneagles Road / Maury Arch – Alternative 2	\$115,554

NOTES:
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS

APPENDIX A - CONCEPTUAL PLANS

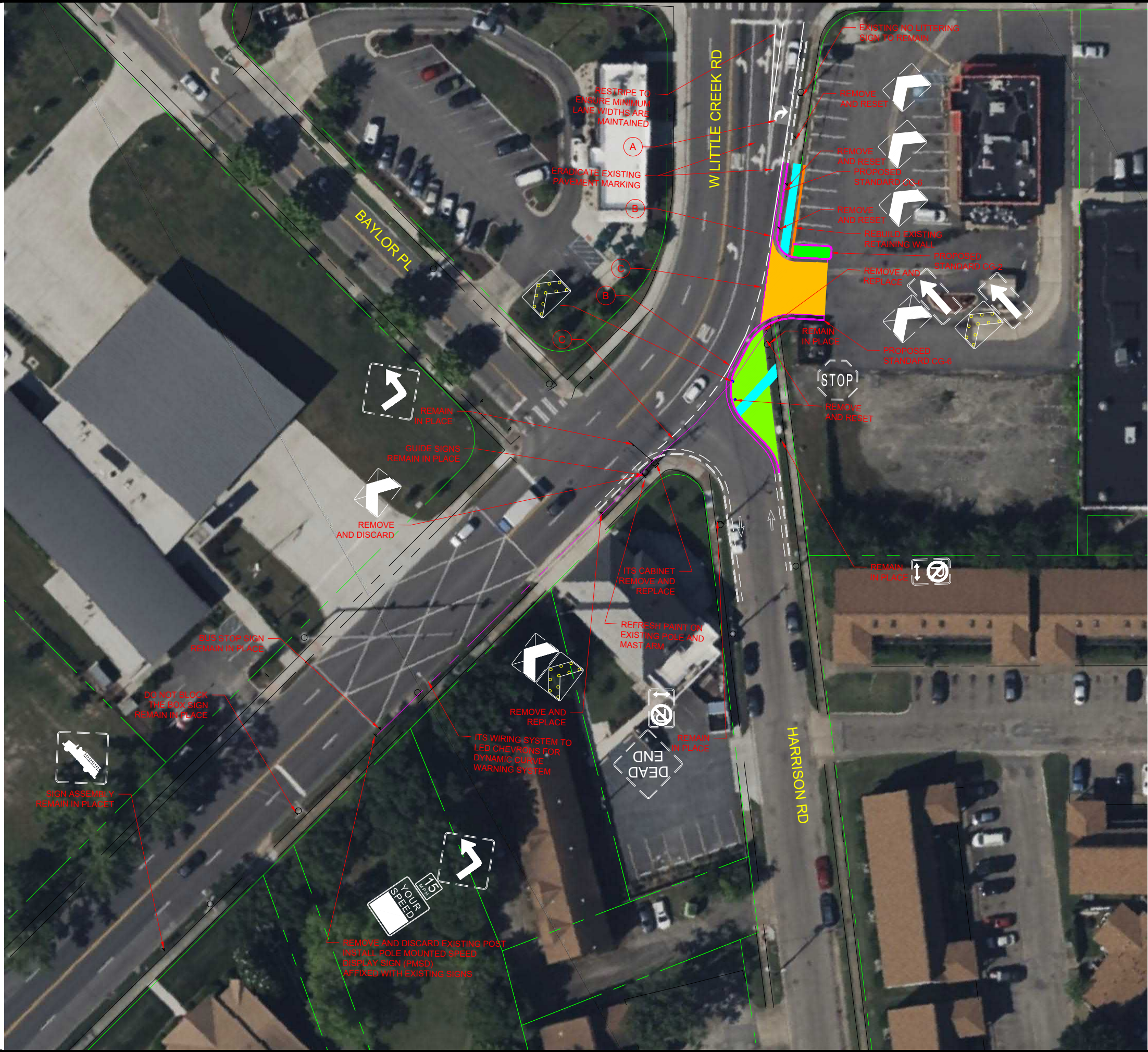
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	TRAFFIC FLOW ARROWS
	PROPOSED SIDEWALK
	EXISTING SIDEWALK
	PROPOSED GRASS AREA/ MEDIAN
	PROPOSED DRIVEWAY
	EXISTING RIGHT OF WAY
	EXISTING CURB LINE
	PROPOSED ITS CABLE
	EXISTING SIGN
	PROPOSED SIGN
	EXISTING POLE
	EXISTING SIGN TO REMAIN
	PROPOSED SIGN
	EXISTING SIGN TO BE REMOVED
(A)	WHITE TURN ARROW
(B)	6" SOLID WHITE LINE
(C)	6" DOTTED EXTENSION 2' WHITE LINE SEGMENT 4' GAP
(D)	6" SOLID DOUBLE YELLOW LINE
(E)	6" SOLID YELLOW LINE
(F)	8" SOLID YELLOW LINE

