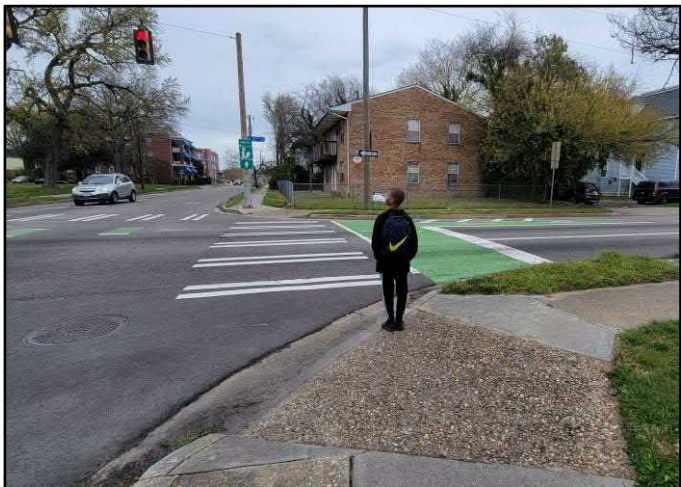


# COLONIAL AVENUE PEDESTRIAN IMPROVEMENTS

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July 2023

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# 1 INTRODUCTION

The City of Norfolk requested an evaluation and determination of planning-level concepts for pedestrian improvements along Colonial Avenue between W Princess Anne Road and W 27<sup>th</sup> Street to improve pedestrian safety, provide traffic calming, and improve the pedestrian experience along this multi-modal corridor. This project is part of the Complete Streets Initiative.

A field investigation was performed along the project corridor in March 2023. The section of roadway currently consists of eight (8) unsignalized intersections, four (4) signalized intersections, and one rail crossing. The existing intersections are as follows and are illustrated in **Figure 1-1**:

1. W Princess Anne Road and Colonial Avenue (Signalized)
2. Shirley Avenue and Colonial Avenue (Unsignalized)
3. Spotswood Avenue and Colonial Avenue (Unsignalized)
4. Washington Park and Colonial Avenue (Unsignalized)
5. W 20<sup>th</sup> Street and Colonial Avenue (Unsignalized)
6. W 21<sup>st</sup> Street and Colonial Avenue (Signalized)
7. W 22<sup>nd</sup> Street and Colonial Avenue (Unsignalized)
8. W 23<sup>rd</sup> Street (including Rail Crossing) and Colonial Avenue (Unsignalized)
9. W 24<sup>th</sup> Street and Colonial Avenue (Unsignalized)
10. W 25<sup>th</sup> Street and Colonial Avenue (Unsignalized)
11. W 26<sup>th</sup> Street and Colonial Avenue (Signalized)
12. W 27<sup>th</sup> Street and Colonial Avenue (Signalized)

**Figure 1-1. Study Area Intersections**



The recommended improvements resulting from the field investigation are depicted as concepts in the Appendix and discussed herein. Cost estimates for improvements at each intersection were developed and are separated into three lump sum categories: roadway improvements, drainage improvements, and traffic improvements. The roadway improvements include pavement, curb and gutter, sidewalk, and incidental improvements. Incidental improvements include landscaping, utility adjustments, and other hardscape related costs. The sidewalk conditioning includes all demolition earthwork, and proposed work to sidewalks. Drainage improvements will include all drainage demolition and proposed work. Traffic improvements include costs associated with pavement markings, signs, and pedestrian signals. Each intersection includes a detailed item breakdown in the Appendix.



## 2 IDENTIFIED IMPROVEMENTS

While a number of pedestrian improvements were considered for this corridor, the following improvements were identified as having the greatest positive impact on the corridor for an efficient cost that does not impact right-of-way. The pedestrian concepts identified and evaluated as part of this study include bulb-outs (also called curb extensions or bump-outs), Americans with Disabilities Act (ADA) compliance improvements, Rectangular Rapid Flashing Beacons (RRFBs), enhanced signage, pedestrian signals at signalized intersections, as well as drainage improvements to reduce ponding of water.

### 2.1 Bulb-Outs

Bulb-outs (also called curb extensions or bump-outs) increase the space available for pedestrians and narrow the roadway by extending the sidewalk or curb line into the parking lane. The increased space provides additional visibility for crossing and shortens the crossing distance when placed at intersections. The narrow roadways encourage drivers to slow down when approaching the pedestrian crossing and reduces the time pedestrians are exposed to traffic. The bulb-outs can also be transformed into landscaped areas or transit waiting zones. Example bulb-outs are illustrated in **Figure 2-1**. Locations for potential bulb-outs were evaluated in areas with existing on street parking along Colonial Avenue.

Figure 2-1. Example Bulb-Outs



Bulb-outs design criteria followed the Curb extension (Bulb-outs) detail in the VDOT Road Design Manual, Appendix B (2). According to VDOT Road Design Manual, bulb-outs should only be used in areas that have on-street parking. Bulb-outs are not applicable to intersections with exclusive right-turn lanes adjacent to the curb or intersections with a high volume of right-turning trucks or buses turning into narrow cross streets. Bulb-outs require a 25' minimum effective radius with space for a 10' crosswalk and 4' minimum stop bar. The offset for the on-street parking is 40' minimum, allowing an 8' parallel parking space.

## 2.2 ADA Compliance Improvements

The Americans with Disabilities Act (ADA) includes standards for accessible design to provide equal access and opportunities for people with disabilities. Transportation ADA standards include guidance for the design of:

- curb ramps, including sloping, space requirements, and tactile detectable warnings
- sidewalk widths and clearances
- pedestrian signal equipment and spacing requirements
- crosswalks

City-funded projects must meet ADA accessible design guidelines. Virginia Department of Transportation (VDOT)-funded projects must meet stricter “Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Rights-of-Way” (PROWAG) guidelines for ADA standards, VDOT Road design guidelines, and Instructional & Informational Memorandums. Since the Colonial Avenue pedestrian improvements are City-funded, they will need to meet ADA accessible guidelines. If a portion or all of the pedestrian improvements will receive VDOT funding, the design will need to meet the more stringent PROWAG guidelines.

### Curb Ramps

Curb ramps should connect the pedestrian access routes at each pedestrian crossing to provide the shortest crossing distance. For ADA compliance, curb ramps shall be accessible and designed in accordance with:

- Maximum running slope of ramps are 12:1 (8.0%) and a 48:1 (2.0%) maximum level landing at the top
- The cross slope shall be 48:1 (2.0%) maximum
- 5’ minimum width
- The bottom of the ramp run shall be located within the crosswalk
- Detectable warning surface shall be 2” or less from the back of the curb and aligned with the travel path.

### Sidewalks

Sidewalks should provide continuous passage. For ADA compliance, sidewalks shall be accessible and designed in accordance with:

- Minimum clearance width of 36”
- Firm, stable, and slip-resistant surface
- Absence of trip hazards
- Slopes less than 20:1 (5%)

### Pedestrian Signals and Equipment

For ADA compliance, pedestrian signals shall be accessible and designed in accordance with:

- 2009 Manual on Uniform Traffic Control Devices (MUTCD), current edition
- Virginia Supplement to the MUTCD, current edition

- Pushbutton offset up to 5 feet maximum from the lateral projection of the outside edge of the cross walk, and 1.5 feet to 6 feet from the edge of the curb, but not further than 10 feet from edge of curb
- Push button(s) mounting height of between 3.5 and 4.0 feet above sidewalk, facing parallel to the crosswalk
- Pushbutton minimum diameter of 2"
- Pushbuttons operable with a closed fist and force no greater than 3.5 pounds

## Crosswalks

Crosswalks should provide safe crossing for pedestrians. For ADA compliance, crosswalks shall be accessible and designed in accordance with:

- 2009 Manual on Uniform Traffic Control Devices (MUTCD), current edition
- Virginia Supplement to the 2009 MUTCD, current edition
- Clearly marked with smooth and slip-resistant pavement markings
- Perpendicular to the roadway and aligned with curb ramps

## 2.3 Rectangular Rapid-Flashing Beacon (RRFB)

Due to the moderate pedestrian traffic in the project area and character of the corridor, RRFB treatment options were considered as they are particularly effective at providing enhanced warning to motorists of pedestrian activity. RRFBs are a pair of rectangular yellow indicators that flash to warn drivers of pedestrian crossings when activated. The devices can be pedestrian-actuated via push button or approach automatic sensors. RRFBs can draw power from standalone solar panel units or a traditional power source via wiring. An example of RRFBs is illustrated in **Figure 2-2**.

Figure 2-2. Rectangular Rapid-Flashing Beacon (RRFBs)





### 3 EVALUATION AND RECOMMENDATIONS

Colonial Avenue is a two-lane roadway classified as a Major Collector with a posted speed limit of 25 mph. Colonial Avenue varies from thirty-six (36) to forty-seven (47) feet across with intermittent on-street parking throughout the corridor. Four (4) bus stops service the northbound lane, and four (4) bus stops service the southbound lane. Crosswalks are fully marked at all signalized intersections and partially marked at six (6) unsignalized intersections. Two (2) signalized intersections are supported by pedestrian crossing signals and two (2) unsignalized intersections are supported by pedestrian crossing signage. Dedicated bike lanes are installed along Colonial Avenue in both directions north of the rail crossing at W 23<sup>rd</sup> Street. The corridor is observed as having moderate pedestrian traffic, with primarily residential uses on the south end transitioning to more commercial uses on the north end of the study corridor.

Existing conditions at each intersection were examined to provide recommendations on potential improvements. The field investigation was performed on Wednesday, March 22, 2023. Colonial Ave will maintain 11' travel lanes and 7' of pavement for on street parking.

#### 3.1 W Princess Anne Road and Colonial Avenue

W Princess Anne Road and Colonial Avenue is a four-leg signalized intersection with fully marked crosswalks and pedestrian signals. Existing crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp on the northwest corner, one (1) diagonal curb ramp on the southwest corner, one (1) perpendicular curb ramp with flared sides and one (1) perpendicular curb ramp with returned curb on the northeast corner, and one (1) perpendicular curb ramp with flared sides and one (1) perpendicular curb ramp with returned curb on the southeast corner. Each leg has a through/right turn lane and dedicated left turn lane.

Marked on-street parking is available on the south leg and unmarked on-street parking is available on the north leg. One curb ramp is overgrown with vegetation on the southeast corner and the mast arm pole in the southwest corner is located within the sidewalk and does not provide three (3) feet of sidewalk clearance as shown in **Figure 3-1**. The City has noted that there are drainage concerns in the southeast corner.

Figure 3-1. ADA compliance issues in southwest and southeast corners  
W Princess Anne Road intersection





The City of Norfolk distinguished the intersection of W Princess Anne Road as potential for ADA Standard non-compliance. Ramps and pedestrian signal field measurements were obtained through a previous study and evaluated to determine the improvements as part of this project. Previous measurements show that all ramp slopes, all pedestrian signal heads, and all pushbuttons were not ADA compliant. In addition, several of the pedestrian signal poles were located too far from the ramps. The City has since corrected the pedestrian signal heads, signage and pushbuttons. However, the ramps and pedestrian pole locations remain out of compliance.

