



MACARTHUR BLVD BIKEWAY SEGMENT 3

FINAL STORMWATER MANAGEMENT REPORT

MCDOT CONTRACT NO. 1111497

JMT JOB NO. 18-04565-003

Submitted to:
Montgomery County Department of Transportation

June 2024



TABLE OF CONTENTS

I.	INTRODUCTION	2
III.	METHODOLOGY	4
IV.	REGULATORY REQUIREMENTS	5
V.	STORMWATER MANAGEMENT ANALYSIS	5
VI.	SOURCES OF INFORMATION	11
VII.	CONCLUSION.....	11

TABLES

TABLE 1 – SUMMARY OF TOTAL LOD AREA AND EXISTING IMPERVIOUS AREA

TABLE 2 – SUMMARY OF STREAM AND RESOTRATION POTENTIAL BY SITE

APPENDICES

APPENDIX A – SITE AND RESOURCE MAPS

APPENDIX B – DRAINAGE AREA MAPS

APPENDIX C – WATER QUALITY MAPS

APPENDIX D – NRCS SOIL RESOURCE REPORT

APPENDIX E – WATERSHED, FEMA AND USE WATERS CLASSIFCATION MAPS

APPENDIX F – ESDv REQUIREMENT COMPUTATIONS



I. INTRODUCTION

On behalf of the Montgomery County Department of Transportation (MCDOT), Johnson, Mirmiran, & Thompson (JMT) has completed this Final Stormwater Management Report for the MacArthur Boulevard Bikeway Segment 3 project located in Montgomery County, Maryland. This report concentrates on quality and quantity stormwater management (SWM) requirements for this project based on the impacts of the roadway improvements.

The MCDOT is proposing roadway improvements to MacArthur Boulevard from Oberlin Avenue to the District of Columbia line for approximately 2.2 miles. The purpose of the MacArthur Boulevard Bikeway Segment 3 project is to construct a separated bicycle facility along MacArthur Boulevard. The eight-foot wide proposed path will be located on the south side of the roadway and will be separated from the edge of pavement with a five-foot grass buffer. Minor roadway widening and resurfacing is also proposed on MacArthur Boulevard. Bike facilities will connect to the existing facilities located at either end of the project corridor. The improvements include widening the existing roadway from 11'-lanes to 13'-lanes.

The combined concept and site development SWM report developed by the URS Corporation, dated September 13, 2016, received combined concept and site development SWM approval from the Montgomery County Department of Permitting Services (MCDPS) on September 21, 2016. That approval is used as the basis for the final stormwater management analysis and reporting.

II. SITE & WATERSHED DESCRIPTION

The existing roadway is located on a ledge cut out of a steep hill that slopes to the west towards the Potomac River. The only open space potentially available for stormwater management is a variable width (0-8 feet) grass buffer area between the existing roadway and bike path. An existing dual aqueduct line runs underneath the roadway throughout the length of the project. The existing conditions include steep slopes, poor soils for infiltration, and residential and commercial development. Even though development criteria limit the increase of impervious area to the region, existing conditions leave little room for traditional stormwater management methods. A vicinity map of the project locations is provided below in Figure 1. Initial watershed delineation identified twelve sub-watersheds along the roadway, see Appendix E for the Drainage Area Maps. Several sections along the roadway do not drain to the roadway due to pre-existing storm water management systems, such as culverts and holding ponds. The new development from the proposed work in these areas was accounted for by adding the required treatment areas to the nearby watersheds.

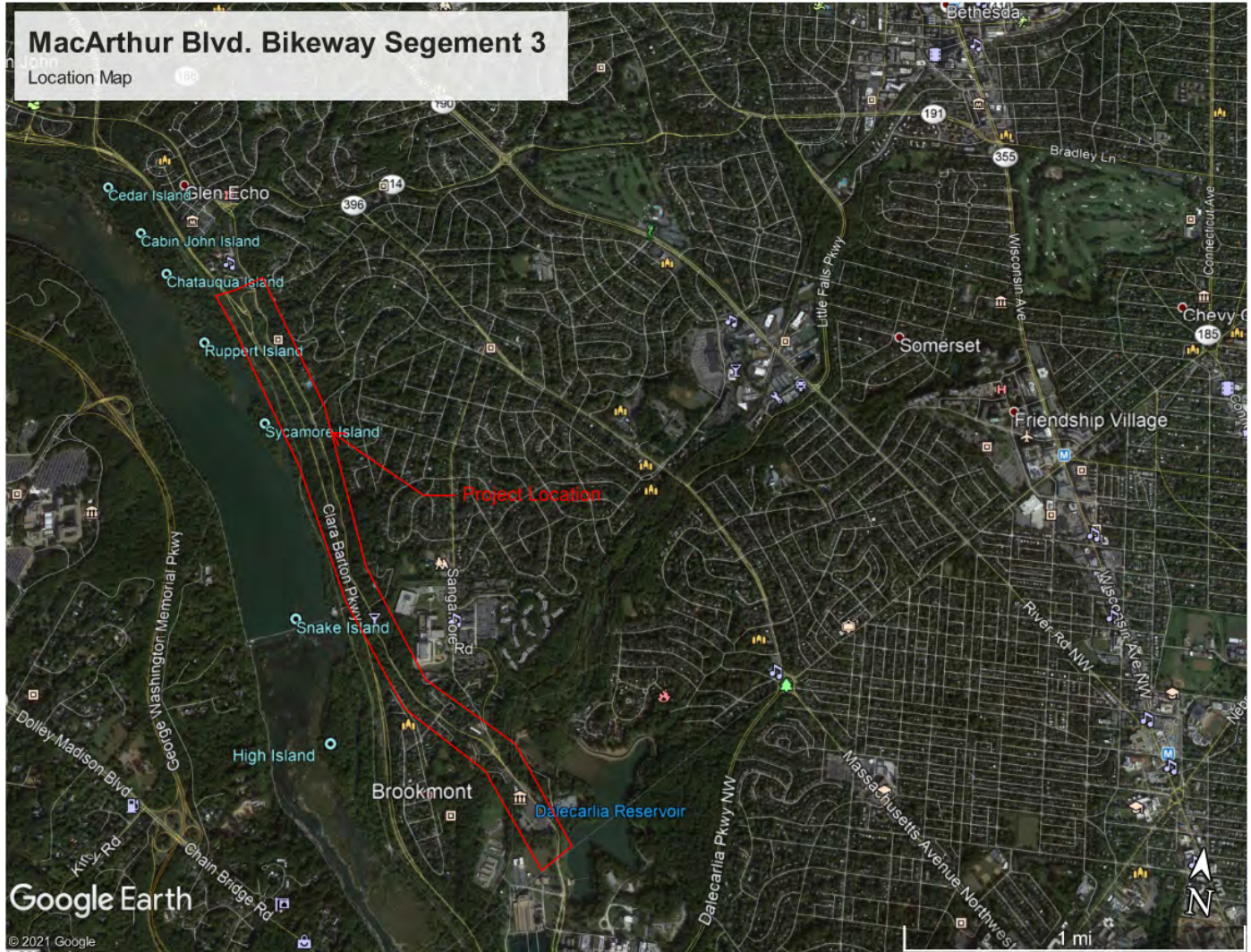


Figure 1. Vicinity Map

The 2020 USDA Natural Resources Conservation Service (NRCS) Web Soil Survey for Montgomery County was used to delineate the hydrologic soil groups in the area. The primary watershed soil present is silt loam, which is a poor soil for infiltration. The site is comprised of Hydrologic Soil Group (HSG) B, C and D soils. The soils maps indicate that the soil in this area is only moderately erodible. Soils maps depicting the various soil types present within the project limits are included in Appendix D.

The project is located between a developed residential area and national park area adjacent to the Chesapeake and Ohio Canal. Most of the drainage area contains roadway and steep-sloped wooded areas. Land uses were derived from aerial topographic maps and aerial photographs in



conjunction with field visits. The drainage area maps were developed through aerial survey data and United States Geographical Survey (USGS) maps.

Site and Resources Maps can be found in Appendix A. There are no designated wetlands located at the site. However, there are two areas of Waters of the US (WUS) located at the site.

The project lies in the Potomac River Montgomery County Sub Watershed (02-14-02-02) within the Washington Metropolitan Watershed (02-14-02). The nearest receiving waters (C&O Canal) within the project site are considered to be Use I-P (Water Contact recreation, and protection of Aquatic Life). For the Use I-P waters, in-stream work is prohibited between March 1 and June 15, inclusive. Although there is no anticipated work within any designated stream or channel.

The project is not located within the Chesapeake Bay Critical Area and does not lie within a FEMA floodplain. The FEMA flood maps along with Watershed maps for this area can be seen in Appendix E.

III. METHODOLOGY

This report was developed in compliance with MCDOT/DPS design criteria, the 2000 Maryland Stormwater Design Manual Volumes I & II, revised May 2009 (The Manual). These documents require establishing a comprehensive process for stormwater management approval by implementing Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP) and ensuring structural practices are used only when absolutely necessary. The goal of ESD is for site runoff to mimic runoff from woods in good condition.

The level of development found in the region has led to significant erosion and instability along the project area. The streams and drainage channels in the area have become incised and now threaten to impact the adjacent properties. In examining the drainage areas, the percentage of existing impervious area within the LOD was determined to be 45%. This project is considered a redevelopment project since the existing imperviousness of the proposed site area is greater than 40%. However, MCDOT/DPS has indicated that all projects are to be designed as new development, so the project will be considered as new development for determining stormwater requirements. A summary of the total project LOD area and the existing/proposed impervious areas can be found in Table 1. Section 4.1 of the Guidelines outlines all minimum control requirements for New Development Projects. The ESD standard is met when the post-development hydrology is restored to natural hydrologic conditions assuring that channel stability is maintained, pre-development groundwater recharge is replicated, and nonpoint source pollution is minimized for the 1-year 24-hour frequency storm event. This requires capturing and treating from 1 inch to 1.8 inches of rainfall (P_E) depending on the site conditions. Runoff from a minimum of 1 inch of rainfall must be treated using Chapter 5 (of the Manual) ESD practices. The rainfall (P_E) above one 1 inch should also be treated using ESD practices.



Only when management of the full ESDv using ESD practices is not practicable may Chapter 3 (of the Manual) structural best management practices (BMPs) be used for treating rainfall (P_E) above 1 inch. When the entire Impervious Area Requiring Treatment (IART) is treated for the full target rainfall (P_E), thereby meeting the ESDv storage volume requirements, the ESD requirements, including CP_V , Water Quality Volume (WQ_V), and Recharge Volume (Re_V), are completely satisfied. Because this project is located within Montgomery County, overbank flood protection (Q_P) will be required for the 10-year storm event. Furthermore, extreme flood protection (Q_f) will not be required for the 100-year storm event for any POI.

TABLE 1: SUMMARY OF TOTAL LOD AREA AND EXISTING IMPERVIOUS AREA

Total LOD Area (ac)	Existing Impervious Area (ac)	Proposed Impervious area (ac)	Net Change (ac)	Existing Impervious Percentage	Required ESDv Volume for New Development (cf)
10.06	4.49	4.43	0.06	45%	3553

IV. REGULATORY REQUIREMENTS

Based on the project scope; the following approvals / permits will be required and submitted accordingly.

- **Stormwater Management-** A stormwater management approval from DPS will be required since this project will disturb more than 5,000 square feet.
- **Erosion and Sediment Control-** An erosion and sediment control approval from DPS will be required since this project will disturb more than 100 cubic yards.
- **NPDES Permit-** A NPDES general construction permit will be required since the project will disturb more than 1 acre.
- **MDE Non-tidal Wetland and Waterways Permit Approval-** Impacts to WUS are occurring.

V. STORMWATER MANAGEMENT ANALYSIS

Since the existing roadway includes an 8-foot or greater paved section for shared use, the proposed path and grass-buffer combination does not increase the impervious area. A comparison of the proposed design and existing conditions indicates that the proposed roadway/path reconfiguration created a 0.06 acre decrease in impervious area.

While there is a decrease in impervious area, there is still a need to investigate providing proper stormwater treatment, as there are currently no existing facilities within the project limits. It



should be noted that the ESD volumes shown in Table 1 were determined using new development criteria, per MCDOT/DPS requirements, and accounts for all the existing and proposed pavement within the project Limit of Disturbance.

Peak flows for each drainage area were not determined for this project since there was a decrease in the impervious area between the existing and the proposed conditions.

Stormwater Management by Stream Restoration

Per the approved URS concept/site report, to address the runoff, bio-swales were considered as an option. For the concept design, a cost for treating an ESD Volume of 1000 cubic feet was determined using Maryland State Highway Administration (MSHA) Price Indices and engineering judgment. The typical cross section was based on Montgomery County specifications and details. The analysis determined a cost of approximately \$15,100 to provide 1,000 cubic feet of ESD volume.

Given the cost, and the difficult site conditions, alternative methods for managing the increased stormwater runoff were explored. Stream restoration in lieu of stormwater management was examined due to the significant erosion to the streams in the area surrounding the project. Restoring these streams would provide additional protection for the increased runoff, meet the SWM needs of this project and reduce erosion in the area. Several locations for possible stream restoration were determined by field investigation and observation.

Four stream sites, with a total of five potential restoration locations were identified. In determining the restoration potential, the needs for restoration as well as the practicality of the site (difficulty for access and benefit of restoration) were taken into account. Several of the more practical restoration sites were located further upstream from MacArthur Blvd, close to the stream headwaters. Below is a preliminary investigation that was performed to analyze each stream location's optimal potential for restoration.

- **Stream Restoration Site 1A (Sta. 183+65)**

Per the URS concept/site report, Site 1A is located near the intersection of MacArthur Boulevard and Walhonding Road. The stream is rocky with several large bedrock outcrops and is surrounded by steep ground slopes and fed by a channel flowing from an outfall at Walhonding Rd. There is erosion present along the clay banks, and some are unstable. The cost to access would likely outweigh the cost of the restoration itself due to the barrier presented by the steep slopes. Therefore, this stream site will not be used.



Figure 1A.1 Bedrock Outcrop



Figure 1A.2 Bank Erosion

- **Stream Restoration Site 1B (Sta. 183+65)**

Per the URS concept/site report, Site 1B is located at the headwaters of the stream flowing parallel to Walhonding Road down toward the intersection with MacArthur Blvd. The stream flows out from a concrete culvert headwall, down a concrete stream bed, and then into a natural, rocky stream bed. The banks along one side of the stream are showing signs of erosion that is slowly encroaching upon the property of nearby residential houses. If not addressed, the erosion could become a danger to these properties. Access to the restoration site can be provided from Walhonding Road.



Figure 1B.1 Headwater Outfall

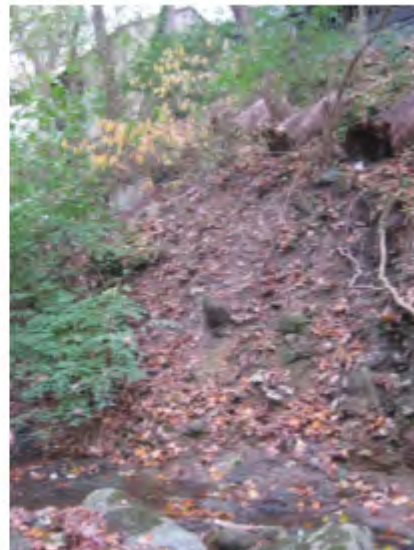


Figure 1B.2 Bank Erosion Near House



- **Stream Restoration Site 2A (Sta. 196+00)**

Per the URS concept/site report, Site 2A is located to the south of Site 1A along MacArthur Blvd. The stream has signs of prior remediation attempts in the form of geotextile fabric, but the erosion has persisted. The stream becomes very steep and rocky at the upstream area near the headwater pipe outlet. The restoration area is directly adjacent to MacArthur Blvd. and should be easy to access but may prove difficult to construct due to the proximity to the proposed roadway.



Figure 2.1 Ditch Erosion



Figure 2.2 Geotextile Failure

- **Stream Restoration Site 3A (Sta. 221+77)**

Per the URS concept/site report, Site 3A is located near the intersection of MacArthur Blvd. and Wapokoneta Road. The stream flows along Wapokoneta Road and then splits, with one branch continuing to follow the road and the other branch diverging away toward the northeast. There are only minor stretches of the stream that are unstable, as the majority of the channel has a large amount of rocks and boulders in place. The stream branch that follows Wapokoneta also has some signs of scour. The site's proximity to Wapokoneta Road allows for easy access to apply restoration measures.



Figure 3A.1 Rocky Streambed

Figure 3A.2 Bank Erosion

- **Stream Restoration Site 3B (Sta. 221+77)**

Per the URS concept/site report, Site 3B is located along the upstream branch of Site 3A that continues to follow Wapokoneta Road. The headwaters flow from a 24" RCP that is a few feet above the stream bed. The stream bed below the outfall shows signs of severe scour due to the change in elevation from outfall invert to stream bed. As with Site 3A, there should be sufficient access to the restoration area given the proximity to Wapokoneta Rd.



Figure 3B.1 Pipe Outfall

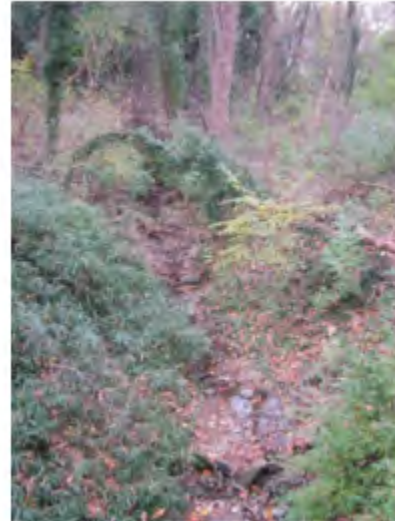


Figure 3B.2 Bank Erosion

- **Stream Restoration Site 4 (Sta. 228+35)**

Per the URS concept/site report, Site 4 is located south of Site 3A along MacArthur Blvd. The stream is incised with the presence of large rocks and boulders making it fairly stable. However, there are spots of visible scouring along the stream that would benefit from restoration efforts. Access to the site would prove difficult due to there being no



nearby road and the steep slope the stream follows as it approaches MacArthur Blvd. Therefore, this stream site will not be used.



Figure 4.1 Rocky Streambed

Figure 4.2 Culvert

Per the URS concept/site report, the varying site conditions including stream width, access, and flow make a uniform cost estimate per linear feet or stream restoration inaccurate. However, a breakdown of the sites and the estimated stream restoration potential, or estimated ditch improvement potential, is shown in Table 2 below.

TABLE 2: SUMMARY OF STREAM AND RESOTRATION POTENTIAL BY SITE

Site	Location	Stream Reach Length (ft)	Estimated Restoration Potential (ft)	Estimated Ditch Improvement Potential (ft)
1A	Walhonding Rd.	550	0	---
1B	Walhonding Rd.	270	80	---
2	MacArthur Ditch	275	100	60
3A	Wapokeneta Rd.	650	75	---
3B	Wapokeneta Rd.	275	200	---
4	South along MacArthur Blvd.	600	0	---

Total Potential Stream Restoration Length = 455 L.F.

Total Potential Ditch Improvement Length = 60 L.F.



Per the URS concept/site report, after the preliminary investigation was performed and the information above compiled, a subsequent site inspection and analysis was completed by the Montgomery County Department of Environmental Protection (DEP). Notes from DEP's inspection were compiled and sent on August 5, 2016 with the conclusion that these sites did not warrant restoration at this time, did not make their list of "critical locations" in their earlier survey of the region and that any action to do restoration may have more impacts to the areas than would be beneficial in the long-term.

Per the URS concept/site report, a meeting was held on September 2, 2016, between DPS, DEP, MCDOT, and URS to discuss these findings. Emphasis was put on the impacts that any restoration would likely cause, the extremely low amount of net impervious gain in the project limits (0.01 acres), the unknown location or an endangered plant species in regards to the restoration areas, and the extremely limiting factors for the project to provide conventional SWM within the project limits. It was agreed upon by all parties in attendance that the best course of action would be to apply for a SWM waiver as presented in the approved Concept/Site Development SWM report.

VI. SOURCES OF INFORMATION

The sources of information for this report are as follows:

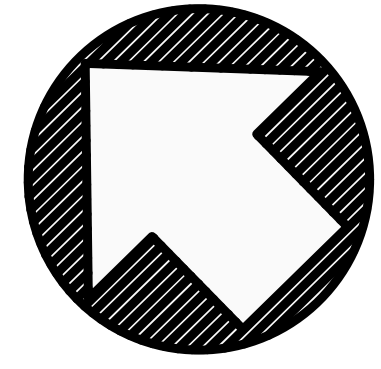
- Site Investigation
- Field Surveys
- Aerial Imagery
- USDA Natural Resources Conservation Service (NRCS) Web Soil Survey
- FEMA Map Service Center
- The 2000 Maryland Stormwater Design Manual Volumes I & II, revised May 2009
- MacArthur Boulevard Bike Path/Lane Improvements Concept Design Stormwater Management Report, dated September 13, 2016, developed by the URS Corp.

VII. CONCLUSION

Per the URS concept/site report, given the steep slopes surrounding the project, poor soil conditions, and high density of developed areas, traditional stormwater management practices are not practicable for the project. An investigation of potential stream restoration sites was performed by URS to be considered in place of stormwater management. DEP performed a subsequent investigation of the same locations and expressed concern that the sites would not benefit enough from any improvements to counteract the impacts created by accessing the streams. A meeting was held to discuss these results and upon considering the project limitations and the extremely low amount of net impervious being added, a stormwater management waiver was decided to be the best course of action. Therefore, consistent with the DPS approved SWM concept/site development submission, this project requests a waiver from providing stormwater quality and quantity management.