[illegible]

DESIGNED BY: *RT*
PREPARED BY: *JAS*
ISSUE DATE:
APRIL 2023

SHEET
P-1

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- LEGEND:
- PROPOSED CURB AND GUTTER
 - TRAFFIC FLOW ARROWS
 - PROPOSED SIDEWALK
 - EXISTING SIDEWALK
 - PROPOSED GRASS AREA/ MEDIAN
 - PROPOSED DRIVEWAY
 - EXISTING RIGHT OF WAY
 - EXISTING CURB LINE
 - PROPOSED ITS CABLE
 - EXISTING SIGN
 - PROPOSED SIGN
 - EXISTING POLE
 - EXISTING SIGN TO REMAIN
 - PROPOSED SIGN
 - EXISTING SIGN TO BE REMOVED
 - (A) WHITE TURN ARROW
 - (B) 6" SOLID WHITE LINE
 - (C) 6" DOTTED EXTENSION 2' WHITE LINE SEGMENT 4' GAP
 - (D) 6" SOLID DOUBLE YELLOW LINE
 - (E) 6" SOLID YELLOW LINE
 - (F) 8" SOLID YELLOW LINE
 - (G) 24" SOLID WHITE LINE



CITY OF NORFOLK
DEPARTMENT OF PUBLIC WORKS
**W LITTLE CREEK ROAD CURVE
WARNING - ALTERNATIVE 2**
LITTLE CREEK RD AT HAMPTON BLVD
CURVE WARNING IMPROVEMENTS
NORFOLK, VIRGINIA