## Recommendations

WSP recommends replacing all existing curb ramps at each corner adding detectable warning surfaces to comply with ADA standards and extending the sidewalk behind the curb ramp to provide adequate landing / sidewalk width for clearance if right-of-way is available, such as in the southwest corner, the sidewalk should be widened to the outside of the signal pole. WSP also recommends connecting storm pipe to a new drop inlet in the southeast quadrant to convey stormwater. The improvements will require manholes to be adjusted to grade.

Bulb-outs were considered at this location but are not recommended considering the spacing constraints and relocation of the bus stop and utilities. The existing sidewalk will be maintained. See **Figure 3-2** for the proposed intersection concept and Appendix A for full concept plans.

Figure 3-2. Existing vs. Proposed W Princess Anne Road and Colonial Avenue Intersection



## Cost Estimate

The cost of improving the intersection of Colonial Ave and West Princess Anne Road is shown in **Table 3-1** for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-1. W Princess Anne Road and Colonial Avenue Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$34,830
DRAINAGE IMPROVEMENTS	\$23,300
TRAFFIC IMPROVEMENTS	\$4,920
<b>TOTAL</b>	<b>\$63,050</b>

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

## 3.2 Shirley Avenue and Colonial Avenue

Shirley Avenue and Colonial Avenue is a four-leg unsignalized intersection with one-way traffic westbound on Shirley Avenue. A crosswalk is visibly marked on the south leg; however it does not align with the curb ramp on the southeast corner. Dual-sided pedestrian crossing signs are installed on each end of the crosswalk as seen **Figure 3-3**. Crossings are accessible from the adjoining sidewalks by two (2) perpendicular curb ramps with flared sides at each corner. Unmarked on-street parking is available on all legs.

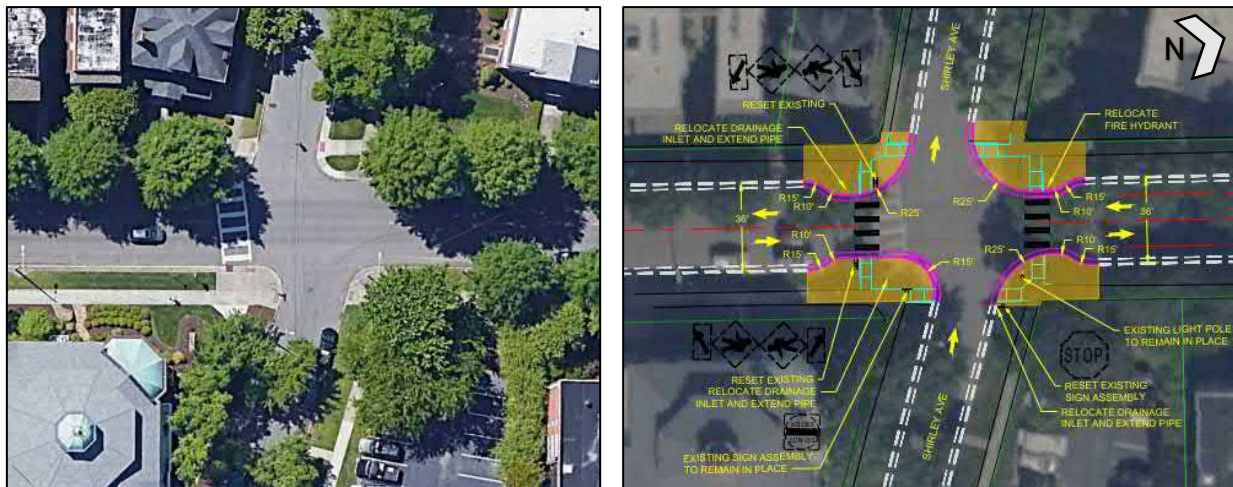
**Figure 3-3. Existing Shirley Avenue Crosswalk Signage**



## Recommendations

WSP recommends installing bulb-outs at all corners to extend into Colonial Avenue. The installation will require new curb ramps will be installed at all corners to meet ADA standards, re-striping the south crosswalk to align with the curb ramps, replacing existing signs, and relocating existing drainage inlets to the new curb location. Drainage inlets will be impacted on the southeast, southwest, and northeast corners of intersection. Existing storm pipe will need to extend to new inlet locations. The existing fire hydrant in the northeast corner will be required to be relocated with installing the bulb-outs. See **Figure 3-4** for the proposed intersection concept and Appendix A for full concept plans.

Figure 3-4. Existing vs. Proposed Shirley Avenue and Colonial Avenue Intersection



## Cost Estimate

The cost of improving the intersection of Colonial Ave and Shirley Avenue is shown in **Table 3-2** for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

Table 3-2. Shirley Avenue and Colonial Avenue  
Cost Estimate of Improvements

ITEM	COST
ROADWAY IMPROVEMENTS	\$65,935
DRAINAGE IMPROVEMENTS	\$63,920
TRAFFIC IMPROVEMENTS	\$3,960
<b>TOTAL</b>	<b>\$133,815</b>

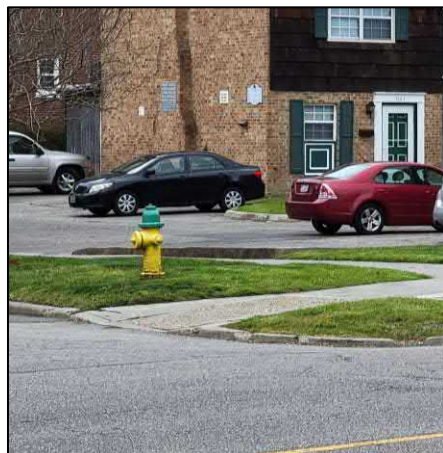
NOTES:  
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS  
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS



### 3.3 Spotswood Avenue and Colonial Avenue

Spotswood Avenue and Colonial Avenue is a four-leg unsignalized intersection with one-way traffic eastbound on Spotswood Avenue. There are no crosswalks or pedestrian signage installed. Crossings are accessible from the adjoining sidewalks by two (2) perpendicular curb ramps with flared sides at each corner. Unmarked on-street parking is available on all legs. Existing curb ramps include detectable warning surfaces and there are no existing drainage structures within the intersection. The relocation of the northwest hydrant is shown in **Figure 3-5**.

Figure 3-5. Spotswood Avenue Northwest Hydrant



### Recommendations

WSP recommends installing bulb-outs at all corners to extend into Colonial Avenue, which would require relocating the fire hydrant at the northwest corner and resetting existing signs. All existing curb ramps will be relocated, with detectable warning surfaces included to comply with ADA standards. See **Figure 3-6** for the proposed intersection concept and Appendix A for full concept plans.

Figure 3-6. Existing vs. Proposed Spotswood Avenue and Colonial Avenue Intersection





## Cost Estimate

The cost of improving the intersection of Colonial Ave and Spotswood Avenue is shown in **Table 3-3** for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-3. Spotswood Avenue and Colonial Avenue  
Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$73,590
DRAINAGE IMPROVEMENTS	-
TRAFFIC IMPROVEMENTS	\$4,960
<b>TOTAL</b>	<b>\$78,070</b>

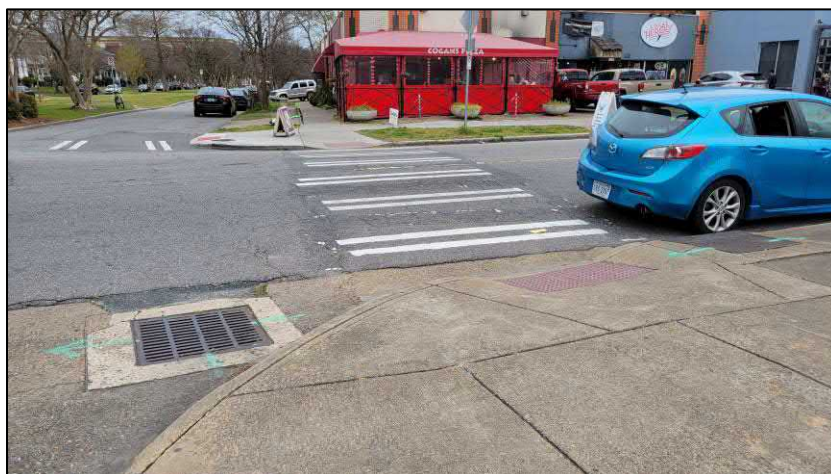
NOTES:  
DOES NOT INCLUDE PROPERTY ACQUISITION OR EASEMENT COSTS  
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS

## 3.4 Washington Park and Colonial Avenue

Washington Park and Colonial Avenue is a five-leg unsignalized intersection with a forty (40) foot median dividing the west approach and a wedge-shaped median of varying width dividing the east approach from a one-way eastbound access road located within the intersection. Crosswalks are visibly marked on the north, west, and south legs. Pedestrian crossing signs are installed on the southeast and northwest corners. Crossings are accessible from the adjoining sidewalks by two (2) perpendicular curb ramps with flared sides at each corner. It is noted the east approach median lacks curb ramps to provide pedestrian refuge while the west approach crosswalk is unobstructed by the median. Unmarked on-street parking is available on all legs.

The existing drop inlet on the northeast corner of Bank of America entrance shown in **Figure 3-7** will be impacted by the proposed recommendations.

**Figure 3-7. Northeast Washington Park Drainage Drop Inlet**

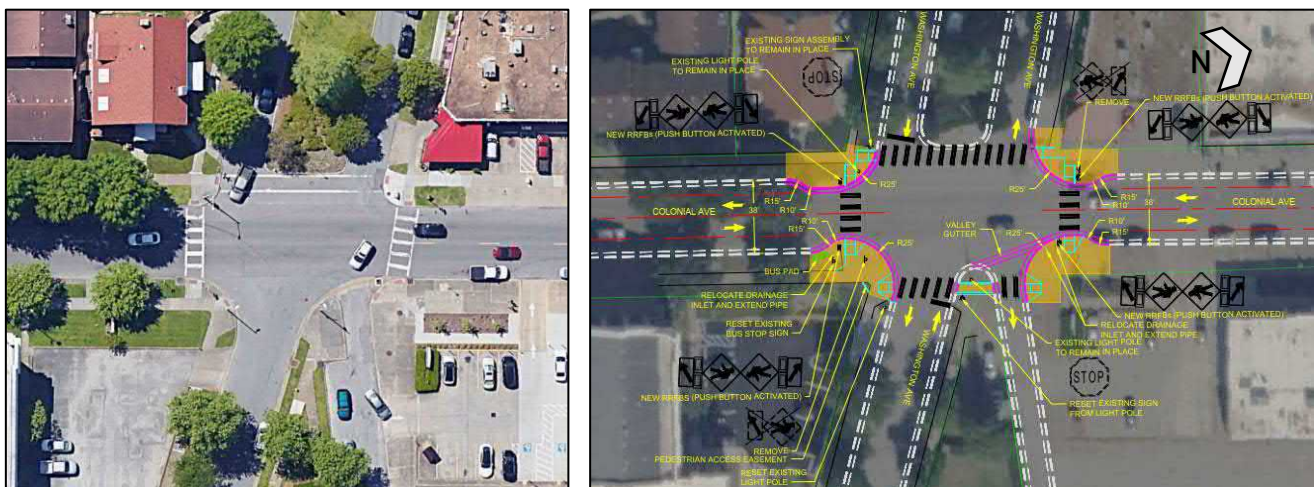


## Recommendations

WSP recommends installing bulb-outs at all corners to extend into Colonial Avenue. The installation will require relocating the curb ramps, adding an at-grade crossing within the median between Washington Ave and Bank of America driveway for pedestrian refuge to provide a safe path. This crossing would include detectable warning pads on each end of the median cut. The improvements will require re-striping the existing crosswalks to align with the curb ramps, resetting the existing signs, relocating storm drains, and resetting manholes. Impacted inlets on the northeast and southeast corners and the drainage drop inlet will need to be relocated.