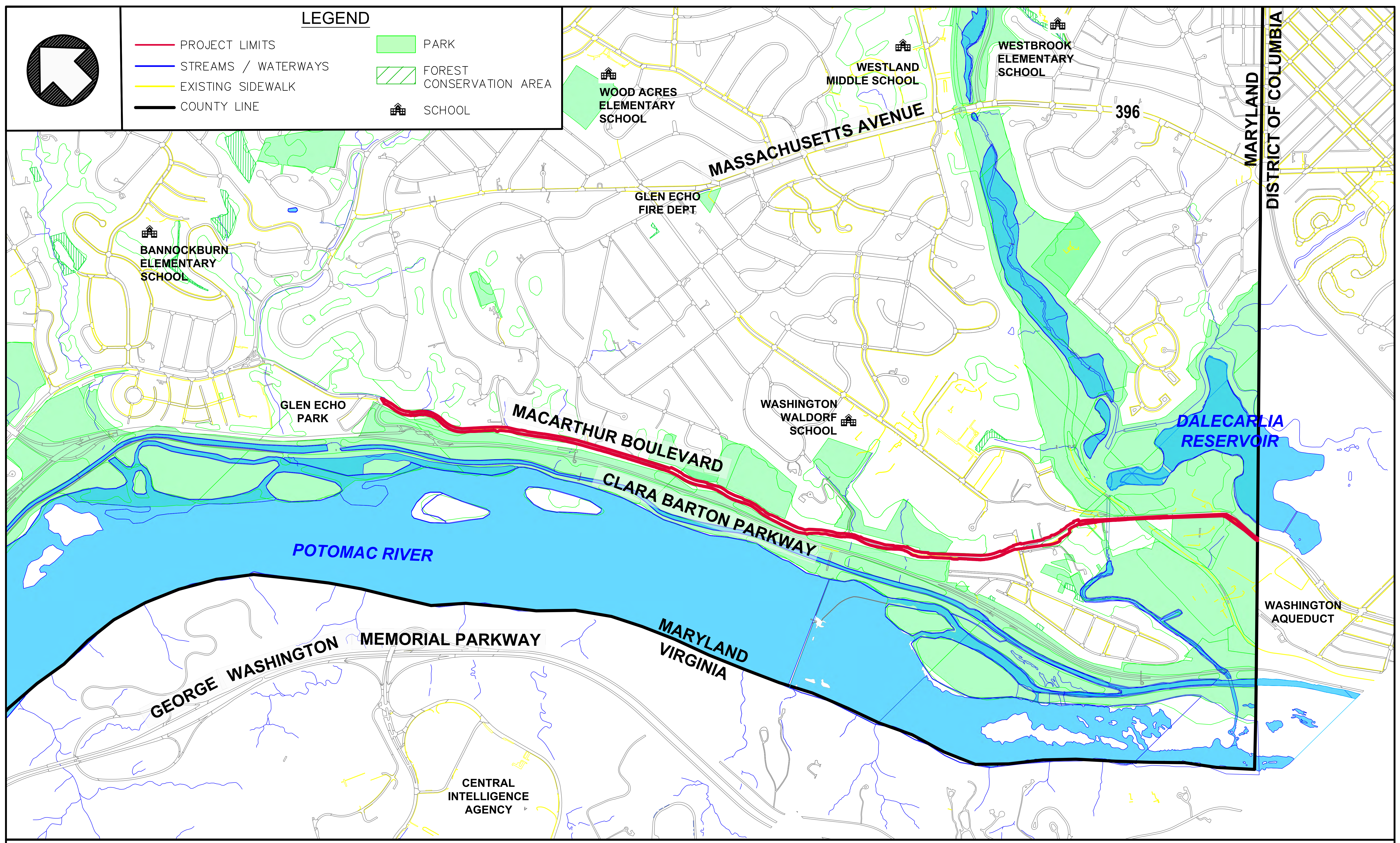
APPENDIX A

SITE RESOURCES MAPS



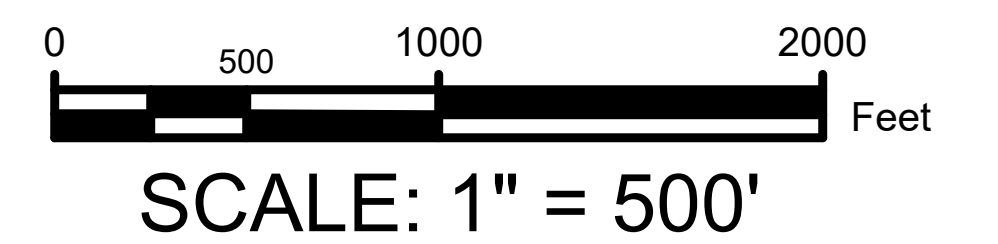
LEGEND

- PROJECT LIMITS
- STREAMS / WATERWAYS
- EXISTING SIDEWALK
- COUNTY LINE
- PARK
- FOREST CONSERVATION AREA
- SCHOOL



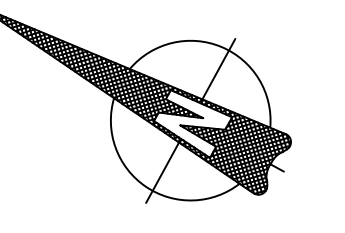
CIP No. 501902

VICINITY MAP
MACARTHUR BOULEVARD BIKEWAY, PHASE III



APPENDIX B

DRAINAGE AREA MAPS



MATCHLINE - STA. 182+00
SEE SHEET NO. DA-02

LEGEND	
---	DITCH DRAINAGE AREA
---	PROPOSED CONTOURS
---	EXISTING CONTOURS

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

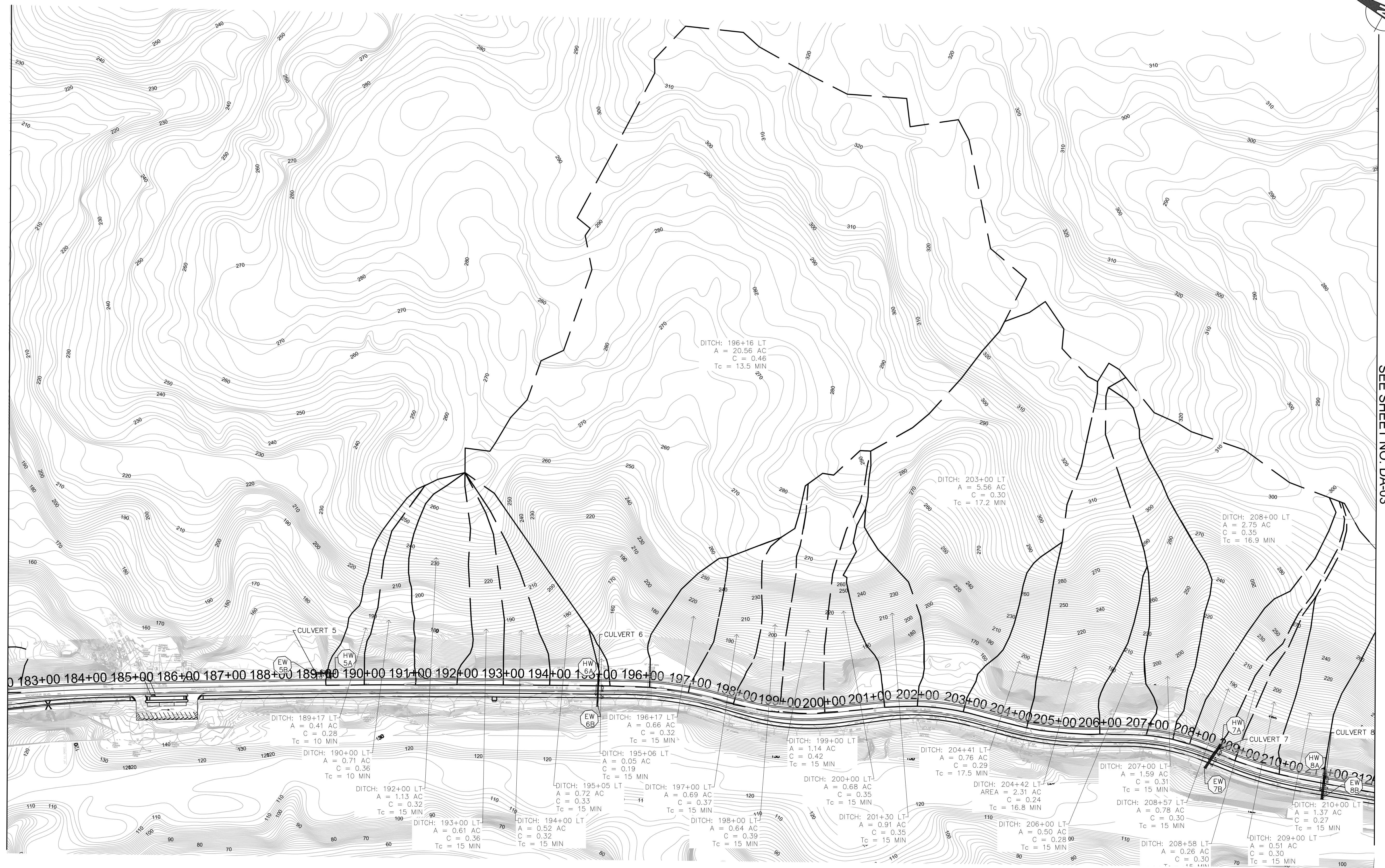
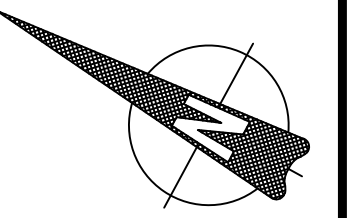
MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION GAIHERSBURG, MARYLAND			
RECOMMENDED FOR APPROVAL			
Chief, Design Section	_____	Date	_____
APPROVED	_____	Date	_____
Chief, Division of Transportation Engineering	_____	Date	_____
Designed by: <u>AGB</u>	Drawn by: <u>AGB</u>	Checked by: <u>WRB</u>	

DA-01
DITCH DRAINAGE AREA MAPS
MACARTHUR BOULEVARD
BIKEWAY SEGMENT III

SCALE: 1"=200'

DATE: JUNE 2024

CIP No.: 500718 SHEET 37 of 285



MATCHLINE - STA. 182+00
SEE SHEET NO. DA-01

MATCHLINE - STA. 212+00
SEE SHEET NO. DA-03

LEGEND

- - - DITCH DRAINAGE AREA
- - - PROPOSED CONTOURS
- - - EXISTING CONTOURS

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

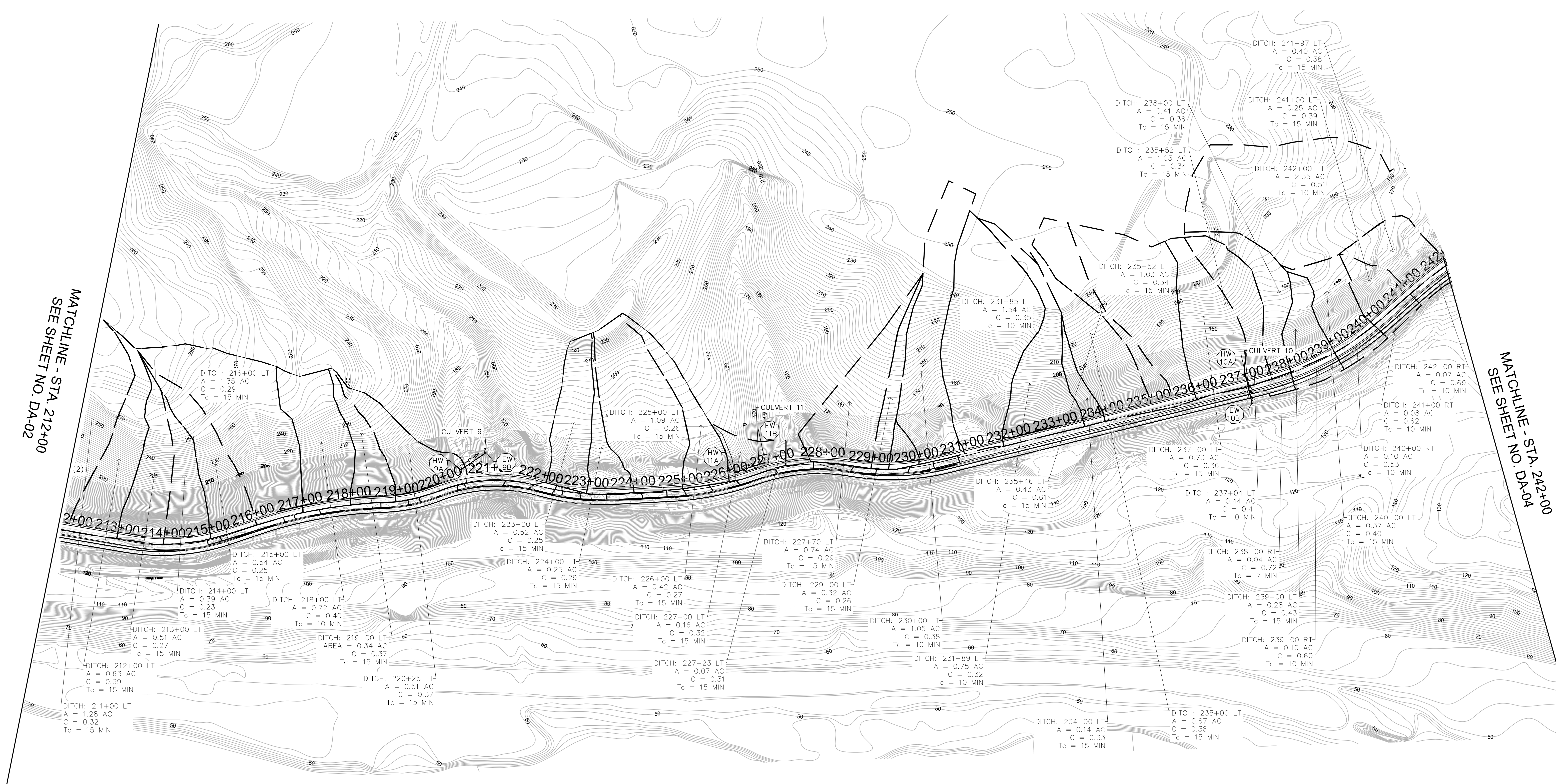
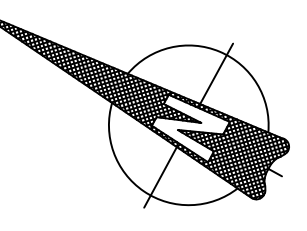
Designed by: AGB Drawn by: AGB Checked by: WRB

DA-02
DITCH DRAINAGE AREA MAPS
MACARTHUR BOULEVARD
BIKEWAY SEGMENT III

SCALE: 1"=200'

DATE: JUNE 2024

CIP No. : 500718 SHEET 38 of 285



MATCHLINE - STA. 212+00
SEE SHEET NO. DA-02

MATCHLINE - STA. 242+00
SEE SHEET NO. DA-04

LEGEND

	DITCH DRAINAGE AREA
	PROPOSED CONTOURS
	EXISTING CONTOURS

DRAFT
NOT FOR CONSTRUCTION



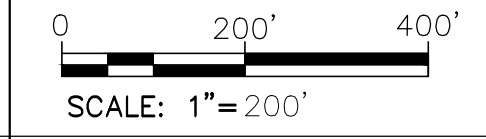
NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

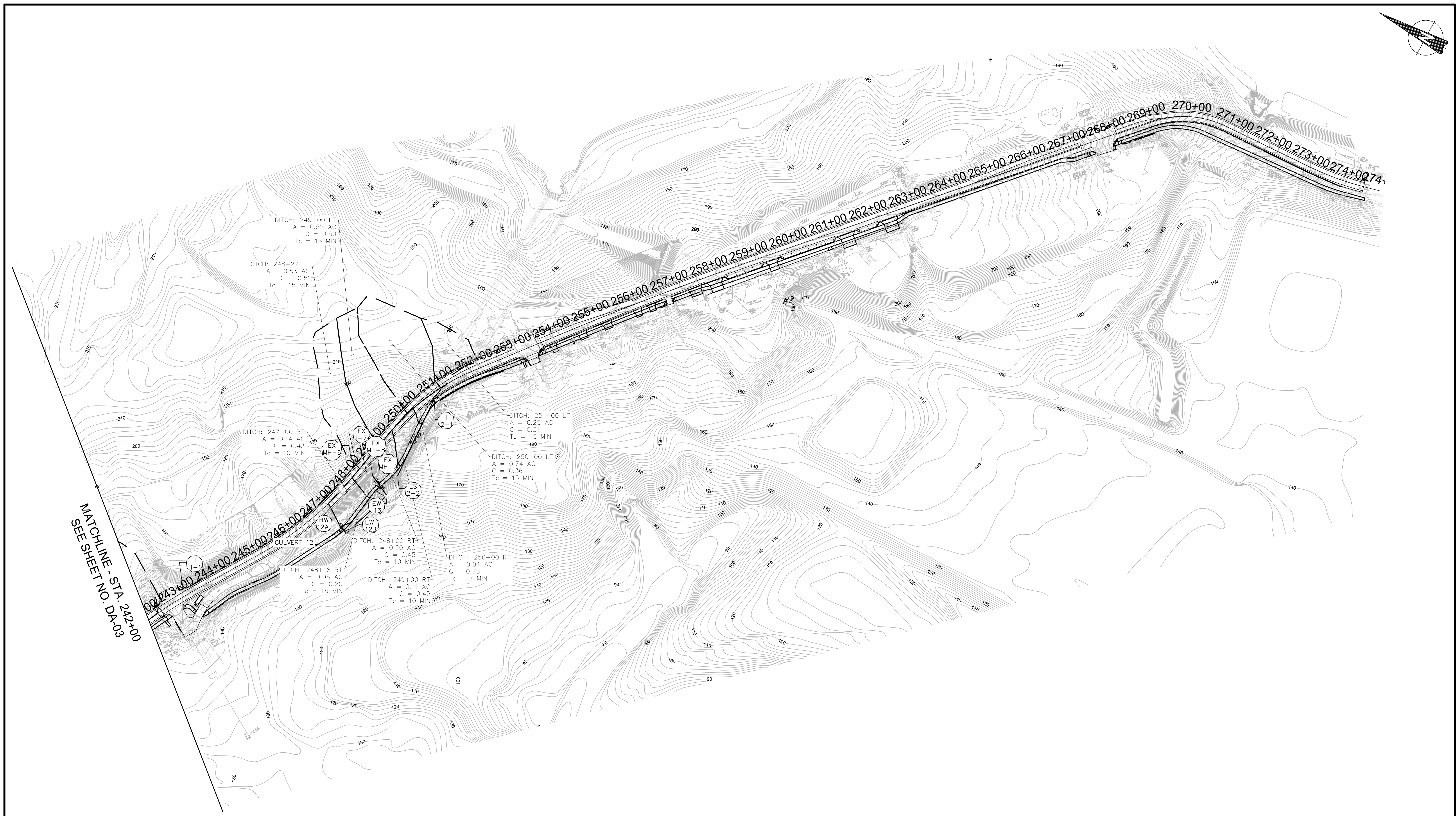
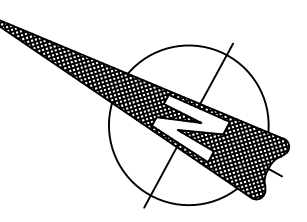
Chief, Design Section	Date
APPROVED	
Chief, Division of Transportation Engineering	Date
Designed by: <u>AGB</u>	Drawn by: <u>AGB</u>
Checked by: <u>WRB</u>	

DA-03
DITCH DRAINAGE AREA MAPS
MACARTHUR BOULEVARD
BIKEWAY SEGMENT III



DATE: JUNE 2024

CIP No.: 500718 SHEET 39 of 285



MATCHLINE - STA 242+00
SEE SHEET NO. DA-03

LEGEND

- DITCH DRAINAGE AREA
- PROPOSED CONTOURS
- EXISTING CONTOURS

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

DA-04
DITCH DRAINAGE AREA MAPS
MACARTHUR BOULEVARD
BIKEWAY SEGMENT III

SCALE: 1"=200'

DATE: JUNE 2024

CIP No. : 500718 SHEET 40 of 285

MATCHLINE - STA. 182+00
SEE SHEET NO. DA-06

LEGEND

- CULVERT DRAINAGE AREA
- PROPOSED CONTOURS
- EXISTING CONTOURS



DRAFT
NOT FOR CONSTRUCTION



NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

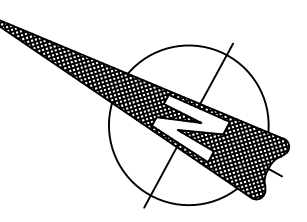
DA-05
CULVERT/INLET DRAINAGE AREA MAPS

**MACARTHUR BOULEVARD
BIKEWAY SEGMENT III**

SCALE: 1" = 200'