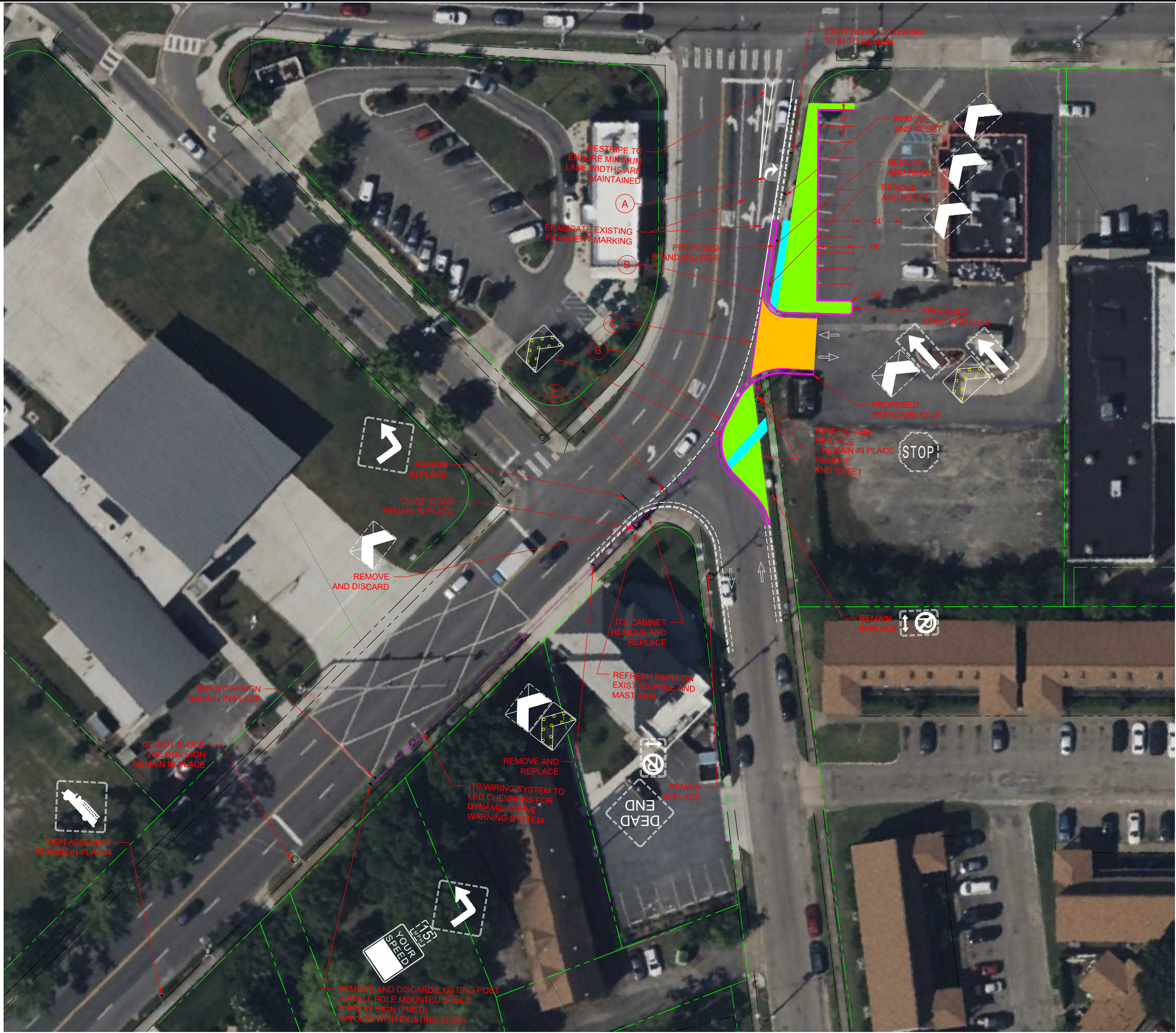
REV #	DATE	PROJECT REVISIONS

DESIGNED BY: RT
PREPARED BY: JAS

ISSUE DATE:
APRIL 2023

**SHEET
P-2**

FILE NAME: T:\30902486 Norfolk Transportation Design Services\Task 02 Little Creek Rd Curve Warning\Concepts\30902486-LC-Concepts-03.dwg LAYOUT NAME: P-3 PLOTTED: Tuesday, July 11, 2023 - 9:23pm



- LEGEND:
- PROPOSED CURB AND GUTTER
 - TRAFFIC FLOW ARROWS
 - PROPOSED SIDEWALK
 - EXISTING SIDEWALK
 - PROPOSED GRASS AREA/ MEDIAN
 - PROPOSED DRIVEWAY
 - EXISTING RIGHT OF WAY
 - EXISTING CURB LINE