Four (4) dual-sided pedestrian-activated RRFB's with pedestrian signs are recommended at the Colonial Avenue crosswalks for enhanced pedestrian visibility. See **Figure 3-8** for the proposed intersection concept and Appendix A for full concept plans.

**Figure 3-8. Existing vs. Proposed Washington Park and Colonial Avenue Intersection**



## Cost Estimate

The cost of improving the intersection of Colonial Ave and Washington Park is shown in Table 3-4 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-4. Washington Park and Colonial Avenue  
Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$58,439
DRAINAGE IMPROVEMENTS	\$63,575
TRAFFIC IMPROVEMENTS	\$47,650
<b>TOTAL</b>	<b>\$169,664</b>

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

### 3.5 W 20<sup>th</sup> Street and Colonial Avenue

W 20<sup>th</sup> Street and Colonial Avenue is a four-leg unsignalized intersection. There are no crosswalks or pedestrian signage installed. Crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp at each corner and one (1) perpendicular curb ramps with flared sides on the southeast corner. Unmarked on-street parking is available on all legs with the exception of the north leg, which has “No Parking” signs. **Figure 3-9** shows the southwest corner of the intersection.

Figure 3-9. Southwest corner of W 20<sup>th</sup> Street Intersection



### Recommendations

WSP recommends installing bulb-outs at the southwest and southeast corners to extend into Colonial Avenue. With new bulb-outs, new curb ramps will be installed with detectable warning surfaces to meet ADA standards. This will require resetting the existing signs, relocating two storm drain inlets in the southwest and southeast corners, extending pipe to new inlets, and resetting manholes.

With no on-street parking, bulb-outs were not considered on the northeast and northwest corners of the intersections due to spacing. The existing diagonal northeast and northwest corners curb ramps will still need to be replaced to perpendicular curb ramps and detectable warning surfaces installed. See **Figure 3-10** for the proposed intersection concept and Appendix A for full concept plans.

Figure 3-10. Existing vs. Proposed W 20<sup>th</sup> Street and Colonial Avenue Intersection





## Cost Estimate

The cost of improving the intersection of Colonial Ave and West 20<sup>th</sup> Street is shown in Table 3-5 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-5. W 20<sup>th</sup> Street and Colonial Avenue Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$63,450
DRAINAGE IMPROVEMENTS	\$21,900
TRAFFIC IMPROVEMENTS	\$1,600
<b>TOTAL</b>	<b>\$87,450</b>

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

## 3.6 W 21<sup>st</sup> Street and Colonial Avenue

W 21<sup>st</sup> Street and Colonial Avenue is a four-leg signalized intersection with fully marked crosswalks and pedestrian signals. Crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp at each corner. Each leg has a through/right turn lane and dedicated left turn lane. The City of Norfolk identified the intersection of W 21<sup>st</sup> Street to be non-compliant with ADA standards and has drainage concerns in the southwest corner.

Ramps and pedestrian signal field measurements were obtained through a previous study and evaluated to determine the improvements as part of this project. Previous measurements show that all ramp slopes, all pedestrian signal heads, and all pushbuttons were not ADA compliant. In addition, several of the pedestrian signal poles were located too far from the ramps. The City has since corrected the pedestrian signal heads, signage and pushbuttons. However, the pedestrian pole locations remain out of compliance. All curb ramps are not ADA compliant.

Marked on-street parking is available on one side of the east and west legs and unmarked on-street parking is available on the south leg. The existing curb ramps at intersection do not have detectable warning surfaces. The pedestrian head offset from the curb ramp and crosswalk of the southwest corner is shown in **Figure 3-11**.



Figure 3-11. Southwest Corner of W 21<sup>st</sup> Street Pedestrian Signal



## Recommendations

WSP recommends relocating the existing pedestrian signals and pushbuttons to new pedestal poles for ADA compliance. It is also recommended that pavement markings be refreshed and ensure crosswalks are aligned with curb ramps. WSP recommends replacing all existing curb ramps at each corner to comply with ADA standards and adjusting all handholes to grade. With no on-street parking, bulb-outs were not considered at this location. The existing sidewalk will be maintained when the curb ramps are replaced. See **Figure 3-12** for the proposed intersection concept and Appendix A for full concept plans.

Figure 3-12. Existing vs. Proposed W 21<sup>st</sup> Street and Colonial Avenue Intersection



## Cost Estimate

The cost of improving the intersection of Colonial Ave and West 21<sup>st</sup> Street is shown in Table 3-6 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-6. W 21<sup>st</sup> Street and Colonial Avenue  
Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$42,195
DRAINAGE IMPROVEMENTS	-
TRAFFIC IMPROVEMENTS	\$34,968
<b>TOTAL</b>	<b>\$77,163</b>

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

## 3.7 W 22<sup>nd</sup> Street and Colonial Avenue

W 22<sup>nd</sup> Street and Colonial Avenue is a four-leg unsignalized intersection. There are poorly marked crosswalks installed on the south and west legs, with portions of the crosswalks paved over as illustrated in **Figure 3-13**. Crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp at the northwest, southwest, and southeast corners, and one (1) perpendicular curb ramp with flared sides and one (1) perpendicular ramp with returned curbs on the northeast corner. No pedestrian signage is installed to coincide with the crosswalks. Marked on-street parking is available on the north leg and unmarked on-street parking is available on the east and west legs. The City has indicated that there is recurring ponding of water in the southwest corner.

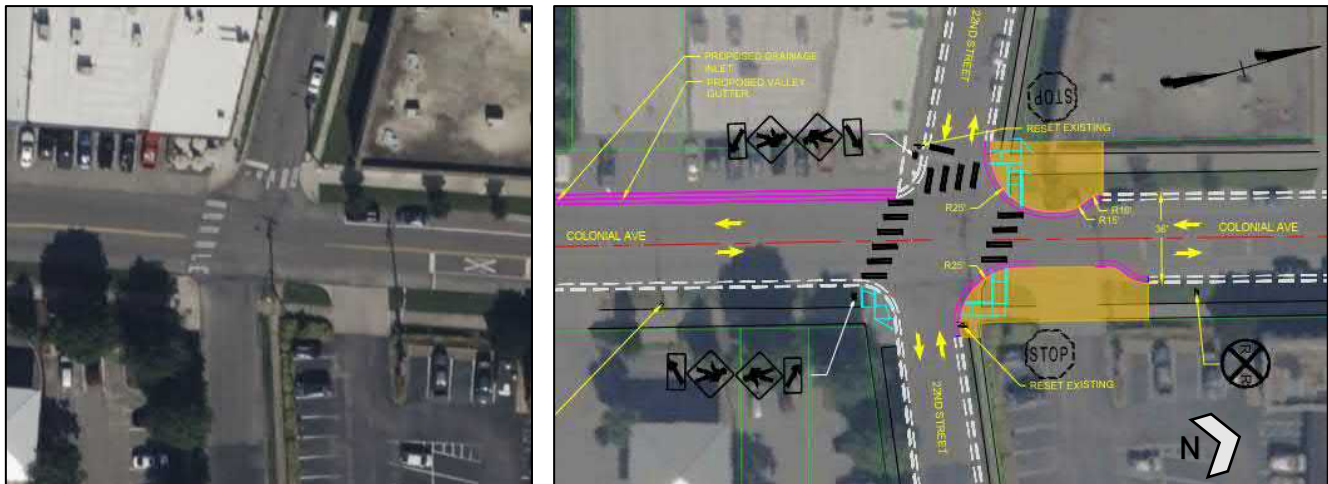
**Figure 3-13. W 22<sup>nd</sup> Street Existing Crosswalks**



## Recommendations

WSP recommends relocating the diagonal curb ramp on the southeast corner to perpendicular curb ramps. This will require restriping the south crosswalk to align with the relocated curb ramps. It is also recommended that dual-sided pedestrian signs installed at each end of the south crosswalk. WSP recommends replacing the existing curb ramps in the northeast and northwest corners of the intersection adding detectable warning surfaces to comply with ADA standards. This will require two manholes to be adjusted to grade. WSP also recommends refreshing the pavement markings in the west crosswalk, and adding a valley gutter along the length of the perpendicular parking area with a drop inlet and associated pipe extensions to help with drainage concerns on the southwest corner of intersection. The existing sidewalk will be maintained. WSP recommends adding bulb-outs to the north side of the intersection. See **Figure 3-14** for the proposed intersection concept and Appendix A for full concept plans.

**Figure 3-14. Existing vs. Proposed W 22<sup>nd</sup> Street and Colonial Avenue Intersection**



## Cost Estimate

The cost of improving the intersection of Colonial Ave and West 22nd Street is shown in Table 3-7 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-7. W 22<sup>nd</sup> Street and Colonial Avenue  
Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$33,330
DRAINAGE IMPROVEMENTS	\$28,500
TRAFFIC IMPROVEMENTS	\$48,038
<b>TOTAL</b>	<b>\$109,868</b>

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



### 3.8 W 23<sup>rd</sup> Street, Rail Crossing, and Colonial Avenue

W 23<sup>rd</sup> Street and Colonial Avenue is a four-leg unsignalized intersection with a two-track rail crossing located just south of 23<sup>rd</sup> Street. There are marked crosswalks installed on the north, east, and west legs. No pedestrian signage is installed. It is noted that a Stop sign located on the northeast corner blocks adequate access of the sidewalk. The sidewalks of the southwest and southeast corners terminate at-grade and transition to marked pathways to cross the tracks northbound and southbound. It is noted the southeast sidewalk has a rough, unfinished surface as shown in **Figure 3-15**. Crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp at the northwest corner, one (1) diagonal curb ramp at the northeast corner, directly from the at-grade transition on the southwest corner, and directly from the at-grade transition on the southeast corner.

The dedicated bike lanes along Colonial Avenue start/end just north of the rail crossing and extend to the north. No bicycle signage is installed to indicate the beginning or end of the bike lanes. Marked on-street parking is available on the north and south legs and unmarked on-street parking is available on the east and west legs. No existing drainage inlets were observed at intersection.

The rail crossing is indicated by stop bars, crossing gates with flashing signals, and cross buck signs installed six (6) feet from the rail on the south leg and twenty-five (25) feet from the rail on the north leg between the crossing and 23<sup>rd</sup> Street. The arm of the crossing gate extends over the roadway, designated pedestrian travel ways, and bicycle paths when activated.