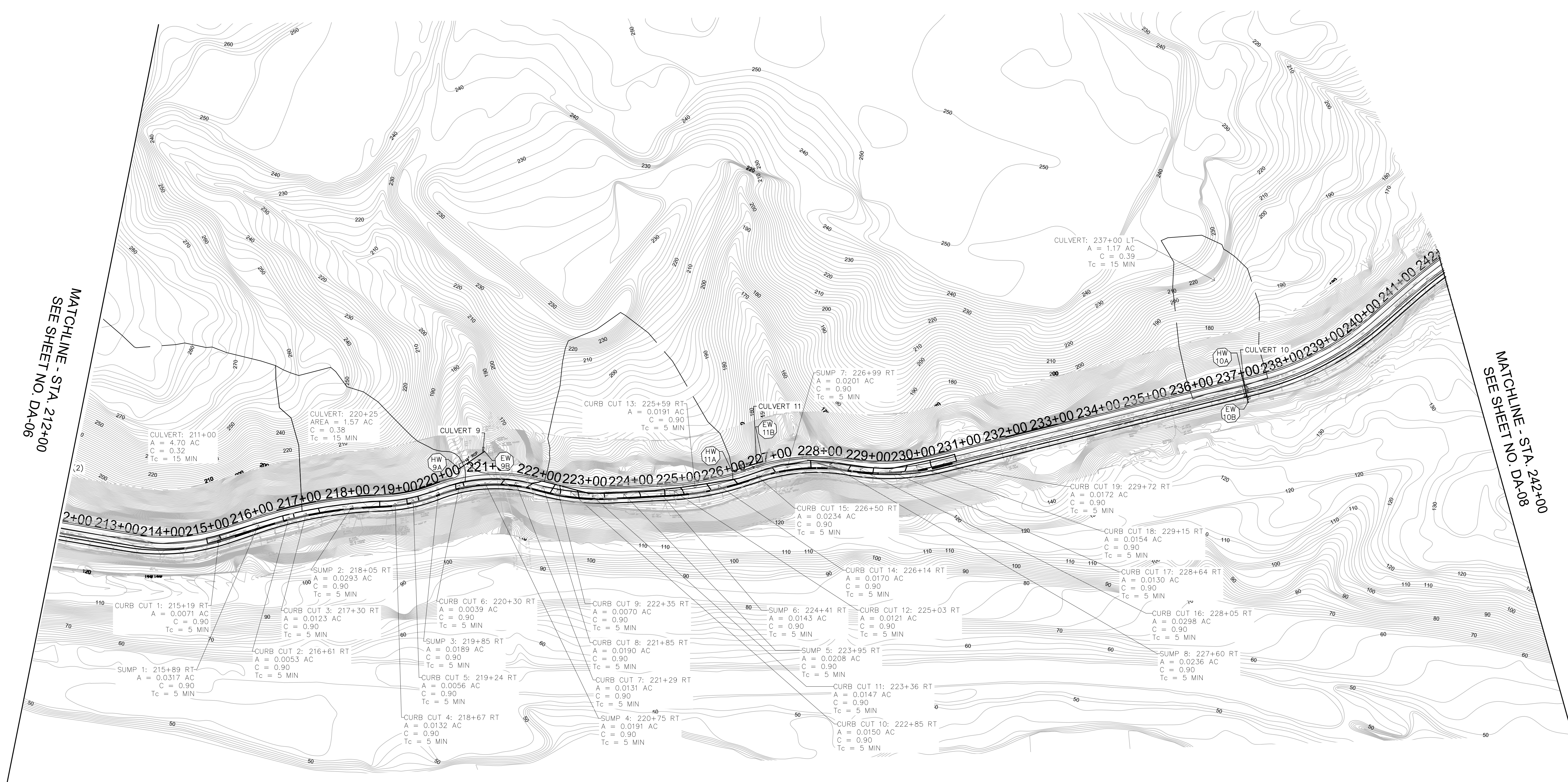
DATE: JUNE 2024

CIP No.: 500718 SHEET 41 of 285





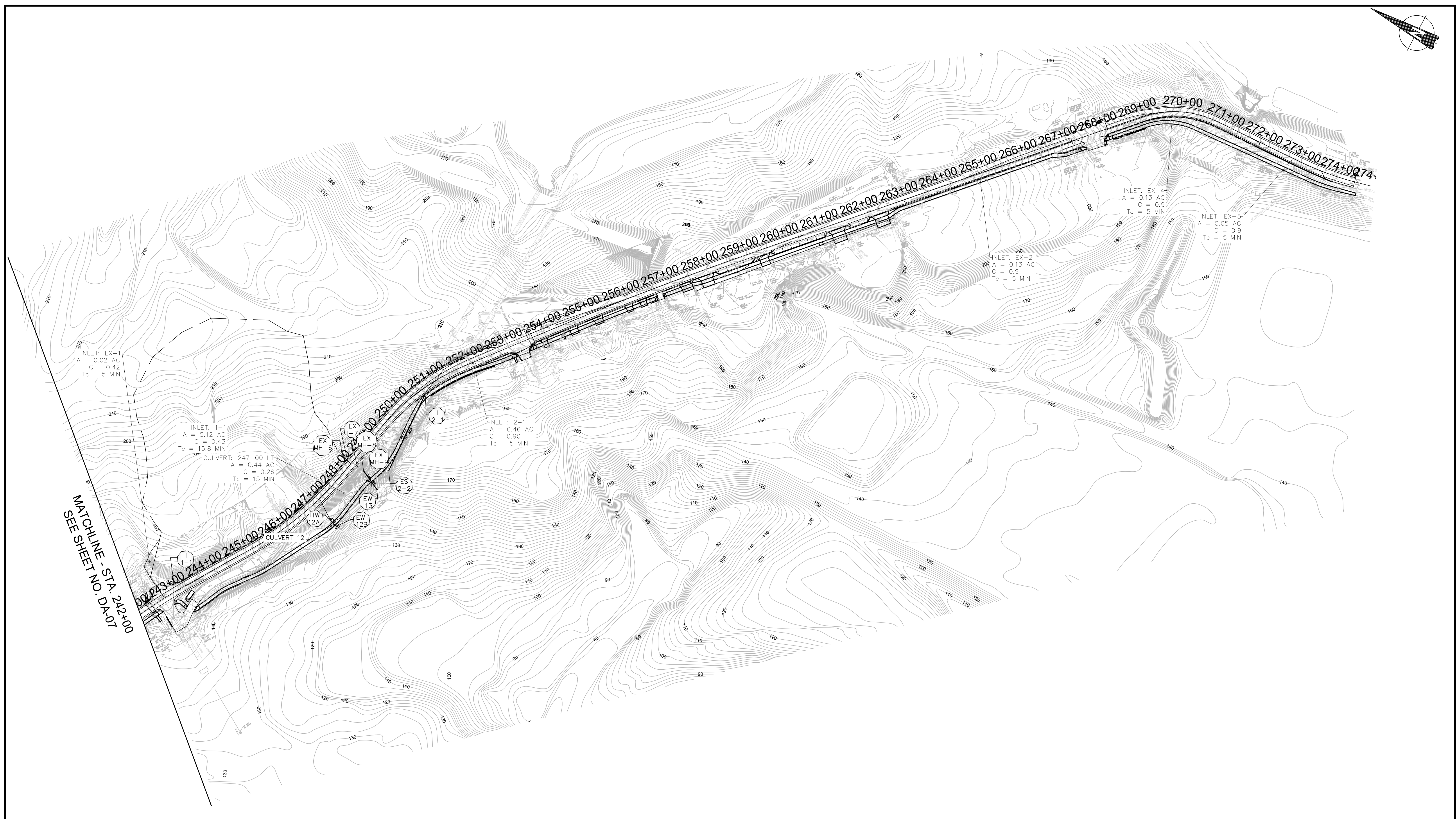
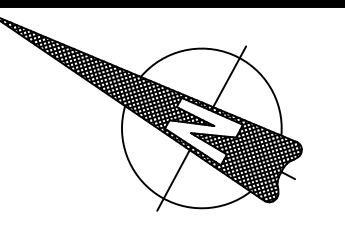
MATCHLINE - STA. 212+00
SEE SHEET NO. DA-06

MATCHLINE - STA. 242+00
SEE SHEET NO. DA-08



LEGEND	
---	CULVERT DRAINAGE AREA
---	CURB CUT DRAINAGE AREA
---	INLET DRAINAGE AREA
---	PROPOSED CONTOURS
---	EXISTING CONTOURS

DRAFT NOT FOR CONSTRUCTION 	MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION GAITHERSBURG, MARYLAND		DA-07 CULVERT/INLET DRAINAGE AREA MAPS MACARTHUR BOULEVARD BIKEWAY SEGMENT III
	RECOMMENDED FOR APPROVAL Chief, Design Section _____ Date _____ APPROVED Chief, Division of Transportation Engineering _____ Date _____		SCALE: 1"=200' 
NO. _____ REVISION _____ DATE _____ BY _____	Designed by: <u>AGB</u> Drawn by: <u>AGB</u> Checked by: <u>WRB</u>		CIP No. : 500718 SHEET 43 of 285



MATCHLINE - STA. 242+00
SEE SHEET NO. DA-07

INLET: EX-1
A = 0.02 AC
C = 0.42
Tc = 5 MIN

INLET: 1-1
A = 5.12 AC
C = 0.43
Tc = 15.8 MIN

CULVERT: 247+00 LT
A = 0.44 AC
C = 0.26
Tc = 15 MIN


INLET: 2-1
A = 0.46 AC
C = 0.90
Tc = 5 MIN

INLET: EX-2
A = 0.13 AC
C = 0.9
Tc = 5 MIN

INLET: EX-4
A = 0.13 AC
C = 0.9
Tc = 5 MIN

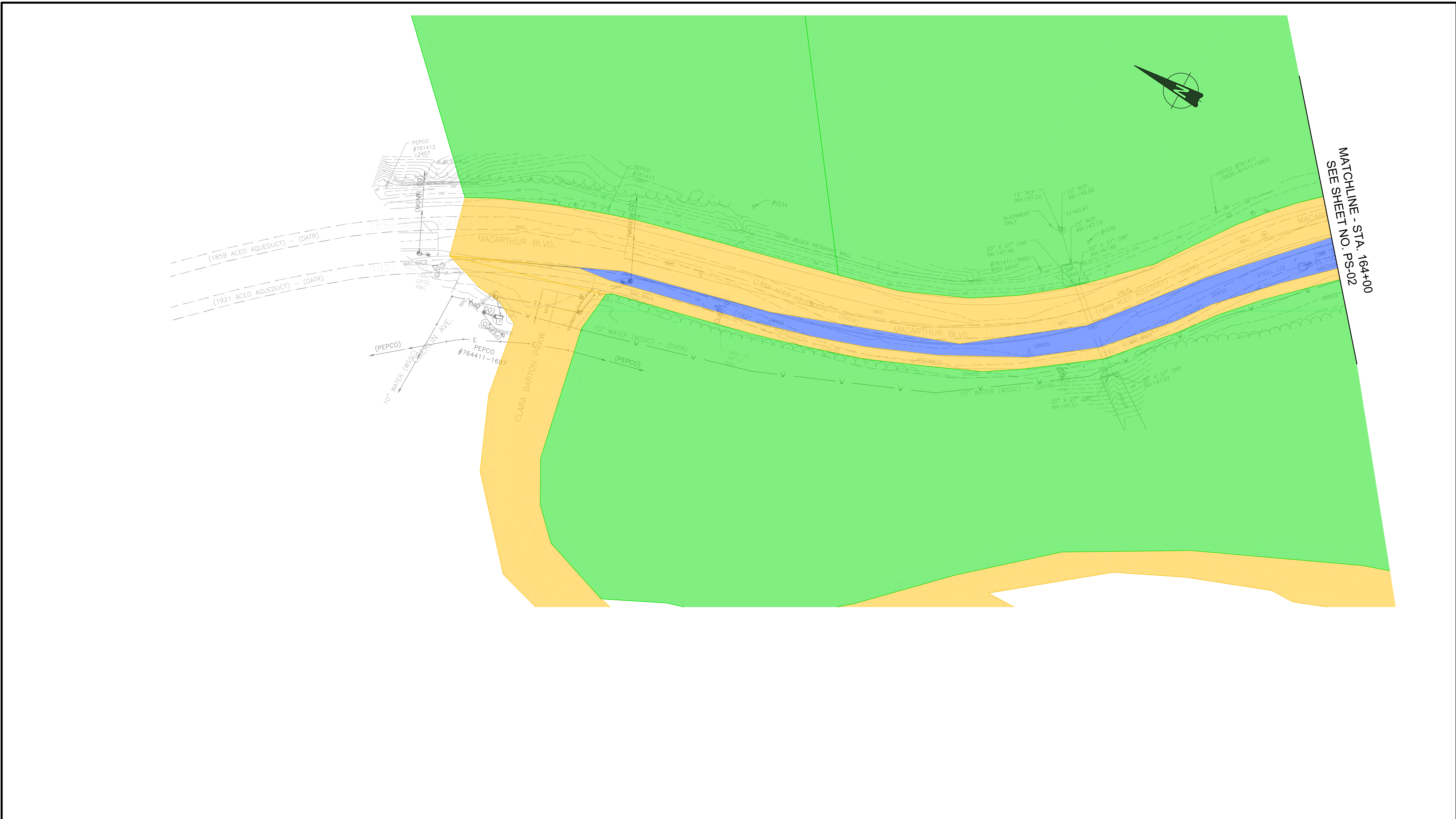
INLET: EX-5
A = 0.05 AC
C = 0.9
Tc = 5 MIN

LEGEND	
---	INLET DRAINAGE AREA
---	PROPOSED CONTOURS
---	EXISTING CONTOURS

DRAFT NOT FOR CONSTRUCTION 	MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION GAITHERSBURG, MARYLAND		DA-08 CULVERT/INLET DRAINAGE AREA MAPS MACARTHUR BOULEVARD BIKEWAY SEGMENT III
	RECOMMENDED FOR APPROVAL Chief, Design Section _____ Date _____ APPROVED		0 200' 400' SCALE: 1"=200' DATE: JUNE 2024
Chief, Division of Transportation Engineering _____ Date _____ Designed by: <u>AGB</u> Drawn by: <u>AGB</u> Checked by: <u>WRB</u>		CIP No. : 500718 SHEET 44 of 285	

APPENDIX C

WATER QUALITY MAPS



MATCHLINE - STA. 164+00
SEE SHEET NO. P.S-02

LEGEND	
■	IMPERVIOUS AREA
■	TURF AREA
■	FORRESTED AREA

<p>DRAFT NOT FOR CONSTRUCTION</p>		<p>MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION GAITHERSBURG, MARYLAND</p>	<p>LU-01 PRE-DEVELOPMENT LAND COVER MAPS MACARTHUR BOULEVARD BIKEWAY PHASE III</p>
		<p>RECOMMENDED FOR APPROVAL</p> <p>Chief, Design Section _____ Date _____</p> <p>APPROVED</p> <p>Chief, Division of Transportation Engineering _____ Date _____</p> <p>Designed by: <u>AGB</u> Drawn by: <u>AGB</u> Checked by: <u>WRB</u></p>	<p>SCALE: 1"=30'</p> <p>DATE: JUNE 2024</p> <p>CIP No. : 502109 SHEET 1 of 15</p>
NO.	REVISION	DATE	BY



LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

LU-02
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 2 of 15



MATCHLINE - STA. 172+00
SEE SHEET NO. PS-02

MATCHLINE - STA. 180+00
SEE SHEET NO. PS-04

LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

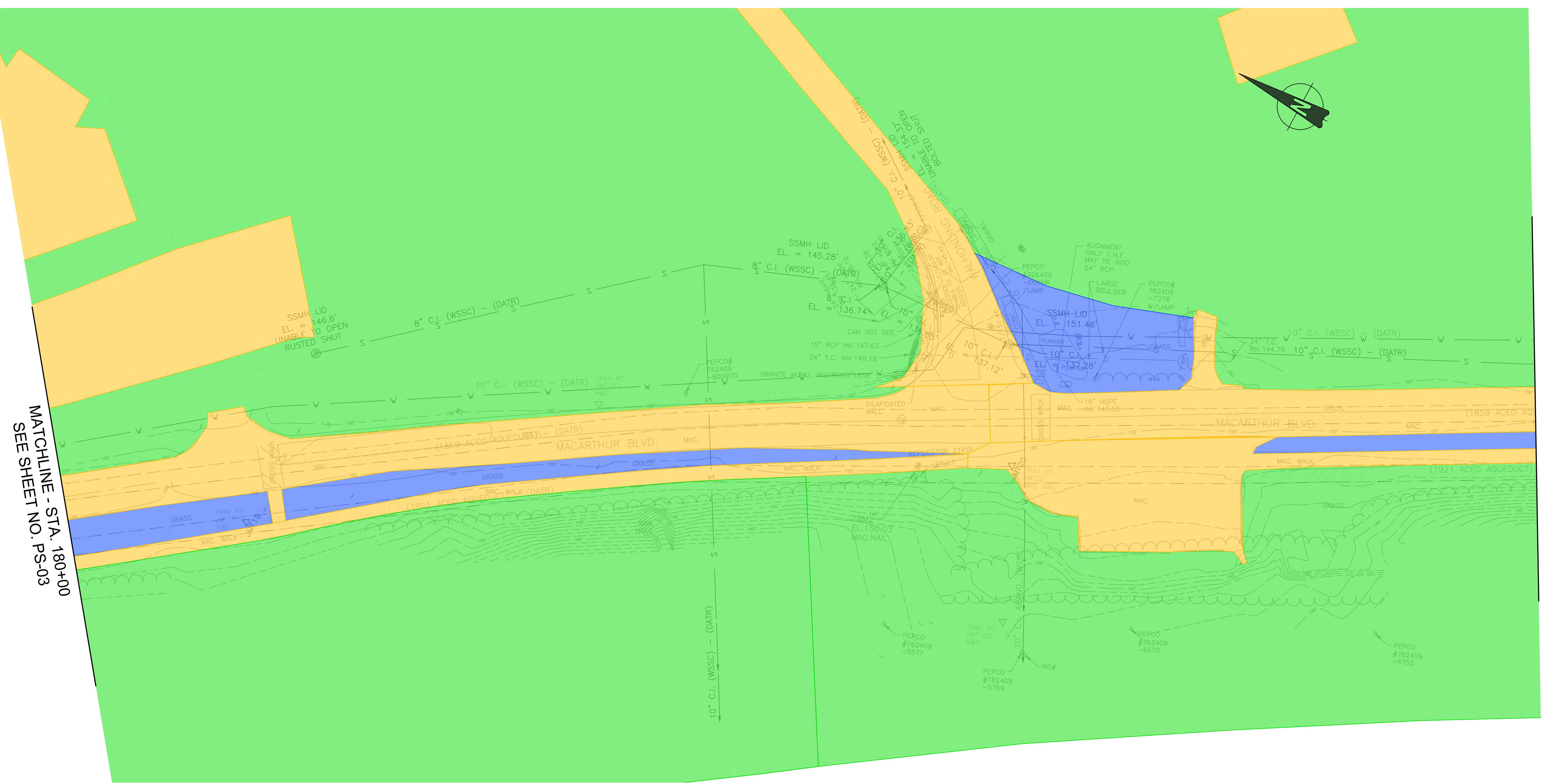
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-03
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 3 of 15



MATCHLINE - STA. 180+00
SEE SHEET NO. PS-03

MATCHLINE - STA. 188+00
SEE SHEET NO. PS-05

LEGEND

■	IMPERVIOUS AREA
■	TURF AREA
■	FORRESTED AREA




<p>DRAFT NOT FOR CONSTRUCTION</p>		<p>MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION GAITHERSBURG, MARYLAND</p> <p>RECOMMENDED FOR APPROVAL</p> <p>Chief, Design Section _____ Date _____ APPROVED</p> <p>Chief, Division of Transportation Engineering _____ Date _____</p> <p>Designed by: <u>AGB</u> Drawn by: <u>AGB</u> Checked by: <u>WRB</u></p>	<p>LU-04 PRE-DEVELOPMENT LAND COVER MAPS MACARTHUR BOULEVARD BIKEWAY PHASE III</p> <p>SCALE: 1"=30'</p> <p>DATE: JUNE 2024</p> <p>CIP No. : 502109 SHEET 4 of 15</p>
NO.	REVISION	DATE	BY


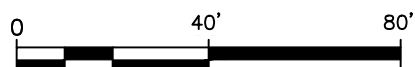


MATCHLINE - STA. 196+00
SEE SHEET NO. PS-05

MATCHLINE - STA. 204+00
SEE SHEET NO. PS-07

LEGEND

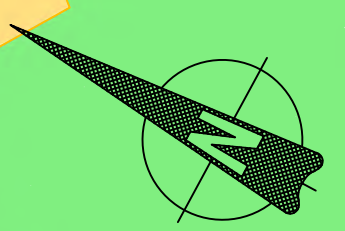
	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

<p>DRAFT NOT FOR CONSTRUCTION</p> 	<p>MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION GAITHERSBURG, MARYLAND</p>	<p>LU-06 PRE-DEVELOPMENT LAND COVER MAPS MACARTHUR BOULEVARD BIKEWAY PHASE III</p>																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">NO.</th> <th style="width: 20%;">REVISION</th> <th style="width: 10%;">DATE</th> <th style="width: 5%;">BY</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	NO.	REVISION	DATE	BY																																									<p>RECOMMENDED FOR APPROVAL</p> <p>Chief, Design Section _____ Date _____</p> <p>APPROVED</p> <p>Chief, Division of Transportation Engineering _____ Date _____</p> <p>Designed by: <u>AGB</u> Drawn by: <u>AGB</u> Checked by: <u>WRB</u></p>	<p>SCALE: 1" = 40'</p>  <p>DATE: JUNE 2024</p> <p>CIP No. : 502109 SHEET <u>6</u> of <u>15</u></p>
NO.	REVISION	DATE	BY																																											