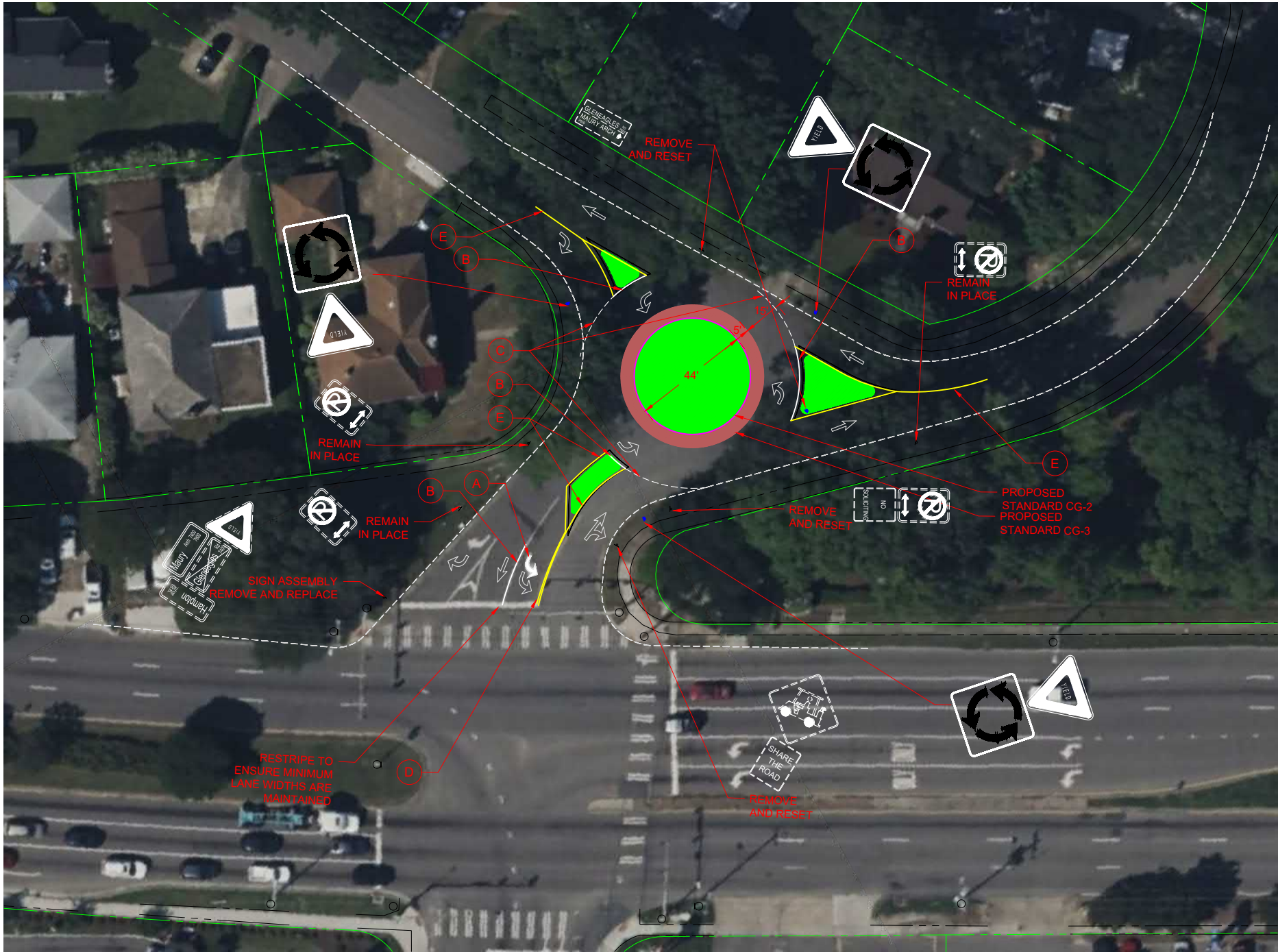


CITY OF NORFOLK
DEPARTMENT OF PUBLIC WORKS
W. LITTLE CREEK CURVE
WARNING - ALTERNATIVE 3
LITTLE CREEK RD AT HAMPTON BLVD
CURVE WARNING IMPROVEMENTS
NORFOLK, VIRGINIA

REV #	DATE	PROJECT REVISIONS

DESIGNED BY: RT
PREPARED BY: JAS
ISSUE DATE:
APRIL 2023
SHEET
P-3

FILE NAME: T:\30902486 Norfolk Transportation Design Services\Task 02 Little Creek Rd Curve Warning\Concepts\30902486-LC-Concepts.dwg LAYOUT NAME: P-4 PLOTTED: Tuesday, July 11, 2023 - 9:22am



- LEGEND:
- PROPOSED CURB AND GUTTER
 - TRAFFIC FLOW ARROWS
 - PROPOSED SIDEWALK
 - EXISTING SIDEWALK
 - PROPOSED GRASS AREA/ MEDIAN
 - PROPOSED DRIVEWAY
 - PROPOSED TRUCK BUFFER
 - EXISTING RIGHT OF WAY
 - EXISTING CURB LINE
 - PROPOSED ITS CABLE
 - EXISTING SIGN
 - PROPOSED SIGN
 - EXISTING POLE
 - EXISTING SIGN TO REMAIN
 - PROPOSED SIGN
 - EXISTING SIGN TO BE REMOVED
 - (A) WHITE TURN ARROW
 - (B) 6" SOLID WHITE LINE
 - (C) 6" DOTTED EXTENSION
2' WHITE LINE SEGMENT
4' GAP
 - (D) 6" SOLID DOUBLE YELLOW LINE
 - (E) 6" SOLID YELLOW LINE
 - (F) 8" SOLID YELLOW LINE