Figure 3-15. Southeast W 23<sup>rd</sup> Street Sidewalk Termination

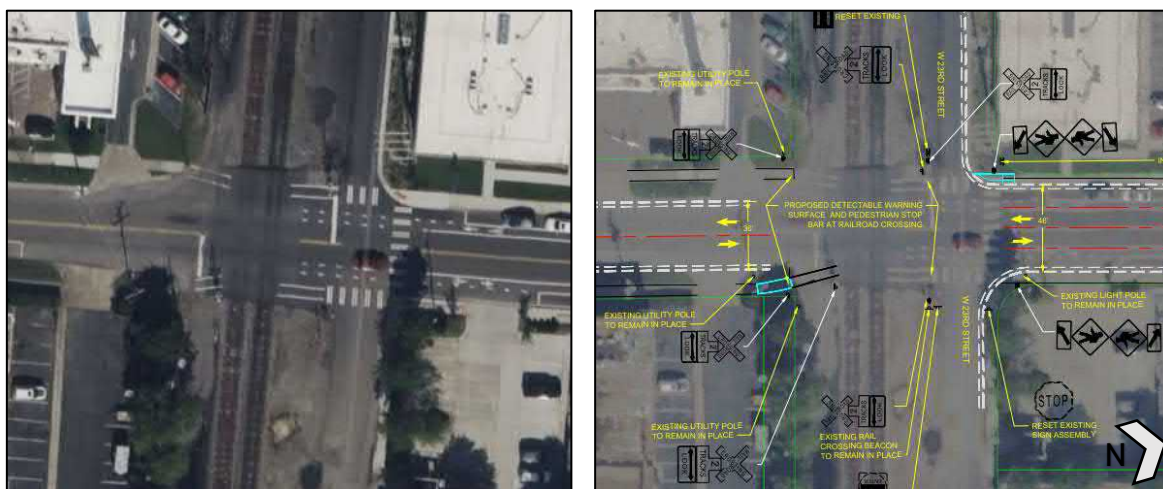




## Recommendations

WSP recommends installing additional signs for the rail crossing (particularly pedestrian-level signs), bike lanes, and Colonial Avenue crosswalk. The Stop sign impeding access on the east leg should be relocated to the inside of the sidewalk for ADA compliance. It is also recommended to improve the existing southeast asphalt/gravel sidewalk with a concrete sidewalk, and detectable warning surfaces be installed at each sidewalk termination as well as on each side of the railroad tracks. Further improvements can be made by installing a crosswalk and pedestrian signs for the south intersection leg as well as finishing the terminated sidewalks as dedicated curb ramps and installing pedestrian stop bars adjacent to the detectable surface or “Stop Here” red-colored pedestrian stop bars. Bulb-outs were investigated and were not considered at this location due to impacts to existing bike lanes and on street parking. See **Figure 3-16** for the proposed intersection concept and Appendix A for full concept plans.

**Figure 3-16. Existing vs. Proposed W 23<sup>rd</sup> Street and Colonial Avenue Intersection**



## Cost Estimate

The cost of improving the intersection of Colonial Ave and West 23<sup>rd</sup> Street is shown in Table 3-8 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-8. W 23<sup>rd</sup> Street and Colonial Avenue Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$9,200
DRAINAGE IMPROVEMENTS	-
TRAFFIC IMPROVEMENTS	\$9,840
<b>TOTAL</b>	<b>\$19,040</b>

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

### 3.9 W 24<sup>th</sup> Street and Colonial Avenue

W 24<sup>th</sup> Street and Colonial Avenue is a four-leg unsignalized intersection. Crosswalks are visibly marked on all four legs and there is no existing pedestrian crossing signage. Dedicated bike lanes run along the northbound and southbound directions, with no existing bicycle lane signage. Crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp at each corner. It is noted the detectable warning surface of the northwest and northwest corners are improperly installed as shown in **Figure 3-17**. Marked on-street parking is available on the north and south legs and unmarked on-street parking is available on the east and west legs. No drainage inlets were observed at the intersection.

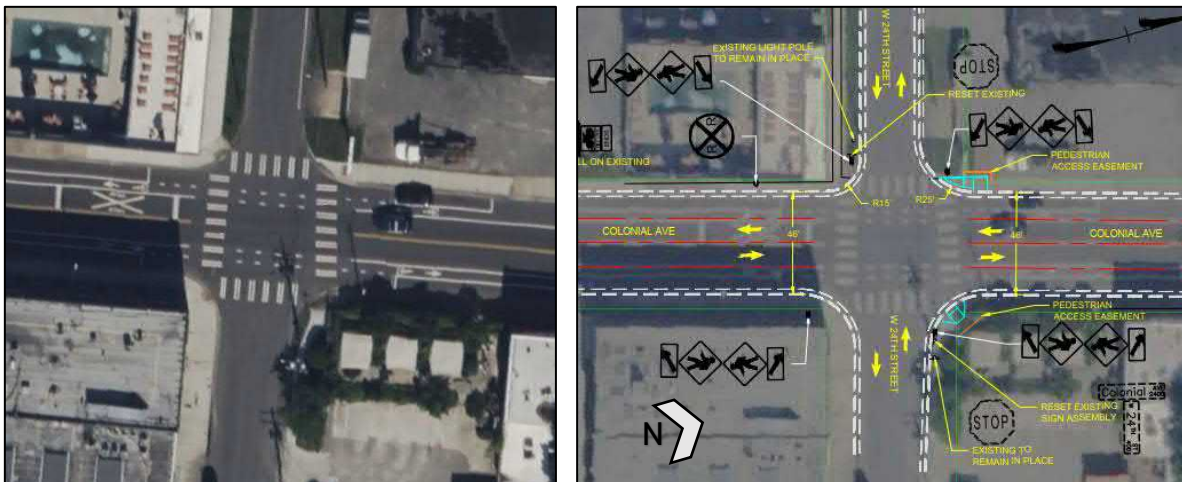
Figure 3-17. Northwest W 24<sup>th</sup> Street Detectable Warning Surface



### Recommendations

WSP recommends installing a new detectable warning surface on the northwest curb ramp and removing the improperly installed surface. It is also recommended to install four (4) dual-sided pedestrian signs to be placed at each end of both Colonial Avenue crosswalks. Bulb-outs were investigated and were not considered at this location due to impacts to existing bike lanes and reduction of the number of parking spaces on the street. See **Figure 3-18** for the proposed intersection concept and Appendix A for full concept plans.

Figure 3-18. Existing vs. Proposed W 24<sup>th</sup> Street and Colonial Avenue Intersection



## Cost Estimate

The cost of improving the intersection of Colonial Ave and West 24<sup>th</sup> Street is shown in Table 3-9 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-9. W 24<sup>th</sup> Street and Colonial Avenue  
Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$9,075
DRAINAGE IMPROVEMENTS	-
TRAFFIC IMPROVEMENTS	\$10,480
<b>TOTAL</b>	<b>\$19,555</b>

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

## 3.10 W 25<sup>th</sup> Street and Colonial Avenue

W 25<sup>th</sup> Street and Colonial Avenue is a four-leg unsignalized intersection. Crosswalks are visibly marked on all four legs and there is no existing pedestrian signage. Dedicated bike lanes run along the northbound and southbound directions, with no existing bicycle signage. Crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp at each corner. All four ramps were field measured and they do not meet ADA requirements. It is noted the detectable warning surface of the southwest corner is improperly installed as illustrated in **Figure 3-19**. Marked on-street parking is available on the north and south legs and unmarked on-street parking is available on the east and west legs. No drainage inlets were observed at the intersection.

**Figure 3-19. Southwest W 25<sup>th</sup> Street Detectable Warning Surface**

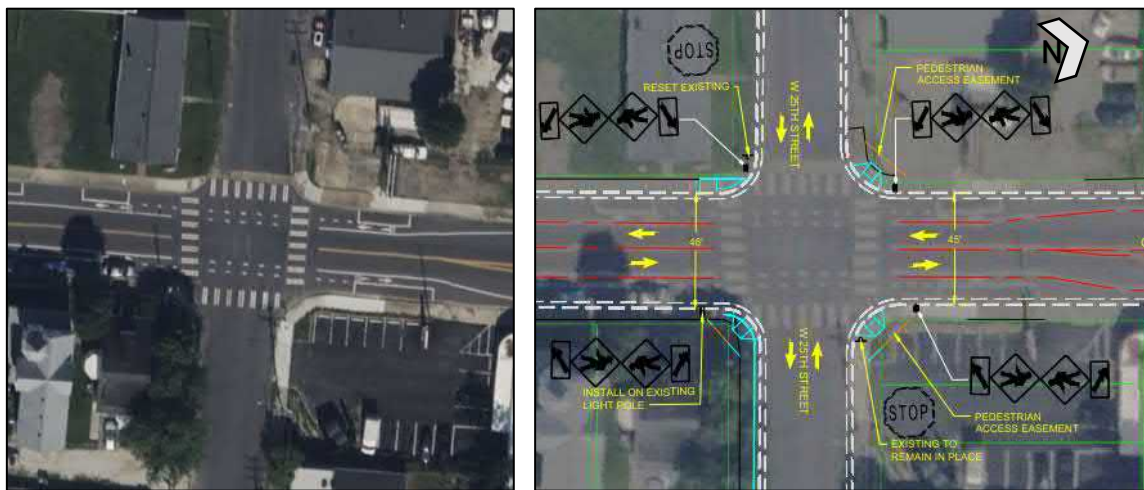




## Recommendations

WSP recommends reconstructing all four curb ramps to meet ADA requirements. It is also recommended that four (4) dual-sided pedestrian signs to be placed at each end of both Colonial Avenue crosswalks. Bulb-outs were investigated and were not considered at this location due to impacts to existing bike lanes and reduction of the number of parking spaces on the street. See **Figure 3-20** for the proposed intersection concept and Appendix A for full concept plans.

Figure 3-20. Existing vs. Proposed W 25<sup>th</sup> Street and Colonial Avenue Intersection



## Cost Estimate

The cost of improving the intersection of Colonial Ave and West 25<sup>th</sup> Street is shown in Table 3-10 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

Table 3-10. W 25<sup>th</sup> Street and Colonial Avenue  
Cost Estimate of Improvements

ITEM	COST
ROADWAY IMPROVEMENTS	\$17,150
DRAINAGE IMPROVEMENTS	-
TRAFFIC IMPROVEMENTS	\$8,200
<b>TOTAL</b>	<b>\$25,350</b>

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



### 3.11 W 26<sup>th</sup> Street and Colonial Avenue

W 26<sup>th</sup> Street and Colonial Avenue is a four-leg signalized intersection with one-way traffic eastbound on W 26<sup>th</sup> Street. The north leg has one (1) through and one (1) dedicated left southbound lanes, the west leg has two (2) through eastbound lane, and the south leg has one (1) shared through/right northbound lane. Crosswalks are visibly marked on all four legs. There is no existing pedestrian signage. Dedicated bike lanes run along the northbound and southbound directions with no existing bicycle signage. Crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp at each corner. One detectable warning surface missing at the intersection in the southeast corner. There is no on-street parking, and no drainage inlets were observed at the intersection.