MATCHLINE - STA. 204+00
SEE SHEET NO. PS-06

MATCHLINE - STA. 212+00
SEE SHEET NO. PS-08



LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

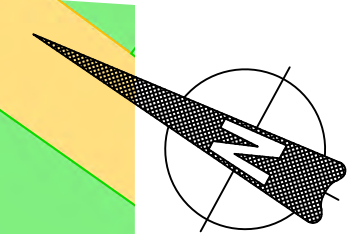
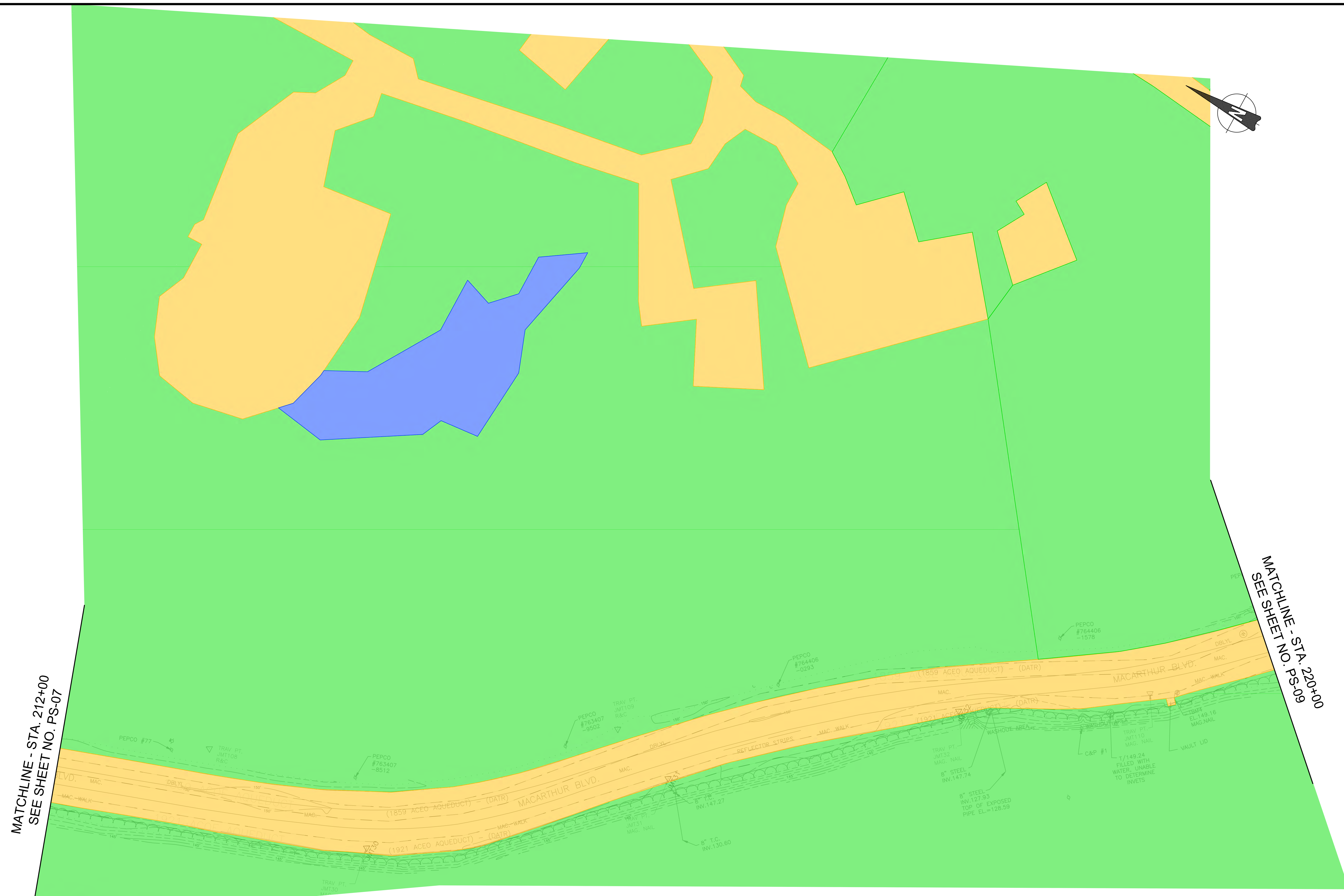
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-07
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1" = 40'

DATE: JUNE 2024

CIP No. : 502109 SHEET 7 of 15



MATCHLINE - STA. 212+00
SEE SHEET NO. PS-07

MATCHLINE - STA. 220+00
SEE SHEET NO. PS-09

LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

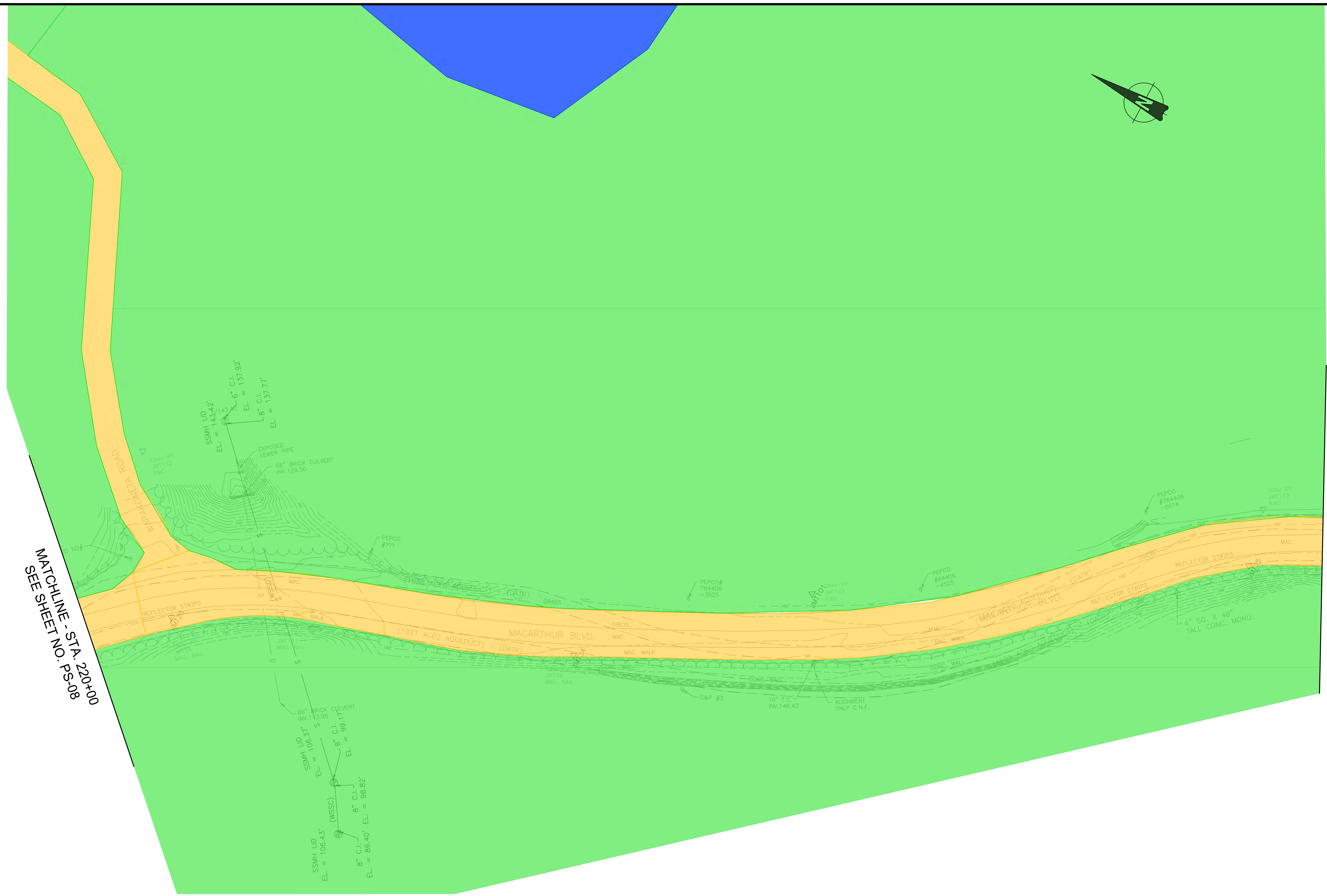
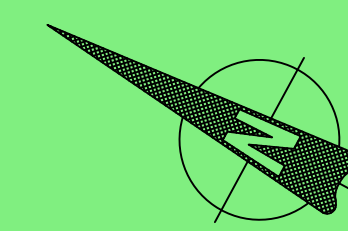
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-08
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 8 of 15



MATCHLINE - STA. 220+00
SEE SHEET NO. PS-08

MATCHLINE - STA. 228+00
SEE SHEET NO. PS-10

LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

LU-09
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 9 of 15


MATCHLINE - STA. 236+00
SEE SHEET NO. PS-10

MATCHLINE - STA. 244+00
SEE SHEET NO. PS-12

LEGEND

- IMPERVIOUS AREA
- TURF AREA
- FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**



NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

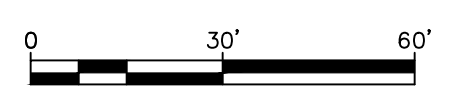
Chief, Design Section _____ Date _____

APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

LU-11
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**



SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 11 of 15



MATCHLINE - STA. 244+00
SEE SHEET NO. PS-11

MATCHLINE - STA. 251+00
SEE SHEET NO. PS-13

LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

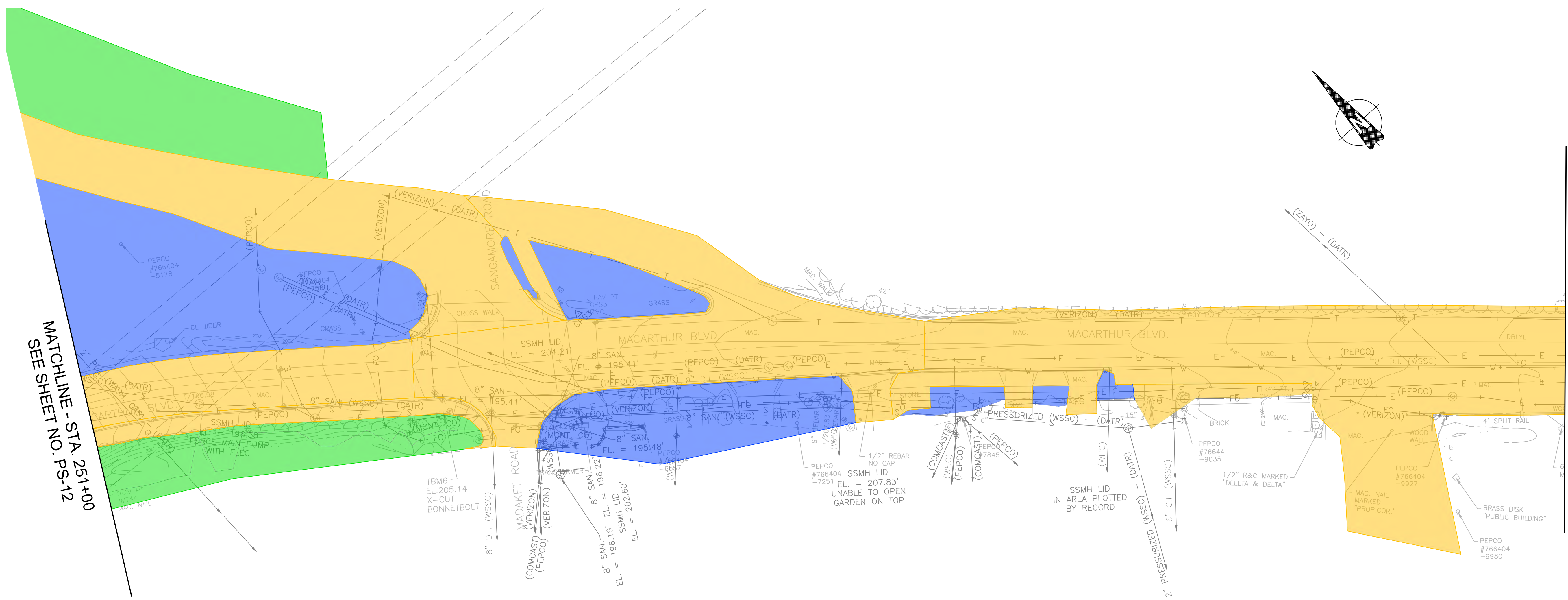
LU-12
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

0 30' 60'

SCALE: 1"=30'

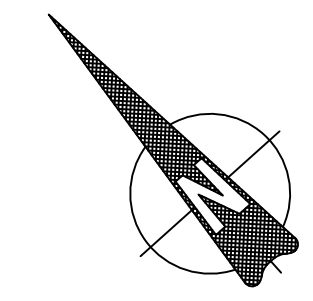
DATE: JUNE 2024

CIP No. : 502109 SHEET 12 of 15



MATCHLINE - STA. 251+00
SEE SHEET NO. PS-12

MATCHLINE - STA. 259+00
SEE SHEET NO. PS-14



LEGEND

■	IMPERVIOUS AREA
■	TURF AREA
■	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

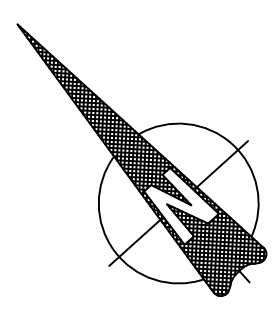
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-13
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

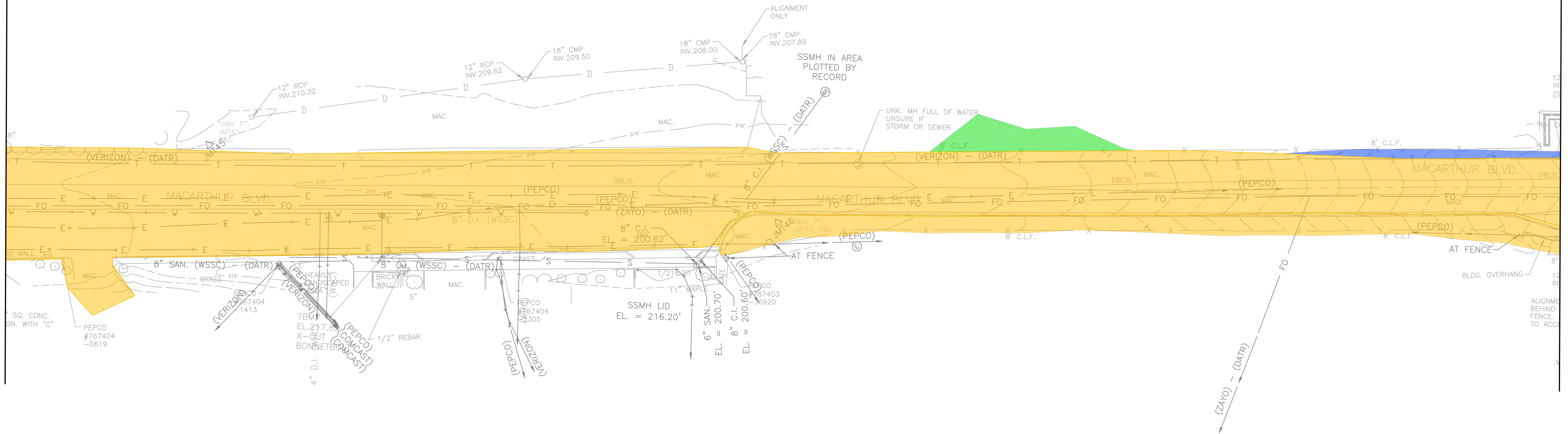
SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 13 of 15



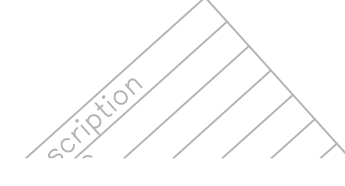
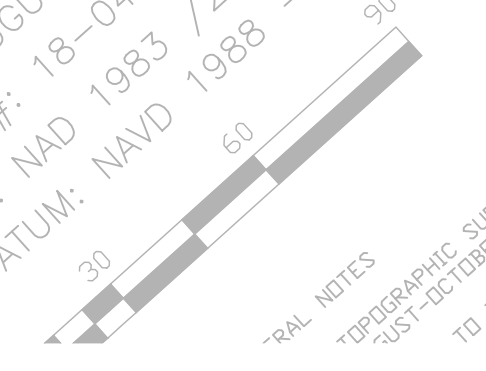
MATCHLINE - STA. 259+00
SEE SHEET NO. PS-13



MATCHLINE - STA. 267+00
SEE SHEET NO. PS-15

MACARTHUR BLVD.
TOPOGRAPHIC WORKSHEET
SURVEY BY: JMT
DATE: AUGUST 2021
JMT JOB #: 18-04565-003
PRJ. DATUM: NAD 1983 / 2011 - GPS
TERT. DATUM: NAVD 1988 - GPS

GENERAL NOTES
TOPOGRAPHIC SURVEY PERFORMED BY JMT
LAST OCTOBER 2021 AND REFLECTS SITE CONDITIONS AS OF THAT DATE.
TO THE MARYLAND STATE PLANE COORDINATE SYSTEM OF THIS DRAWING



LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

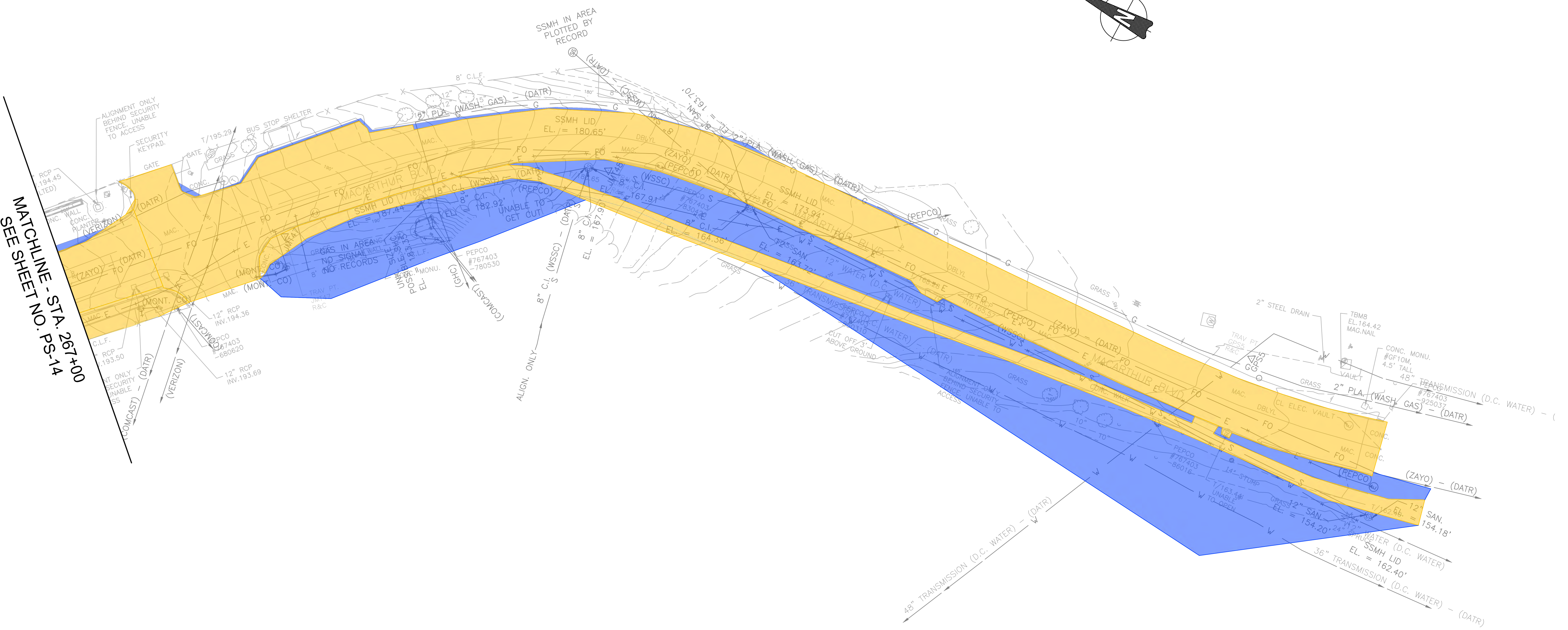
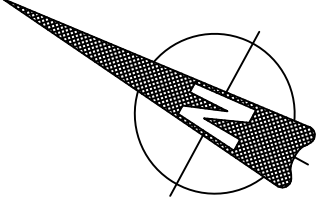
LU-14
PRE-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024


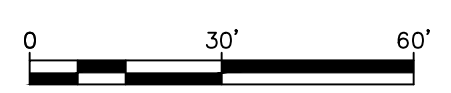
CIP No. : 502109 SHEET 14 of 15

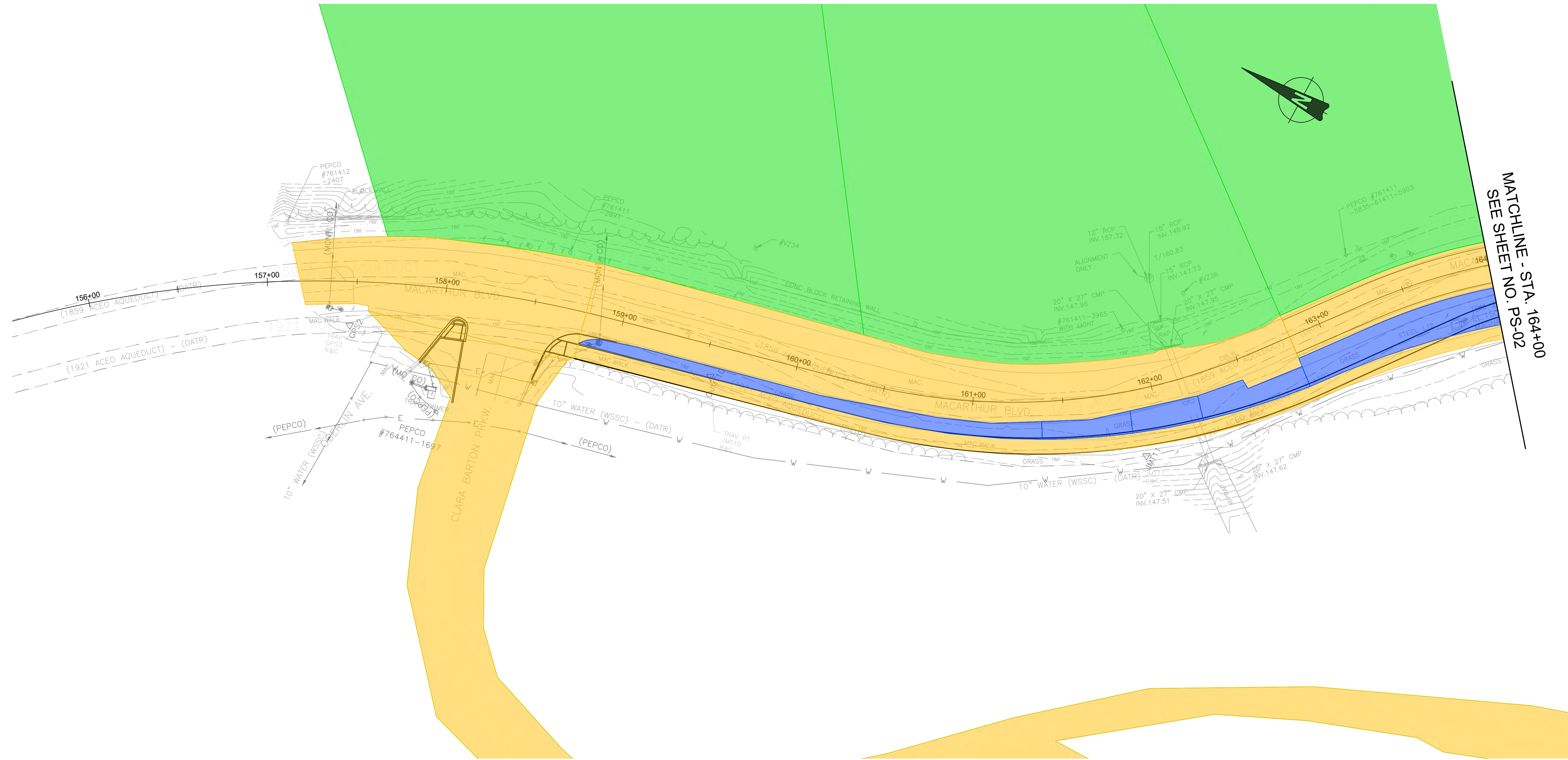
MATCHLINE - STA. 267+00
SEE SHEET NO. PS-1A