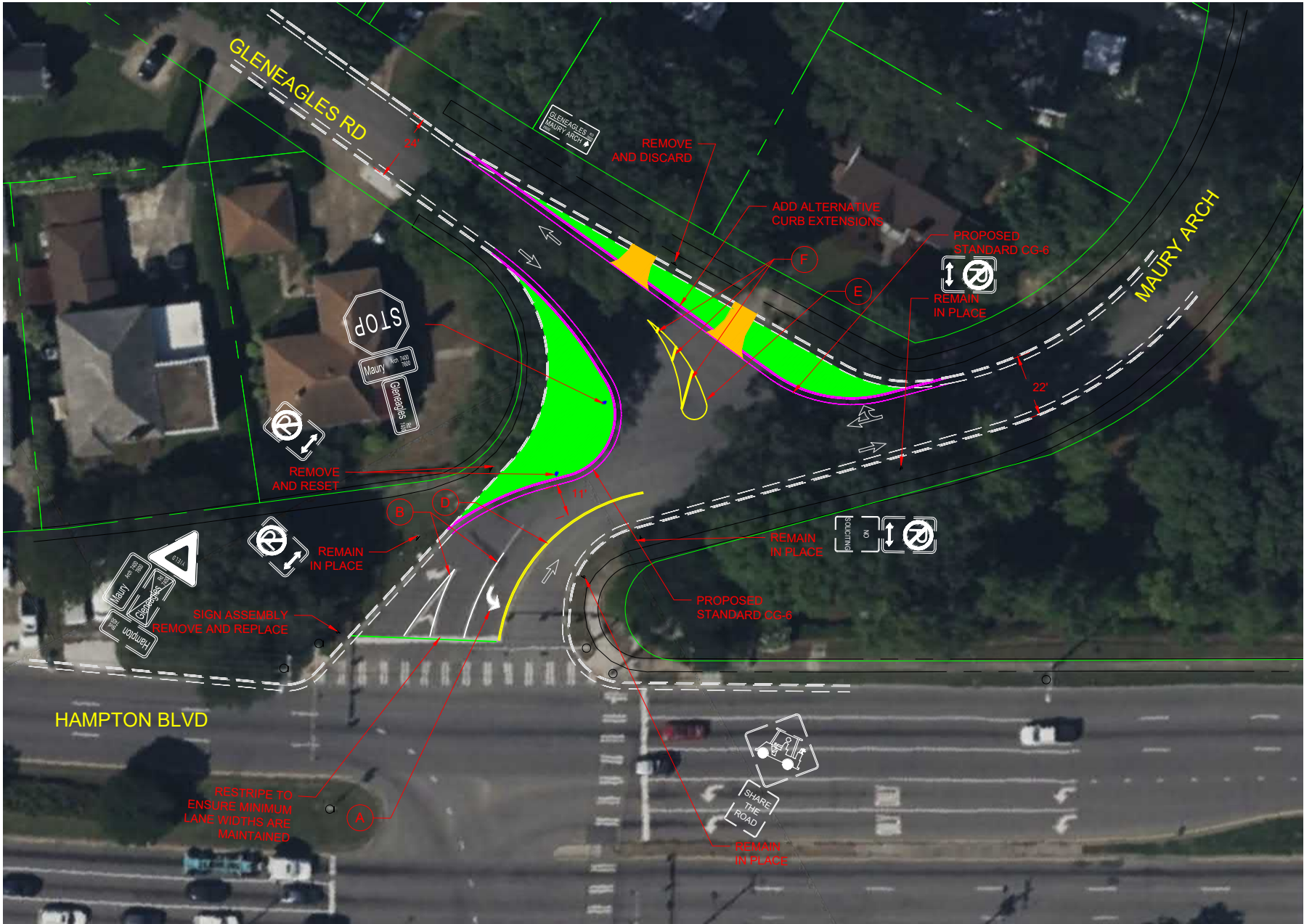


CITY OF NORFOLK
DEPARTMENT OF PUBLIC WORKS
**GLENEAGLES ROAD AT W LITTLE
CREEK ROAD - ALTERNATIVE 1**
LITTLE CREEK RD AT HAMPTON BLVD
CURVE WARNING IMPROVEMENTS
NORFOLK, VIRGINIA

REV #	PROJECT REVISIONS	DATE

DESIGNED BY: RT
PREPARED BY: JAS
ISSUE DATE:
APRIL 2023
SHEET
P-4

FILE NAME: T:\30902486 Norfolk Transportation Design Services\Task 02 Little Creek Rd Curve Warning\Concepts\30902486-LC-Concepts-02.dwg LAYOUT NAME: P-5 PLOTTED: Tuesday, July 11, 2023 - 9:31am



- LEGEND:
- PROPOSED CURB AND GUTTER
 - TRAFFIC FLOW ARROWS
 - PROPOSED SIDEWALK
 - EXISTING SIDEWALK
 - PROPOSED GRASS AREA/ MEDIAN
 - PROPOSED DRIVEWAY
 - EXISTING RIGHT OF WAY
 - EXISTING CURB LINE
 - EXISTING SIGN
 - PROPOSED SIGN
 - EXISTING POLE
 - EXISTING SIGN TO REMAIN
 - PROPOSED SIGN
 - EXISTING SIGN TO BE REMOVED
 - (A) WHITE TURN ARROW
 - (B) 6" SOLID WHITE LINE
 - (C) 6" DOTTED EXTENSION 2' WHITE LINE SEGMENT 4' GAP
 - (D) 6" SOLID DOUBLE YELLOW LINE
 - (E) 6" SOLID YELLOW LINE
 - (F) 8" SOLID YELLOW LINE



CITY OF NORFOLK
DEPARTMENT OF PUBLIC WORKS
**GLENEAGLES ROAD AT W LITTLE
CREEK ROAD - ALTERNATIVE 2**
LITTLE CREEK RD AT HAMPTON BLVD
CURVE WARNING IMPROVEMENTS
NORFOLK, VIRGINIA