The existing signal poles are steel span wire poles and show signs of wear and age, as shown in **Figure 3-21**. There is no pedestrian signal equipment at this intersection.

Figure 3-21. W 26<sup>th</sup> Street Existing Signal Poles

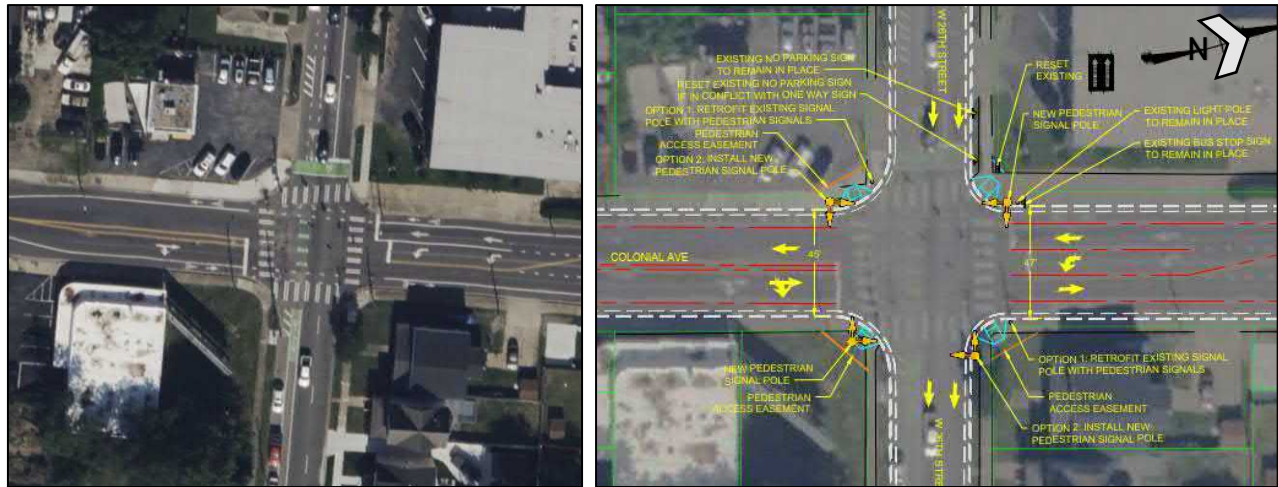


### Recommendations

While the entire signal should be replaced with new mast arm poles at this location, this improvement is beyond the scope of the available budget for pedestrian improvements. In order to provide a benefit to pedestrians that fits within the short-term allowable City funding, WSP recommends placing new pedestrian signals at each corner of the intersection. While retrofitting the existing poles with pedestrian signal equipment may be an option, a structural analysis would need to be completed to assess its' feasibility and practicality. New ADA-compliant pedestal poles should therefore be provided.

WSP recommends installing a detectable warning surface the ramp in the southeast corner. See **Figure 3-22** for the proposed intersection concept and Appendix A for full concept plans.

Figure 3-22. Existing vs. Proposed W 26<sup>th</sup> Street and Colonial Avenue Intersection



## Cost Estimate

The cost of improving the intersection of Colonial Ave and West 26<sup>th</sup> Street is shown in Table 3-11 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

Table 3-11. W 26<sup>th</sup> Street and Colonial Avenue  
Cost Estimate of Improvements

ITEM	COST
ROADWAY IMPROVEMENTS	\$12,500
DRAINAGE IMPROVEMENTS	-
TRAFFIC IMPROVEMENTS	\$28,000
<b>TOTAL</b>	<b>\$40,500</b>

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

### 3.12W 27<sup>th</sup> Street and Colonial Avenue

W 27<sup>th</sup> Street and Colonial Avenue is a four-leg signalized intersection with one-way traffic on 27<sup>th</sup> St westbound. The north leg has one (1) through and one (1) right southbound lane, the east leg has two (2) through westbound lanes, and the south leg has one (1) through and one (1) dedicated right northbound lane. Crosswalks are visibly marked on all four legs. There is no existing pedestrian signage. Dedicated bike lanes run along the northbound and southbound directions, with no existing bicycle signage. Crossings are accessible from the adjoining sidewalks by one (1) diagonal curb ramp the northwest corner, one (1) diagonal curb ramp the northeast corner, one (1) diagonal curb ramp the southeast corner, and two (2) perpendicular curb ramps with flared sides on the southwest corner. All four curb ramps are not ADA compliant and there is only one detectable warning surface installed on the southwest corner and the sidewalk/curb ramp is overgrown with vegetation on the northwest corner. The W 27<sup>th</sup> St approaches have on-street parking on one side. The existing signal poles are steel span wire poles and show signs of wear and age, as shown in **Figure 3-23**. There is no pedestrian signal equipment at this intersection.

Figure 3-23. W 27<sup>th</sup> Street Existing Signal Poles



### Recommendations

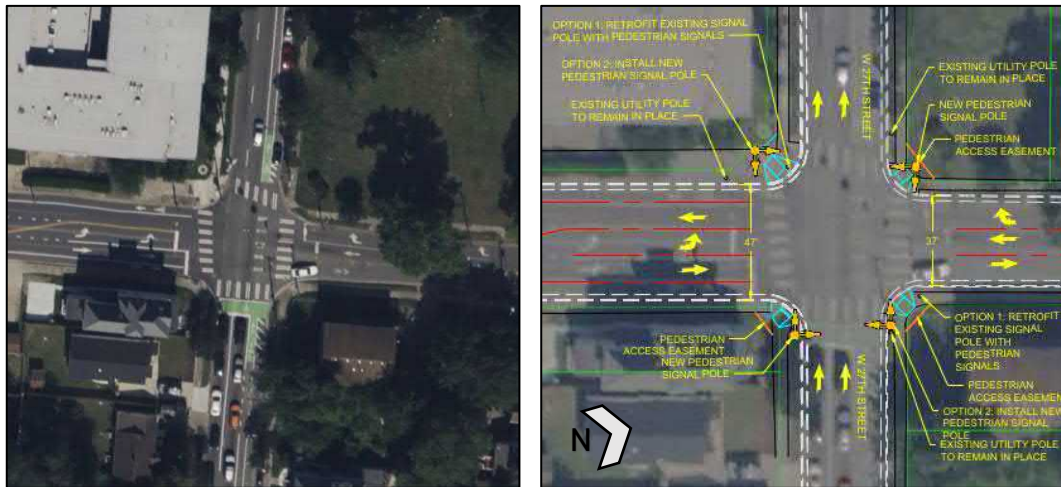
While the entire signal should be replaced with new mast arm poles at this location, this improvement is beyond the scope of the available budget for pedestrian improvements. In order to provide a benefit to pedestrians that fits within the short-term allowable City funding, WSP recommends placing new pedestrian signals at each corner of the intersection. While retrofitting the existing poles with pedestrian signal equipment may be an option, a structural analysis would need to be completed to assess its' feasibility and practicality. New ADA-compliant pedestal poles should therefore be provided.

Replace all four curb ramps of the intersection and add detectable warning surfaces to comply with ADA standards. The vegetation on the sidewalk in the northwest corner should be cleared and the area



examined for underlying damage. See **Figure 3-24** for the proposed intersection concept and Appendix A for full concept plans.

**Figure 3-24. Existing vs. Proposed W 27<sup>th</sup> Street and Colonial Avenue Intersection**



## Cost Estimate

The cost of improving the intersection of Colonial Ave and West 27<sup>TH</sup> Street is shown in See Table 3-12 for an overall intersection cost estimate and Appendix B for a detailed cost breakdown.

**Table 3-12. W 27<sup>th</sup> Street and Colonial Avenue Cost Estimate of Improvements**

ITEM	COST
ROADWAY IMPROVEMENTS	\$20,225
DRAINAGE IMPROVEMENTS	-
TRAFFIC IMPROVEMENTS	\$26,000
<b>TOTAL</b>	<b>\$46,225</b>

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

## 3.13 Other Field Observations

General observations were made regarding improvements to apply throughout the entire corridor. Portions of sidewalk contain uneven slabs or rough surfaces. Segments of curb were either damaged or constructed with fragmented sections of different materials. Signs were defaced with stickers and graffiti. A few of these field observations are illustrated in **Figure 3-25**.

Figure 3-25. General Field Observations



## Recommendations

WSP recommends inspecting sidewalks, curbs, and curb ramps to ensure consistent and maintained access is provided throughout the corridor. Ensure walkways are even and free from obstructions. Remove and replace damaged items. Signage should be free of damage and markings. See Appendix A for full plans.

## 4 CONCLUSION AND SUMMARY OF RECOMMENDATIONS

The Colonial Avenue Pedestrian Improvements project is part of the Complete Streets Initiative. This project aims to promote safe access for all pedestrians, bicyclists, motorists, and transit users. Installing bulb-outs, enhancing pedestrian signage and crosswalks, and making improvements to meet ADA standards are proposed recommendations to support this initiative.

- In order to create a sense of a pedestrian-oriented corridor, WSP recommends installing bulb-outs at select intersections throughout the corridor.
- RRFBs are recommended for placement at the Washington Park and Colonial Avenue intersection due to higher pedestrian activity with the surrounding land uses, and the emphasis on pedestrian movements at this location as evident by the crosswalks on all four legs. Consider community outreach efforts to educate the public and law enforcement officers on the purpose and use of bulb-outs and RRFBs.
- Install dual-sided pedestrian crossing signs at all crosswalks traversing Colonial Avenue. It should be ensured that all crosswalks are properly aligned, and paint is refreshed and maintained regularly.
- Advanced warning of the rail crossing should be enhanced with the addition of new signs and detectable warning surfaces, particularly signs to warn pedestrians approaching opposite traffic flow on the side of the road that does not include barrier arms.
- Place pedestrian signals at each signalized intersection and ensure position is in compliance of ADA standards.
- Sidewalks, curbs, and curb ramps throughout the corridor should be examined to ensure proper access is maintained and surfaces are in good condition. Inspect detectable warning surfaces and confirm they are acceptably installed.

### Cost Estimate

The total cost for pedestrian improvements along Colonial Ave is \$1,444,463. See Table 4-1 for project cost estimate summary. See Appendix B for a detailed cost breakdown.