LEGEND

█	IMPERVIOUS AREA
█	TURF AREA
█	FORRESTED AREA

<p>DRAFT NOT FOR CONSTRUCTION</p> 	<table border="1"> <tr><td>NO.</td><td>REVISION</td><td>DATE</td><td>BY</td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>	NO.	REVISION	DATE	BY																	<p>MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION GAITHERSBURG, MARYLAND</p>	<p>LU-15 PRE-DEVELOPMENT LAND COVER MAPS MACARTHUR BOULEVARD BIKEWAY PHASE III</p>
		NO.	REVISION	DATE	BY																		
<p>RECOMMENDED FOR APPROVAL</p> <table border="0"> <tr> <td>Chief, Design Section</td> <td>_____</td> <td>Date</td> <td>_____</td> </tr> <tr> <td>APPROVED</td> <td>_____</td> <td>Date</td> <td>_____</td> </tr> <tr> <td>Chief, Division of Transportation Engineering</td> <td>_____</td> <td>Date</td> <td>_____</td> </tr> </table>		Chief, Design Section	_____	Date	_____	APPROVED	_____	Date	_____	Chief, Division of Transportation Engineering	_____	Date	_____	<p>SCALE: 1"=30'</p>  <p>DATE: JUNE 2024</p>									
Chief, Design Section	_____	Date	_____																				
APPROVED	_____	Date	_____																				
Chief, Division of Transportation Engineering	_____	Date	_____																				
<p>Designed by: <u>AGB</u> Drawn by: <u>AGB</u> Checked by: <u>WRB</u></p>		<p>CIP No. : 502109 SHEET 15 of 15</p>																					



MATCHLINE - STA. 164+00
SEE SHEET NO. P.S.02

LEGEND	
	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

LU-16
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 16 of 30



MATCHLINE - STA. 164+00
SEE SHEET NO. PS-01

MATCHLINE - STA. 172+00
SEE SHEET NO. PS-03

LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

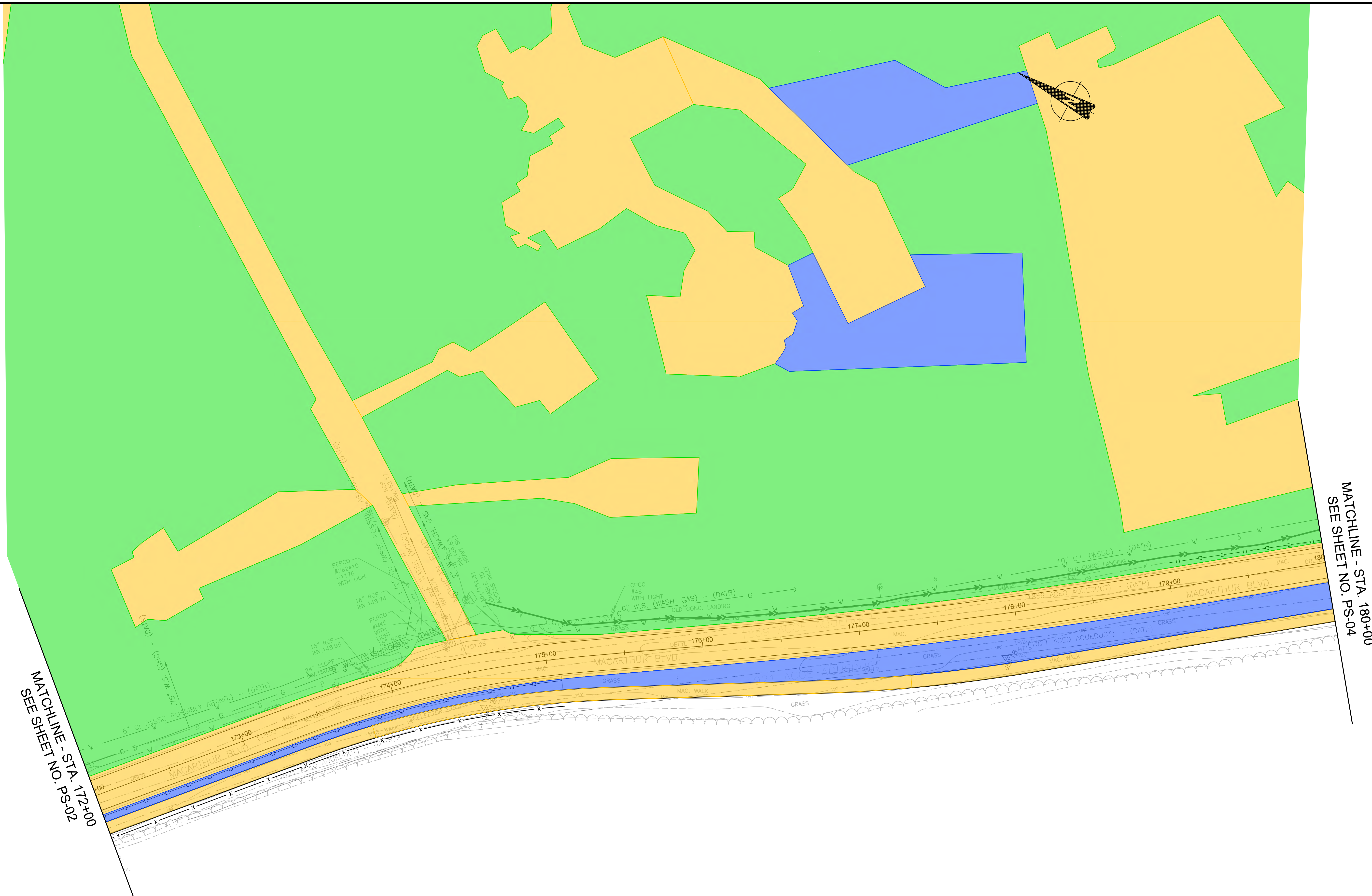
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-17
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 17 of 30



MATCHLINE - STA. 172+00
SEE SHEET NO. PS-02

MATCHLINE - STA. 180+00
SEE SHEET NO. PS-04

LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

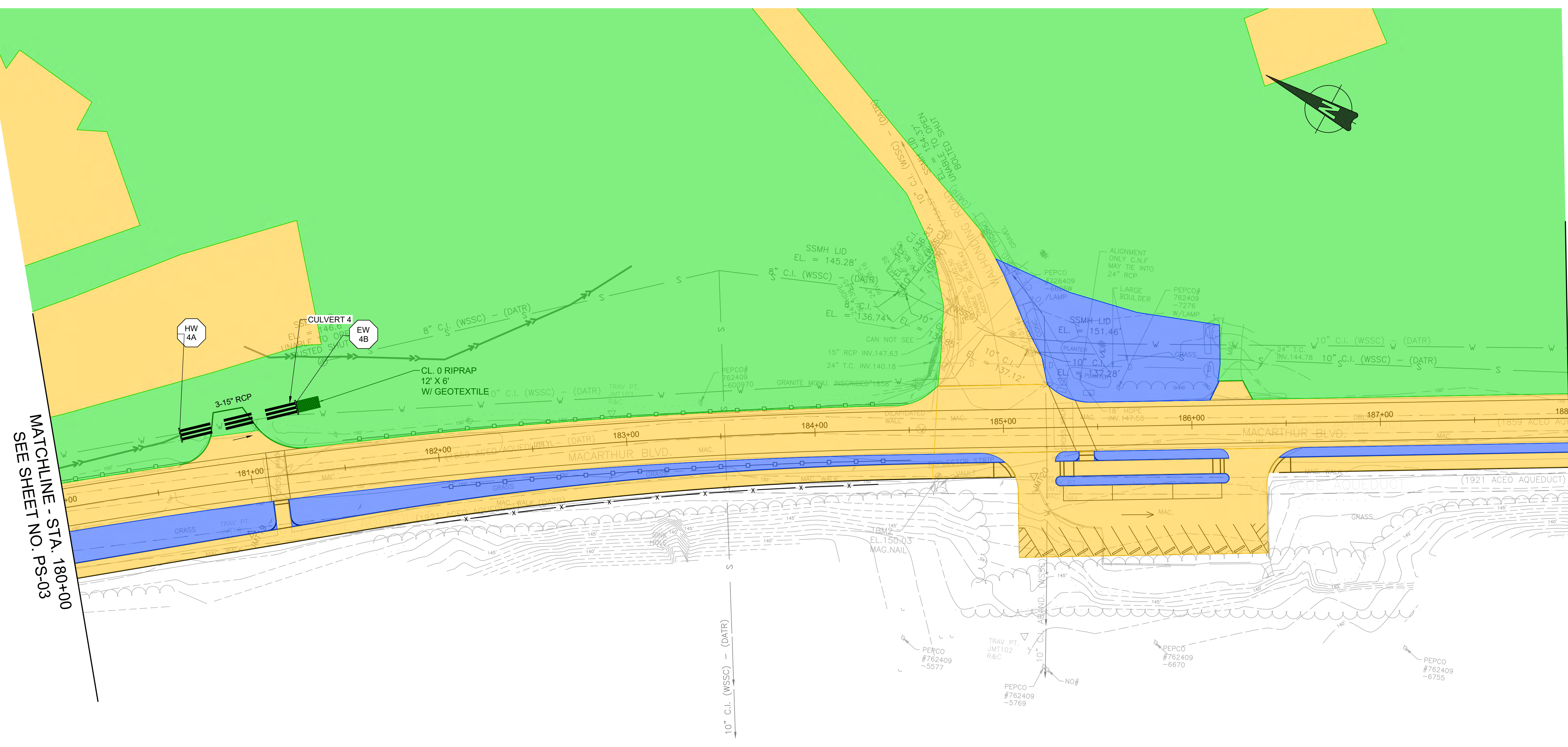
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-18
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 18 of 30



MATCHLINE - STA. 180+00
SEE SHEET NO. PS-03

MATCHLINE - STA. 188+00
SEE SHEET NO. PS-05

LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

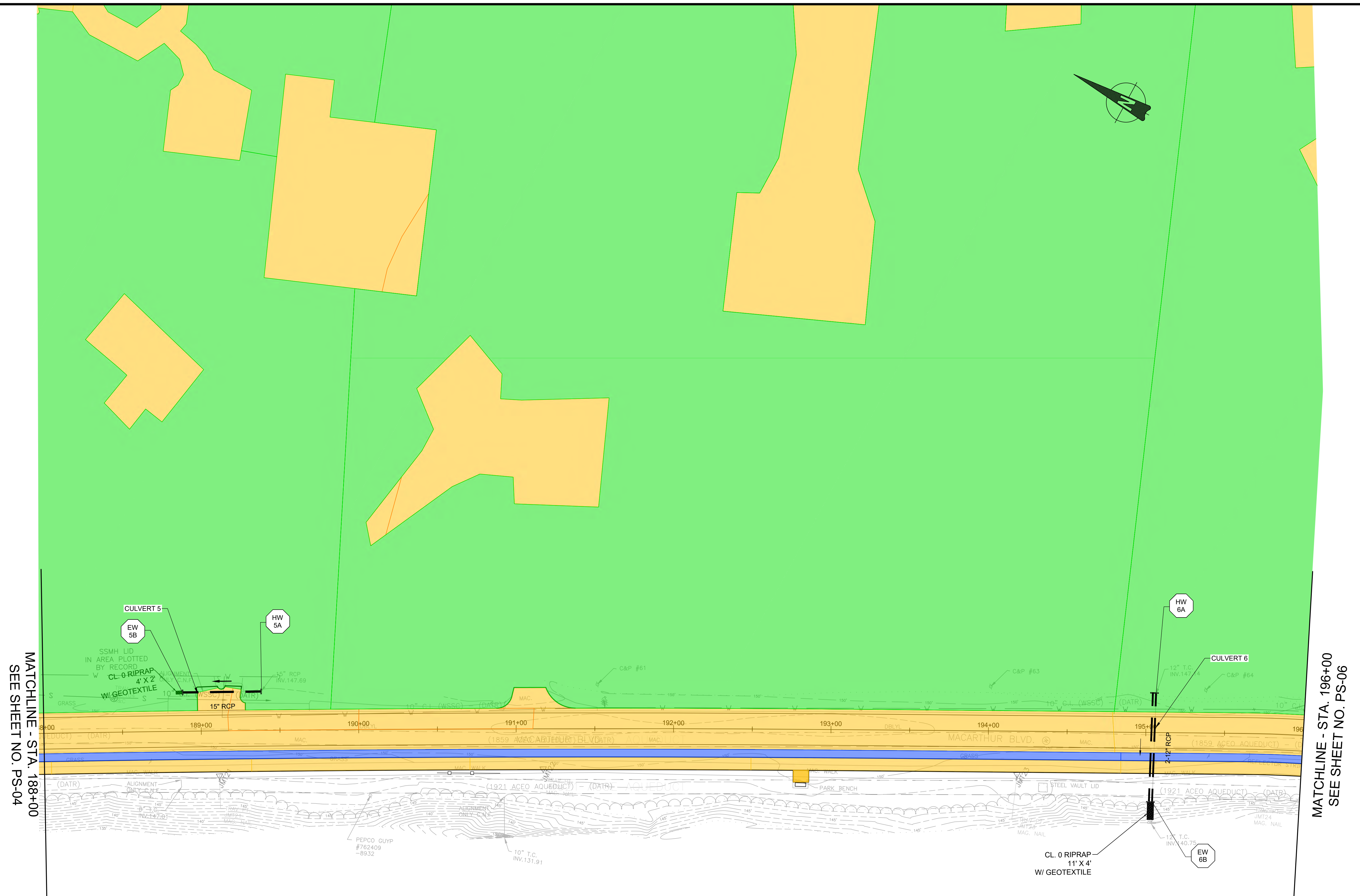
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-19
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 19 of 30



MATCHLINE - STA. 188+00
SEE SHEET NO. PS-04

MATCHLINE - STA. 196+00
SEE SHEET NO. PS-06

LEGEND	
	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

DRAFT
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

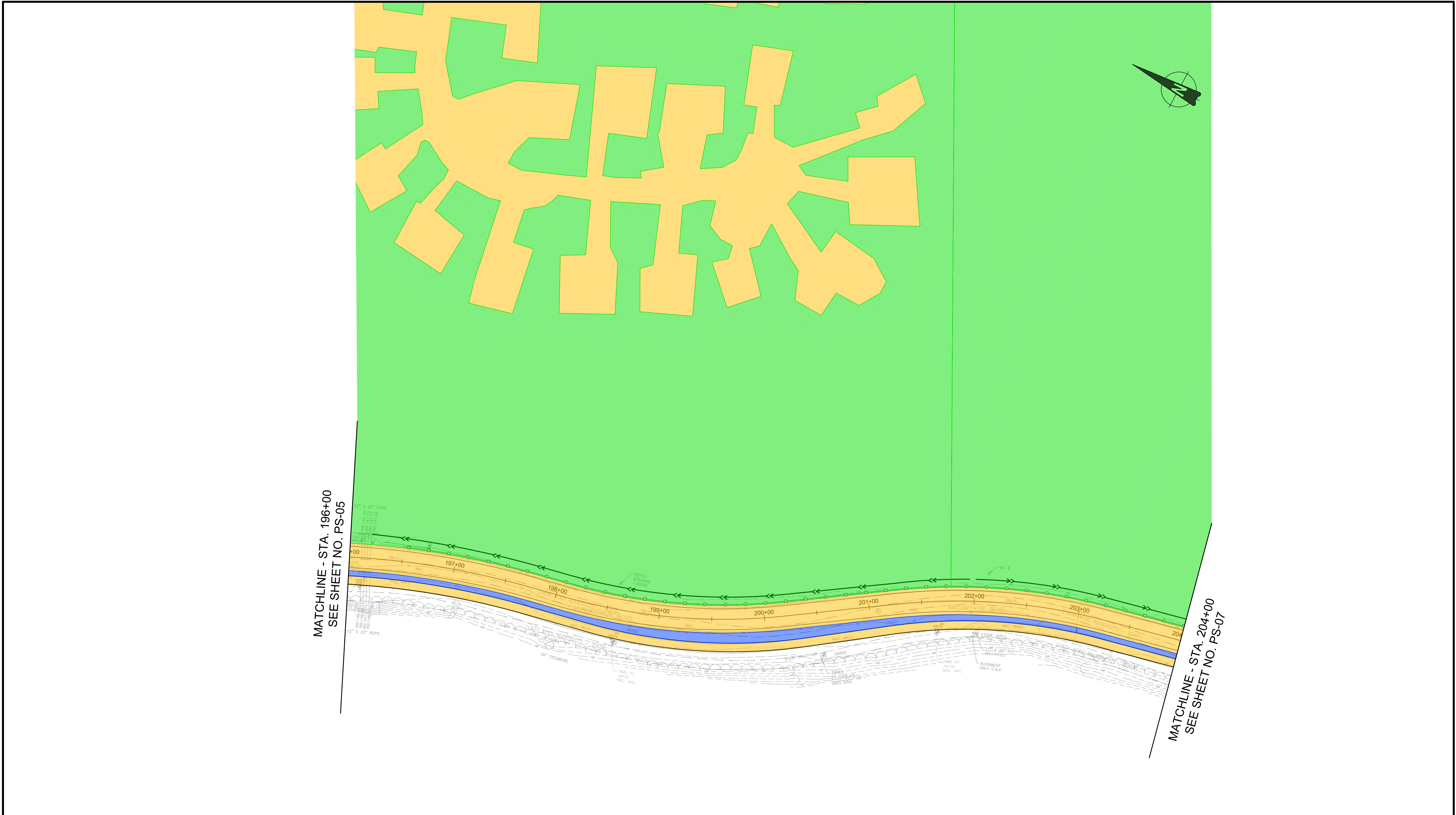
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-20
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 20 of 30




MATCHLINE - STA. 196+00
SEE SHEET NO. PS-05

MATCHLINE - STA. 204+00
SEE SHEET NO. PS-07

LEGEND

- IMPERVIOUS AREA
- TURF AREA
- FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**



NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

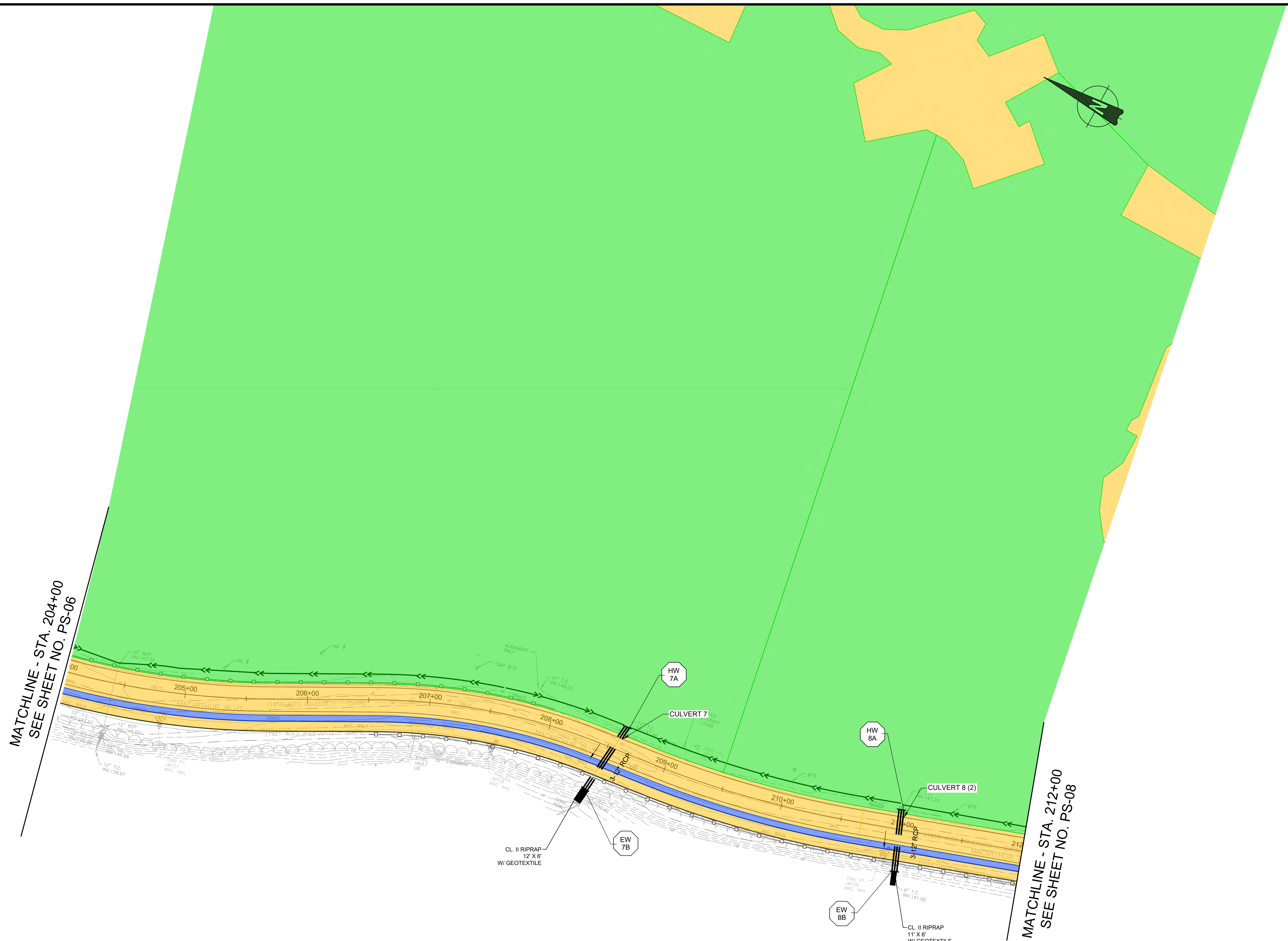
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-21
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1" = 40'