REV #	PROJECT REVISIONS	DATE

DESIGNED BY: RT
PREPARED BY: JAS
ISSUE DATE:
APRIL 2023
SHEET
P-5

APPENDIX B – COST ESTIMATES

LOCATION:	LITTLE CREEK RD AT HAMPTON BLVD CURVE WARNING IMPROVEMENTS			CIP NO.	
	NORFOLK, VIRGINIA			DATE:	Jul-23
	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
W LITTLE CREEK ROAD CURVE WARNING - ALTERNATIVE 1					
1	MOBILIZATION	LS	1	\$ 26,264	\$ 26,264
2	CONSTRUCTION SURVEYING	LS	1	\$ 1,040	\$ 1,040
SUB-TOTAL					\$ 27,304
1	STANDARD CG-6 CURB AND GUTTER	LF	450	\$ 50.00	\$ 22,500
2	REMOVAL OF CURB AND GUTTER	LF	170	\$ 10.00	\$ 1,700
3	REMOVAL OF ASPHALT	SY	71	\$ 10.00	\$ 710
4	COMMERICAL DRIVEWAY	SY	375	\$ 55.00	\$ 20,625
5	REBUILD RETAINING WALL	LF	47	\$ 40.00	\$ 1,880
6	STANDARD CONC. SIDEWALK 4"	SY	67	\$ 55.00	\$ 3,685
7	REMOVAL OF ASPHALT	SY	67	\$ 25.00	\$ 1,675
8	LANDSCAPE IMPROVEMENTS	LS	1	\$ 5,000.00	\$ 5,000
9	ERADICATE EX. LINEAR PVMT MRKG	LF	190	\$ 2.00	\$ 380
10	ERAD. EXIST. NONLINEAR PVMT MRKG	SF	153	\$ 2.00	\$ 306
11	TYPE B CLASS I PAVE. LINE MARKING 6"	LF	900	\$ 6.00	\$ 5,400
12	TYPE B CLASS II PAVE. LINE MARKING 24"	LF	80	\$ 22.00	\$ 1,760
13	PVMT SYMB MRKG SGL TURN ARROW TY B, CL II	EA	2	\$ 360.00	\$ 720
14	REMOVE AND RELOCATE SIGN	EA	4	\$ 1,000.00	\$ 4,000
15	REMOVE SIGN	EA	4	\$ 300.00	\$ 1,200
16	ILLUMINATED TRAFFIC CONTROL SIGN	EA	4	\$ 1,920.00	\$ 7,680
17	PMSD (SIGNS, POLE, CABLES)	EA	1	\$ 9,000.00	\$ 9,000
18	DETECTOR CABLE	LF	300	\$ 4.00	\$ 1,200
19	NS MODIFY EXIST.	EA	1	\$ 2,000.00	\$ 2,000
20	ITS CONTROLLER CABINET AND CONTROLLER	EA	1	\$ 10,000.00	\$ 10,000
21	REMOVE EXISTING CONTROLLER	EA	1	\$ 500.00	\$ 500
22	SIGN POST STP-1, 2" 14 GAUGE	LF	40	\$ 40.00	\$ 1,600
SUB-TOTAL					\$ 103,521
40% MOT CONTINGENCY					\$ 41,408
5% EROSION AND SEDIMENT CONTROL CONTINGENCY					\$ 5,176
20% STORMWATER MANAGEMENT CONTINGENCY					\$ 20,704
CONSTRUCTION SUB-TOTAL					\$ 198,114
25% GENERAL CONTINGENCY					\$ 49,528
CONSTRUCTION TOTAL					\$ 247,642