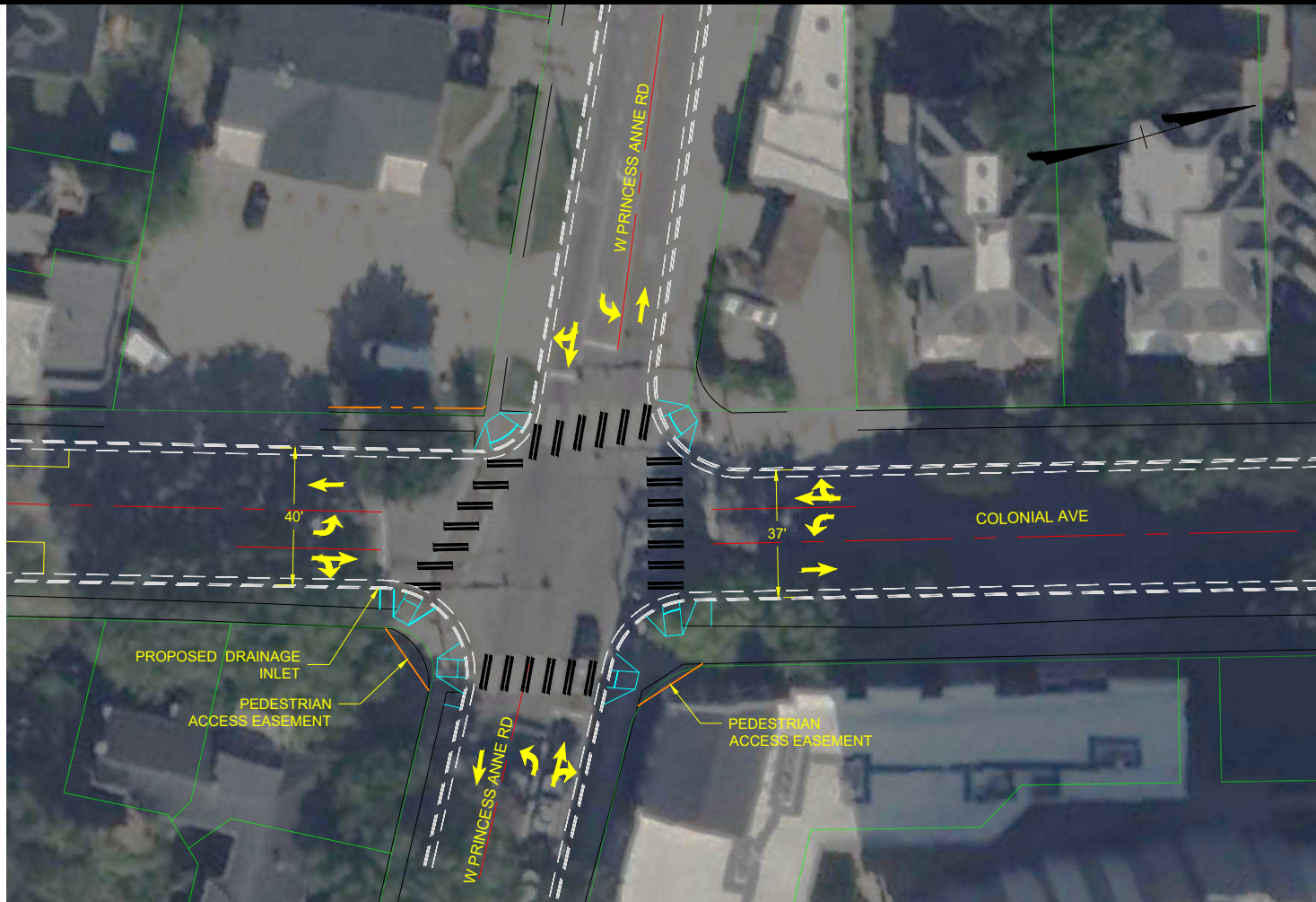
Table 4-1. Colonial Ave Pedestrian Improvements Project Cost Estimate Summary

INTERSECTION	COST
General Requirements (Mobilization/Construction Surveying)	\$92,431
W Princess Anne Road and Colonial Avenue	\$63,050
Shirley Avenue and Colonial Avenue	\$133,815
Spotswood Avenue and Colonial Avenue	\$78,070
Washington Avenue and Colonial Avenue	\$169,664
W 20 <sup>th</sup> Street and Colonial Avenue	\$87,450
W 21 <sup>st</sup> Street and Colonial Avenue	\$77,163
W 22 <sup>nd</sup> Street and Colonial Avenue	\$109,868
W 23 <sup>rd</sup> Street and Colonial Avenue	\$19,040
W 24 <sup>th</sup> Street and Colonial Avenue	\$19,555
W 25 <sup>th</sup> Street and Colonial Avenue	\$25,350
W 26 <sup>th</sup> Street and Colonial Avenue	\$40,500
W 27 <sup>th</sup> Street and Colonial Avenue	\$46,225
<b>2% EASEMENT AND ROW CONTINGENCY</b>	\$19,244
<b>20% MOT CONTINGENCY</b>	<b>\$192,436</b>
<b>CONSTRUCTION SUBTOTAL</b>	<b>\$1,073,856</b>
<b>25% CONTINGENCY</b>	<b>\$268,464</b>
<b>CONSTRUCTION TOTAL</b>	<b>\$1,342,320</b>

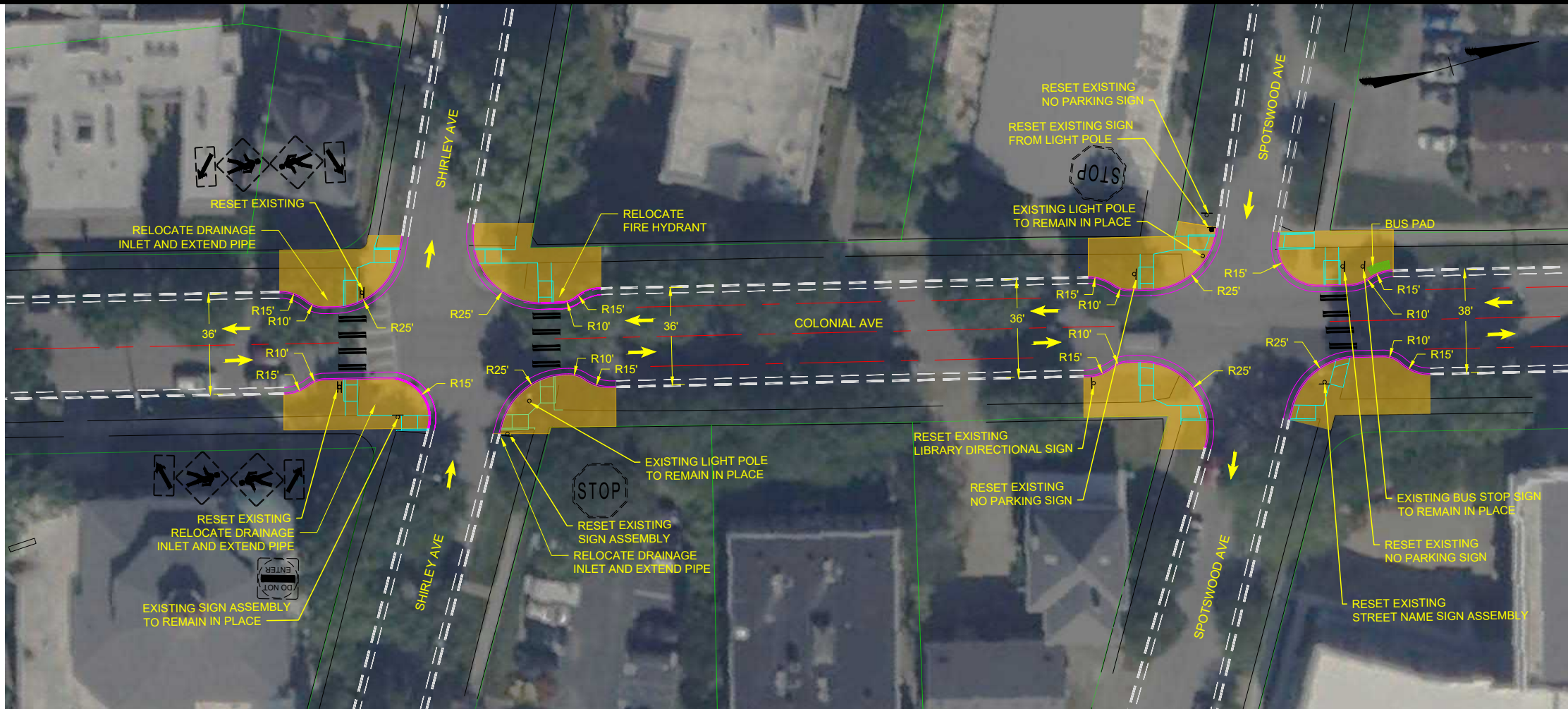
NOTES:  
DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS

# APPENDIX A - CONCEPTUAL PLAN

FILE NAME: T:\30902486 Norfolk Transportation Design Services\Task 01 Colonial Ave Pedestrian Improvements\Concepts\30902486-Colonial-Concepts.dwg LAYOUT NAME: PLAN 1 PLOTTED: Tuesday, July 11, 2023 - 2:16pm



- LEGEND:
- PROPOSED CURB AND GUTTER
  - TRAFFIC FLOW ARROWS
  - HANDICAP RAMP IMPROVEMENTS
  - EXISTING SIDEWALK
  - PROPOSED BULB-OUT/ SIDEWALK IMPROVEMENTS
  - EXISTING CURB LINE
  - PROPOSED RRFB
  - PROPOSED PEDESTAL POLE WITH PEDESTRIAN SIGNAL HEADS AND PUSHBUTTONS (DIRECTION SHOWN)
  - EXISTING RIGHT OF WAY
  - 24" SOLID WHITE LINE
  - EXISTING SIGN
  - PROPOSED SIGN
  - EXISTING POLE
  - EXISTING SIGN TO REMAIN
  - PROPOSED SIGN
  - EXISTING SIGN TO BE REMOVED