DATE: JUNE 2024

CIP No. : 502109 SHEET 21 of 30



LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

DRAFT
NOT FOR CONSTRUCTION



NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

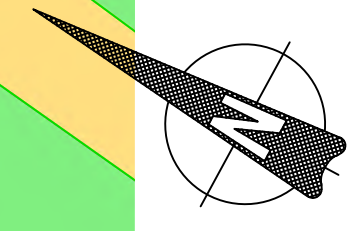
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-22
POST-DEVELOPMENT LAND COVER MAPS
MACARTHUR BOULEVARD
BIKEWAY PHASE III

SCALE: 1" = 40'

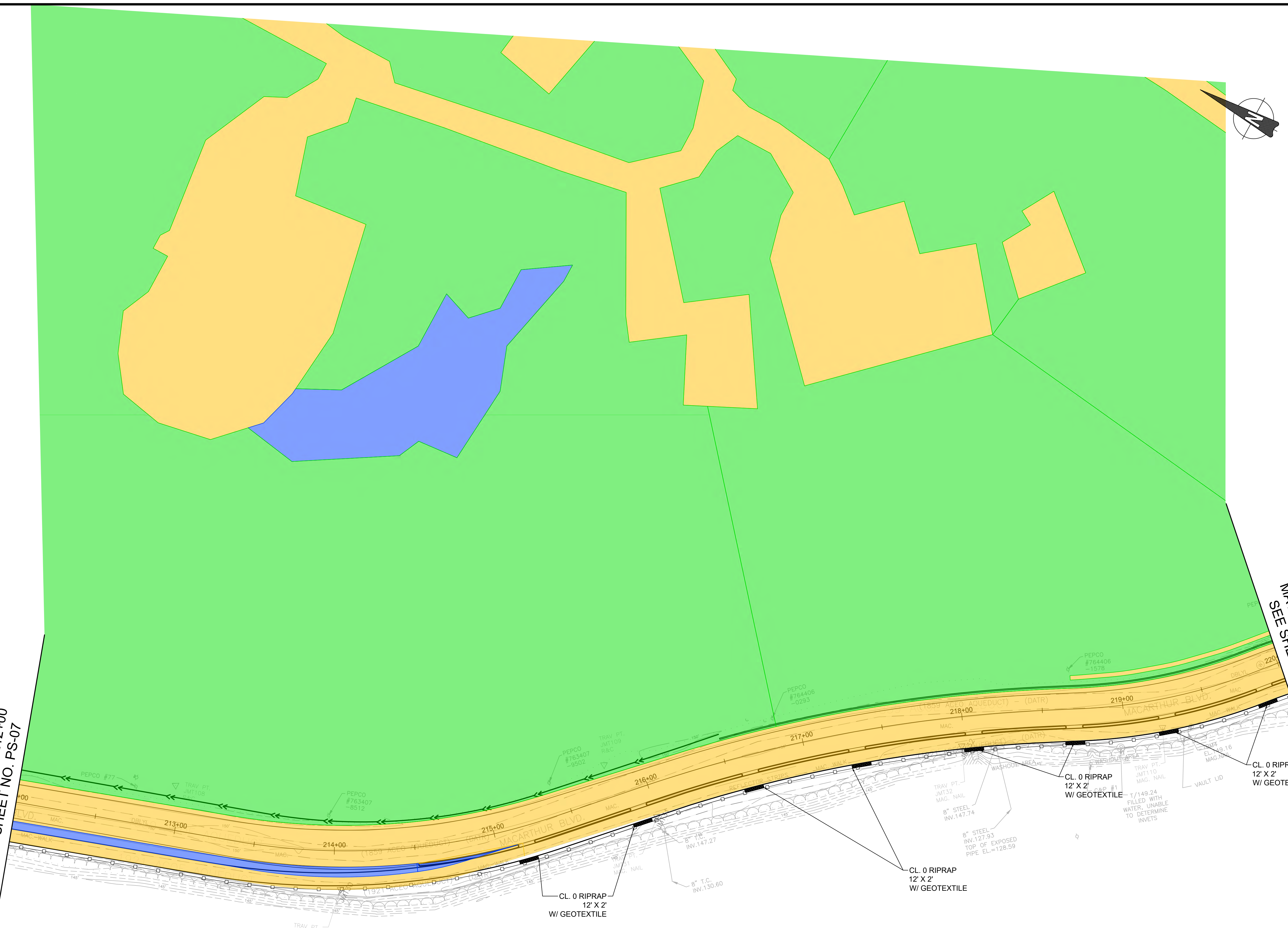
DATE: JUNE 2024

CIP No. : 502109 SHEET 22 of 30



MATCHLINE - STA. 212+00
SEE SHEET NO. PS-07

MATCHLINE - STA. 220+00
SEE SHEET NO. PS-09



LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

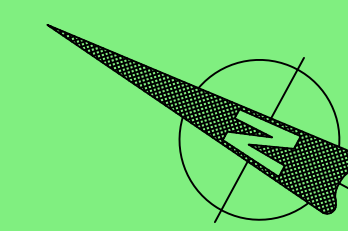
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-23
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 23 of 30



MATCHLINE - STA. 220+00
SEE SHEET NO. PS-08

MATCHLINE - STA. 228+00
SEE SHEET NO. PS-10

LEGEND	
	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

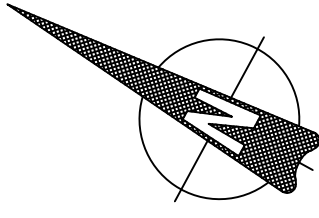
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-24
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 24 of 30



MATCHLINE - STA. 228+00
SEE SHEET NO. PS-09

MATCHLINE - STA. 236+00
SEE SHEET NO. PS-11

LEGEND	
	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

DRAFT
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

LU-25
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

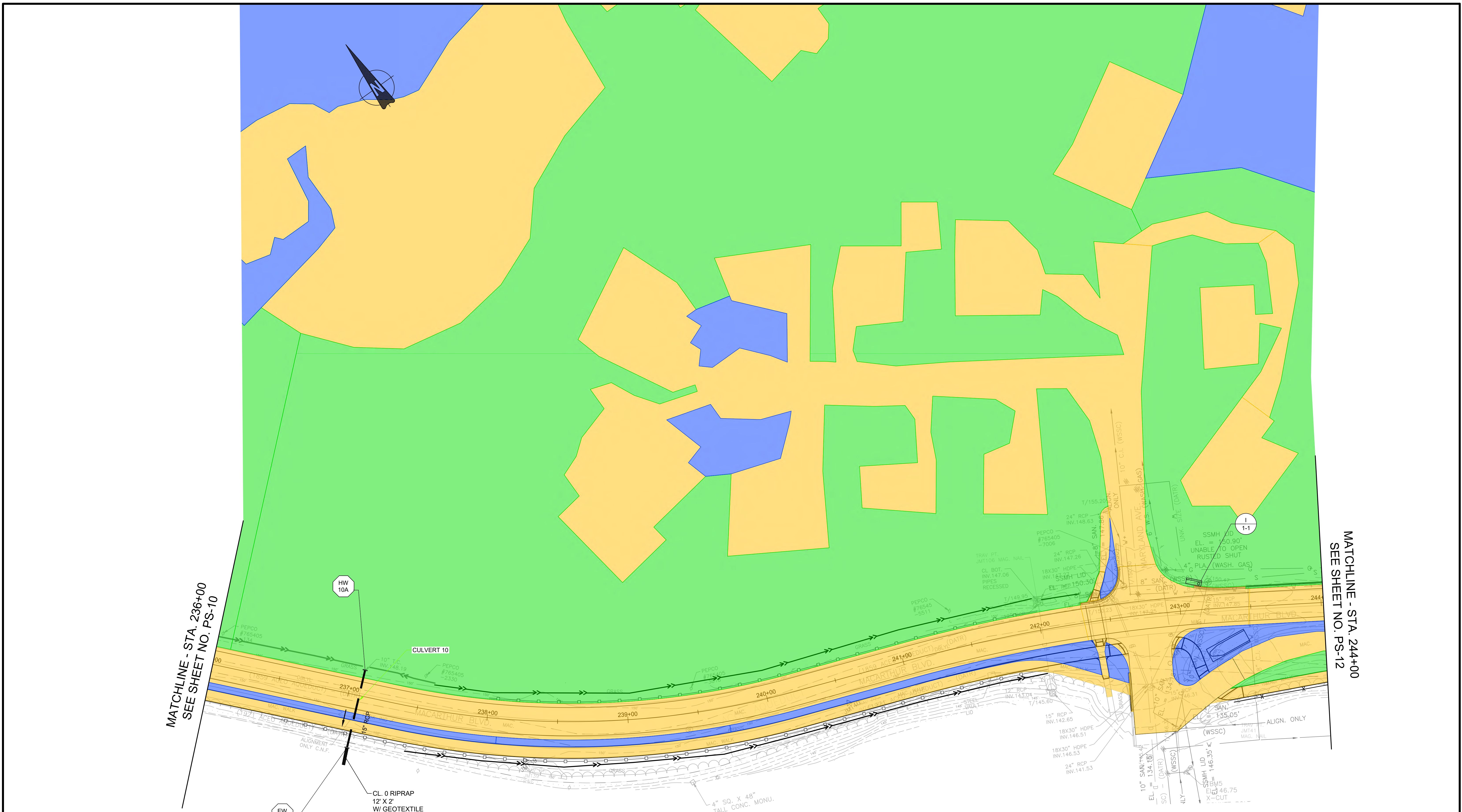
SCALE: 1" = 40'

DATE: JUNE 2024

CIP No. : 502109 SHEET 25 of 30

MATCHLINE - STA. 236+00
SEE SHEET NO. PS-10


MATCHLINE - STA. 244+00
SEE SHEET NO. PS-12



LEGEND

	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**



NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____

APPROVED

Chief, Division of Transportation Engineering _____ Date _____

Designed by: AGB Drawn by: AGB Checked by: WRB

LU-26
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 26 of 30




MATCHLINE - STA. 244+00
SEE SHEET NO. PS-11

MATCHLINE - STA. 251+00
SEE SHEET NO. PS-13

LEGEND

■	IMPERVIOUS AREA
■	TURF AREA
■	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**



NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____

APPROVED

Chief, Division of Transportation Engineering _____ Date _____

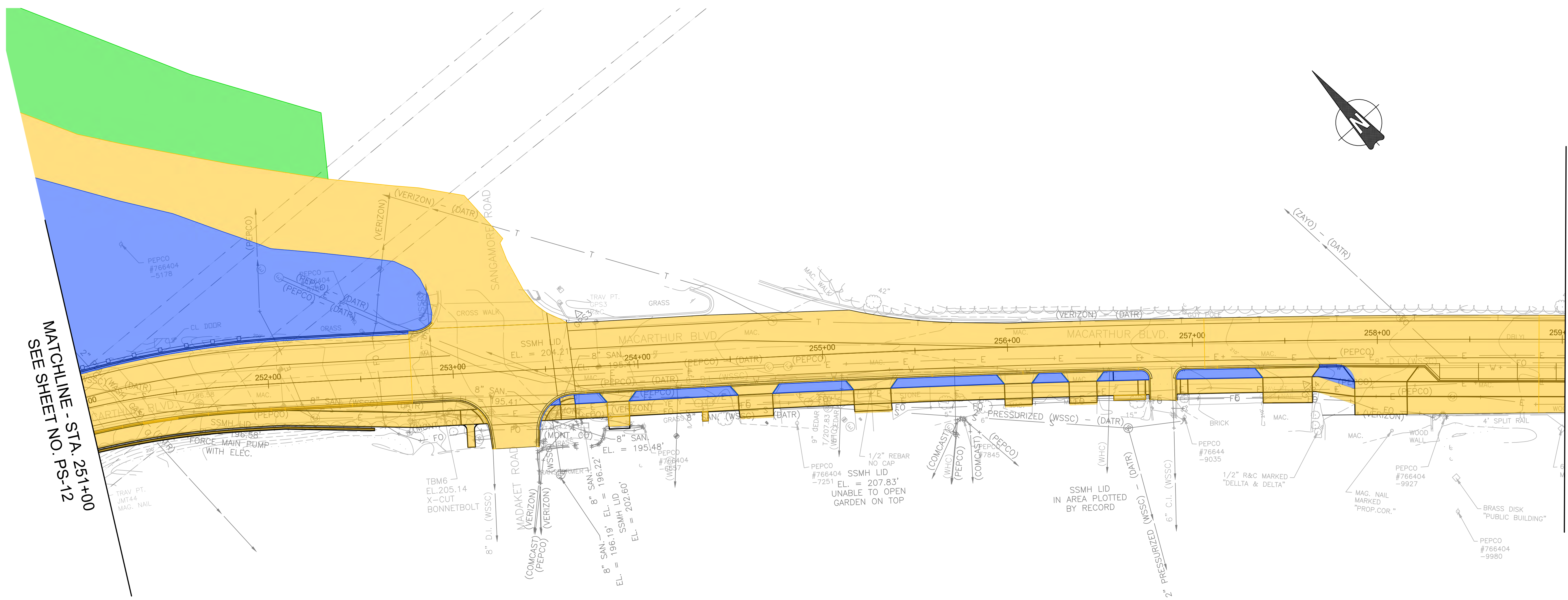
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-27
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 27 of 30



MATCHLINE - STA. 251+00
SEE SHEET NO. PS-12

MATCHLINE - STA. 259+00
SEE SHEET NO. PS-14

LEGEND	
	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

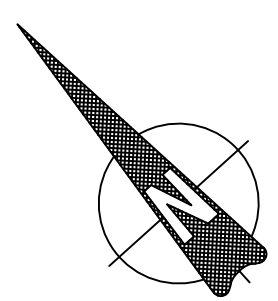
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-28
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

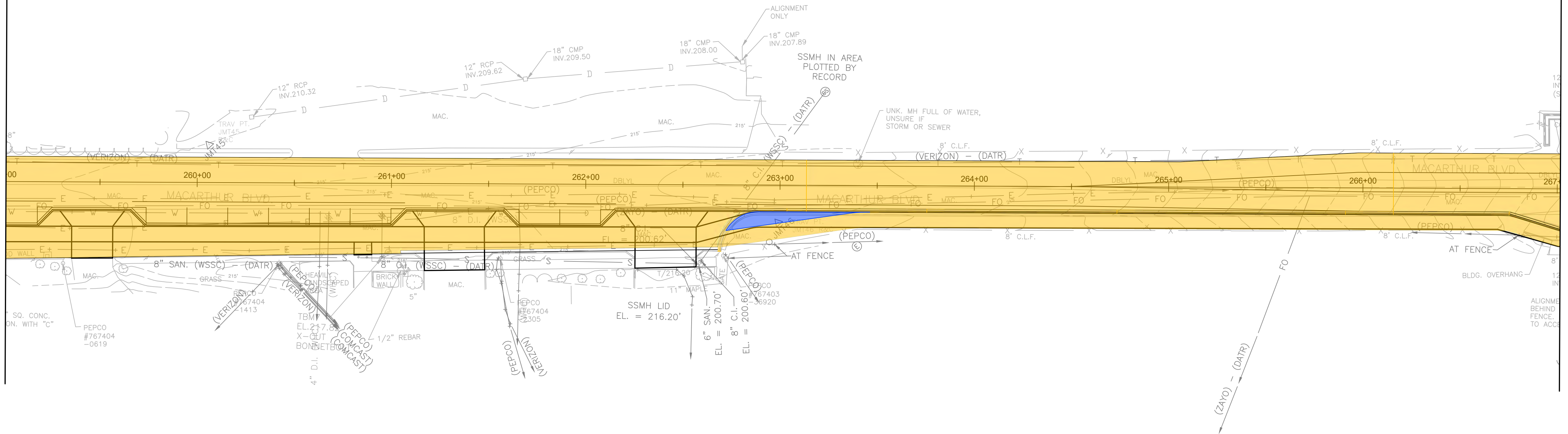
SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 28 of 30



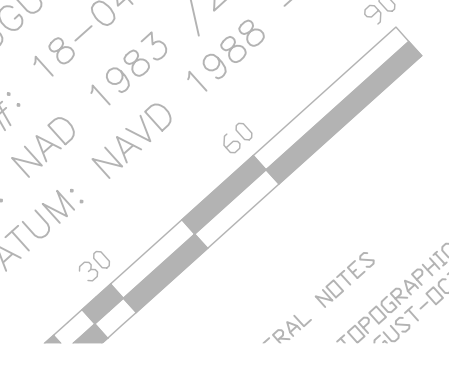
MATCHLINE - STA. 259+00
SEE SHEET NO. PS-13



MATCHLINE - STA. 267+00
SEE SHEET NO. PS-15

MACARTHUR BLVD.
TOPOGRAPHIC WORKSHEET
SURVEY BY: JMT
DATE: AUGUST 2021
JMT JOB #: 18-04565-003
PRJ. DATUM: NAD 1983 / 2011 - GPS
TERT. DATUM: NAVD 1988 - GPS

GENERAL NOTES:
TOPOGRAPHIC SURVEY PERFORMED BY JMT OCTOBER 2021 AND REFLECTS SITE CONDITIONS AS OF THAT DATE.
TO THE MARYLAND STATE PLANE COORDINATE SYSTEM OF THIS DRAWING



LEGEND	
	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

**DRAFT
NOT FOR CONSTRUCTION**

NO.	REVISION	DATE	BY

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
GAITHERSBURG, MARYLAND

RECOMMENDED FOR APPROVAL

Chief, Design Section _____ Date _____
APPROVED

Chief, Division of Transportation Engineering _____ Date _____

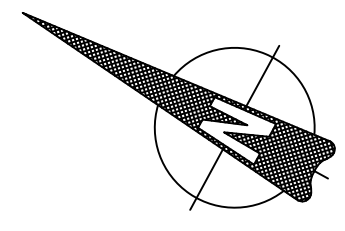
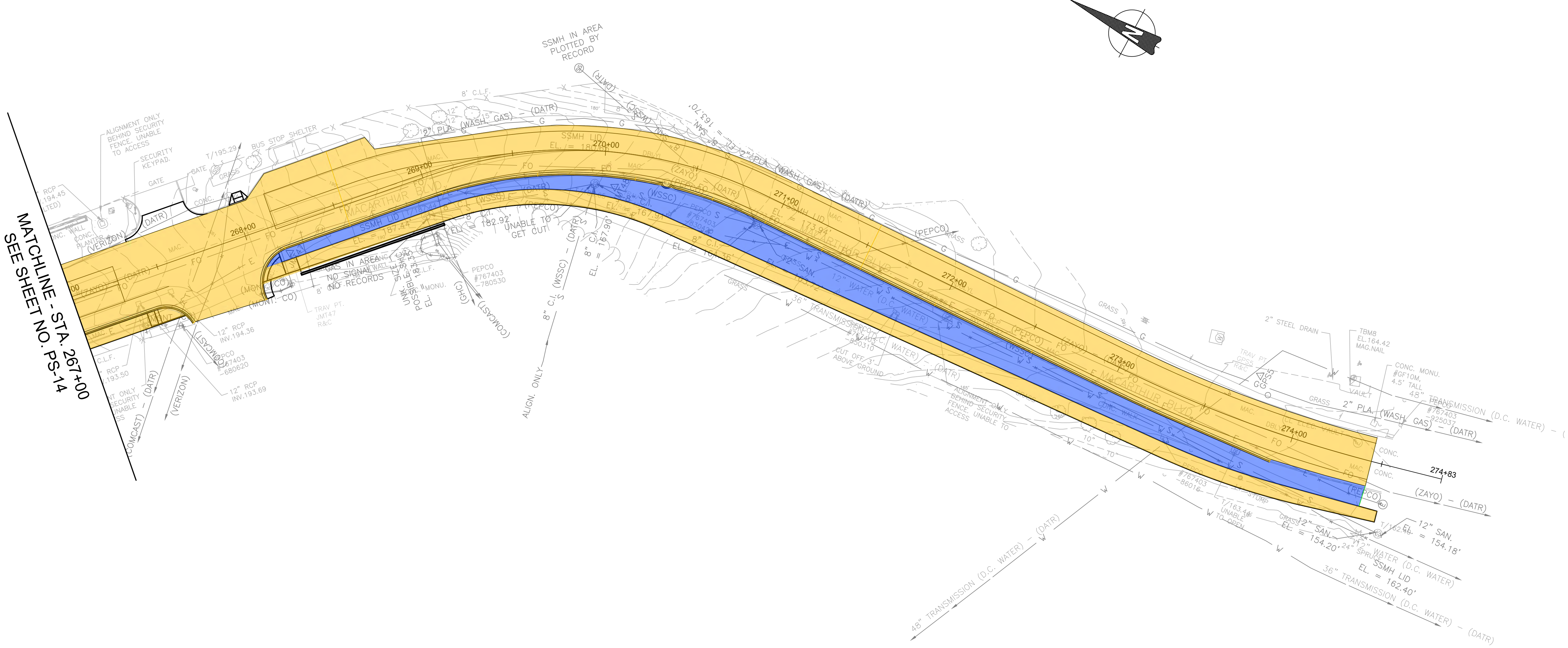
Designed by: AGB Drawn by: AGB Checked by: WRB