W LITTLE CREEK ROAD CURVE WARNING - ALTERNATIVE 2					
1	MOBILIZATION	LS	1	\$ 24,120	\$ 24,120
2	CONSTRUCTION SURVEYING	LS	1	\$ 750	\$ 750
SUB-TOTAL					\$ 24,870
1	STANDARD CG-6 CURB AND GUTTER	LF	145	\$ 50.00	\$ 7,250
2	REMOVAL OF CURB AND GUTTER	LF	145	\$ 10.00	\$ 1,450
3	STANDARD CG-2	LF	130	\$ 50.00	\$ 6,500
4	COMMERICAL DRIVEWAY	SY	94	\$ 55.00	\$ 5,194
5	REBUILD RETAINING WALL	LF	47	\$ 40.00	\$ 1,880
6	STANDARD CONC. SIDEWALK 4"	SY	52	\$ 55.00	\$ 2,860
7	REMOVAL OF SIDEWALK	SY	39	\$ 25.00	\$ 975
8	LANDSCAPE IMPROVEMENTS	LS	1	\$ 5,000.00	\$ 5,000
9	ERADICATE EX. LINEAR PVMT MRKG	LF	190	\$ 2.00	\$ 380
10	ERAD. EXIST. NONLINEAR PVMT MRKG	SF	153	\$ 2.00	\$ 306
11	TYPE B CLASS I PAVE. LINE MARKING 6"	LF	900	\$ 6.00	\$ 5,400
12	TYPE B CLASS II PAVE. LINE MARKING 24"	LF	80	\$ 22.00	\$ 1,760
13	PVMT SYMB MRKG SGL TURN ARROW TY B, CL II	EA	2	\$ 360.00	\$ 720
14	REMOVE AND RELOCATE SIGN	EA	4	\$ 1,000.00	\$ 4,000
15	REMOVE SIGN	EA	4	\$ 300.00	\$ 1,200
16	ILLUMINATED TRAFFIC CONTROL SIGN	EA	3	\$ 1,920.00	\$ 5,760
17	PMSD (SIGNS, POLE, CABLES)	EA	1	\$ 9,000.00	\$ 9,000
18	DETECTOR CABLE	LF	300	\$ 4.00	\$ 1,200
19	NS MODIFY EXIST.	EA	1	\$ 2,000.00	\$ 2,000
20	ITS CONTROLLER CABINET AND CONTROLLER	EA	1	\$ 10,000.00	\$ 10,000
21	REMOVE EXISTING CONTROLLER	EA	1	\$ 500.00	\$ 500
22	SIGN POST STP-1, 2" 14 GAUGE	LF	40	\$ 40.00	\$ 1,600
SUB-TOTAL					\$ 74,935
40% MOT CONTINGENCY					\$ 29,974
5% EROSION AND SEDIMENT CONTROL CONTINGENCY					\$ 3,747
30% STORMWATER MANAGEMENT CONTINGENCY					\$ 22,481
CONSTRUCTION SUB-TOTAL					\$ 156,007
25% GENERAL CONTINGENCY					\$ 39,002
CONSTRUCTION TOTAL					\$ 195,009

W LITTLE CREEK ROAD CURVE WARNING - ALTERNATIVE 3						
1	MOBILIZATION	LS	1	\$	24,219	\$ 24,219
2	CONSTRUCTION SURVEYING	LS	1	\$	770	\$ 770
SUB-TOTAL						\$ 24,989
1	STANDARD CG-6 CURB AND GUTTER	LF	156	\$	50.00	\$ 7,800
2	REMOVAL OF CURB AND GUTTER	LF	145	\$	10.00	\$ 1,450
3	STANDARD CG-2	LF	188	\$	50.00	\$ 9,400
4	COMMERICAL DRIVEWAY	SY	94	\$	55.00	\$ 5,194
5	STANDARD CONC. SIDEWALK 4"	LF	33	\$	55.00	\$ 1,815
6	REMOVAL OF SIDEWALK	SY	39	\$	25.00	\$ 975
7	LANDSCAPE IMPROVEMENTS	SY	1	\$	5,000.00	\$ 5,000
8	ERADICATE EX. LINEAR PVMT MRKG	LF	190	\$	2.00	\$ 380
9	ERAD. EXIST. NONLINEAR PVMT MRKG	LF	153	\$	2.00	\$ 306
10	TYPE B CLASS I PAVE. LINE MARKING 4"	SF	198	\$	4.00	\$ 792
11	TYPE B CLASS I PAVE. LINE MARKING 6"	LF	900	\$	6.00	\$ 5,400
12	TYPE B CLASS II PAVE. LINE MARKING 24"	LF	80	\$	22.00	\$ 1,760
13	PVMT SYMB MRKG SGL TURN ARROW TY B, CL II	EA	2	\$	360.00	\$ 720
14	REMOVE AND RELOCATE SIGN	EA	4	\$	1,000.00	\$ 4,000
15	REMOVE SIGN	EA	4	\$	300.00	\$ 1,200
16	ILLUMINATED TRAFFIC CONTROL SIGN	EA	3	\$	1,920.00	\$ 5,760
17	PMSD (SIGNS, POLE, CABLES)	EA	1	\$	9,000.00	\$ 9,000
18	DETECTOR CABLE	LF	300	\$	4.00	\$ 1,200
19	NS MODIFY EXIST.	EA	1	\$	2,000.00	\$ 2,000
20	ITS CONTROLLER CABINET AND CONTROLLER	EA	1	\$	10,000.00	\$ 10,000
21	REMOVE EXISTING CONTROLLER	EA	1	\$	500.00	\$ 500
22	SIGN POST STP-1, 2" 14 GAUGE	LF	40	\$	40.00	\$ 1,600
SUB-TOTAL						\$ 76,252
40% MOT CONTINGENCY						\$ 30,501
5% EROSION AND SEDIMENT CONTROL CONTINGENCY						\$ 3,813
30% STORMWATER MANAGEMENT CONTINGENCY						\$ 22,876
CONSTRUCTION SUB-TOTAL						\$ 158,431
25% GENERAL CONTINGENCY						\$ 39,608
CONSTRUCTION TOTAL						\$ 198,038