CITY OF NORFOLK  
DEPARTMENT OF PUBLIC WORKS

## CONCEPT PLAN

COLONIAL AVE PEDESTRIAN IMPROVEMENTS  
NORFOLK, VIRGINIA

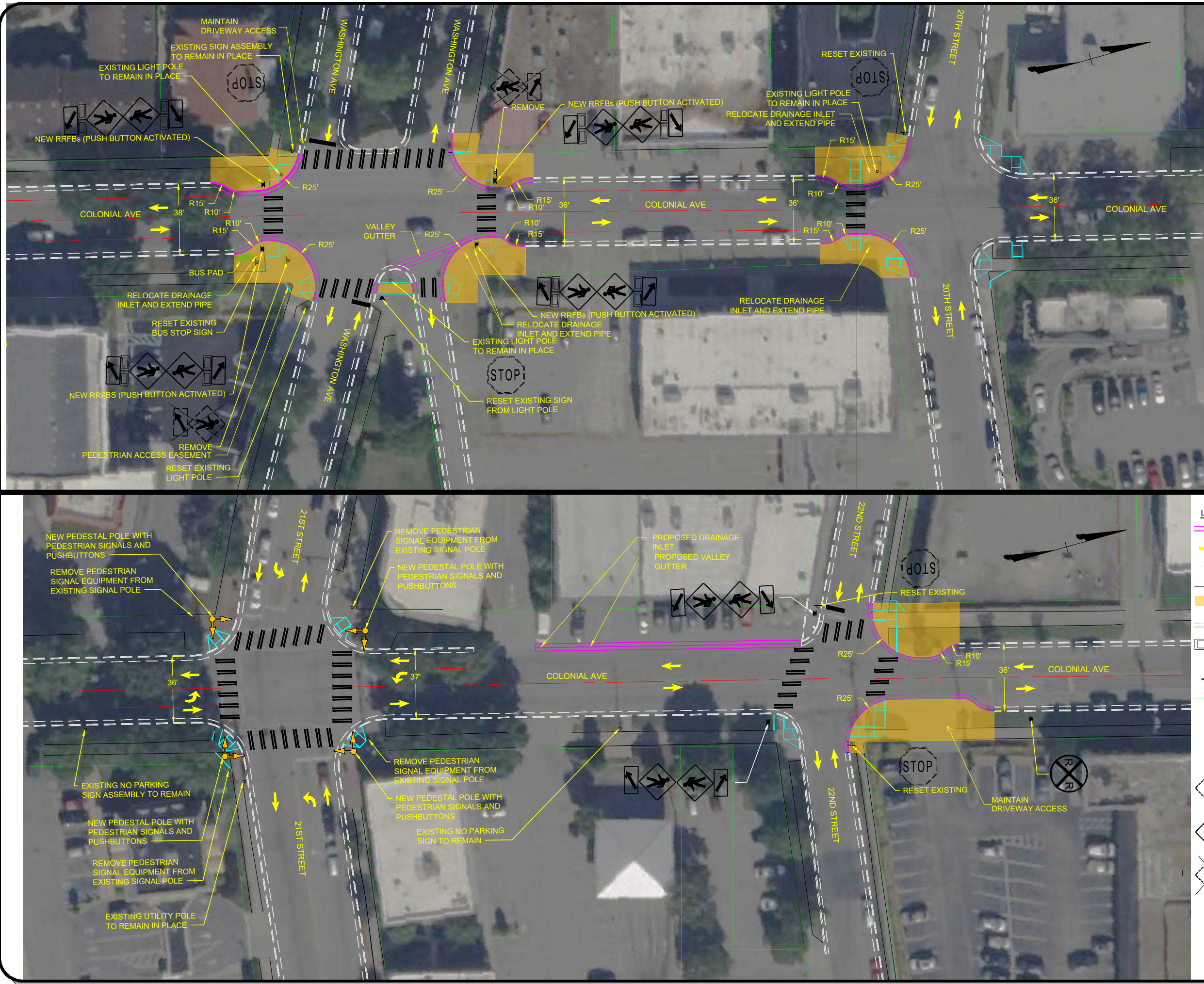
REV #	DATE	PROJECT REVISIONS

DESIGNED BY: RT  
PREPARED BY: JAS

ISSUE DATE:  
APRIL 2023

SHEET  
P-1





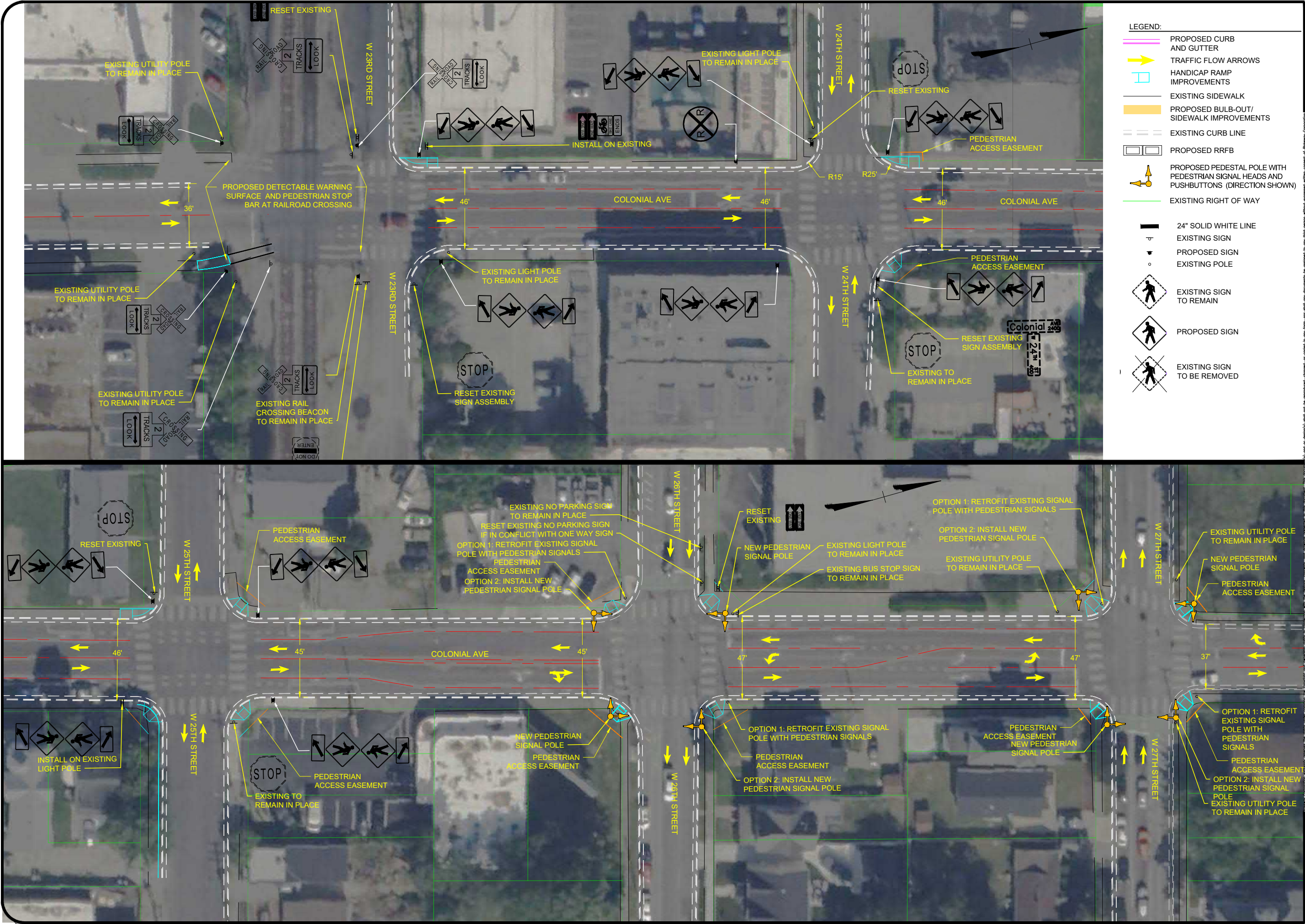
CITY OF NORFOLK  
DEPARTMENT OF PUBLIC WORKS  
**CONCEPT PLAN SHEET**  
COLONIAL AVE PEDESTRIAN IMPROVEMENTS  
NORFOLK, VIRGINIA

[illegible]

DESIGNED BY: <i>RT</i>
PREPARED BY: <i>JAS</i>
ISSUE DATE: <b>APRIL 2023</b>
<b>SHEET</b> <b>P-2</b>



FILE NAME: T:\30902486 Norfolk Transportation Design Services\Task 01 Colonial Ave Pedestrian Improvements\Concepts\30902486-Colonial-Concepts.dwg LAYOUT NAME: PLAN 3 PLOTTED: Tuesday, July 11, 2023 - 9:54pm





CITY OF NORFOLK  
DEPARTMENT OF PUBLIC WORKS

**CONCEPT PLAN**

COLONIAL AVE PEDESTRIAN IMPROVEMENTS  
NORFOLK, VIRGINIA

REV #	DATE	PROJECT REVISIONS


DESIGNED BY: RT  
PREPARED BY: JAS

ISSUE DATE:  
**APRIL 2023**

**SHEET**  
**P-3**

# APPENDIX B – COST ESTIMATES



	COLONIAL AVE PEDESTRIAN IMPROVEMENTS			CIP NO.	
LOCATION:	NORFOLK, VIRGINIA			DATE:	Jul-23
	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
1	MOBILIZATION	LS	1	\$ 83,731	\$ 83,731
2	CONSTRUCTION SURVEYING	LS	1	\$ 8,700	\$ 8,700
	SUB-TOTAL				\$ 92,431
	W PRINCESS ANNE ROAD AND COLONIAL AVENUE				
3	CG-12 W/ DETECTABLE WARNING SURFACE	SY	130	\$ 200.00	\$ 26,000
4	REMOVAL OF CURB AND GUTTER	LF	32	\$ 10.00	\$ 320
5	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	12	\$ 55.00	\$ 660
6	REMOVAL OF SIDEWALK AND ENTRANCE	SY	114	\$ 25.00	\$ 2,850
7	LANDSCAPE IMPROVEMENTS	LS	1	\$ 5,000.00	\$ 5,000
8	DROP INLET	EA	1	\$ 9,400.00	\$ 9,400
9	REMOVE STRUCTURE	EA	1	\$ 2,000.00	\$ 2,000
10	ADJUST EXISTING STRUCTURE TO GRADE	EA	1	\$ 2,000.00	\$ 2,000
11	RCP DRAINAGE PIPE	LF	36	\$ 275.00	\$ 9,900
12	ERADICATE EXIST. LINEAR PVMT	LF	960	\$ 2.00	\$ 1,920
13	TYPE B CLASS I PAVE. LINE MARKING 8"	LF	500	\$ 6.00	\$ 3,000
	SUB-TOTAL				\$ 63,050
	SHIRLEY AVE AND COLONIAL AVENUE				
14	CG-12 W/ DETECTABLE WARNING SURFACE	SY	56	\$ 200.00	\$ 11,200
15	REMOVAL OF CURB AND GUTTER	LF	255	\$ 40.00	\$ 10,200
16	CURB AND GUTTER	LF	208	\$ 25.00	\$ 5,200
17	REMOVAL OF ASPHALT	SY	60	\$ 40.00	\$ 2,400
18	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	377	\$ 55.00	\$ 20,735
19	REMOVAL OF SIDEWALK AND ENTRANCE	SY	208	\$ 25.00	\$ 5,200
20	LANDSCAPE	LS	1	\$ 5,000.00	\$ 5,000
21	FIRE HYDRANT	EA	1	\$ 6,000.00	\$ 6,000
22	DROP INLET	EA	4	\$ 9,400.00	\$ 37,600
23	REMOVE STRUCTURE	EA	4	\$ 2,000.00	\$ 8,000
24	RCP DRAINAGE PIPE	LF	64	\$ 275.00	\$ 17,600
25	ERADICATE EXIST. LINEAR PVMT	LF	360	\$ 2.00	\$ 720
26	TYPE B CLASS I PAVE. LINE MARKING 8"	LF	160	\$ 6.00	\$ 960
27	REMOVE AND RELOCATE SIGN	EA	3	\$ 1,000.00	\$ 3,000
	SUB-TOTAL				\$ 133,815
	SPOTSWOOD AVE AND COLONIAL AVENUE				
28	CG-12 W/ DETECTABLE WARNING SURFACE	SY	147	\$ 200.00	\$ 29,400
29	REMOVAL OF ASPHALT	SY	63	\$ 40.00	\$ 2,520
30	CURB AND GUTTER	LF	193	\$ 40.00	\$ 7,720
31	REMOVAL OF CURB AND GUTTER	LF	193	\$ 40.00	\$ 7,720
32	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	386	\$ 55.00	\$ 21,230
33	LANDSCAPE	LS	1	\$ 5,000.00	\$ 5,000
34	TYPE B CLASS I PAVE. LINE MARKING 8"	LF	80	\$ 6.00	\$ 480
35	REMOVE AND RELOCATE SIGN	EA	4	\$ 1,000.00	\$ 4,000
36	SIGN POST STP-1, 2" 14 GAUGE	LF	12	\$ 40.00	\$ 480
	SUB-TOTAL				\$ 78,070
	WASHINGTON AVENUE AND COLONIAL AVENUE				
37	CG-12 W/ DETECTABLE WARNING SURFACE	SY	76	\$ 200.00	\$ 15,200
38	REMOVAL OF CURB AND GUTTER	LF	32	\$ 10.00	\$ 320
39	CURB AND GUTTER	LF	264	\$ 40.00	\$ 10,560
40	CG-12 W/ DETECTABLE WARNING SURFACE, TYPE M-2	LF	12	\$ 200.00	\$ 2,400
41	REMOVAL OF ASPHALT	SY	98	\$ 40.00	\$ 3,920
42	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	42	\$ 200.00	\$ 8,489
43	REMOVAL OF SIDEWALK AND ENTRANCE	SY	502	\$ 25.00	\$ 12,550
44	LANDSCAPE	LS	1	\$ 5,000.00	\$ 5,000
45	DROP INLET	EA	2	\$ 9,400.00	\$ 18,800
46	REMOVE STRUCTURE	EA	3	\$ 2,000	\$ 6,000
47	RCP DRAINAGE PIPE	LF	141	\$ 275.00	\$ 38,775
48	ERADICATE EXIST. LINEAR PVMT	LF	1,240	\$ 2.00	\$ 2,480
49	TYPE B CLASS I PAVE. LINE MARKING 8"	LF	560	\$ 6.00	\$ 3,360
50	TYPE B CLASS I PAVE. LINE MARKING 24"	LF	31	\$ 30.00	\$ 930
51	REMOVE AND RELOCATE SIGN	EA	1	\$ 1,000.00	\$ 1,000
52	REMOVE SIGN	EA	2	\$ 300.00	\$ 600
53	STP-1, 2" 14 GAUGE	LF	12	\$ 40.00	\$ 480
54	RECTANGULAR RAPID-FLASHING BEACON W/ SIGN PANELS (PUSH BUTTON)	EA	4	\$ 9,700.00	\$ 38,800
	SUB-TOTAL				\$ 169,664

	<b>W 20TH STREET AND COLONIAL AVENUE</b>				
55	CG-12 W/ DETECTABLE WARNING SURFACE	SY	148	\$ 200.00	\$ 29,600
56	CURB AND GUTTER	LF	128	\$ 40.00	\$ 5,120
57	REMOVAL OF CURB AND GUTTER	SY	27	\$ 10.00	\$ 270
58	REMOVAL OF ASPHALT	SY	35	\$ 40.00	\$ 1,400
59	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	182	\$ 55.00	\$ 10,010
60	REMOVAL OF SIDEWALK AND ENTRANCE	SY	502	\$ 25.00	\$ 12,550
61	LANDSCAPE	LS	1	\$ 5,000.00	\$ 5,000
62	ADJUST MANHOLE TO GRADE	EA	2	\$ 2,000.00	\$ 4,000
63	DROP INLET	EA	2	\$ 2,000.00	\$ 4,000
64	REMOVE STRUCTURE	EA	2	\$ 2,000.00	\$ 4,000
65	RCP DRAINAGE PIPE	LF	36	\$ 275.00	\$ 9,900
66	TYPE B CLASS I PAVE. LINE MARKING 8"	LF	100	\$ 6.00	\$ 600
67	REMOVE AND RELOCATE SIGN	EA	1	\$ 1,000.00	\$ 1,000
	<b>SUB-TOTAL</b>				<b>\$ 87,450</b>
	<b>W 21ST STREET AND COLONIAL AVENUE</b>				
68	CG-12 W/ DETECTABLE WARNING SURFACE	SY	75	200	\$ 15,000
69	REMOVAL OF CURB AND GUTTER	SY	32	10	\$ 320
70	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	56	200	\$ 11,200
71	REMOVAL OF SIDEWALK AND ENTRANCE	SY	235	25	\$ 5,875
72	LANDSCAPE	SY	1	5,000	\$ 5,000
73	ADJUST HANDHOLE TO GRADE	LS	8	600	\$ 4,800
74	ERADICATE EXIST. LINEAR PVMT	LF	744	\$ 2.00	\$ 1,488
75	TYPE B CLASS I PAVE. LINE MARKING 8"	LF	580	\$ 6.00	\$ 3,480
76	PEDESTAL SIGNAL POLE & EQUIPMENT	EA	4	\$ 6,500.00	\$ 26,000
77	REMOVE EXISTING PEDESTRIAN EQUIPMENT	EA	4	\$ 1,000.00	\$ 4,000
	<b>SUB-TOTAL</b>				<b>\$ 77,163</b>
	<b>W 22ND STREET AND COLONIAL AVENUE</b>				
78	CG-12 W/ DETECTABLE WARNING SURFACE	SY	56	200	\$ 11,200
74	REMOVAL OF CURB AND GUTTER	LF	32	10	\$ 320
75	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	30	200	\$ 6,000
76	REMOVAL OF SIDEWALK AND ENTRANCE	SY	114	25	\$ 2,850
77	REMOVAL OF ASPHALT	SY	99	40	\$ 3,960
78	LANDSCAPE	LS	1	5,000	\$ 5,000
79	ADJUST MANHOLE TO GRADE	EA	2	2,000	\$ 4,000
80	VALLEY GUTTER	LF	120	60	\$ 7,200
81	REMOVE STRUCTURE	EA	1	2,000	\$ 2,000
82	DROP INLET	EA	1	9,400	\$ 9,400
83	RCP DRAINAGE PIPE	LF	36	275	\$ 9,900
84	ERADICATE EXIST. LINEAR PVMT	LF	264	\$ 2.00	\$ 528
85	TYPE B CLASS I PAVE. LINE MARKING 8"	LF	280	\$ 6.00	\$ 1,680
86	TYPE B CLASS I PAVE. LINE MARKING 24"	LF	13	\$ 30.00	\$ 390
87	REMOVE AND RELOCATE SIGN	EA	2	\$ 1,000.00	\$ 2,000
88	SIGN PANEL	SF	80	\$ 40.00	\$ 3,200
89	STP-1, 2" 14 GAUGE	LF	36	\$ 40.00	\$ 1,440
90	RECTANGULAR RAPID-FLASHING BEACON W/ SIGN PANELS (PUSH BUTTON)	EA	4	\$ 9,700.00	\$ 38,800
	<b>SUB-TOTAL</b>				<b>\$ 109,868</b>
	<b>W 23RD STREET/RAILROAD AND COLONIAL AVENUE</b>				
91	CG-12 W/ DETECTABLE WARNING SURFACE	EA	14	\$ 200.00	\$ 2,800
92	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	24	\$ 200.00	\$ 4,800
93	REMOVAL OF SIDEWALK AND ENTRANCE	SY	24	\$ 25.00	\$ 600
94	LANDSCAPE	LS	1	\$ 1,000.00	\$ 1,000
95	REMOVE AND RELOCATE SIGN	EA	3	\$ 1,000.00	\$ 3,000
96	SIGN PANEL	SF	115	\$ 40.00	\$ 4,600
97	STP-1, 2" 14 GAUGE	LF	56	\$ 40.00	\$ 2,240
	<b>SUB-TOTAL</b>				<b>\$ 19,040</b>
	<b>W 24TH STREET AND COLONIAL AVENUE</b>				
98	CG-12 W/ DETECTABLE WARNING SURFACE	EA	19	\$ 200.00	\$ 3,800
99	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	19	\$ 200.00	\$ 3,800
100	REMOVAL OF SIDEWALK AND ENTRANCE	SY	19	\$ 25.00	\$ 475
101	LANDSCAPE	LS	1	\$ 1,000.00	\$ 1,000
102	REMOVE AND RELOCATE SIGN	EA	2	\$ 1,000.00	\$ 2,000
103	SIGN PANEL	SF	152	\$ 40.00	\$ 6,080
104	STP-1, 2" 14 GAUGE	LF	60	\$ 40.00	\$ 2,400
	<b>SUB-TOTAL</b>				<b>\$ 19,555</b>
	<b>W 25TH STREET AND COLONIAL AVENUE</b>				
105	CG-12 W/ DETECTABLE WARNING SURFACE	EA	38	\$ 200.00	\$ 7,600
104	REMOVAL OF SIDEWALK AND ENTRANCE	SY	38	\$ 25.00	\$ 950
105	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	38	\$ 200.00	\$ 7,600
106	LANDSCAPE	LS	1	\$ 1,000.00	\$ 1,000
107	REMOVE AND RELOCATE SIGN	EA	1	\$ 1,000.00	\$ 1,000
108	SIGN PANEL	SF	144	\$ 40.00	\$ 5,760
109	STP-1, 2" 14 GAUGE	LF	36	\$ 40.00	\$ 1,440
	<b>SUB-TOTAL</b>				<b>\$ 25,350</b>

	<b>W 26TH STREET AND COLONIAL AVENUE</b>				
110	CG-12 W/ DETECTABLE WARNING SURFACE	EA	38	\$ 200.00	\$ 7,600
111	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	10	\$ 200.00	\$ 2,000
112	REMOVAL OF SIDEWALK AND ENTRANCE	SY	76	\$ 25.00	\$ 1,900
113	LANDSCAPE	LS	1	\$ 1,000.00	\$ 1,000
114	REMOVE AND RELOCATE SIGN	EA	2	\$ 1,000.00	\$ 2,000
115	PEDESTAL SIGNAL POLE & EQUIPMENT	EA	4	\$ 6,500.00	\$ 26,000
	<b>SUB-TOTAL</b>				<b>\$ 40,500</b>
	<b>W 27TH STREET AND COLONIAL AVENUE</b>				
116	CG-12 W/ DETECTABLE WARNING SURFACE	EA	40	\$ 200.00	\$ 8,000
117	HYDRAULIC CEMENT CONCRETE SIDEWALK 4"	SY	30	\$ 200.00	\$ 6,000
118	REMOVAL OF SIDEWALK AND ENTRANCE	SY	49	25	\$ 1,225
119	LANDSCAPE	LS	1	\$ 5,000.00	\$ 5,000
120	PEDESTAL SIGNAL POLE & EQUIPMENT	EA	4	\$ 6,500.00	\$ 26,000
	<b>SUB-TOTAL</b>				<b>\$ 46,225</b>
	(SUB-TOTAL)				<b>\$ 962,181</b>
	2% EASEMENT AND ROW CONTINGENCY				<b>\$ 19,244</b>
	20% MOT CONTINGENCY				<b>\$ 192,436</b>
	(CONSTRUCTION SUBTOTAL )				<b>\$ 1,073,856</b>
	25% GENERAL CONTINGENCY				<b>\$ 268,464</b>
	<b>CONSTRUCTION TOTAL:</b>				<b>\$ 1,342,320</b>
	NOTES:				
	DOES NOT INCLUDE ALL PRIVATE UTILITY RELOC. COSTS				