LU-29
POST-DEVELOPMENT LAND COVER MAPS
**MACARTHUR BOULEVARD
BIKEWAY PHASE III**

SCALE: 1"=30'

DATE: JUNE 2024

CIP No. : 502109 SHEET 29 of 30



MATCHLINE - STA. 267+00
SEE SHEET NO. PS-1A

LEGEND

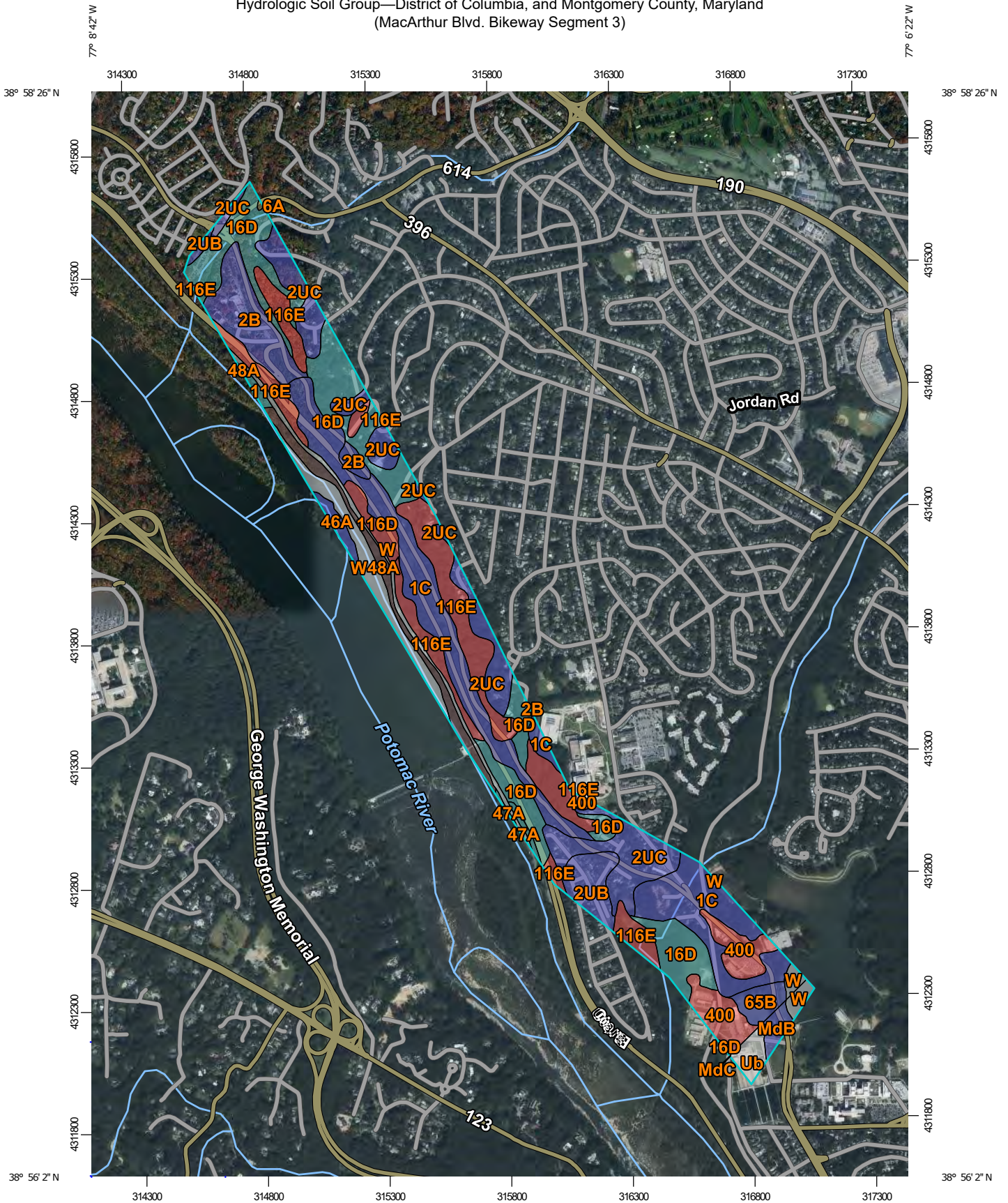
	IMPERVIOUS AREA
	TURF AREA
	FORRESTED AREA

<p>DRAFT NOT FOR CONSTRUCTION</p>		<p>MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION GAITHERSBURG, MARYLAND</p>	<p>LU-30 POST-DEVELOPMENT LAND COVER MAPS MACARTHUR BOULEVARD BIKEWAY PHASE III</p>
		<p>RECOMMENDED FOR APPROVAL</p>	<p>SCALE: 1"=30'</p>
		<p>Chief, Design Section Date</p> <p>APPROVED _____</p>	<p>DATE: JUNE 2024</p>
		<p>Chief, Division of Transportation Engineering Date</p> <p>Designed by: <u>AGB</u> Drawn by: <u>AGB</u> Checked by: <u>WRB</u></p>	<p>CIP No. : 502109 SHEET 30 of 30</p>
NO.	REVISION	DATE	BY

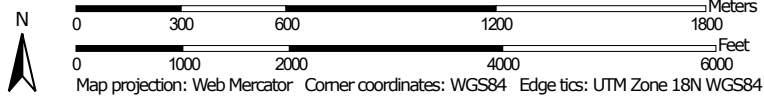
APPENDIX D

NRCS SOIL RESOURCE REPORT

Hydrologic Soil Group—District of Columbia, and Montgomery County, Maryland
(MacArthur Blvd. Bikeway Segment 3)



Map Scale: 1:21,600 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84




Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

7/14/2021
Page 1 of 5

MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points






 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:12,000 to 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: District of Columbia
 Survey Area Data: Version 14, Jun 11, 2020

Soil Survey Area: Montgomery County, Maryland
 Survey Area Data: Version 16, Jun 12, 2020

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 3, 2015—Sep 23, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
MdB	Manor-Urban land complex, 0 to 8 percent slopes	B	3.5	0.9%
MdC	Manor-Urban land complex, 8 to 15 percent slopes	B	0.0	0.0%
Ub	Urban land		5.1	1.3%
W	Water		2.2	0.6%
Subtotals for Soil Survey Area			10.7	2.8%
Totals for Area of Interest			388.2	100.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1C	Gaila silt loam, 8 to 15 percent slopes	B	78.6	20.3%
2B	Glenelg silt loam, 3 to 8 percent slopes	B	24.4	6.3%
2UB	Glenelg-Urban land complex, 0 to 8 percent slopes	B	12.6	3.2%
2UC	Glenelg-Urban land complex, 8 to 15 percent slopes	B	52.8	13.6%
6A	Baile silt loam, 0 to 3 percent slopes	C/D	0.2	0.0%
16D	Brinklow-Blocktown channery silt loams, 15 to 25 percent slopes	C	73.3	18.9%
46A	Huntington silt loam, 0 to 3 percent slopes, occasionally flooded	B	3.2	0.8%
47A	Lindside silt loam, 0 to 3 percent slopes, occasionally flooded	C	2.9	0.8%
48A	Melvin silt loam, 0 to 2 percent slopes, occasionally flooded	B/D	13.0	3.4%
65B	Wheaton silt loam, 0 to 8 percent slopes	B	6.2	1.6%
116D	Blocktown channery silt loam, 15 to 25 percent slopes, very rocky	D	5.5	1.4%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
116E	Blocktown channery silt loam, 25 to 45 percent slopes, very rocky	D	59.3	15.3%
400	Urban land	D	20.5	5.3%
W	Census water		24.8	6.4%
Subtotals for Soil Survey Area			377.4	97.2%
Totals for Area of Interest			388.2	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk "*" denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—District of Columbia														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	
MdB—Manor-Urban land complex, 0 to 8 percent slopes														
Manor	41	B	0-6	Loam, sandy loam	ML	A-4	0- 0- 0	0- 0- 0	85-93-100	80-90-100	70-85-100	50-70-90	32-36-40	6-9 -12
			6-22	Loam, sandy loam, loamy sand	ML	A-4, A-6	0- 0- 0	0- 0- 0	85-90-100	80-90-100	70-80-100	50-60-90	26-33-40	4-8 -12
			22-72	Channery sandy loam, sand, channery loamy sand	SM, CL-ML	A-2, A-4	0- 0- 0	0- 3- 5	60-70-85	50-50-75	30-50-70	15-40-55	0-24 -34	NP-6 -12
MdC—Manor-Urban land complex, 8 to 15 percent slopes														
Manor	41	B	0-6	Loam, sandy loam	ML	A-4	0- 0- 0	0- 0- 0	85-93-100	80-90-100	70-85-100	50-70-90	32-36-40	6-9 -12
			6-22	Loamy sand, loam, sandy loam	ML	A-4, A-6	0- 0- 0	0- 0- 0	85-90-100	80-90-100	70-80-100	50-60-90	26-33-40	4-8 -12
			22-72	Channery sandy loam, sand, channery loamy sand	SM, CL-ML	A-2, A-4	0- 0- 0	0- 3- 5	60-70-85	50-50-75	30-50-70	15-40-55	0-24 -34	NP-6 -12

Engineering Properties--Montgomery County, Maryland														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
1C--Gaila silt loam, 8 to 15 percent slopes														
Gaila	95	B	0-8	Silt loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 3- 5	80-90-100	75-85-95	65-78-90	50-60-70	15-23-30	6-9 -12
			8-17	Sandy clay loam, loam, sandy loam	CL, SC	A-2, A-4, A-6	0- 0- 0	0- 3- 5	80-90-100	75-85-95	50-70-90	25-48-70	20-28-35	8-12-15
			17-20	Sandy loam, loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0- 0- 0	0- 5- 10	80-88-95	70-83-95	45-68-90	25-48-70	15-23-30	6-9 -12
			20-76	Loamy sand, sandy loam, loam	CL-ML, SC, SC-SM	A-1, A-2, A-4	0- 0- 0	0- 5- 10	80-88-95	70-83-95	40-65-90	15-40-65	15-23-30	NP-5 -10

Engineering Properties--Montgomery County, Maryland														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
2B--Glenelg silt loam, 3 to 8 percent slopes														
Glenelg	85	B	0-8	Channery silt loam, silt loam	CL	A-6	0- 0- 0	0- 4- 6	74-87-100	72-86-100	59-80-98	53-72-89	23-35-47	6-12-17
			8-18	Channery loam, clay loam, silty clay loam, silt loam, loam	CL	A-6	0- 0- 0	0- 0- 6	76-97-100	74-97-100	62-91-100	53-78-87	29-37-44	13-19-25
			18-30	Channery loam, loam, clay loam	CL	A-6	0- 0- 0	0- 1- 6	73-95-100	71-95-100	49-85-97	41-74-86	18-37-44	3-19-25
			30-42	Silty clay loam, clay loam, loam, silt loam, channery clay loam	CL	A-6	0- 0- 0	0- 1- 7	73-96-100	70-96-100	51-86-95	36-66-75	18-34-39	3-17-21
			42-54	Loam, loamy sand, sandy loam, channery sandy loam	CL	A-6	0- 0- 0	0- 1- 7	74-96-100	71-96-100	56-91-96	40-70-74	18-33-34	3-16-17
			54-76	Loam, channery fine sandy loam, loamy sand	SM	A-2-4	0- 0- 0	5-10- 15	56-67-89	53-64-88	44-55-86	25-32-54	0-0 -25	NP-0 -9

Engineering Properties--Montgomery County, Maryland														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
2UB—Glenelg-Urban land complex, 0 to 8 percent slopes														
Glenelg	45	B	0-10	Loam	ML	A-4, A-6	0- 0- 0	0- 3- 12	78-94-100	75-93-100	63-83-94	45-61-70	32-36-40	7-10-12
			10-30	Clay loam, loam, sandy loam	CL-ML, GC, CL	A-4, A-6	0- 0- 0	0-11- 22	74-90-100	71-88-100	61-88-100	43-70-100	23-32-38	7-12-16
			30-54	Channery sandy loam, loam, sandy loam	ML	A-4	0- 0- 0	0-13- 25	72-88-100	68-87-100	55-76-96	38-55-71	32-36-40	6-9 -12
			54-76	Loam, very channery sandy loam, channery loam	SC-SM, ML, SM	A-2, A-4	0- 0- 0	6-25- 36	44-63-100	36-58-100	25-44-89	11-22-51	0-20 -40	NP-3 -6
2UC—Glenelg-Urban land complex, 8 to 15 percent slopes														
Glenelg	45	B	0-10	Loam	ML	A-4, A-6	0- 0- 0	0- 3- 12	78-94-100	75-93-100	63-83-94	45-61-70	32-36-40	7-10-12
			10-30	Clay loam, loam, sandy loam	CL-ML, GC, CL	A-4, A-6	0- 0- 0	0-11- 22	74-90-100	71-88-100	61-88-100	43-70-100	23-32-38	7-12-16
			30-54	Channery sandy loam, loam, sandy loam	ML	A-4	0- 0- 0	0-13- 25	72-88-100	68-87-100	55-76-96	38-55-71	32-36-40	6-9 -12
			54-76	Loam, very channery sandy loam, channery loam	SC-SM, ML, SM	A-2, A-4	0- 0- 0	6-25- 36	44-63-100	36-58-100	25-44-89	11-22-51	0-20 -40	NP-3 -6

Engineering Properties--Montgomery County, Maryland														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
6A--Baile silt loam, 0 to 3 percent slopes														
Baile	85	C/D	0-9	Silt loam, loam	MH, ML	A-4, A-6, A-7	0- 0- 0	0- 0- 0	81-93-100	74-90-100	64-86-100	55-75-92	33-50-67	7-16-24
			9-32	Silty clay loam, silt loam, clay loam	CL	A-6	0- 0- 0	0- 0- 0	78-94-100	69-91-100	59-91-100	50-83-98	28-31-34	11-13-14
			32-65	Loam, sandy loam, silt loam	CL, SC, SM, CL-ML, ML	A-2, A-4, A-6	0- 0- 0	0- 5- 8	64-88-100	48-83-100	39-73-96	27-53-71	15-25-35	NP-6-11
16D--Brinklow-Blocktown channery silt loams, 15 to 25 percent slopes														
Brinklow	50	C	0-10	Channery silt loam, channery loam	GM, ML	A-4, A-6, A-7-6	0- 0- 0	0- 0- 0	85-90-100	80-85-100	70-81-95	49-70-85	33-40-44	7-14-16
			10-25	Channery loam, channery clay loam, channery silt loam	CL, GC	A-7-6, A-6, A-2-4	0- 0- 0	0- 0- 0	60-80-95	52-76-90	50-69-75	35-59-70	25-35-45	10-16-22
			25-35	Bedrock	---	---	0- 0- 0	0- 0- 0	---	---	---	---	---	---
			35-39	Bedrock	---	---	0- 0- 0	0- 0- 0	---	---	---	---	---	---
Blocktown	30	D	0-6	Channery silt loam, channery loam	GC, CL	A-6, A-4	0- 0- 0	0- 2- 5	76-80-100	60-70-100	50-65-90	40-55-77	21-25-40	8-10-15
			6-17	Extremely channery silt loam, extremely channery loam	GM, GW-GC, ML	A-7-6, A-2-6	0- 0- 0	0- 5- 12	40-50-100	30-40-95	15-38-85	10-26-60	21-34-45	8-13-17
			17-21	Bedrock	---	---	0- 0- 0	---	---	---	---	---	---	---
			21-25	Bedrock	---	---	0- 0- 0	---	---	---	---	---	---	---

Engineering Properties--Montgomery County, Maryland														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
46A--Huntington silt loam, 0 to 3 percent slopes, occasionally flooded														
Huntington	85	B	0-12	Silt loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	95-98-100	95-98-100	85-93-100	60-78-95	25-33-40	5-10-15
			12-65	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	95-98-100	95-98-100	85-93-100	60-78-95	25-33-40	5-10-15
47A--Lindside silt loam, 0 to 3 percent slopes, occasionally flooded														
Lindside	80	C	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	95-98-100	80-90-100	55-73-90	20-28-35	2-9 -15
			9-65	Silty clay loam, silt loam, very fine sandy loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	95-98-100	90-95-100	70-83-95	25-33-40	4-11-18
48A--Melvin silt loam, 0 to 2 percent slopes, occasionally flooded														
Melvin	85	B/D	0-9	Silt loam	CL-ML, ML	A-4	0- 0- 0	0- 0- 0	95-98-100	90-95-100	80-90-100	80-88-95	25-30-35	4-7 -10
			9-24	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6, A-7	0- 0- 0	0- 0- 0	95-98-100	90-95-100	80-90-100	80-89-98	25-33-45	5-13-20
			24-60	Silt loam, silty clay loam, loam	CL, CL-ML	A-4, A-6, A-7	0- 0- 0	0- 0- 0	85-93-100	80-90-100	70-85-100	60-79-98	25-33-45	5-13-20

Engineering Properties--Montgomery County, Maryland														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>					<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
65B--Wheaton silt loam, 0 to 8 percent slopes														
Wheaton	100	B	0-6	Silt loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 3- 5	80-90-100	75-88-100	65-78-90	55-68-80	25-30-35	5-10-15
			6-68	Loam, silt loam, channery loam	CL, CL-ML, GC, GC-GM	A-4, A-6	0- 0- 0	0- 3- 5	65-83-100	55-75-95	45-65-85	35-50-65	25-30-35	5-10-15
116D--Blocktown channery silt loam, 15 to 25 percent slopes, very rocky														
Blocktown	85	D	0-6	Channery silt loam, channery loam	CL, GC	A-6, A-4	0- 0- 0	0- 2- 5	76-80-100	60-70-100	50-65-90	40-55-77	21-25-40	8-10-15
			6-17	Extremely channery silt loam, extremely channery loam	GM, GW-GC, ML	A-7-6, A-2-6	0- 0- 0	0- 5- 12	40-50-100	30-40-95	15-38-85	10-26-60	21-34-45	8-13-17
			17-21	Bedrock	—	—	0- 0- 0	—	—	—	—	—	—	—
			21-25	Bedrock	—	—	0- 0- 0	—	—	—	—	—	—	—

Engineering Properties--Montgomery County, Maryland														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
116E--Blocktown channery silt loam, 25 to 45 percent slopes, very rocky														
Blocktown	85	D	0-6	Channery silt loam, channery loam	CL, GC	A-6, A-4	0- 0- 0	0- 2- 5	76-80-100	60-70-100	50-65-90	40-55-77	21-25-40	8-10-15
			6-17	Extremely channery silt loam, extremely channery loam	GM, GW-GC, ML	A-7-6, A-2-6	0- 0- 0	0- 5- 12	40-50-100	30-40-95	15-38-85	10-26-60	21-34-45	8-13-17
			17-21	Bedrock	—	—	0- 0- 0	—	—	—	—	—	—	—
			21-25	Bedrock	—	—	0- 0- 0	—	—	—	—	—	—	—

Data Source Information

Soil Survey Area: District of Columbia
 Survey Area Data: Version 14, Jun 11, 2020

Soil Survey Area: Montgomery County, Maryland
 Survey Area Data: Version 16, Jun 12, 2020

Conservation Planning

This report provides those soil attributes for the conservation plan for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. It provides the soil description along with the slope, runoff, T Factor, WEI, WEG, Erosion class, Drainage class, Land Capability Classification, and the engineering Hydrologic Group and the erosion factors Kf, the representative percentage of fragments, sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic surface layer. Further information on these factors can be found in the National Soil Survey Handbook section 618 found at the url http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054223#00 .

Report—Conservation Planning

Soil properties and interpretations for conservation planning. The surface mineral horizon properties are displayed.
Organic surface horizons are not displayed.

Conservation Planning—District of Columbia																	
Map symbol and soil name	Pct. of map unit	Slope RV	USLE Slope Length ft.	Runoff	T Factor	WEI	WEG	Erosion	Drainage	NIRR LCC	Hydro logic Group	Surface					
												Depths in.	Kf Factor	Frag-ments RV	Sand RV	Silt RV	Clay RV
MdB—Manor-Urban land complex, 0 to 8 percent slopes																	
Manor	41	4.0	—	—	5	56	5	—	Well drained	2e	B	0 - 6	.37	13	43	39	17
MdC—Manor-Urban land complex, 8 to 15 percent slopes																	
Manor	41	12.0	—	—	5	56	5	—	Well drained	3e	B	0 - 6	.37	13	43	39	17

Conservation Planning—Montgomery County, Maryland																	
Map symbol and soil name	Pct. of map unit	Slope RV	USLE Slope Length ft.	Runoff	T Factor	WEI	WEG	Erosion	Drainage	NIRR LCC	Hydro logic Group	Surface					
												Depths in.	Kf Factor	Frag-ments RV	Sand RV	Silt RV	Clay RV
1C—Gaila silt loam, 8 to 15 percent slopes																	
Gaila	95	12.0	—	Medium	5	56	5	—	Well drained	3e	B	0 - 7	.43	14	29	53	17
2B—Glenelg silt loam, 3 to 8 percent slopes																	
Glenelg	85	6.0	150	Medium	5	48	6	Class 1	Well drained	2e	B	0 - 7	.37	10	20	60	20
2UB—Glenelg-Urban land complex, 0 to 8 percent slopes																	
Glenelg	45	4.0	—	Medium	4	48	6	—	Well drained	2e	B	0 - 9	.28	5	42	37	20

Conservation Planning--Montgomery County, Maryland																	
Map symbol and soil name	Pct. of map unit	Slope RV	USLE Slope Length ft.	Runoff	T Factor	WEI	WEG	Erosion	Drainage	NIRR LCC	Hydro logic Group	Surface					
												Depths in.	Kf Factor	Frag-ments RV	Sand RV	Silt RV	Clay RV
2UC—Glenelg-Urban land complex, 8 to 15 percent slopes																	
Glenelg	45	12.0	—	Medium	4	48	6	—	Well drained	3e	B	0 - 9	.28	5	42	37	20
6A—Baile silt loam, 0 to 3 percent slopes																	
Baile	85	2.0	—	Very high	5	48	6	—	Poorly drained	4w	C/D	0 - 9	.37	5	21	54	23
16D—Brinklow-Blocktown channery silt loams, 15 to 25 percent slopes																	
Brinklow	50	20.0	—	Very high	2	38	7	—	Well drained	6e	C	0 - 9	.37	15	22	55	23
Blocktown	30	20.0	—	Very high	2	48	6	—	Well drained	6e	D	0 - 5	.49	20	27	55	18
46A—Huntington silt loam, 0 to 3 percent slopes, occasionally flooded																	
Huntington	85	2.0	—	Low	5	48	6	—	Well drained	—	B	0 - 11	.37	4	9	66	24
47A—Lindside silt loam, 0 to 3 percent slopes, occasionally flooded																	
Lindside	80	2.0	—	Low	5	48	6	—	Moderately well drained	2w	C	0 - 9	.43	2	11	67	21
48A—Melvin silt loam, 0 to 2 percent slopes, occasionally flooded																	
Melvin	85	1.0	—	Very high	5	56	5	—	Poorly drained	4w	B/D	0 - 9	.37	5	14	71	15
65B—Wheaton silt loam, 0 to 8 percent slopes																	
Wheaton	100	4.0	—	Low	5	48	6	—	Well drained	2e	B	0 - 5	.43	14	24	52	22

Conservation Planning--Montgomery County, Maryland																	
Map symbol and soil name	Pct. of map unit	Slope RV	USLE Slope Length ft.	Runoff	T Factor	WEI	WEG	Erosion	Drainage	NIRR LCC	Hydro logic Group	Surface					
												Depths in.	Kf Factor	Frag-ments RV	Sand RV	Silt RV	Clay RV
116D--Blocktown channery silt loam, 15 to 25 percent slopes, very rocky																	
Blocktown	85	20.0	—	Very high	2	48	6	—	Well drained	6e	D	0 - 5	.49	20	27	55	18
116E--Blocktown channery silt loam, 25 to 45 percent slopes, very rocky																	
Blocktown	85	35.0	—	Very high	2	48	6	—	Well drained	7e	D	0 - 5	.49	20	27	55	18

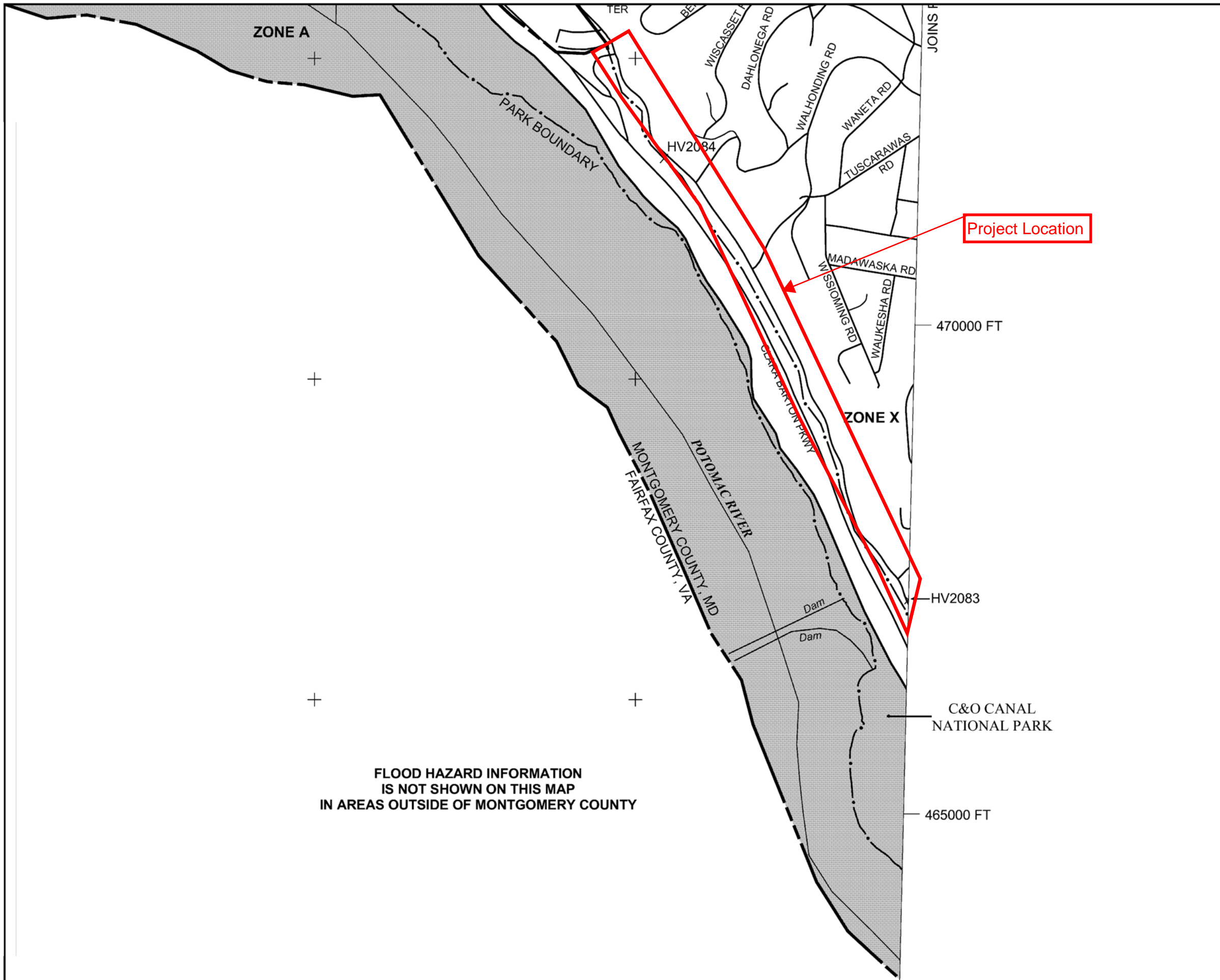
Data Source Information

Soil Survey Area: District of Columbia
 Survey Area Data: Version 14, Jun 11, 2020

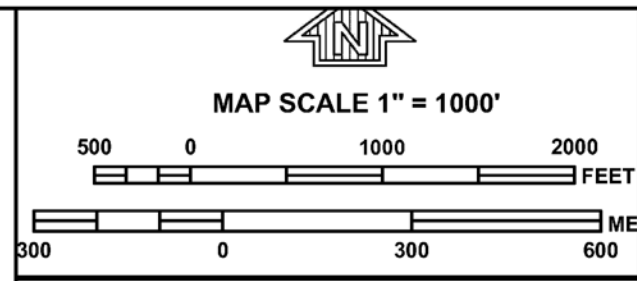
Soil Survey Area: Montgomery County, Maryland
 Survey Area Data: Version 16, Jun 12, 2020

APPENDIX E

**WATERSHED, FEMA AND USE WATERS
CLASSIFICATION MAPS**



FLOOD HAZARD INFORMATION
IS NOT SHOWN ON THIS MAP
IN AREAS OUTSIDE OF MONTGOMERY COUNTY



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0435D

FIRM
FLOOD INSURANCE RATE MAP
MONTGOMERY COUNTY,
MARYLAND
AND INCORPORATED AREAS

PANEL 435 OF 480
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GLEN ECHO, TOWN OF	240142	0435	D
MONTGOMERY COUNTY	240049	0435	D

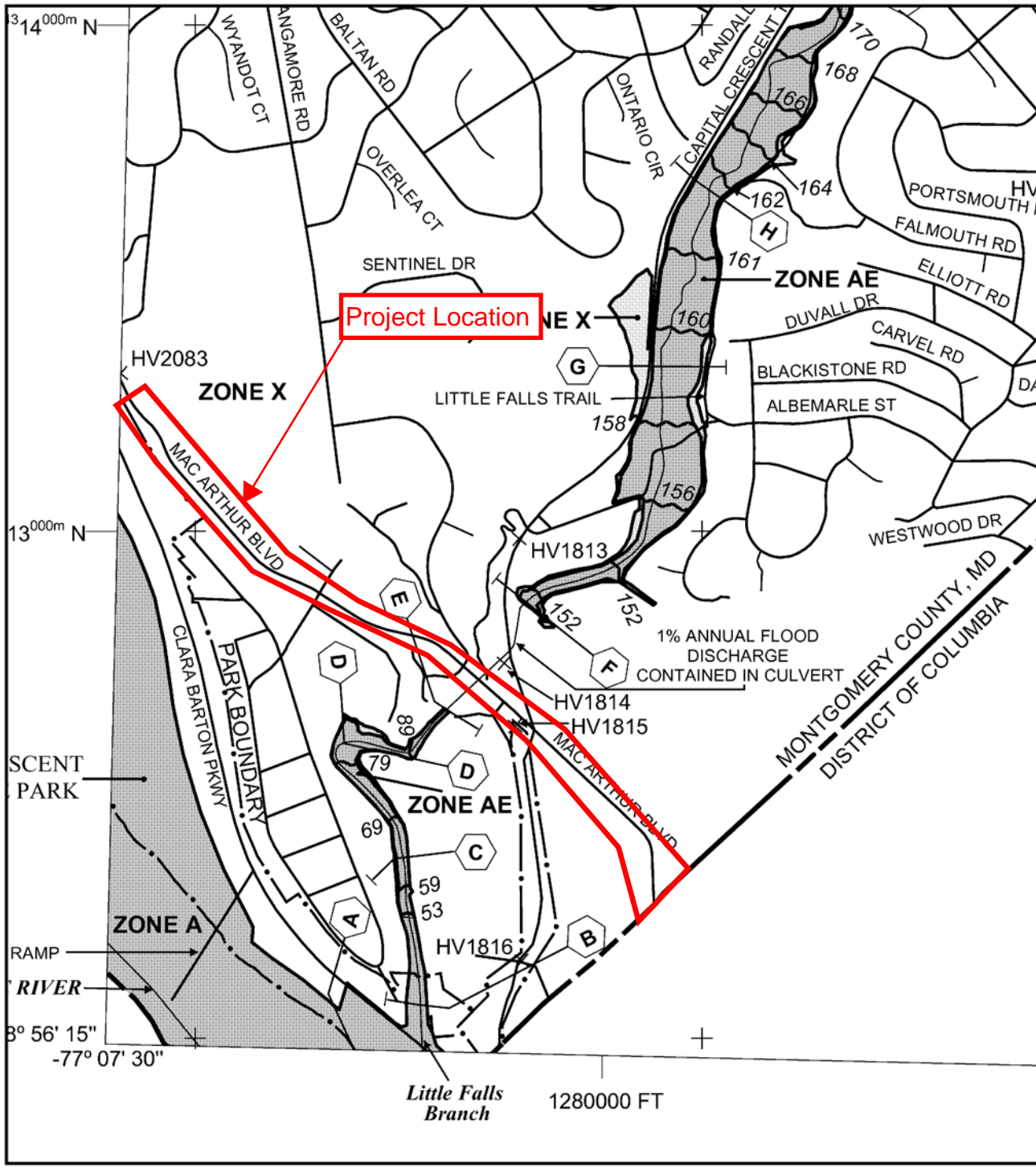
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
24031C0435D

EFFECTIVE DATE
SEPTEMBER 29, 2006

Federal Emergency Management Agency

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.



MAP SCALE 1" = 1000'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0455D

FIRM
FLOOD INSURANCE RATE MAP
MONTGOMERY COUNTY,
MARYLAND
AND INCORPORATED AREAS
PANEL 455 OF 480

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHEVY CHASE SECTION FIVE, VILLAGE OF	240137	0455	D
CHEVY CHASE SECTION THREE, VILLAGE OF	240136	0455	D
CHEVY CHASE, TOWN OF	240122	0455	D
CHEVY CHASE VILLAGE, TOWN OF	240047	0455	D
MARTIN'S ADDITION, TOWN OF	240113	0455	D
MONTGOMERY COUNTY	240049	0455	D
NORTH CHEVY CHASE, TOWN OF	240129	0455	D
SOMERSET, TOWN OF	240134	0455	D

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



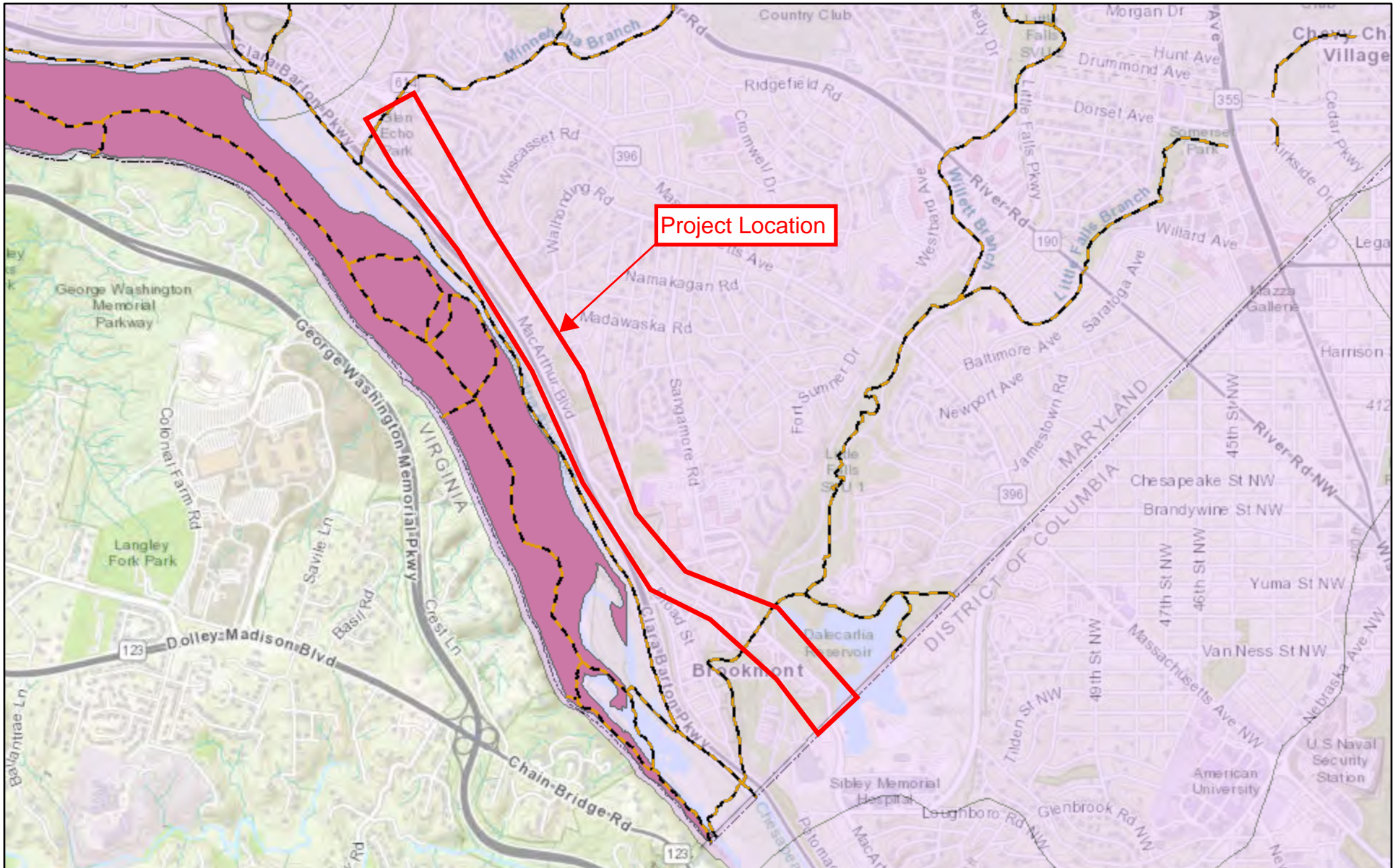
MAP NUMBER
 24031C0455D

EFFECTIVE DATE
 SEPTEMBER 29, 2006

Federal Emergency Management Agency

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.

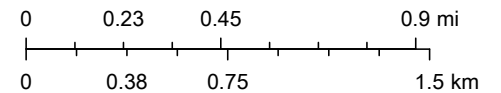
MDE Use Classes



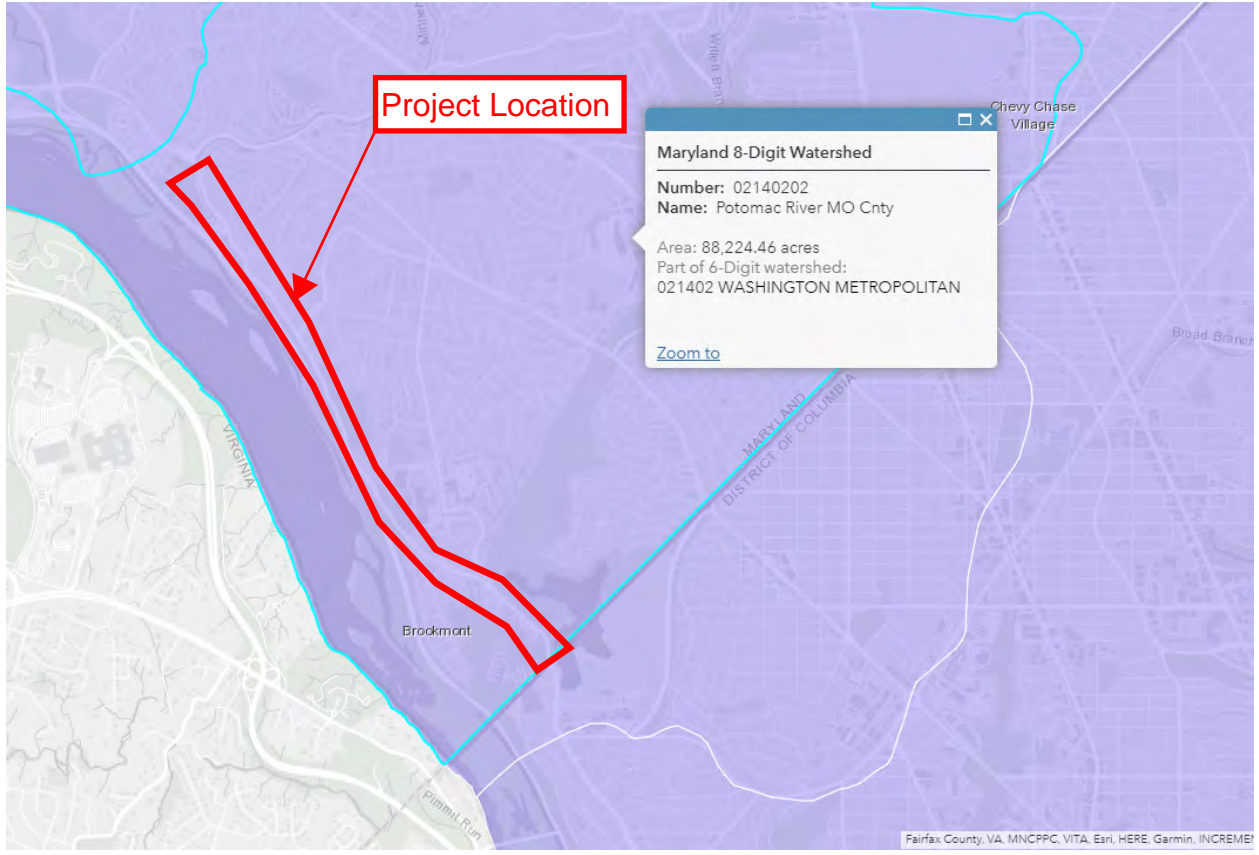
7/13/2021, 3:30:41 PM



1:36,112



MDE, WSA, Fairfax County, VA, MNCPPC, VITA, Esri, HERE, Garmin,



Watershed Map
N.T.S

APPENDIX F

ESD_v REQUIREMENT COMPUTATIONS

DESIGNED BY: AGB DATE: 6/28/2024 CHECKED BY: WRB DATE: 6/28/2024

MACARTHUR BOULEVARD BIKEWAY ESDv REQUIREMENT COMPUTATIONS

% Impervious	RCN	Pe (from Table 5.3) (in.)	Rv	Area (sf)	ESDv (cf)
45%	57	1.8	0.05405	438,213.6	3553

ESD Sizing Requirements:

P_E = Rainfall Target from Table 5.3 used to determine ESD goals and size practices

Q_E = Runoff depth in inches that must be treated using ESD practices
= $P_E \times R_v$; R_v = the dimensionless volumetric runoff coefficient
= $0.05 + 0.009(I)$ where I is percent impervious cover

ESD_v = Runoff volume (in cubic feet or acre-feet) used in the design of specific ESD practices

$$= \frac{(P_E)(R_v)(A)}{12} \quad \text{where A is the drainage area (in square feet or acres)}$$