GLENEAGLES ROAD AT HAMPTON BLVD AND MAURY ARCH - ALTERNATIVE 1						
1	MOBILIZATION	LS	1	\$	26,175	\$ 26,175
2	CONSTRUCTION SURVEYING	LS	1	\$	1,030	\$ 1,030
SUB-TOTAL						\$ 27,205
1	STANDARD CG-2	LF	1,610	\$	50.00	\$ 80,500
2	STANDARD MEDIAN	LS	1	\$	5,000.00	\$ 5,000
3	LANDSCAPE IMPROVEMENTS	SY	1	\$	5,000.00	\$ 5,000
4	ERADICATE EX. LINEAR PVMT MRKG	LF	252	\$	2.00	\$ 504
5	ERAD. EXIST. NONLINEAR PVMT MRKG	SF	102	\$	2.00	\$ 204
6	TYPE B CLASS I PAVE. LINE MARKING 6"	LF	477	\$	6.00	\$ 2,862
7	TYPE B CLASS II PAVE. LINE MARKING 24"	LF	40	\$	22.00	\$ 880
8	PVMT SYMB MRKG SGL TURN ARROW TY B, CL II	EA	2	\$	360.00	\$ 720
9	REMOVE AND RELOCATE SIGN	EA	3	\$	1,000.00	\$ 3,000
10	REMOVE SIGN	EA	1	\$	300.00	\$ 300
11	SIGN PANEL	SF	48	\$	40.00	\$ 1,920
12	SIGN POST STP-1, 2" 14 GAUGE	LF	36	\$	40.00	\$ 1,440
SUB-TOTAL						\$ 102,330
40% MOT CONTINGENCY						\$ 40,932
5% EROSION AND SEDIMENT CONTROL CONTINGENCY						\$ 5,117
STORMWATER MANAGEMENT CONTINGENCY						\$ 20,466
CONSTRUCTION SUB-TOTAL						\$ 196,049
25% GENERAL CONTINGENCY						\$ 49,012
CONSTRUCTION TOTAL						\$ 245,062

GLENEAGLES ROAD AT HAMPTON BLVD AND MAURY ARCH - ALTERNATIVE 2						
1	MOBILIZATION	LS	1	\$	21,103	\$ 21,103
2	CONSTRUCTION SURVEYING	LS	1	\$	180	\$ 180
SUB-TOTAL						\$ 21,283
1	STANDARD CG-6 CURB AND GUTTER	LF	155	\$	55.00	\$ 8,525
2	REMOVAL OF CURB AND GUTTER	SF	115	\$	10.00	\$ 1,150
3	LANDSCAPE IMPROVEMENTS	LS	1	\$	2,500.00	\$ 2,500
4	ERADICATE EX. LINEAR PVMT MRKG	LF	252	\$	2.00	\$ 504
5	ERAD. EXIST. NONLINEAR PVMT MRKG	SF	102	\$	2.00	\$ 204
6	TYPE B CLASS II PAVE. LINE MARKING 6"	LF	312	\$	6.00	\$ 1,872
7	TYPE B CLASS II PAVE. LINE MARKING 24"	LF	40	\$	22.00	\$ 880
8	PVMT SYMB MRKG SGL TURN ARROW TY B, CL II	EA	2	\$	360.00	\$ 720
9	REMOVE SIGN	EA	2	\$	300.00	\$ 600
10	SIGN PANEL	SF	13	\$	40.00	\$ 520
11	SIGN POST STP-1, 2" 14 GAUGE	LF	12	\$	40.00	\$ 480
SUB-TOTAL						\$ 17,955
GLENEAGLES ROAD AT HAMPTON BLVD AND MAURY ARCH - ADD ALTERNATIVE						
12	STANDARD CG-6 CURB AND GUTTER	LF	179	\$	55.00	\$ 9,845
13	REMOVAL OF CURB AND GUTTER	SF	264	\$	10.00	\$ 2,640
14	RESIDENTIAL DRIVEWAY	SY	32	\$	55.00	\$ 1,772
15	LANDSCAPE IMPROVEMENTS	LS	1	\$	2,500.00	\$ 2,500
SUB-TOTAL						\$ 16,757
40% MOT CONTINGENCY						\$ 13,885
5% EROSION AND SEDIMENT CONTROL CONTINGENCY						\$ 1,736
STORMWATER MANAGEMENT CONTINGENCY						\$ 20,827
CONSTRUCTION SUB-TOTAL						\$ 92,443
25% GENERAL CONTINGENCY						\$ 23,111
CONSTRUCTION TOTAL						\$ 115,554

NOTES:
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS