

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DAILY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

REVISIONS	APPROVED
DESCRIPTION	BY DATE

Pennoni

PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

GP# G02017905 DWG NO: DD08E

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97114 APRIL 5, 2021

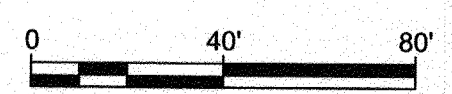
APPROVED DATE: *[Signature]* 4/13/21
APPROVED DATE: *[Signature]* 4/14/21

APPROVAL DATE: *[Signature]* 4/24/21
APPROVAL DATE: *[Signature]* 4/14/21

SCALE: 1" = 40'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 46 of 137
PROJECT # P504100
PROPOSAL #

STORMWATER MANAGEMENT PLAN
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

DPW No.:



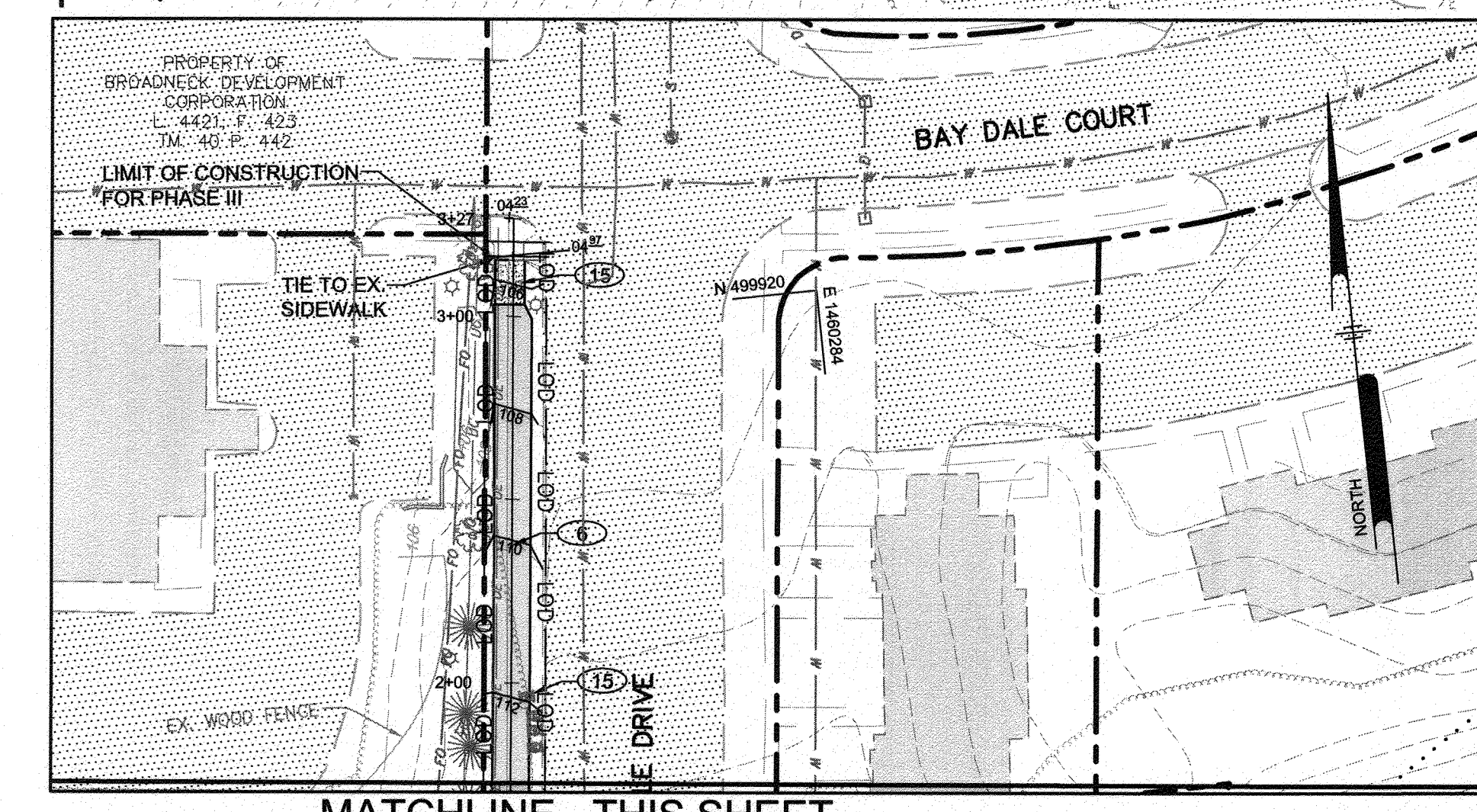
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MATCHLINE - SEE SHEET 46

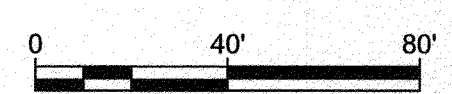
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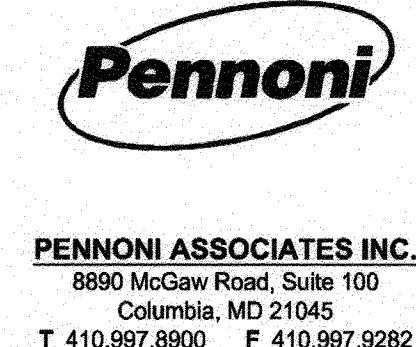


MATCHLINE - THIS SHEET



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#	REVISIONS DESCRIPTION	APPROVED BY	DATE



ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS
 97115
 APRIL 5, 2021

GP# G02017905 DWG NO: DD08F

APPROVED <i>[Signature]</i> CHIEF ENGINEER	DATE 5/16/21	APPROVED <i>[Signature]</i> PROJECT MANAGER	DATE 4/15/21
APPROVAL <i>[Signature]</i> ASSISTANT CHIEF ENGINEER	DATE 4/16/21	APPROVED <i>[Signature]</i> CHIEF, RIGHT OF WAY SERVICES	DATE 4/16/21

SCALE: 1" = 40'
 DRAWN BY: PAI
 CHECKED BY: PJS/JAR
 SHEET 47 of 137
 PROJECT #: P504100
 PROPOSAL #:

STORMWATER MANAGEMENT PLAN
 BROADNECK TRAIL - PHASE III
 CONSTRUCTION DOCUMENTS
 TAX MAP 32, 33, AND 40
 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
 ANNE ARUNDEL COUNTY, MD
 NOVEMBER 2019

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MICROBIORETENTION FACILITY AND BIOSWALE SPECIFICATIONS

- WHERE REQUIRED, THE UNDERDRAIN PIPE MUST BE 4-INCH DIAMETER SCHEDULE 40 OR STRONGER PERFORATED PVC PIPE AT 0.00% SLOPE. THREE INCHES OF GRAVEL MUST BE PLACED UNDER THE PIPE, WITH A MINIMUM OF 6 INCHES OF GRAVEL OVER THE PIPE. PERFORATIONS MUST BE 3/8 INCH IN DIAMETER AND MUST BE LOCATED 4 INCHES ON CENTER, EVERY 90 DEGREES AROUND THE PIPE. PERFORATED PIPE MUST BEGIN AT LEAST 5 FT. INSIDE THE FILTER MEDIA. FILTER FABRIC MUST NOT BE WRAPPED AROUND THE UNDERDRAIN PIPE.
- WHERE REQUIRED FOR UNDERDRAINS, 4" INCH CLEAN-OUTS SHOULD BE USED. CLEANOUTS FOR EACH PIPE SHOULD EXTEND 6 INCHES ABOVE THE TOP OF THE PLANTING MEDIA AND HAVE A REMOVABLE CAP.
- THE GRAVEL LAYER SURROUNDING THE UNDERDRAIN PIPES MUST MEET MSHA SIZE #7 (TABLE 901A), AND MUST PROVIDE A MINIMUM OF 6 INCHES COVER OVER THE PIPE, AND MINIMUM 3 INCHES UNDER THE PIPE. NO GEOTEXTILE OR FILTER FABRIC IS ALLOWED ANYWHERE WITHIN THE FILTER MEDIA (STONE OR SAND).
- A MINIMUM 6-INCH FINE AGGREGATE SAND LAYER SHALL BE PROVIDED BELOW THE SOIL FILTER/PLANTING MEDIA. THE SAND MUST MEET GRADATION REQUIREMENTS FOR WASHED ASTM C33 FINE AGGREGATE CONCRETE SAND. AASHTO M-6 GRADATION IS ALSO ACCEPTABLE. SAND MUST BE SILICA BASED. NO LIMESTONE BASED PRODUCTS MAY BE USED. IF MATERIAL IS WHITE OR GREY IN COLOR, IT IS PROBABLY NOT ACCEPTABLE. SAND MUST BE CLEAN, NATURAL, UNWASHED SAND DEPOSITS MAY NOT BE USED. LIKEWISE, SAND THAT HAS BECOME CONTAMINATED BY IMPROPER STORAGE OR INSTALLATION PRACTICES WILL BE REJECTED. MANUFACTURED SAND OR STONE DUST IS NOT ACCEPTABLE.
- A MINIMUM 4-INCH PEA GRAVEL LAYER SHALL BE PROVIDED BETWEEN THE SAND AND THE STONE.
- THE PLANTING MEDIA MIX SHALL MEET SHA BIORETENTION SOIL MIX STANDARDS. THE SOIL SHALL MEET THE FOLLOWING MINIMUM CRITERIA: A HOMOGENEOUS MIXTURE COMPOSED OF 5 PARTS COARSE SAND, 3 PARTS BASE SOIL, AND 2 PARTS FINE BARK. THE SOIL SHALL BE FREE OF STONES, STUMPS, ROOTS OR OTHER SIMILAR OBJECTS LARGER THAN 2 INCHES. THE PLANTING MATERIAL SHALL BE FLOODED AFTER PLACEMENT. ANY SETTLEMENT THAT OCCURS SHALL BE FILLED BACK TO THE DESIGN ELEVATION.
- FOR MICRO-BIORETENTION FACILITIES, THE SURFACE MULCH LAYER WILL CONSIST OF STANDARD FINE SHREDDED AGED HARDWOOD MULCH. THE MULCH SHOULD BE UNIFORMLY TO A DEPTH OF 2 TO 3 INCHES. YEARLY REPLENISHING MAY BE NECESSARY. PINE BARK IS NOT ACCEPTABLE.
- FOR BIOSWALES, A SEED MIX WILL BE INSTALLED ON THE SURFACE OF THE PLANTING MEDIA. A TYPE D STABILIZATION MAT (BIODEGRADABLE WOVEN COIR NETTING) SHALL BE PLACED TO PROTECT THE SEED MIX UNTIL THE SEED MIX HAS BEEN ESTABLISHED.
- ALL MATERIALS SHALL BE SUBMITTED FOR APPROVAL BY ENGINEER, CONSTRUCTION MANAGER, AND COUNTY INSPECTOR PRIOR TO INSTALLATION.

OPERATION AND MAINTENANCE SCHEDULE FOR MICRO-BIORETENTION (M-6)

- ANNUAL MAINTENANCE OF PLANT MATERIAL, MULCH LAYER AND SOIL LAYER IS REQUIRED. MAINTENANCE OF MULCH AND SOIL IS LIMITED TO CORRECTING AREAS OF EROSION OR WASH OUT. ANY MULCH REPLACEMENT SHALL BE DONE IN THE SPRING. PLANT MATERIAL SHALL BE CHECKED FOR DISEASE AND INSECT INFESTATION AND MAINTENANCE WILL ADDRESS DEAD MATERIAL AND PRUNING. ACCEPTABLE REPLACEMENT PLANT MATERIAL IS LIMITED TO THE FOLLOWING: 2000 MARYLAND STORMWATER DESIGN MANUAL VOLUME II, TABLE A.4.1 AND 2.
- SCHEDULE OF PLANT INSPECTION WILL BE TWICE A YEAR IN SPRING AND FALL. THIS INSPECTION WILL INCLUDE REMOVAL OF DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, TREATMENT OF ALL DISEASED TREES AND SHRUBS AND REPLACEMENT OF ALL DEFICIENT STAKES AND WIRES.
- MULCH SHALL BE INSPECTED EACH SPRING. REMOVE PREVIOUS MULCH LAYER BEFORE APPLYING NEW LAYER ONCE EVERY 2 TO 3 YEARS.
- SOIL EROSION TO BE ADDRESSED ON AN AS NEEDED BASIS, WITH A MINIMUM OF ONCE PER MONTH AND AFTER HEAVY STORM EVENTS.

MICRO-BIORETENTION SEQUENCE OF CONSTRUCTION

- DO NOT BEGIN BIORETENTION INSTALLATION UNTIL SITE UPSTREAM OF MICRO-BIORETENTION IS STABILIZED AND FINE GRADING HAS BEEN COMPLETED. IF BIORETENTION IS INSTALLED PRIOR TO SITE STABILIZATION, PERIMETER OF BIORETENTION SHALL BE WRAPPED IN SILT FENCE TO LIMIT DRAINAGE OF SEDIMENT LADEN WATER INTO FACILITY. SILT FENCE SHALL BE PLACED AT THE PERIMETER OF THE FILTER SURFACE.
- EXCAVATE MICRO-BIORETENTION. CONSTRUCTION SHALL BE PERFORMED WITH LIGHTWEIGHT, WIDE-TRACKED EQUIPMENT TO MINIMIZE DISTURBANCE AND COMPACTION. EXCAVATED MATERIALS SHALL BE PLACED IN A CONTAINED AREA. INSTALL FILTER FABRIC AROUND SIDES OF FACILITY. DO NOT INSTALL ON BOTTOM OF FACILITY. (1 DAY)
- PLACE STONE AND UNDERDRAINS. (1 DAY)
- PLACE SAND LAYER IN LIFTS OF THREE INCHES. (0.5 DAY)
- PLACE PLANTING SOIL AND OBSERVATION WELLS. (1 DAY)
- PLACE MULCH. (0.5 DAY)
- INSTALL PLANT MATERIAL. (1 DAY)
- STABILIZE MICRO-BIORETENTION AREA. (0.5 DAY)

BIO-SWALE SEQUENCE OF CONSTRUCTION

- NOT BEGIN BIO-SWALE INSTALLATION UNTIL SITE UPSTREAM OF BIO-SWALE IS STABILIZED AND FINE GRADING HAS BEEN COMPLETED. IF BIORETENTION IS INSTALLED PRIOR TO SITE STABILIZATION, PERIMETER OF BIORETENTION SHALL BE WRAPPED IN SILT FENCE TO LIMIT DRAINAGE OF SEDIMENT LADEN WATER INTO FACILITY. SILT FENCE SHALL BE PLACED AT THE PERIMETER OF THE FILTER SURFACE.
- EXCAVATE BIO-SWALE. CONSTRUCTION SHALL BE PERFORMED WITH LIGHTWEIGHT, WIDE-TRACKED EQUIPMENT TO MINIMIZE DISTURBANCE AND COMPACTION. EXCAVATED MATERIALS SHALL BE PLACED IN A CONTAINED AREA. INSTALL FILTER FABRIC AROUND SIDES OF FACILITY. DO NOT INSTALL ON BOTTOM OF FACILITY. (1 DAY)
- PLACE STONE AND UNDERDRAINS. (1 DAY)
- PLACE SAND LAYER IN LIFTS OF THREE INCHES. (0.5 DAY)
- PLACE PLANTING SOIL AND OBSERVATION WELLS. (1 DAY)
- PLACE CHECK DAMS (1 DAY)
- PLACE SEED MIX. (0.5 DAY)
- PLACE STRAW MULCH. (1 DAY)
- STABILIZE BIO-SWALE AREA. (0.5 DAY)

OPERATION AND MAINTENANCE SCHEDULE FOR BIO-SWALE (M-8)

- ANNUAL MAINTENANCE OF PLANT MATERIAL, CHECK DAMS, AND SOIL LAYER IS REQUIRED. MAINTENANCE OF CHECK DAMS, AND SOIL IS LIMITED TO CORRECTING AREAS OF EROSION OR WASH OUT. PLANT MATERIAL SHALL BE CHECKED FOR DISEASE AND INSECT INFESTATION AND MAINTENANCE WILL ADDRESS DEAD MATERIAL AND PRUNING. ACCEPTABLE REPLACEMENT PLANT MATERIAL IS LIMITED TO THE FOLLOWING: 2000 MARYLAND STORMWATER DESIGN MANUAL VOLUME II, TABLE A.4.1 AND 2.
- SCHEDULE OF PLANT INSPECTION WILL BE TWICE A YEAR IN SPRING AND FALL. THIS INSPECTION WILL INCLUDE REMOVAL OF DEAD AND DISEASED VEGETATION CONSIDERED BEYOND TREATMENT, TREATMENT OF ALL DISEASED TREES AND SHRUBS.
- SOIL EROSION TO BE ADDRESSED ON AN AS NEEDED BASIS, WITH A MINIMUM OF ONCE PER MONTH AND AFTER HEAVY STORM EVENTS.

INFILTRATION BERM SPECIFICATIONS

- TOPSOIL: CLEAN TOPSOIL WITH A MINIMUM ORGANIC MATTER CONTENT OF 1.5% SHALL BE PROVIDED.
- STONE: STONE SHALL BE OPEN GRADED #57 STONE. STONE SHALL BE CLEAN, WASHED, AND FREE OF FINES.
- BERM SHALL BE KEYED INTO EXISTING GRADE A MINIMUM OF 6".
- BERM SHALL BE SEEDED OR SODDED IMMEDIATELY UPON COMPLETION.
- BERM SHALL HAVE SIDE SLOPES OF NO GREATER THAN 3:1.
- BERM SHALL BE CONSTRUCTED TO ENSURE THAT IT CAPTURES DRAINAGE FROM THE AREA SHOWN ON THE PLAN AND ALLOWS WATER TO POND UP TO THE ELEVATION SHOWN ON THE PLAN BEFORE ALLOWING THE WATER TO CONTINUE TO SHEETFLOW DOWNSTREAM.

INFILTRATION BERM OPERATION AND MAINTENANCE NOTES:

- MOW GRASS ON BERM REGULARLY WITH OTHER ONSITE MOWING.
- INSPECT BERM ON AN ANNUAL BASIS AND AFTER SIGNIFICANT RAIN EVENTS AND STABILIZE ANY AREAS WHERE SOIL IS ERODED ADJACENT TO BERM.
- CORRECT ANY SETTLEMENT OF BERM TO MAINTAIN ELEVATIONS SHOWN ON PLAN.

INFILTRATION BERM SEQUENCE OF CONSTRUCTION

- CONTACT THE CERTIFYING PROFESSIONAL ENGINEER OR PROFESSIONAL LAND SURVEYOR 24 HOURS PRIOR TO START OF CONSTRUCTION OF THE DRYWELLS. ENGINEER: (PENNONI ASSOCIATES - (410) 997.8900). ONCE THE CERTIFYING PROFESSIONAL HAS GIVEN HIS/HER APPROVAL TO PROCEED, PROCEED AS NOTED BELOW.
- HAVE BERM CENTERLINE STAKED OUT. EXCAVATE TO SUBGRADE FOR INFILTRATION BERM PER DETAILS SHOWN ON THIS PLAN SET. HAVE CERTIFYING ENGINEER/SURVEYOR VERIFY THAT EXCAVATION IS PER DESIGN.
- INSTALL STONE CORE.
- INSTALL TOPSOIL.
- COMPLETE FINAL GRADING.
- PLACE SEED/SOD AND STABILIZE.
- COMPLETE AS-BUILTS AND SUBMIT TO ANNE ARUNDEL COUNTY CONSTRUCTION INSPECTION DIVISION FOR REVIEW.

NON-ROOFTOP RUNOFF DISCONNECTION SPECIFICATIONS

- PROPOSED TRAIL SHALL BE CONSTRUCTED WITH CROSS SLOPES AS SHOWN ON GRADING PLAN TO ENSURE THAT DRAINAGE FLOWS TO NON-ROOFTOP DISCONNECTION AREAS.
- SLOPE OF NON-ROOFTOP DISCONNECTION AREAS SHALL NOT EXCEED 5%.
- A THICK STAND OF GRASS SHALL BE ESTABLISHED IN ALL NON-ROOFTOP DISCONNECTION AREAS.

OPERATION AND MAINTENANCE SCHEDULE FOR DISCONNECTION OF NON-ROOFTOP RUNOFF (N-2)

- MAINTENANCE OF AREAS RECEIVING DISCONNECTED RUNOFF IS GENERALLY NO DIFFERENT THAN THAT REQUIRED FOR OTHER LAWN OR LANDSCAPED AREAS. THE OWNER SHALL ENSURE THE AREAS RECEIVING RUNOFF ARE PROTECTED FROM FUTURE COMPACTION OR DEVELOPMENT OF IMPERVIOUS AREA. IN COMMERCIAL AREAS, FOOT TRAFFIC SHOULD BE DISCOURAGED AS WELL.

OPERATION AND MAINTENANCE SCHEDULE FOR INFILTRATION BERM (M-4)

- THE BERM SHOULD BE INSPECTED REGULARLY TO ENSURE THAT PONDING WATER DOES NOT CREATE NUISANCE CONDITIONS.
- SIGNS OF CONCENTRATED FLOW AND OTHER SURFACE EROSION SHOULD BE REPAIRED TO PROMOTE SHEET FLOW.
- A DENSE STAND OF VEGETATION SHOULD BE PRESENT AT ALL TIMES. BERMS SHOULD BE PLANTED WITH MEADOW VEGETATION AND SHRUBS. TURF GRASS MAY BE USED ON BERMS THAT ARE TO BE MOWN. VEGETATION SHOULD BE REPLACED AS NEEDED.

OPERATION AND MAINTENANCE SCHEDULE FOR GRASS SWALE (M-8)

- MAINTENANCE OF GRASS SWALE AREAS IS GENERALLY NO DIFFERENT THAN THAT REQUIRED FOR OTHER LAWN OR LANDSCAPED AREAS. THE OWNER SHALL ENSURE THE AREAS ARE PROTECTED FROM FUTURE COMPACTION OR DEVELOPMENT OF IMPERVIOUS AREA. IN COMMERCIAL AREAS, FOOT TRAFFIC SHOULD BE DISCOURAGED AS WELL.

STORMWATER MANAGEMENT PLANTING CREDITS

DUE TO LIMITED SITE AREA, AND THE NEED TO MINIMIZE THE LIMITS OF DISTURBANCE AND PRESERVE EXISTING VEGETATION, SPACE FOR STORMWATER FACILITIES IS LIMITED. IN ORDER TO ACHIEVE THE FULL ESDv CREDIT FOR THIS PROJECT, TREE PLANTING CREDITS WERE UTILIZED. TREE PLANTING CREDITS WERE CALCULATED AS FOLLOWS:

$ESDv = [(Pe)(Rv)(DA)] / 12$, WHERE:

Pe = 1.0
Rv = 0.95
DA = AREA OF IMPERVIOUS SURFACE DRAINING TO PLANTING AREA

EACH PLANTING UNIT OF ONE TREE AND THREE SHRUBS TREATS 400 SF OF IMPERVIOUS SURFACE. BASED ON THE ABOVE FORMULA, A CREDIT OF 31 CF CAN BE ACHIEVED FOR EACH PLANTING UNIT.

$ESDv = [(1.0)(0.95)(400)] / 12 = 380/12 = 31.66 \rightarrow 31$ CF

THE FOLLOWING DRAINAGE AREAS HAVE UTILIZED THE PLANTING CREDIT WHERE UNTREATED IMPERVIOUS SURFACE DRAINS TO A VEGETATED PLANTING AREA:

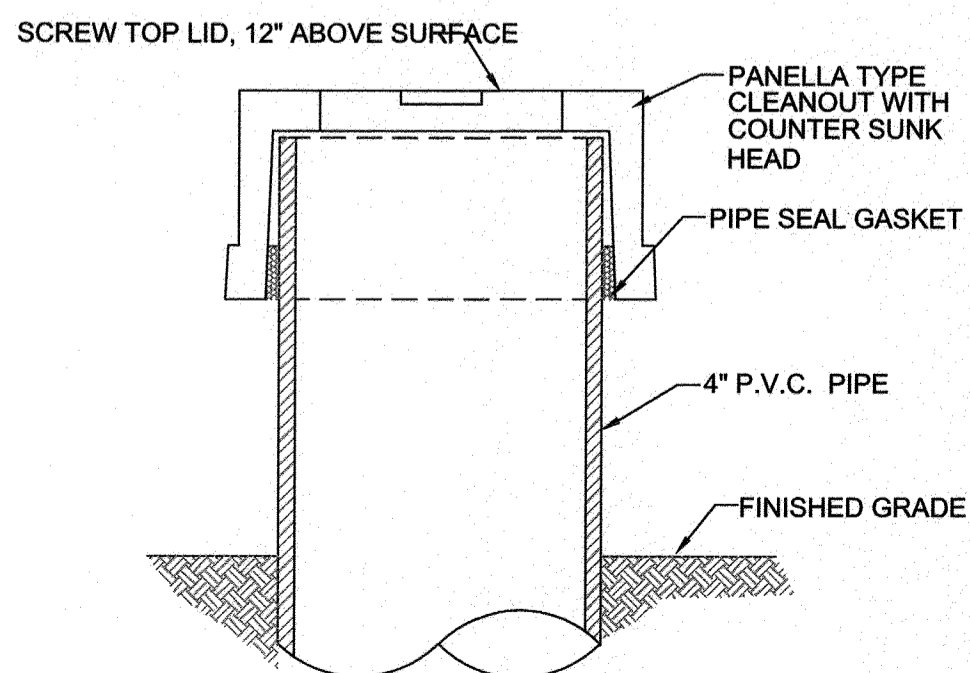
DRAINAGE AREA 1 - 2 TREES AND 6 SHRUBS TREATING 800 SF, WITH A YIELD OF 62 CF OF ESDv

DRAINAGE AREA 7 - 5 TREES AND 15 SHRUBS TREATING 2,000 SF WITH A YIELD OF 155 CF OF ESDv

DRAINAGE AREA 8 - 4 TREES AND 12 SHRUBS TREATING 2,000 SF WITH A YIELD OF 124 CF OF ESDv

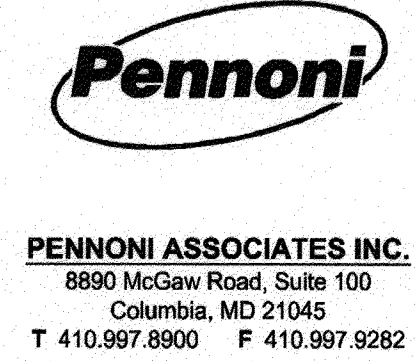
TOTAL PLANTING AREA CREDIT = 341 CF ESDv

PLANTING AREAS SHALL BE LOCATED AT LEAST 8' FROM THE TRAIL FOR TREES AND AT LEAST 4' FROM THE TRAIL FOR SHRUBS.



5 CLEAN-OUT OBSERVATION WELL CAP
48 NOT TO SCALE

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REVISIONS	APPROVED
#	BY DATE



ANNE ARUNDEL COUNTY		DEPARTMENT OF PUBLIC WORKS		97116		APRIL 5, 2021	
APPROVED	DATE	APPROVED	DATE	SCALE: AS SHOWN	TYPICAL STORMWATER MANAGEMENT DETAILS		
<i>[Signature]</i>	<i>[Date]</i>	<i>[Signature]</i>	4/15/21	DRAWN BY: PAI	BROADNECK TRAIL - PHASE III CONSTRUCTION DOCUMENTS		
CHIEF ENGINEER		PROJECT MANAGER		CHECKED BY: PJS/JAR			
APPROVAL	DATE	APPROVED	DATE	SHEET 48 of 137			
<i>[Signature]</i>	<i>[Date]</i>	<i>[Signature]</i>	4/16/21	PROJECT # : P504100	ARNOLD, MD ZIP CODE 21012 3RD DISTRICT ANNE ARUNDEL COUNTY, MD NOVEMBER 2019		
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES		PROPOSAL #:			

GP# G02017905 DWG NO: DD08G

DWG No.:

STRUCTURE NAME	E, S, or A		MDP CODE									
	MDE BMP CLASS	MDE BMP TYPE	CONSTRUCTION PURPOSE	ON / OFF SITE	LAND USE	DEVICE DRAINAGE AREA	IMPERVIOUS AREA DRAINING TO DEVICE	IMPERVIOUS ACRES RESTORED (SEE NOTE 3)	MD NORTH COORD (NAD83--FT)	MD EAST COORD (NAD83--FT)	WOV (CF) (SEE NOTE 5)	MAX. ESDv (CF)
NON-ROOFTOP DISCONNECT #1	E	NDNR	NEW DEVELOPMENT	ON	18	2,043 SF (0.47 AC)	960 SF (0.02 AC)	0			81 CF	81
NON-ROOFTOP DISCONNECT #2.1	E	NDNR	NEW DEVELOPMENT	ON	18	11,419 SF (0.26 AC)	2,970 SF (0.07 AC)	0			270 CF	270
NON-ROOFTOP DISCONNECT #2.2	E	NDNR	NEW DEVELOPMENT	ON	18	1,985 SF (0.04 AC)	1,985 SF (0.04 AC)	0			63 CF	63
NON-ROOFTOP DISCONNECT #3.1	E	NDNR	NEW DEVELOPMENT	ON	18	3,849 SF (0.9 AC)	3080 SF (0.07 AC)	0			253 CF	253
NON-ROOFTOP DISCONNECT #3.2	E	NDNR	NEW DEVELOPMENT	ON	18	3,616 SF (0.08 AC)	2423 SF (0.06 AC)	0			197 CF	197
NON-ROOFTOP DISCONNECT #3.3	E	NDNR	NEW DEVELOPMENT	ON	18	2,170 SF (0.05 AC)	868 SF (0.02 AC)	0			74 CF	74
NON-ROOFTOP DISCONNECT #5	E	NDNR	NEW DEVELOPMENT	ON	18	17,192 SF (0.39 AC)	860 SF (0.02 AC)	0			136 CF	136
NON-ROOFTOP DISCONNECT #7	E	NDNR	NEW DEVELOPMENT	ON	18	29,767 SF (0.68 AC)	1,488 SF (0.03 AC)	0			236 CF	236
NON-ROOFTOP DISCONNECT #8.1	E	NDNR	NEW DEVELOPMENT	ON	18	7,296 SF (0.17 AC)	2,772 SF (0.06 AC)	0			238 CF	238
NON-ROOFTOP DISCONNECT #8.2	E	NDNR	NEW DEVELOPMENT	ON	18	4,524 SF (0.10 AC)	1,086 SF (0.03 AC)	0			100 CF	100
NON-ROOFTOP DISCONNECT #10.4	E	NDNR	NEW DEVELOPMENT	ON	18	9,217 SF (0.21 AC)	1,659 SF (0.04 AC)	0			163 CF	163
NON-ROOFTOP DISCONNECT #10.5	E	NDNR	NEW DEVELOPMENT	ON	18	6,966 SF (0.16 AC)	2,926 SF (0.07 AC)	0			248 CF	248
NON-ROOFTOP DISCONNECT #11	E	NDNR	NEW DEVELOPMENT	ON	18	5,200 SF (0.12 AC)	5,200 SF (0.12 AC)	0			412 CF	412
NON-ROOFTOP DISCONNECT #13.1	E	NDNR	NEW DEVELOPMENT	ON	18	5,794 SF (0.13 AC)	5,794 SF (0.13 AC)	0			225 CF	225
NON-ROOFTOP DISCONNECT #14.1	E	NDNR	NEW DEVELOPMENT	ON	18	8,269 SF (0.19 AC)	2,233 SF (0.05 AC)	0			202 CF	202
NON-ROOFTOP DISCONNECT #14.2	E	NDNR	NEW DEVELOPMENT	ON	18	17,176 SF (0.39 AC)	4,575 SF (0.10 AC)	0			419 CF	419
NON-ROOFTOP DISCONNECT #14.3	E	NDNR	NEW DEVELOPMENT	ON	18	4,540 SF (0.10 AC)	1,090 SF (0.03 AC)	0			101 CF	101
NON-ROOFTOP DISCONNECT #15.1	E	NDNR	NEW DEVELOPMENT	ON	18	29,648 SF (0.68 AC)	2,372 SF (0.05 AC)	0			301 CF	301
NON-ROOFTOP DISCONNECT #15.2	E	NDNR	NEW DEVELOPMENT	ON	18	2,855 SF (0.07 AC)	1,941 SF (0.04 AC)	0			158 CF	158
INFILTRATION BERM #3.2	E	MIBR	NEW DEVELOPMENT	ON	18	3,616 SF (0.08 AC)	2423 SF (0.06 AC)	0			197 CF	197
GRASS SWALE #2	E	MSWC	NEW DEVELOPMENT	ON	18	17,278 SF (0.40 AC)	8,913 SF (0.20 AC)	0			521 CF	521
GRASS SWALE #3.1	E	MSWC	NEW DEVELOPMENT	ON	18	1,188 SF (0.03 AC)	487 SF (0.01 AC)	0			118 CF	118
GRASS SWALE #4	E	MSWG	NEW DEVELOPMENT	ON	18	11,600 SF (0.27 SF)	6,960 SF (0.16 AC)	0			717 CF	717
GRASS SWALE #6.1	E	MSWG	NEW DEVELOPMENT	ON	18	36,360 SF (0.83 AC)	10,181 SF (0.23 AC)	0			268 CF	268
GRASS SWALE #6.2	E	MSWG	NEW DEVELOPMENT	ON	18	14,070 SF (0.32 AC)	4,221 SF (0.10 AC)	0			192 CF	192
BIO-SWALE #5	E	MSWB	NEW DEVELOPMENT	ON	18	16,376 SF (0.38 AC)	7,533 SF (0.17 AC)	0			1,284 CF	1,284
BIO-SWALE #8	E	MSWB	NEW DEVELOPMENT	ON	18	41,962 SF (0.96 AC)	22,239 SF (0.51 AC)	0			1,608 CF	2,089
BIO-SWALE #9	E	MSWB	NEW DEVELOPMENT	ON	18	28,939 SF (0.66 AC)	13,891 SF (0.32 AC)	0			1,939 CF	1,939
BIO-SWALE #10.1	E	MSWB	NEW DEVELOPMENT	ON	18	40,685 SF (0.93 AC)	2,441 SF (0.05 AC)	0			517 CF	952
BIO-SWALE #10.2	E	MSWB	NEW DEVELOPMENT	ON	18	26,918 SF (0.62 AC)	1,615 SF (0.04 AC)	0			233 CF	630
BIO-SWALE 10.3	E	MSWB	NEW DEVELOPMENT	ON	18	30,131 SF (0.69 AC)	6,629 SF (0.15 AC)	0			996 CF	1,681
BIO-SWALE 10.4	E	MSWB	NEW DEVELOPMENT	ON	18	16,600 SF (0.38 AC)	3,652 SF (0.08 AC)	0			412 CF	854
BIO-SWALE #12	E	MSWB	NEW DEVELOPMENT	ON	18	35,423 SF (0.81 AC)	12,756 SF (0.29 AC)	0			1,767 CF	3,482
MICROBIORETENTION #13	E	MMBR	NEW DEVELOPMENT	ON	18	10,205 SF (0.23 AC)	6,123 SF (0.14 AC)	0			1,328 CF	1,328

DRAINAGE AREA #1	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	0.31 ACRES
RCN -- PRECONSTRUCTION	82
RCN -- POSTCONSTRUCTION	94
RCN -- WOODS	70
TOTAL NUMBER OF BMPs	1
PE REQUIRED (SEE NOTE 1)	1.80
PE ADDRESSED (SEE NOTE 2)	0.19
MD 8-DIGIT HUC (SEE NOTE 4)	02131001
USGS 12-DIGIT HUC	021310011003

DRAINAGE AREA #2	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	4.2 ACRES
RCN -- PRECONSTRUCTION	74
RCN -- POSTCONSTRUCTION	76
RCN -- WOODS	70.63
TOTAL NUMBER OF BMPs	4
PE REQUIRED (SEE NOTE 1)	1.60
PE ADDRESSED (SEE NOTE 2)	0.96
MD 8-DIGIT HUC (SEE NOTE 4)	02131002
USGS 12-DIGIT HUC	021310020997

DRAINAGE AREA #3	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	22.24 ACRES
RCN -- PRECONSTRUCTION	74
RCN -- POSTCONSTRUCTION	75
RCN -- WOODS	72.73
TOTAL NUMBER OF BMPs	5
PE REQUIRED (SEE NOTE 1)	1.20
PE ADDRESSED (SEE NOTE 2)	1.31
MD 8-DIGIT HUC (SEE NOTE 4)	02131002
USGS 12-DIGIT HUC	021310020997

DRAINAGE AREA #4	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	4.32 ACRES
RCN -- PRECONSTRUCTION	74
RCN -- POSTCONSTRUCTION	75
RCN -- WOODS	70
TOTAL NUMBER OF BMPs	1
PE REQUIRED (SEE NOTE 1)	1.20
PE ADDRESSED (SEE NOTE 2)	1.58
MD 8-DIGIT HUC (SEE NOTE 4)	02131002
USGS 12-DIGIT HUC	021310020997

DRAINAGE AREA #5	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	2.75 ACRES
RCN -- PRECONSTRUCTION	75
RCN -- POSTCONSTRUCTION	77
RCN -- WOODS	70
TOTAL NUMBER OF BMPs	2
PE REQUIRED (SEE NOTE 1)	1.20
PE ADDRESSED (SEE NOTE 2)	2.61
MD 8-DIGIT HUC (SEE NOTE 4)	02131002
USGS 12-DIGIT HUC	021310020997

DRAINAGE AREA #6	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	4.2 ACRES
RCN -- PRECONSTRUCTION	74
RCN -- POSTCONSTRUCTION	75
RCN -- WOODS	70
TOTAL NUMBER OF BMPs	2
PE REQUIRED (SEE NOTE 1)	1.00
PE ADDRESSED (SEE NOTE 2)	1.17
MD 8-DIGIT HUC (SEE NOTE 4)	02131002
USGS 12-DIGIT HUC	021310020997

DRAINAGE AREA #7	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	7.80 ACRES
RCN -- PRECONSTRUCTION	74.7
RCN -- POSTCONSTRUCTION	75
RCN -- WOODS	61.3
TOTAL NUMBER OF BMPs	1
PE REQUIRED (SEE NOTE 1)	1.60
PE ADDRESSED (SEE NOTE 2)	0.37
MD 8-DIGIT HUC (SEE NOTE 4)	02131002
USGS 12-DIGIT HUC	021310020997


DRAINAGE AREA #8	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	11.91 ACRES
RCN -- PRECONSTRUCTION	74.2
RCN -- POSTCONSTRUCTION	73.9
RCN -- WOODS	66.55
TOTAL NUMBER OF BMPs	3
PE REQUIRED (SEE NOTE 1)	1.29
PE ADDRESSED (SEE NOTE 2)	1.70
MD 8-DIGIT HUC (SEE NOTE 4)	02131002
USGS 12-DIGIT HUC	021310020997

DRAINAGE AREA #9	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	0.96 ACRES
RCN -- PRECONSTRUCTION	57
RCN -- POSTCONSTRUCTION	64
RCN -- WOODS	35
TOTAL NUMBER OF BMPs	2
PE REQUIRED (SEE NOTE 1)	1.60
PE ADDRESSED (SEE NOTE 2)	2.70
MD 8-DIGIT HUC (SEE NOTE 4)	02131002
USGS 12-DIGIT HUC	021310020997

- NOTES:**
- RAINFALL TARGET (FROM TABLE 5.3, DESIGN MANUAL PP.5-21-22) USED TO DETERMINE ESD GOALS AND SIZE PRACTICES (FOR NEW DEVELOPMENT OR REDEVELOPMENT). IF PRACTICE IS FOR RESTORATION, IF PRACTICE IS FOR RESTORATION, THEN PE REQUIRED IS 1 INCH.
 - RAINFALL ADDRESSED (USING BOTH ESD TECHNIQUES AND PRACTICES, AND STRUCTURAL PRACTICES) BY THEM BMPs WITHIN DRAINAGE AREA
 - EQUALS IMPERVIOUS AREA DRAINAGE TO DEVICE WHEN PE_ADR = 1 INCH (FOR RESTORATION ONLY)
 - MARYLAND 8-DIGIT HUC (HYDROLOGIC UNIT CODE) CAN BE FOUND BY USING MAP AT: <https://Data.Maryland.gov/Energy-and-Environment/Maryland-8-Digit-Sub-Watersheds/e919-vuxg>
 - WATER QUALITY VOLUME, THE SMALLER OF THE VOLUME OF THE ACTUAL STOARGE VOLUME IN THE DEVICE OF THE VOLUME FROM THE 1-YEAR 24-HOUR STORM FOR THE DRAINAGE AREA TO THE DEVICE ((2.7" x Rv X A)/12)

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE



Pennoni
PENNONI ASSOCIATES INC.
8880 McGraw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

GP# G02017905 DWG NO: DD08H

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED DATE: [Signature] 5/2/21
CHIEF ENGINEER

APPROVED DATE: [Signature] 4/15/21
PROJECT MANAGER

APPROVED DATE: [Signature] 4/24/21
ASSISTANT CHIEF ENGINEER

APPROVED DATE: [Signature] 4/16/21
CHIEF, RIGHT OF WAY SERVICES

SCALE: 1" = 40'
DRAWN BY: PAI
CHECKED BY: PJS/IAR
SHEET 49 of 137
PROJECT #: P504100
PROPOSAL #:

97117
APRIL 5, 2021
STORMWATER MANAGEMENT DETAILS
BROADNECK TRAIL -- PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

STORMWATER MANAGEMENT NARRATIVE

THIS PROJECT HAS 15 DISTINCT DRAINAGE AREAS IN THE MAGOTHY AND SEVERN RIVER WATERSHEDS DUE TO ITS LOCATION ALONG A RIDGE WITHIN THE BROADNECK PENINSULA. THE LIMITS OF DISTURBANCE (PROJECT AREA) WITHIN EACH DRAINAGE AREA HAS BEEN ANALYZED SEPARATELY FOR PURPOSES OF THE STORMWATER DESIGN. WITHIN THE OVERALL MAGOTHY AND SEVERN RIVER WATERSHEDS OVERALL ESDv REQUIREMENTS AND Pe HAVE BEEN CALCULATED, AND ARE PROVIDED IN A SUMMARY TABLE ON THIS SHEET. DUE TO SITE CONDITIONS AND VARIOUS CONSTRAINTS, EACH SEPARATE DRAINAGE AREA WAS NOT ABLE TO MEET THE ESDv OR Pe REQUIREMENT ON ITS OWN, BUT THE OVERALL DRAINAGE AREAS EXCEEDED THE ESDv AND Pe REQUIREMENT WHEN LOOKED AT AS A WHOLE, AS NOTED IN THE SUMMARY TABLE.

DRAINAGE AREA #1 IS LOCATED AT THE EASTERN END OF BAY DALE DRIVE AT COLLEGE PARKWAY AND DRAINS EAST TO A TRIBUTARY OF THE MAGOTHY RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 776 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS AND ADDITIONAL PLANTINGS, 143 CF OF ESDv IS PROVIDED. DUE TO STEEP SLOPES AND SPACE CONSTRAINTS, NO OTHER SWM IS PROVIDED AT THIS LOCATION.

DRAINAGE AREA #2 IS LOCATED AT AN EXISTING 24" CULVERT THAT CROSSES UNDER COLLEGE PARKWAY AND DRAINS SOUTH TO A TRIBUTARY OF THE SEVERN RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 1,415 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS AND A GRASS SWALE, 854 CF OF ESDv IS PROVIDED. DUE TO STEEP SLOPES, ENVIRONMENTAL FEATURES, AND SPACE CONSTRAINTS, NO OTHER SWM IS PROVIDED AT THIS LOCATION.

DRAINAGE AREA #3 IS LOCATED AT AN EXISTING 36" CULVERT THAT CROSSES UNDER COLLEGE PARKWAY AND DRAINS SOUTH TO A TRIBUTARY OF THE SEVERN RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 1,025 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS, AN INFILTRATION BERM, AND A GRASS SWALE, 839 CF OF ESDv IS PROVIDED. DUE TO STEEP SLOPES, ENVIRONMENTAL FEATURES, AND SPACE CONSTRAINTS, NO OTHER SWM IS PROVIDED AT THIS LOCATION.

DRAINAGE AREA #4 IS LOCATED AT AN EXISTING 24" CULVERT THAT CROSSES UNDER COLLEGE PARKWAY NEAR THE INTERSECTION OF SHORE ACRES ROAD AND COLLEGE PARKWAY AND DRAINS SOUTH TO A TRIBUTARY OF THE SEVERN RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 619 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS AND A GRASS SWALE, 819 CF OF ESDv IS PROVIDED.

DRAINAGE AREA #5 IS LOCATED AT AN EXISTING 30" CULVERT THAT CROSSES UNDER COLLEGE PARKWAY AND DRAINS SOUTH TO A TRIBUTARY OF THE SEVERN RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 617 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS AND A BIOSWALE, 1,344 CF OF ESDv IS PROVIDED.

DRAINAGE AREA #6 IS LOCATED AT AN EXISTING 24" CULVERT THAT CROSSES UNDER COLLEGE PARKWAY AND DRAINS SOUTH TO A TRIBUTARY OF THE SEVERN RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 295 CF. THROUGH THE USE OF A GRASS SWALE, 347 CF OF ESDv IS PROVIDED.

DRAINAGE AREA #7 IS LOCATED AT AN EXISTING 27" CULVERT THAT CROSSES UNDER COLLEGE PARKWAY AND DRAINS NORTH TO FORKED CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 1,019 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS AND ADDITIONAL PLANTINGS, 391 CF OF ESDv IS PROVIDED. DUE TO STEEP SLOPES, ENVIRONMENTAL FEATURES, AND SPACE CONSTRAINTS, NO OTHER SWM IS PROVIDED AT THIS LOCATION.

DRAINAGE AREA #8 IS LOCATED AT THE OUTFALL OF SEVERAL EXISTING CULVERTS AND A CONCRETE CHANNEL AND DRAINS NORTH TO FORKED CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 1,810 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS, ADDITIONAL PLANTINGS, AND A BIOSWALE, 2,502 CF OF ESDv IS PROVIDED.

THE STUDY POINT FOR DRAINAGE AREA #9 IS LOCATED AT AN EXISTING 24" STORM DRAIN THAT CROSSES UNDER COLLEGE PARKWAY AND CONNECTS SOUTH TO AN EXISTING STORM DRAIN SYSTEM DISCHARGING INTO MILL CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 686 CF. THROUGH THE USE OF A BIOSWALE, 1,480 CF OF ESDv IS PROVIDED.

THE STUDY POINT FOR DRAINAGE AREA #10 IS LOCATED AT AN EXISTING 24" CULVERT THAT CROSSES UNDER JONES STATION ROAD (EAST) AT COLLEGE PARKWAY AND DRAINS WEST TO AN EXISTING SWALE THAT DISCHARGES INTO MILL CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 2,231 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS AND FOUR BIOSWALES, 4,141 CF OF ESDv IS PROVIDED.

THE STUDY POINT FOR DRAINAGE AREA #11 IS LOCATED AT AN EXISTING 24" CULVERT THAT CROSSES UNDER COLLEGE PARKWAY AND DRAINS SOUTH TO AN EXISTING OPEN CHANNEL SYSTEM DISCHARGING INTO MILL CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 639 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS 412 CF OF ESDv IS PROVIDED. DUE TO RIGHT OF WAY AND SPACE CONSTRAINTS, NO OTHER SWM IS PROVIDED AT THIS LOCATION.

THE STUDY POINT FOR DRAINAGE AREA #12 IS LOCATED AT AN EXISTING 24" CULVERT THAT CROSSES UNDER COLLEGE PARKWAY AND DRAINS SOUTH TO AN EXISTING OPEN CHANNEL SYSTEM DISCHARGING INTO MILL CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THIS AREA HAS AN ESDv REQUIREMENT OF 1,306 CF. THROUGH THE USE OF A BIOSWALE, 3,553 CF OF ESDv IS PROVIDED.

THE STUDY POINT FOR DRAINAGE AREA #13 IS LOCATED AT AN EXISTING 6'X12" BOX CULVERT THAT CROSSES UNDER JONES STATION ROAD (WEST) AT COLLEGE PARKWAY AND DRAINS WEST TO MILL CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THIS OUTFALL IS CURRENTLY BEING IMPROVED UNDER A CAPITAL PROJECT (9552200). THIS AREA HAS AN ESDv REQUIREMENT OF 1,594 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS AND A MICROBIORETENTION FACILITY, 1,452 CF OF ESDv IS PROVIDED. DUE TO STEEP SLOPES, ENVIRONMENTAL FEATURES, AND SPACE CONSTRAINTS, NO OTHER SWM IS PROVIDED AT THIS LOCATION.

FOR STORMWATER MANAGEMENT DESIGN PURPOSES, DRAINAGE AREAS 14 AND 15 WERE COMBINED. THE STUDY POINT FOR DRAINAGE AREA #14 IS LOCATED AT AN EXISTING OPEN CHANNEL SYSTEM IMMEDIATELY WEST OF A 6'X12" BOX CULVERT AND DRAINS EAST TO MILL CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THE STUDY POINT FOR DRAINAGE AREA #15 IS LOCATED AT AN EXISTING 15" STORM DRAIN SYSTEM THAT CROSSES UNDER COLLEGE PARKWAY AND DRAINS NORTH TO AN EXISTING OPEN CHANNEL SYSTEM DISCHARGING INTO DOWING CREEK, A TRIBUTARY OF THE MAGOTHY RIVER. THESE AREAS HAVE AN ESDv REQUIREMENT OF 4,618 CF. THROUGH THE USE OF NON ROOFTOP DISCONNECT CREDITS, 1,181 CF OF ESDv IS PROVIDED. DUE TO RIGHT-OF-WAY LIMITATIONS AND SPACE CONSTRAINTS, NO OTHER SWM IS PROVIDED AT THIS LOCATION.

DRAINAGE AREA #10	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	7.90 ACRES
RCN -- PRECONSTRUCTION	49
RCN -- POSTCONSTRUCTION	52
RCN -- WOODS	35
TOTAL NUMBER OF BMPs	6
PE REQUIRED (SEE NOTE 1)	1.60
PE ADDRESSED (SEE NOTE 2)	2.54
MD 8-DIGIT HUC (SEE NOTE 4)	02131001
USGS 12-DIGIT HUC	021310011003

DRAINAGE AREA #11	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	2.2 ACRES
RCN -- PRECONSTRUCTION	52
RCN -- POSTCONSTRUCTION	55
RCN -- WOODS	35
TOTAL NUMBER OF BMPs	1
PE REQUIRED (SEE NOTE 1)	1.60
PE ADDRESSED (SEE NOTE 2)	1.03
MD 8-DIGIT HUC (SEE NOTE 4)	02131001
USGS 12-DIGIT HUC	021310011003

DRAINAGE AREA #12	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	1.95 ACRES
RCN -- PRECONSTRUCTION	79
RCN -- POSTCONSTRUCTION	82
RCN -- WOODS	70
TOTAL NUMBER OF BMPs	1
PE REQUIRED (SEE NOTE 1)	1.60
PE ADDRESSED (SEE NOTE 2)	2.70
MD 8-DIGIT HUC (SEE NOTE 4)	02131001
USGS 12-DIGIT HUC	021310011003

DRAINAGE AREA #13	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	8.06 ACRES
RCN -- PRECONSTRUCTION	74
RCN -- POSTCONSTRUCTION	76
RCN -- WOODS	70
TOTAL NUMBER OF BMPs	3
PE REQUIRED (SEE NOTE 1)	1.60
PE ADDRESSED (SEE NOTE 2)	1.47
MD 8-DIGIT HUC (SEE NOTE 4)	02131001
USGS 12-DIGIT HUC	021310011003

DRAINAGE AREA #14	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	7.72 ACRES
RCN -- PRECONSTRUCTION	78
RCN -- POSTCONSTRUCTION	79
RCN -- WOODS	70
TOTAL NUMBER OF BMPs	3
PE REQUIRED (SEE NOTE 1)	1.80
PE ADDRESSED (SEE NOTE 2)	0.46
MD 8-DIGIT HUC (SEE NOTE 4)	02131001
USGS 12-DIGIT HUC	021310011003

DRAINAGE AREA #15	
PERMIT NUMBER	
PROJECT NUMBER	P504104
PROJECT NAME	BROADNECK TRAIL -- PHASE 3
STRUCTURE ADDRESS	COLLEGE PARKWAY
STRUCTURE CITY	ARNOLD
STATE	MARYLAND
STRUCTURE ZIP	21012
TOTAL DRAINAGE AREA	10.22 ACRES
RCN -- PRECONSTRUCTION	78
RCN -- POSTCONSTRUCTION	79
RCN -- WOODS	70
TOTAL NUMBER OF BMPs	2
PE REQUIRED (SEE NOTE 1)	1.80
PE ADDRESSED (SEE NOTE 2)	0.46
MD 8-DIGIT HUC (SEE NOTE 4)	02131001
USGS 12-DIGIT HUC	021310011003

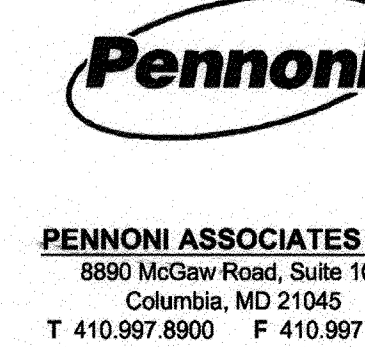
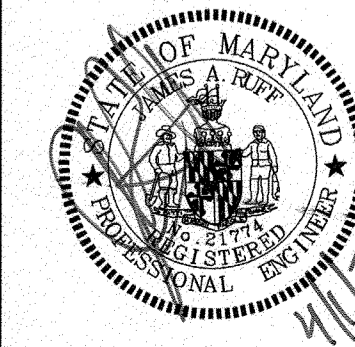
STORMWATER MANAGEMENT SUMMARY TABLE		
	REQUIRED	PROVIDED
SEVERN RIVER WATERSHED		
Pe	1.20	186.00
ESDv	3,958	4,298 CF
MAGOTHY RIVER WATERSHED		
Pe	1.67	2.04
ESDv	16,089	16,414

NOTES:

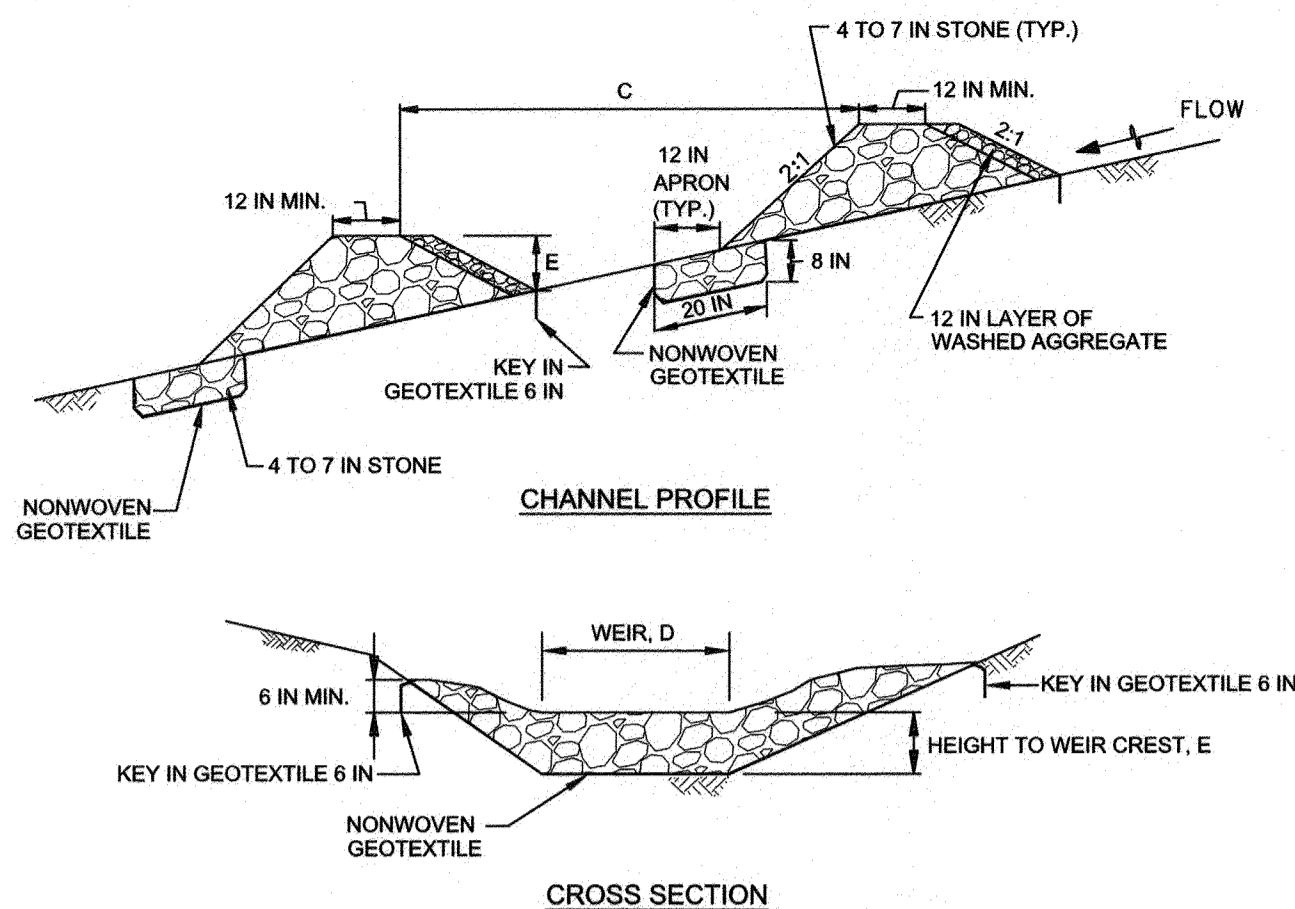
1. RAINFALL TARGET (FROM TABLE 5.3, DESIGN MANUAL PP.5-21-22) USED TO DETERMINE ESD GOALS AND SIZE PRACTICES (FOR NEW DEVELOPMENT OR REDEVELOPMENT). IF PRACTICE IS FOR RESTORATION, IF PRACTICE IS FOR RESTORATION, THEN PE REQUIRED IS 1 INCH.
2. RAINFALL ADDRESSED (USING BOTH ESD TECHNIQUES AND PRACTICES, AND STRUCTURAL PRACTICES) BY THEM BMPs WITHIN DRAINAGE AREA
3. EQUALS IMPERVIOUS AREA DRAINAGE TO DEVICE WHEN PE_ADR = 1 INCH (FOR RESTORATION ONLY)
4. MARYLAND 8-DIGIT HUC (HYDROLOGIC UNIT CODE) CAN BE FOUND BY USING MAP AT: <https://Data.Maryland.gov/Energy-and-Environment/Maryland-s-8-Digit-Sub-Watersheds/e919-vuxg>
5. WATER QUALITY VOLUME, THE SMALLER OF THE VOLUME OF THE ACTUAL STOARGE VOLUME IN THE DEVICE OF THE VOLUME FROM THE 1-YEAR 24-HOUR STORM FOR THE DRAINAGE AREA TO THE DEVICE ((2.7 * Rv * A)/12)

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE



ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS		GP# G02017905 DWG NO: DD08I
97118		APRIL 5, 2021
APPROVED DATE <i>[Signature]</i> 5/16/21 CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/15/21 PROJECT MANAGER	SCALE: 1" = 40' DRAWN BY: PAI CHECKED BY: PJS/JAR SHEET <u>50</u> OF <u>137</u> PROJECT #: P504100 PROPOSAL #:
APPROVAL DATE <i>[Signature]</i> 4/24/21 ASSISTANT CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/16/21 CHIEF, RIGHT OF WAY SERVICES	STORMWATER MANAGEMENT DETAILS BROADNECK TRAIL -- PHASE III CONSTRUCTION DOCUMENTS TAX MAP 32, 39, AND 40 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT ANNE ARUNDEL COUNTY, MD NOVEMBER 2019

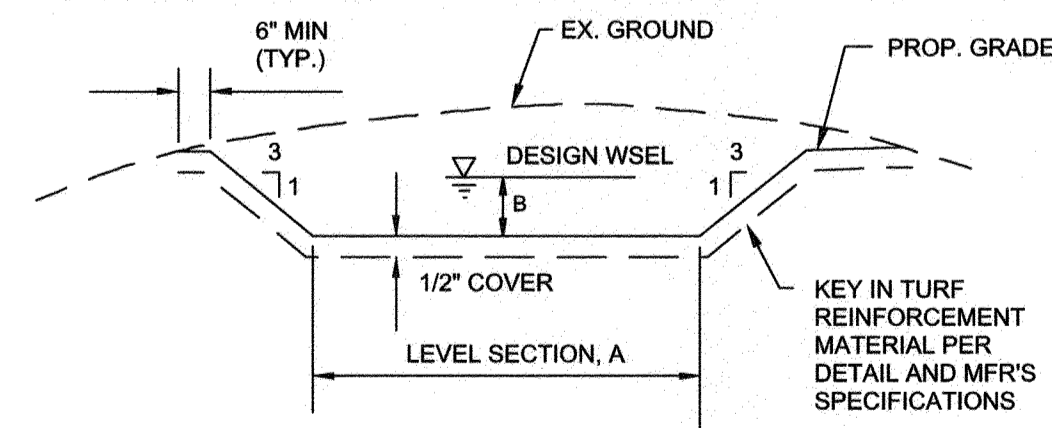


CHECK DAM CONSTRUCTION SPECIFICATIONS

- PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, UNDER THE BOTTOM AND SIDES OF THE DAM PRIOR TO PLACEMENT OF STONE. CONSTRUCT THE CHECK DAM WITH WASHED 4 TO 7 INCH STONE WITH SIDE SLOPES OF 2:1 OR FLATTER AND A MINIMUM TOP WIDTH OF 12 INCHES. PLACE THE STONE SO THAT IT COMPLETELY COVERS THE WIDTH OF THE CHANNEL AND CHANNEL BANKS. FORM THE WEIR SO THAT TOP OF THE OUTLET CREST IS APPROXIMATELY 6 INCHES LOWER THAN THE OUTER EDGES. LINE THE UPSTREAM FACE OF THE DAM WITH A 1 FOOT THICK LAYER OF WASHED RIVERSTONE (¾ TO 1½ INCH). STONE COLOR SHALL BE DARK GREY FOR BOTH 4 TO 7 INCH STONE AND WASHED RIVERSTONE.
- SET THE HEIGHT FOR THE WEIR CREST EQUAL TO THE ELEVATION SHOWN ON THE TABLE BELOW TO AVOID SCOUR. THE MAXIMUM HEIGHT OF THE WEIR CREST MUST NOT EXCEED 2.0 FEET.

1 TYPICAL CHECK DAM
51 NOT TO SCALE

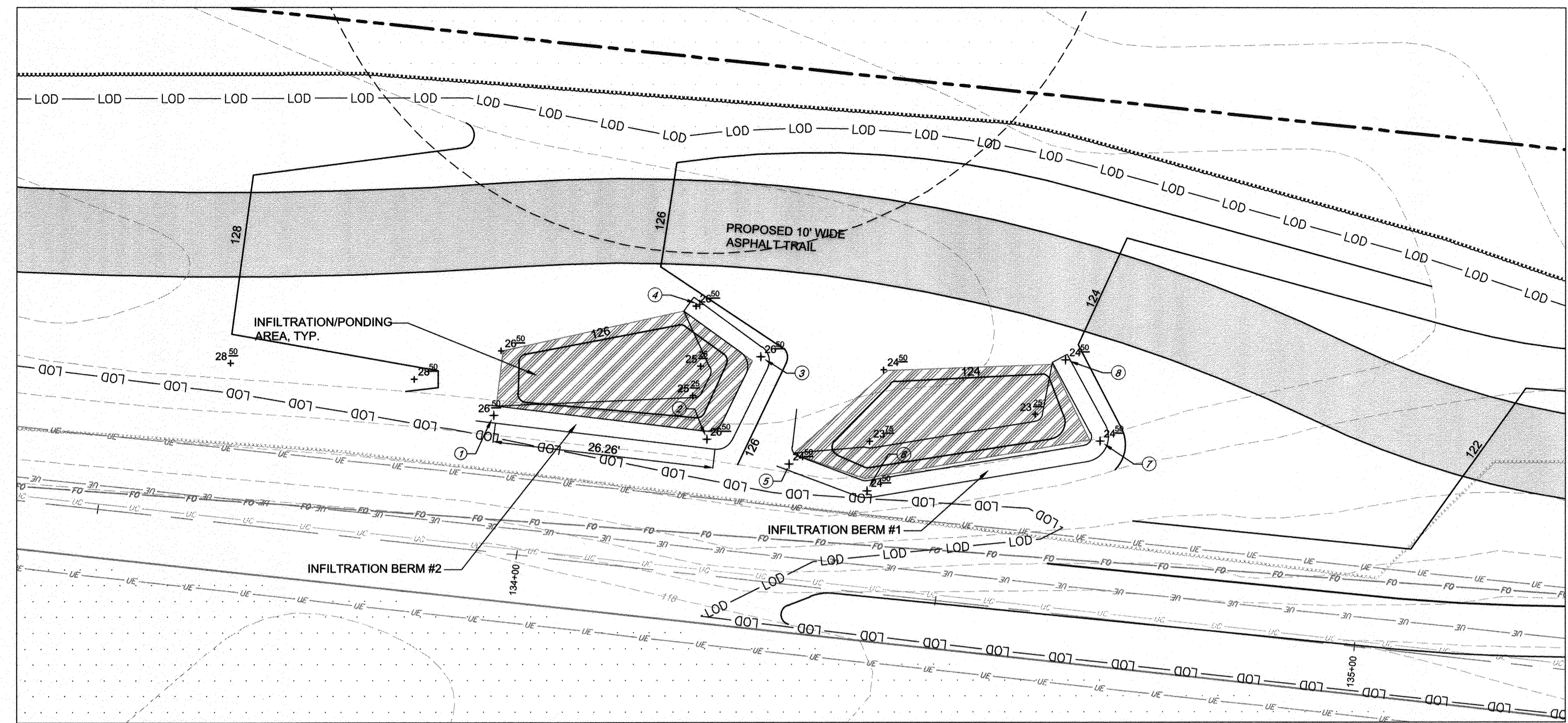
GRASS SWALE DESIGN DATA										
	#2	#2 AS-BUILT	#3.1	#3 AS-BUILT	#4	#4 AS-BUILT	#6.1	#6.1 AS-BUILT	#6.2	#6.2 AS-BUILT
BOTTOM WIDTH, A	4'		4'		3'		7'		7'	
AVERAGE DEPTH, B	6"		6"		4"		12"		12"	
MAX. DEPTH	12"		12"		8"		18"		18"	
SWALE SLOPE	2%		4%		3.3%		2.8%		2.3%	
CHECK DAM SPACING, C	50'		20'		20'		35'		44'	
WEIR WIDTH, D	4'		4'		3'		5'		5'	
WEIR HEIGHT, E	12"		12"		8"		18"		18"	
WEIR TOP WIDTH	12"		12"		12"		12"		12"	
LENGTH OF SWALE	301'		84'		241'		100'		88'	
NUMBER OF CHECK DAMS	6		4		11		3		2	
TRAIL STATION START	127+60		126+75		119+60		107+00		104+89	
TRAIL STATION END	130+63		127+60		117+19		106+00		105+78	



NOTES

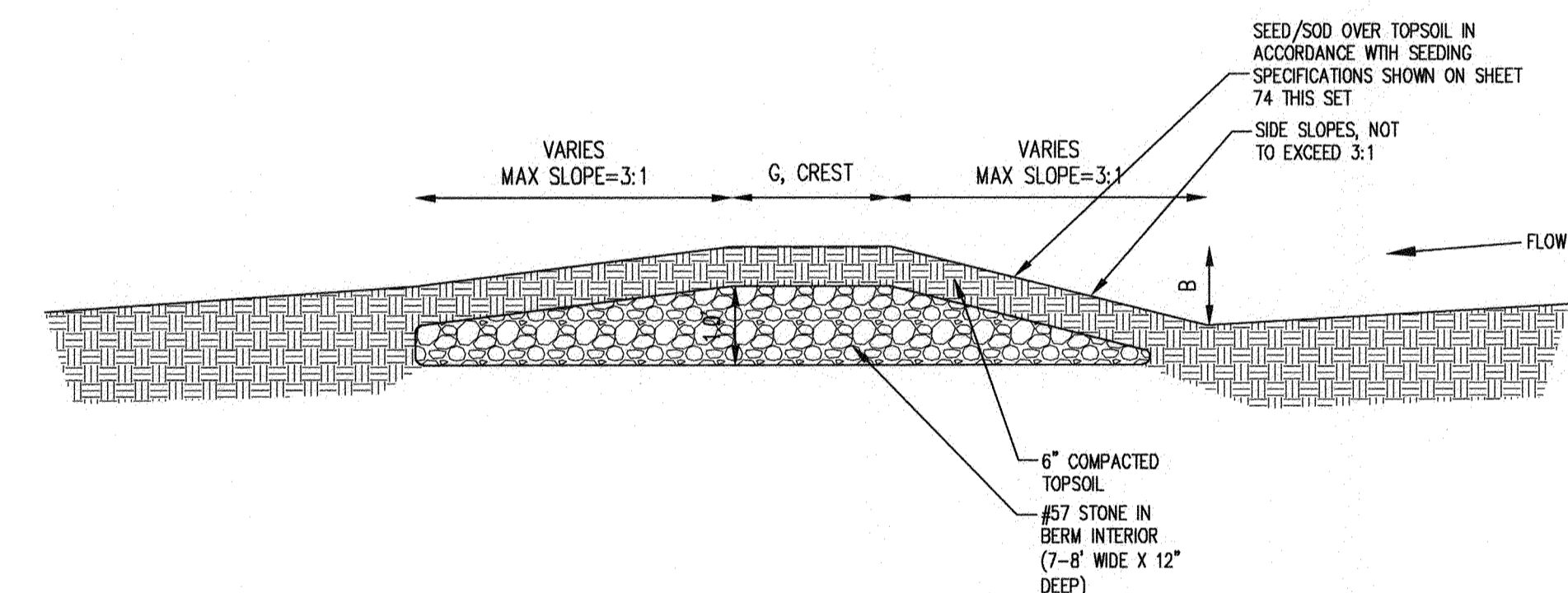
- INSTALL THE MATERIAL PER THE MANUFACTURER'S INSTRUCTIONS INCLUDING SURFACE PREPARATION AND STAPLING. IT IS VERY IMPORTANT THAT THE MATERIAL BE INSTALLED IN GOOD CONTACT WITH THE GROUND WITH NO WRINKLES OR VOID SPACES BELOW THE FABRIC. STAPLES MUST BE PLACED IN A DIAMOND PATTERN APPROXIMATELY 18" APART.
- FILL VOIDS IN THE MATERIAL WITH TOPSOIL BEFORE SODDING OR SEEDING DO NOT PLACE MORE THAN ONE HALF INCH (1/2") OF TOPSOIL OVER THE MATERIAL. THE MATERIAL MUST BE WITHIN THE ROOT ZONE FOR IT TO FUNCTION PROPERLY.
- MATERIAL MUST BE ENKAMAT 7010, ENKAMAT 7020, TENSAR TM-3000, PYRAMAT, OR OTHER MCDPS APPROVED EQUIVALENT. TO BE CONSIDERED AS AN EQUIVALENT, THE MATERIAL MUST BE A SINGLE BONDED TURF REINFORCEMENT MATERIAL. PROPOSED ALTERNATIVES MUST BE APPROVED BY MCDPS IN WRITING PRIOR TO PLACEMENT.
- TURF REINFORCEMENT IS NOT MEANT TO SERVE AS AN EROSION CONTROL MAT. IF NECESSARY, A BIOGRADABLE MATERIAL SUCH AS EXVELSIOR MAY BE PLACE OVER THE PREPARED SEED BED TO HOLD THE SEED IN PLACE. THE PURPOSE OF THE TURF REINFORCEMENT MATERIAL IS TO ADD STRENGTH TO THE ROOT SYSTEM AFTER GERMINATION.

2 GRASS SWALE WITH TURF REINFORCEMENT TYPICAL SECTION
51 NOT TO SCALE



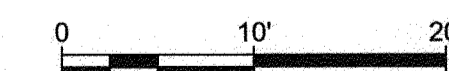
INFILTRATION BERM 3.2 DETAIL PLAN
SCALE: 1"=10'

INFILTRATION BERM 3.2 DESIGN DATA				
	#1	#1 AS-BUILT	#2	#2 AS-BUILT
INFILTRATION AREA (SF)	312		297	
PONDING VOLUME (CF)	99 CF		98 CF	
BERM HEIGHT UPSTREAM, B	15"		15"	
BERM HEIGHT DOWNSTREAM	12"		12"	
BERM WIDTH AT TOP, G	2'		2'	
NON ROOFTOP DISCONNECT/ GRASS SHOULDER WIDTH	5'		5'	
AVERAGE DEPTH	4"	4	4"	



3 INFILTRATION/CHECK BERM DETAILED SECTION
51 SCALE: 1"=2'

INFILTRATION BERM 3.2 STAKEOUT TABLE			
Point #	Elevation	Northing	Easting
1	126.50	499795.7777	1458611.5138
2	126.50	499792.9221	1458636.8098
3	126.50	499802.7255	1458643.2320
4	126.50	499808.9126	1458635.9840
5	124.50	499789.9659	1458646.5933
6	124.50	499786.8158	1458655.8275
7	124.50	499792.6739	1458683.4746
8	124.50	499802.3454	1458679.3829



GP# G02017905 DWG NO: DD08J

PROFESSIONAL CERTIFICATION: I, **JAMES A. RUFF, PE**, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

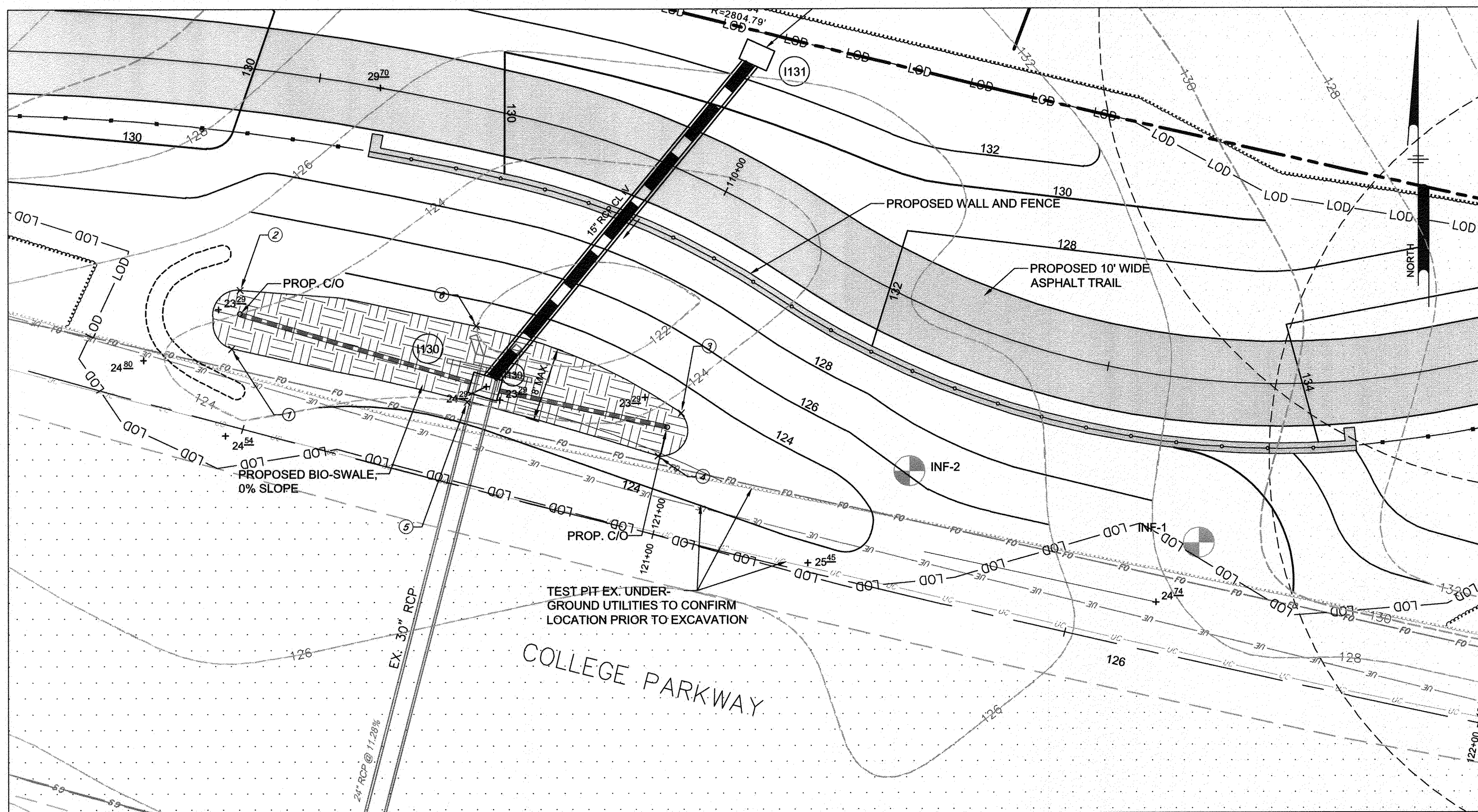
#	REVISIONS DESCRIPTION	APPROVED BY	DATE

Penioni
PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

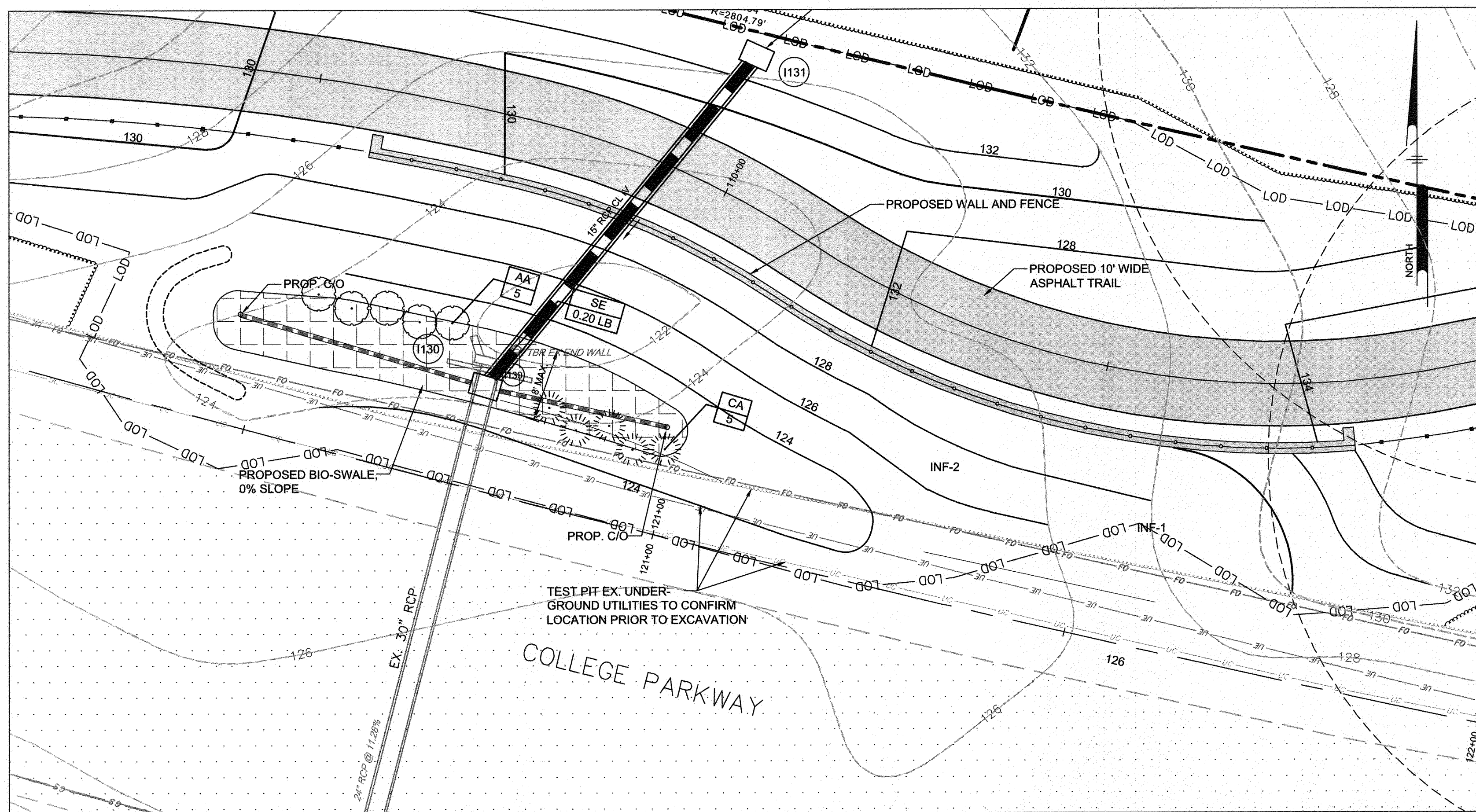
ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97119
APRIL 5, 2021

APPROVED DATE <i>[Signature]</i> 4/15/21 CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/15/21 PROJECT MANAGER	SCALE: 1" = 40" DRAWN BY: PAI	STORMWATER MANAGEMENT DETAILS BROADNECK TRAIL - PHASE III CONSTRUCTION DOCUMENTS TAX MAP 32, 39, AND 40 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT ANNE ARUNDEL COUNTY, MD NOVEMBER 2019
APPROVAL DATE <i>[Signature]</i> 4/24/21 ASSISTANT CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/16/21 CHIEF, RIGHT OF WAY SERVICES	SHEET 51 OF 137	
PROJECT # P504100		PROPOSAL #	



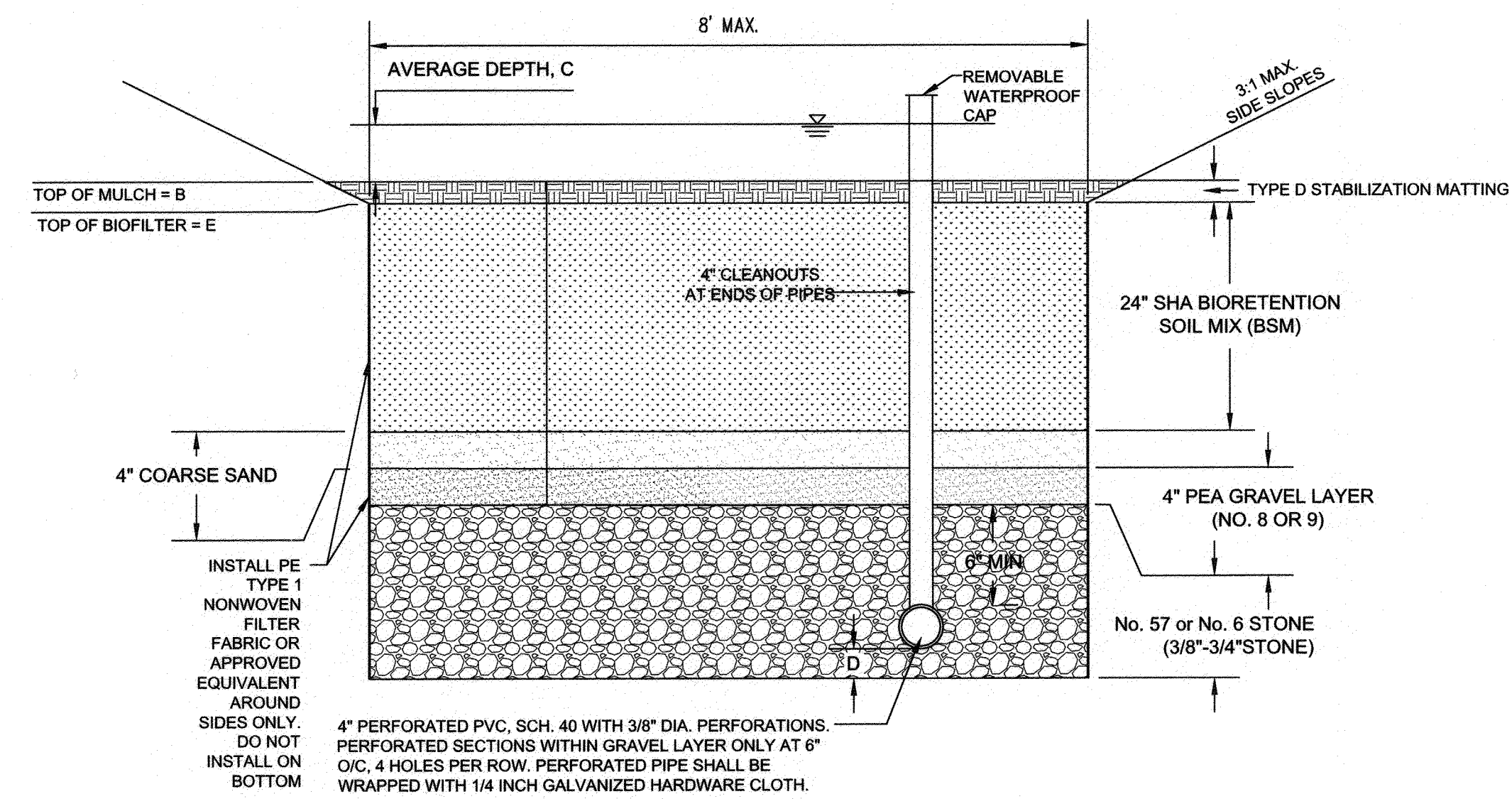
BIO-SWALE #5 DETAIL PLAN
SCALE: 1"=10'



BIO-SWALE #5 LANDSCAPE PLAN
SCALE: 1"=10'

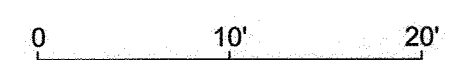
BIO-SWALE #5 PLANT SCHEDULE					
SYMBOL	QTY.	SCIENTIFIC/ COMMON NAME	SIZE	ROOT	REMARKS
SE	0.20 LB	ERNST SEEDS SOUTHEAST RAIN GARDEN MIX	LB	SEED	AS SHOWN
CA	5	CLETHRA ALNIFOLIA SWEET PEPPERBUSH ARONIA ARBUTIFOLIA RED CHOKEBERRY	24-30"	CONT.	AS SHOWN
AA	5		24-30"	CONT.	AS SHOWN

BIO-SWALE DESIGN DATA		
	#5	AS-BUILT
TOP OF MULCH, B	123.29	
AVERAGE DEPTH, C	12"	
No. 57 or No. 6 STONE (3/8"-3/4" STONE), D	3"	
TOP OF BIOFILTER, E	123.29	
SURFACE AREA AT E (SF)	450	
OVERFLOW STRUCTURE	124.29	
OVERFLOW RIM ELEVATION	124.29	
UNDERDRAIN INVERT	119.54	



1 BIO-SWALE TYPICAL CROSS SECTION
52 NOT TO SCALE

Bioswale #5 Stakeout Table			
Point #	Proposed Elevation	Northing	Easting
1	123.04	499968.6620	1457276.2795
2	123.04	499975.5694	1457277.3087
3	125.45	499961.0624	1457329.3959
4	125.45	499955.9820	1457326.6427
5	124.74	499962.3996	1457304.0897
6	124.74	499971.3564	1457305.2185



GP# G02017905 DWG NO: D008K

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774. EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE

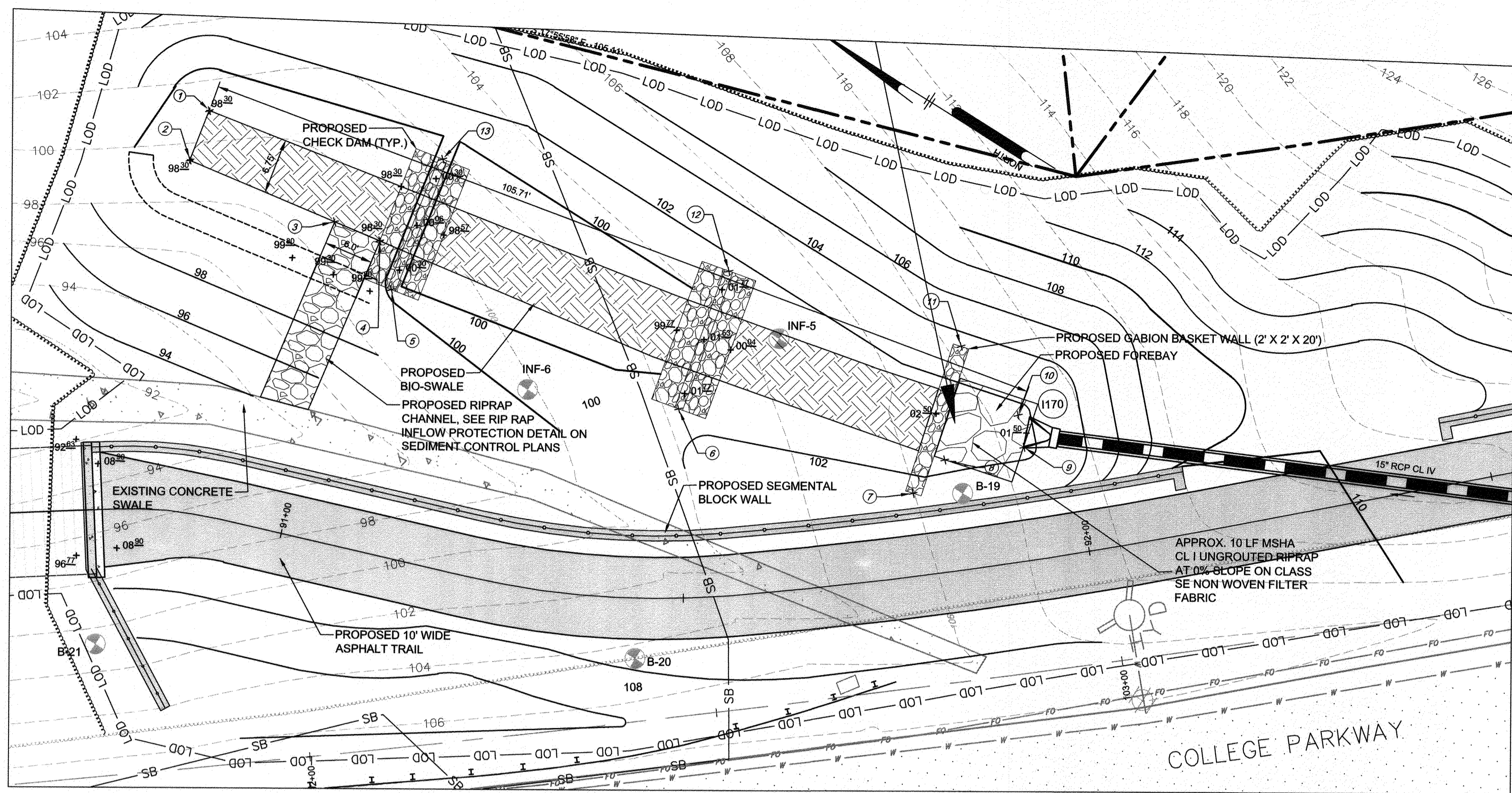
Pennoni
PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

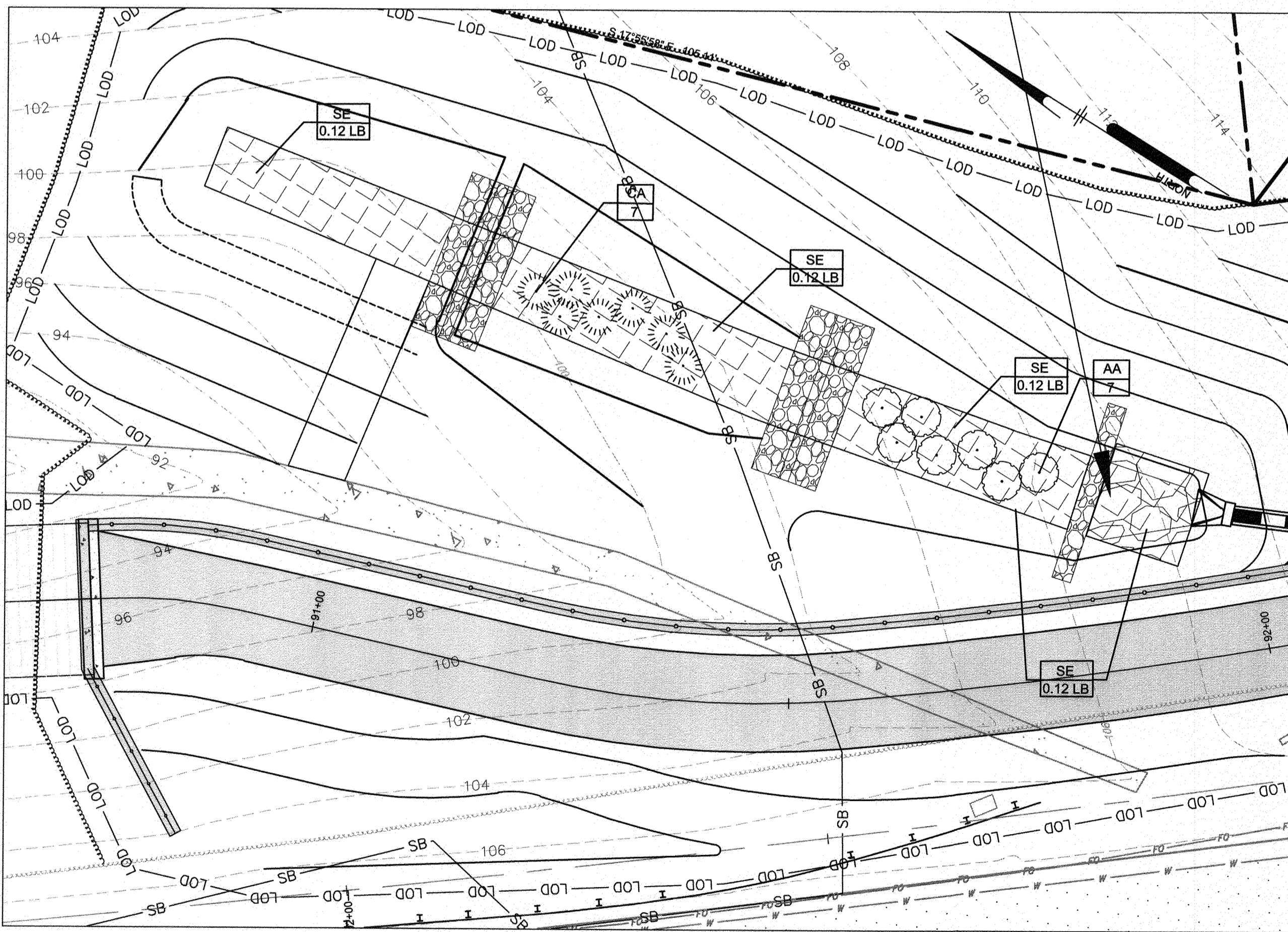
APPROVED DATE: 4/15/21
APPROVED DATE: 4/15/21
APPROVAL DATE: 4/15/21
APPROVED DATE: 4/15/21

SCALE: 1" = 40'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 52 OF 137
PROJECT #: P504100
PROPOSAL #:

97120
APRIL 5, 2021
STORMWATER MANAGEMENT DETAILS
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 38, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019



BIO-SWALE #8 DETAIL PLAN
SCALE: 1"=10'

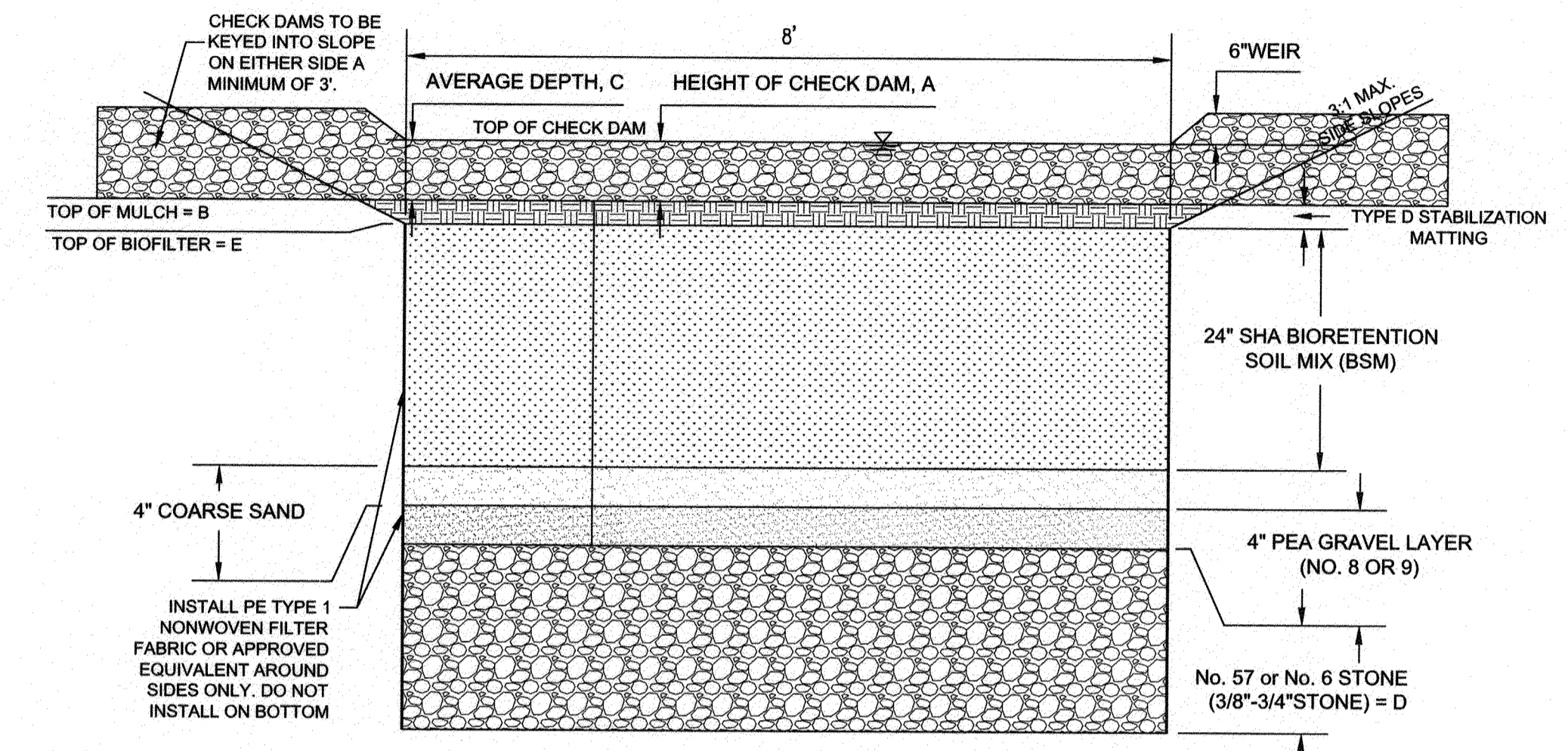


BIO-SWALE #8 LANDSCAPE PLAN
SCALE: 1"=10'

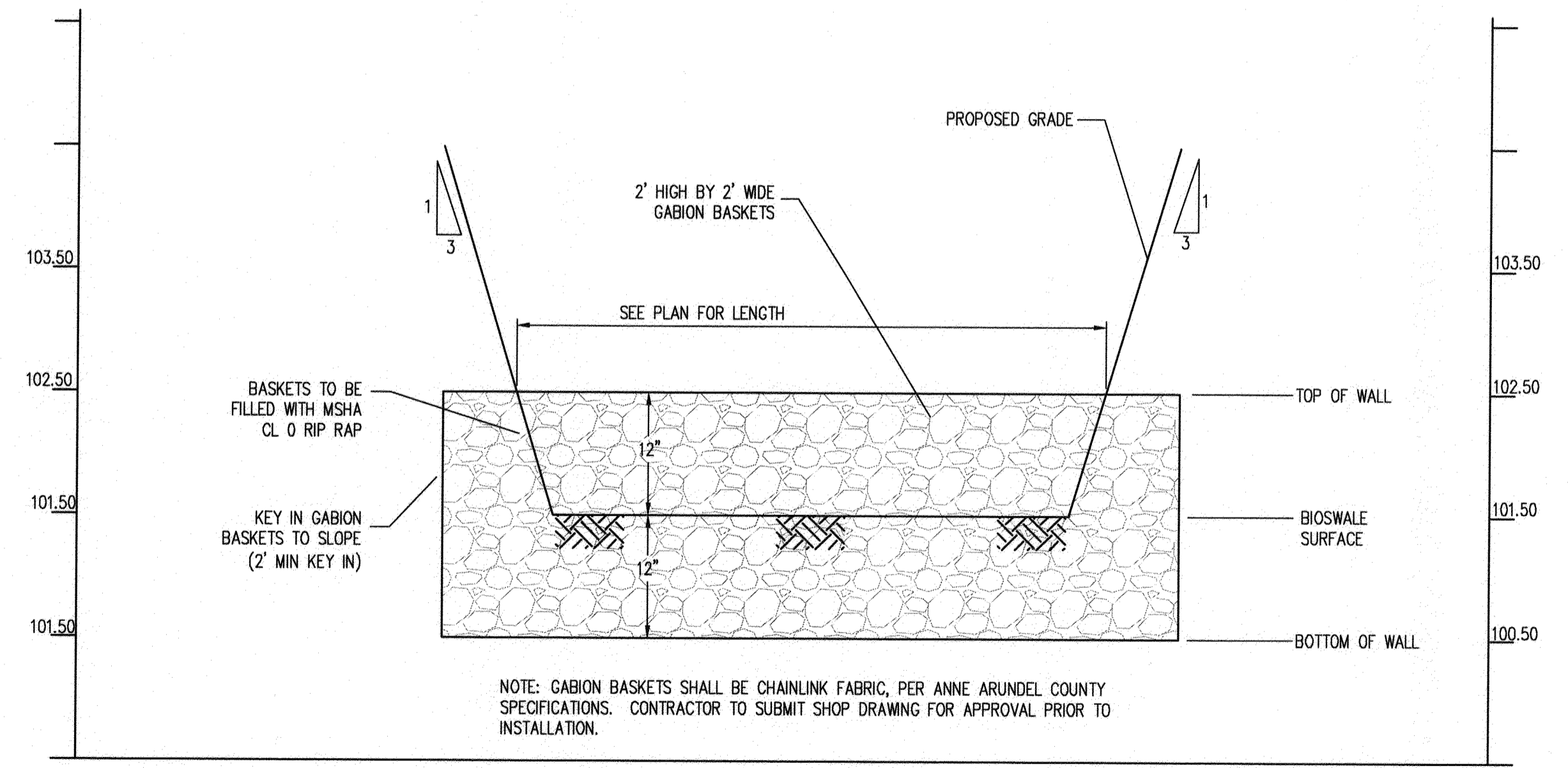
POINT	Proposed Elevation	Northing	Easting
8346.8444	98.30	501014.4039	1455820.9290
8339.8351	98.30	501013.1848	1455814.5444
3829.8225	98.30	500994.1991	1455817.6918
3888.4639	98.30	500988.2799	1455818.6731
3882.8948	98.30	500983.9043	1455814.4182
3898.3499	100.30	500946.4238	1455820.9342
5486.2828	101.77	500916.6303	1455827.5408
8328.8690	102.50	500915.5423	1455833.0530
8078.7542	101.50	500908.1844	1455839.5363
7306.2187	101.50	500910.9100	1455842.4530
7338.3496	102.50	500921.3240	1455845.8427
6852.0917	101.77	500950.2520	1455838.4049
6840.9697	101.77	500987.1122	1455831.2188
5842.8666	100.30		
5878.7668			
5455.3284			
4627.3585			

SYMBOL	QTY.	SCIENTIFIC/ COMMON NAME	SIZE	ROOT	REMARKS
SE	0.36 LB	ERNST SEEDS SOUTHEAST RAIN GARDEN MIX	LB	SEEDS	AS SHOWN
CA	7	CLETHRA ALNIFOLIA SWEET PEPPERBUSH	24-30"	CONT.	AS SHOWN
AA	7	ARONIA ARBUTIFOLIA RED CHOKEBERRY	24-30"	CONT.	AS SHOWN

PARAMETER	VALUE	REMARKS
HEIGHT OF CHECK DAM, A	SEE PLAN	
TOP OF MULCH, B	VARIES	
AVERAGE DEPTH, C	12"	
No. 57 or No. 6 STONE (3/8"-3/4" STONE), D	12"	
TOP OF BIOFILTER, E	SEE PLAN	
SURFACE AREA AT E (SF)	720	
OVERFLOW STRUCTURE	99.30	
OVERFLOW RIM ELEVATION	99.30	
UNDERDRAIN INVERT	NO UNDER-DRAIN	



1 BIO-SWALE TYPICAL CROSS SECTION
53 NOT TO SCALE



BIOSWALE FOREBAY GABION WALL DETAIL
SCALE: HOR: 1"=10'
VERT: 1"=1'

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

REVISIONS	APPROVED
DESCRIPTION	BY DATE

Pennoni
PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.987.8900 F 410.987.9282

GP# G02017905 DWG NO: DD08L

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED DATE: 5/15/21
APPROVED DATE: 4/15/21

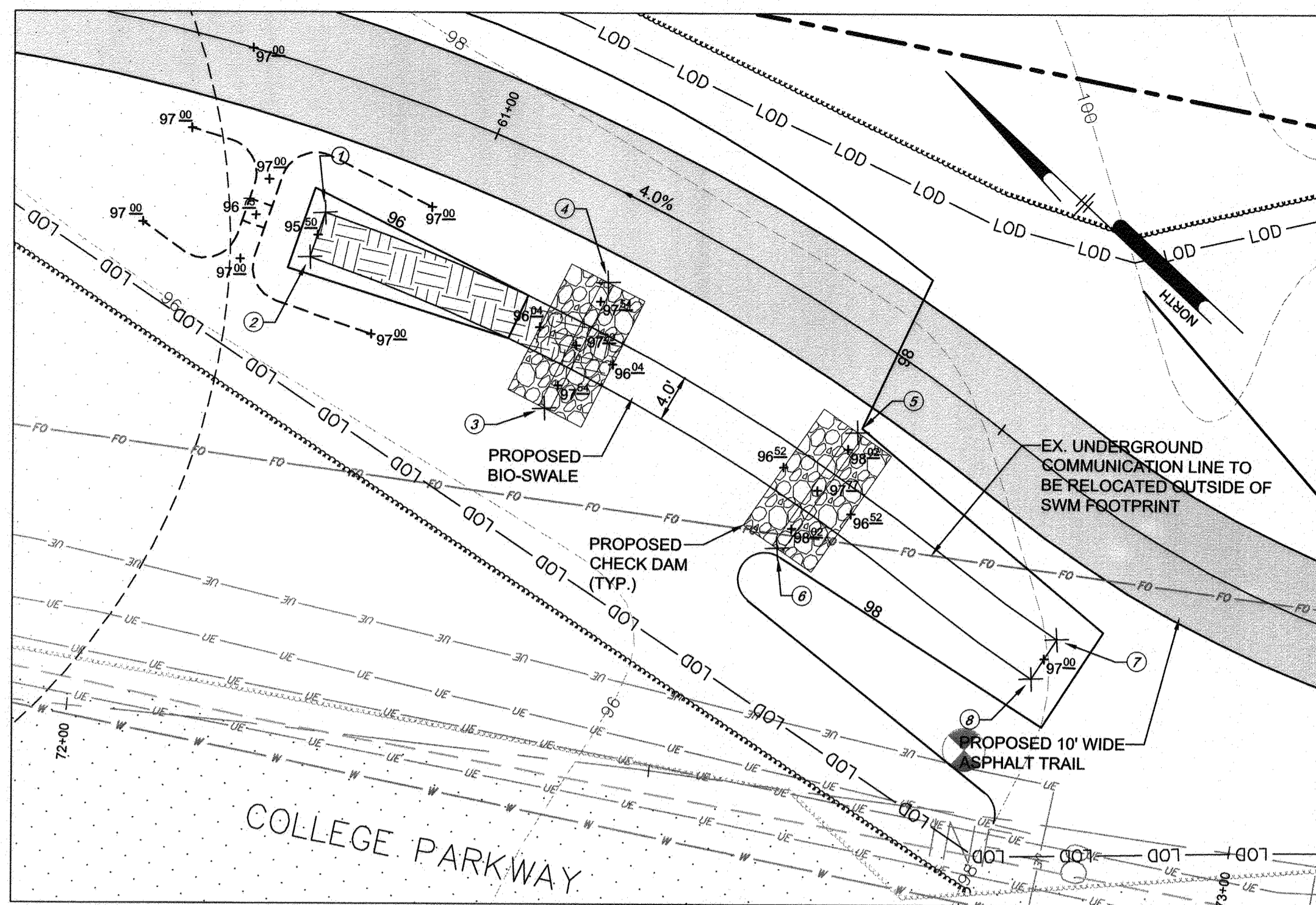
CHIEF ENGINEER: [Signature]
PROJECT MANAGER: [Signature]

APPROVAL DATE: 4/15/21
APPROVED DATE: 4/15/21

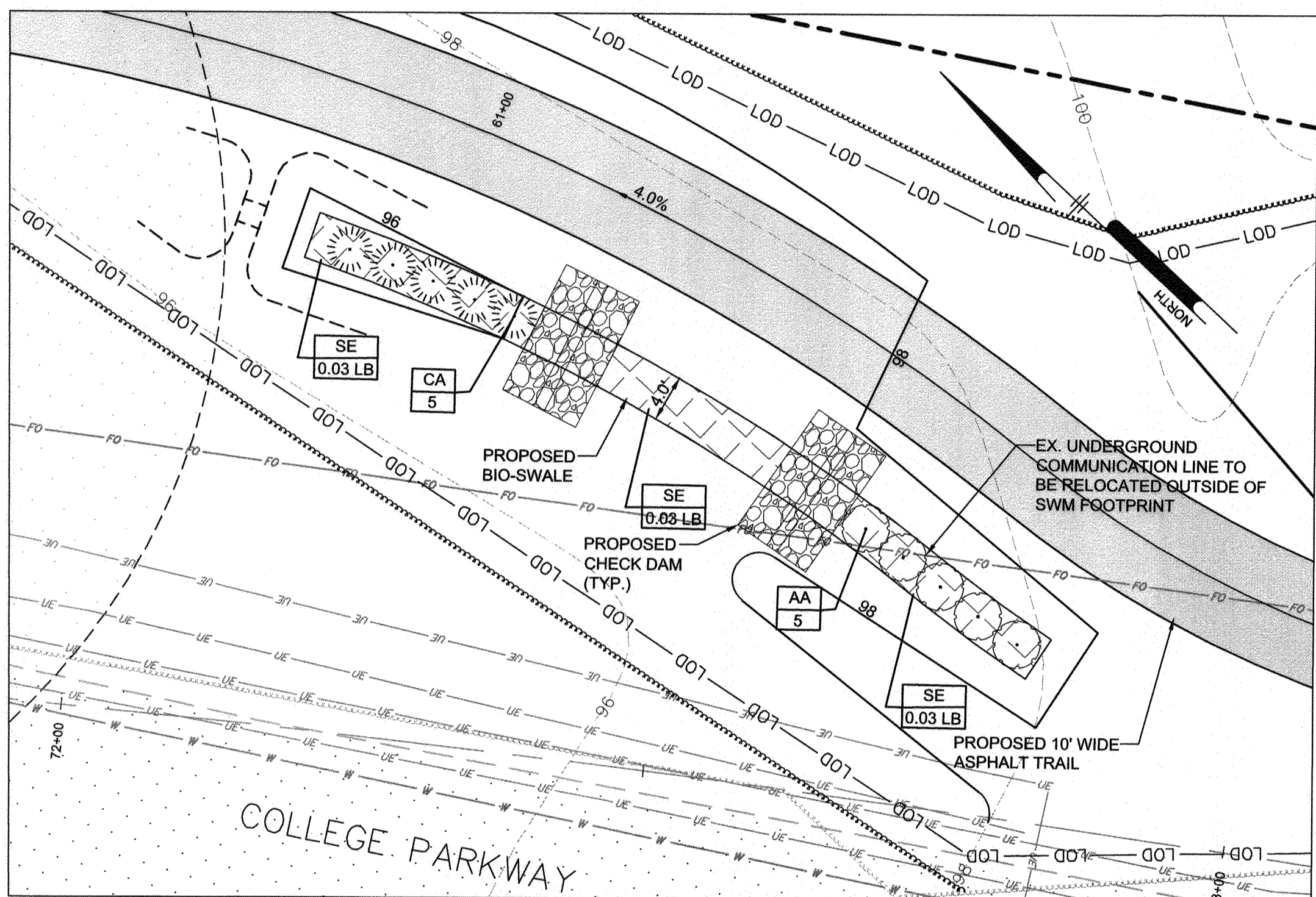
ASSISTANT CHIEF ENGINEER: [Signature]
CHIEF, RIGHT OF WAY SERVICES: [Signature]

SCALE: 1" = 40'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 53 of 137
PROJECT #: P504100
PROPOSAL #:

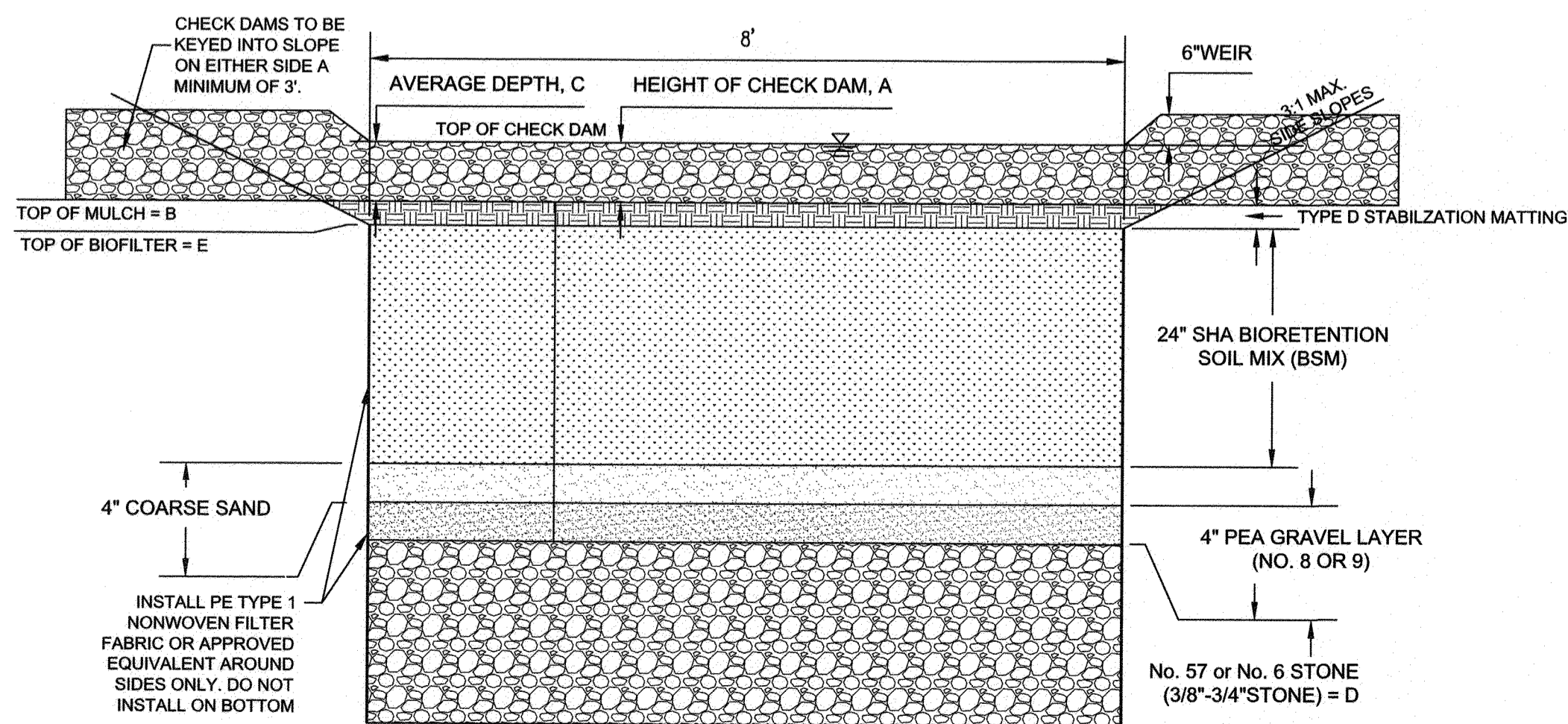
97121 APRIL 5, 2021
STORMWATER MANAGEMENT DETAILS
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2010



BIO-SWALE #10.1 DETAIL PLAN
SCALE: 1"=10'



BIO-SWALE #10.1 LANDSCAPE PLAN
SCALE: 1"=10'



1 BIO-SWALE TYPICAL CROSS SECTION
NOT TO SCALE

BIO-SWALE DESIGN DATA

	#10.1	AS-BUILT
HEIGHT OF CHECK DAM, A	SEE PLAN	
TOP OF MULCH, B	VARIES	
AVERAGE DEPTH, C	12"	
No. 57 or No. 6 STONE (3/8"-3/4" STONE), D	12"	
TOP OF BIOFILTER, E	SEE PLAN	
SURFACE AREA AT E (SF)	308	
OVERFLOW STRUCTURE	96.75	
OVERFLOW RIM ELEVATION	96.75	
UNDERDRAIN INVERT	NO UNDERDRAIN	

BIO-SWALE DESIGN DATA

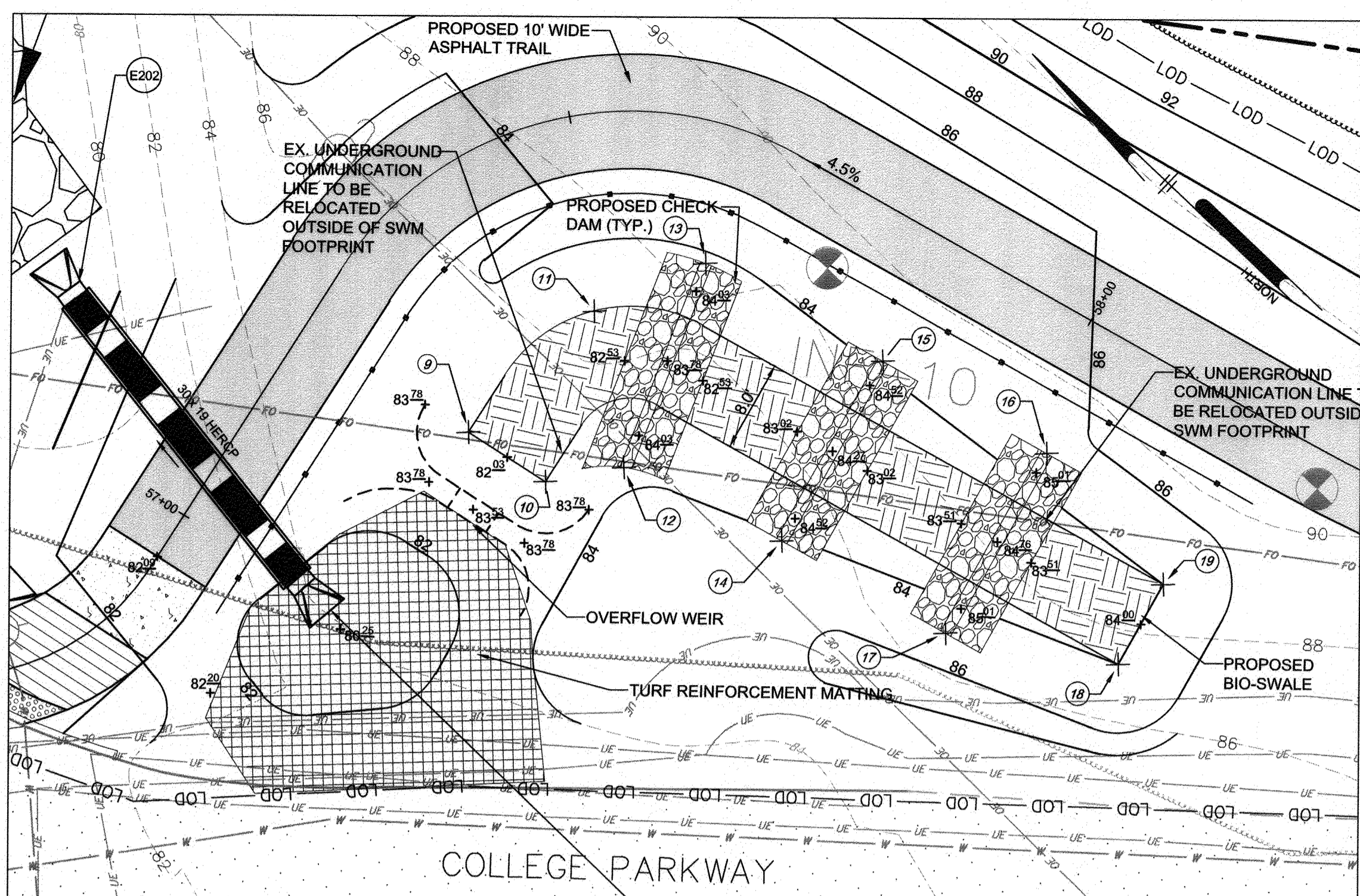
	#10.2	AS-BUILT
HEIGHT OF CHECK DAM, A	SEE PLAN	
TOP OF MULCH, B	VARIES	
AVERAGE DEPTH, C	12"	
No. 57 or No. 6 STONE (3/8"-3/4" STONE), D	12"	
TOP OF BIOFILTER, E	SEE PLAN	
SURFACE AREA AT E (SF)	269	
OVERFLOW STRUCTURE	83.53	
OVERFLOW RIM ELEVATION	83.53	
UNDERDRAIN INVERT	NO UNDERDRAIN	

BIO-SWALE #10.1 PLANT SCHEDULE

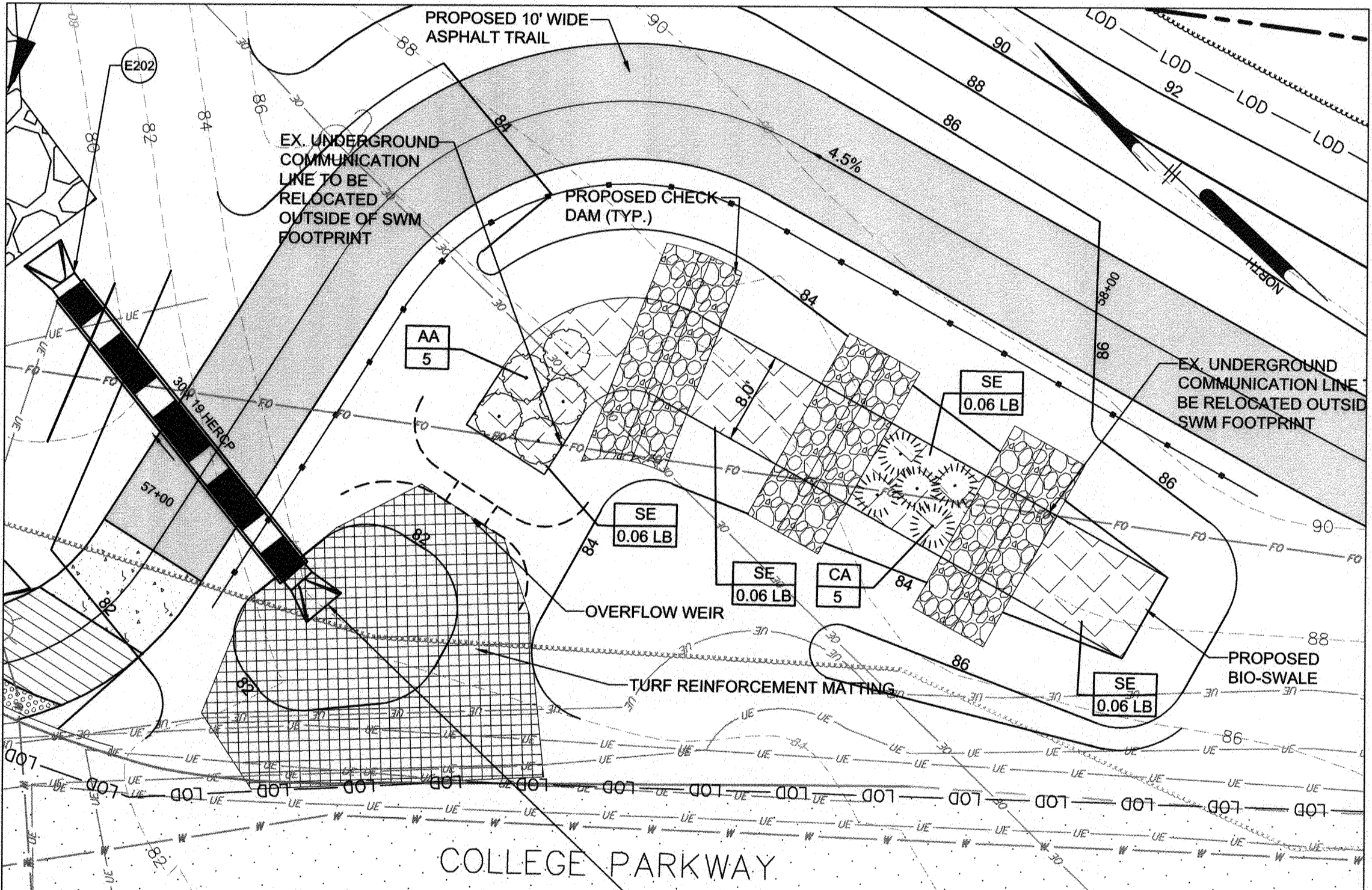
SYMBOL	QTY.	SCIENTIFIC/COMMON NAME	SIZE	ROOT	REMARKS
SE	0.1 LB	SOUTHEAST RAIN GARDEN MIX	LB	SEEDS	AS SHOWN
CA	5	CLETHRA ALNIFOLIA SWEET PEPPERBUSH	24-30"	CONT.	AS SHOWN
AA	5	ARONIA ARBUTIFOLIA RED CHOKEBERRY	24-30"	CONT.	AS SHOWN

BIO-SWALE 10.1 AND 10.2 STAKEOUT TABLE

Point #	Elevation	Northing	Easting
1	95.50	503498.4880	1454186.1100
2	95.50	503496.8475	1454182.4619
3	97.54	503473.4681	1454186.8618
4	97.54	503476.8597	1454198.3725
5	98.02	503452.6338	1454203.7516
6	98.02	503450.8352	1454191.8871
7	97.00	503428.1615	1454202.6525
8	97.00	503427.4523	1454198.7159
9	82.03	503755.8588	1453977.8787
10	82.03	503748.0012	1453979.3816
11	82.30	503755.1603	1453993.0887
12	84.03	503743.8982	1453984.9951
13	84.03	503750.9831	1454002.7771
14	84.52	503729.4907	1453989.8167
15	84.53	503733.8973	1454007.2690
16	84.01	503717.9769	1454011.2887
17	85.01	503713.5703	1453993.8364
18	84.00	503700.7369	1454002.2337
19	84.00	503702.6953	1454009.9902



BIO-SWALE #10.2 DETAIL PLAN
SCALE: 1"=10'



BIO-SWALE #10.2 LANDSCAPE PLAN
SCALE: 1"=10'

BIO-SWALE #10.2 PLANT SCHEDULE

SYMBOL	QTY.	SCIENTIFIC/COMMON NAME	SIZE	ROOT	REMARKS
SE	0.24 LB	SOUTHEAST RAIN GARDEN MIX	LB	SEEDS	AS SHOWN
CA	5	CLETHRA ALNIFOLIA SWEET PEPPERBUSH	24-30"	CONT.	AS SHOWN
AA	5	ARONIA ARBUTIFOLIA RED CHOKEBERRY	24-30"	CONT.	AS SHOWN

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REVISIONS	APPROVED
DESCRIPTION	BY DATE

Pennoni
PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9262

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED: *[Signature]* DATE: 5/6/21
CHIEF ENGINEER

APPROVED: *[Signature]* DATE: 4/15/21
PROJECT MANAGER

APPROVAL: *[Signature]* DATE: 4/15/21
ASSISTANT CHIEF ENGINEER

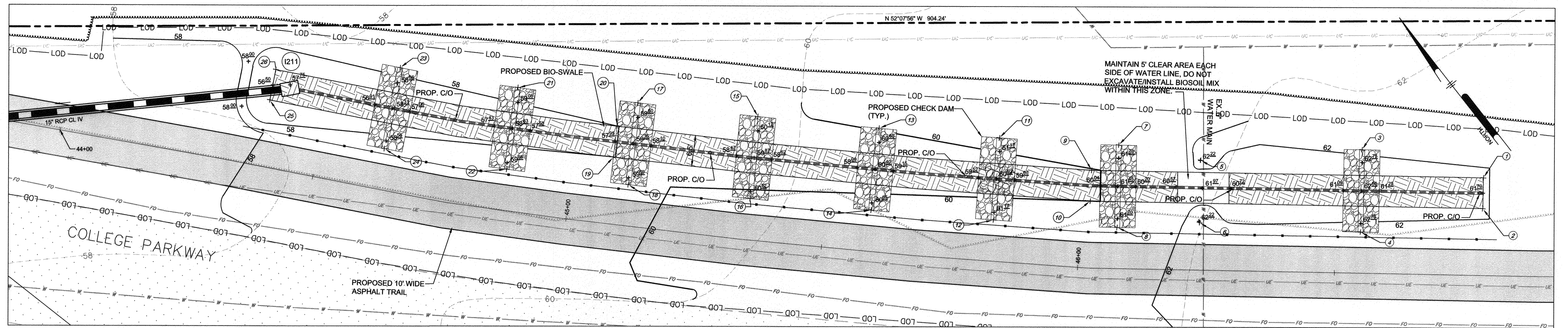
APPROVED: *[Signature]* DATE: 4/16/21
CHIEF, RIGHT OF WAY SERVICES

SCALE: 1" = 40'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 55 OF 137
PROJECT #: P504100
PROPOSAL #:

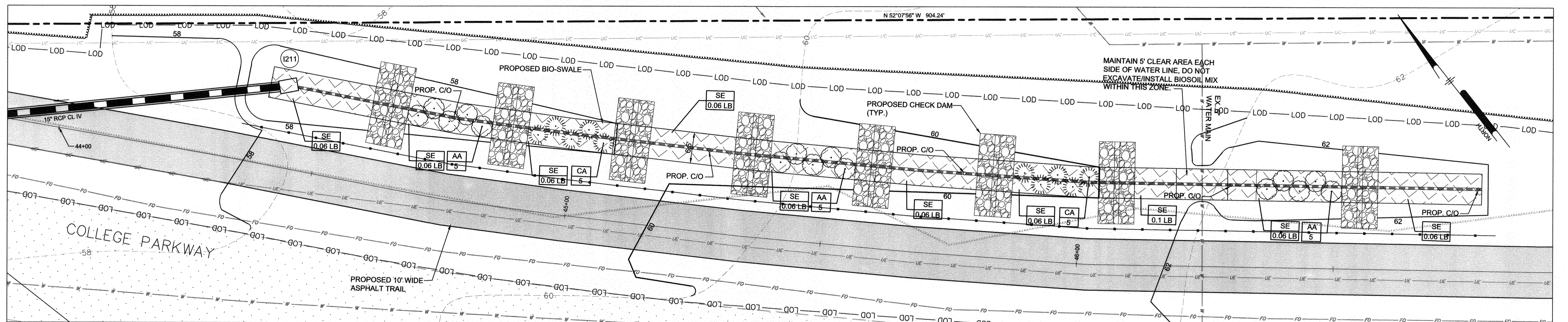
GP# G02017905 DWG NO: DD08N

97123 APRIL 5, 2021

STORMWATER MANAGEMENT PLAN
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012, 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

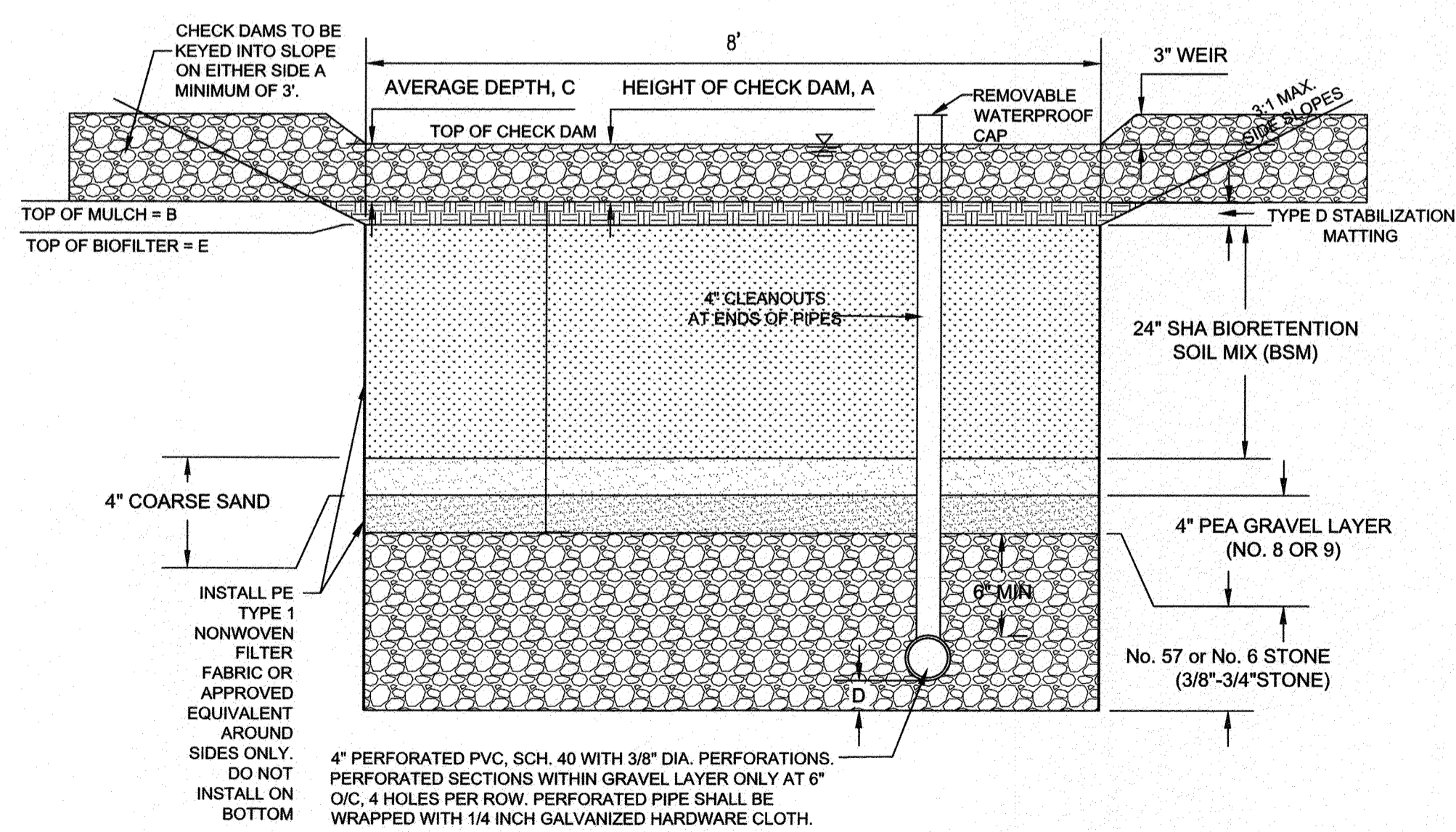


BIO-SWALE #12 DETAIL PLAN
SCALE: 1"=10'



BIO-SWALE #12 LANDSCAPE PLAN
SCALE: 1"=10'

Point #	Proposed Elevation	Northing	Easting
9	60.00	504445.0769	1453107.0937
1	61.70	504396.9386	1453166.1976
2	61.70	504392.2864	1453162.4085
3	62.75	504415.7922	1453150.9668
4	62.75	504403.3864	1453140.8626
5	62.22	504433.5553	1453124.9882
6	62.22	504424.1260	1453117.3560
7	61.70	504445.7006	1453114.2454
8	61.70	504433.2947	1453104.1412
10	60.00	504440.5239	1453103.1828
11	61.17	504461.1184	1453096.8277
12	61.17	504449.2584	1453086.0881
13	60.65	504477.0357	1453079.5437
14	60.65	504465.4247	1453068.5353
15	60.12	504493.3483	1453062.3785
16	60.12	504481.7404	1453051.3730
17	59.60	504509.8570	1453045.6582
18	59.60	504498.5002	1453034.3879
19	57.95	504504.5146	1453035.4255
20	57.95	504508.7734	1453039.6519
21	59.08	504526.5899	1453029.1204
22	59.08	504515.4516	1453017.6339
23	58.56	504543.7721	1453013.5018
24	58.56	504533.3124	1453001.3941
25	56.50	504554.4995	1452989.6984
26	56.50	504558.4218	1452994.2388



1 BIO-SWALE TYPICAL CROSS SECTION
56 NOT TO SCALE

BIO-SWALE #12 PLANT SCHEDULE					
SYMBOL	QTY.	SCIENTIFIC/COMMON NAME	SIZE	ROOT	REMARKS
SE	0.70 LB	ERNST SEEDS SOUTHEAST RAIN GARDEN MIX	LB	SEEDS	20 LBS/AC
CA	10	CLETHRA ALNIFOLIA SWEET PEPPERBUSH	24-30"	CONT.	AS SHOWN
AA	15	ARONIA ARBUTIFOLIA RED CHOKEBERRY	24-30"	CONT.	AS SHOWN

BIO-SWALE DESIGN DATA		SURFACE AREA AT E (SF)	1,464
#12	AS-BUILT		
HEIGHT OF CHECK DAM, A	SEE PLAN	OVERFLOW STRUCTURE	57.75
TOP OF MULCH, B	VARIES	OVERFLOW RIM ELEVATION	57.75
AVERAGE DEPTH, C	12"	UNDERDRAIN INVERT	53.00
No. 57 or No. 6 STONE (3/8"-3/4" STONE), D	3"		
TOP OF BIOFILTER, E	SEE PLAN		

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774. EXPIRATION DATE 11/10/2021.

#	REVISIONS DESCRIPTION	APPROVED BY	DATE

Pennoni
PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

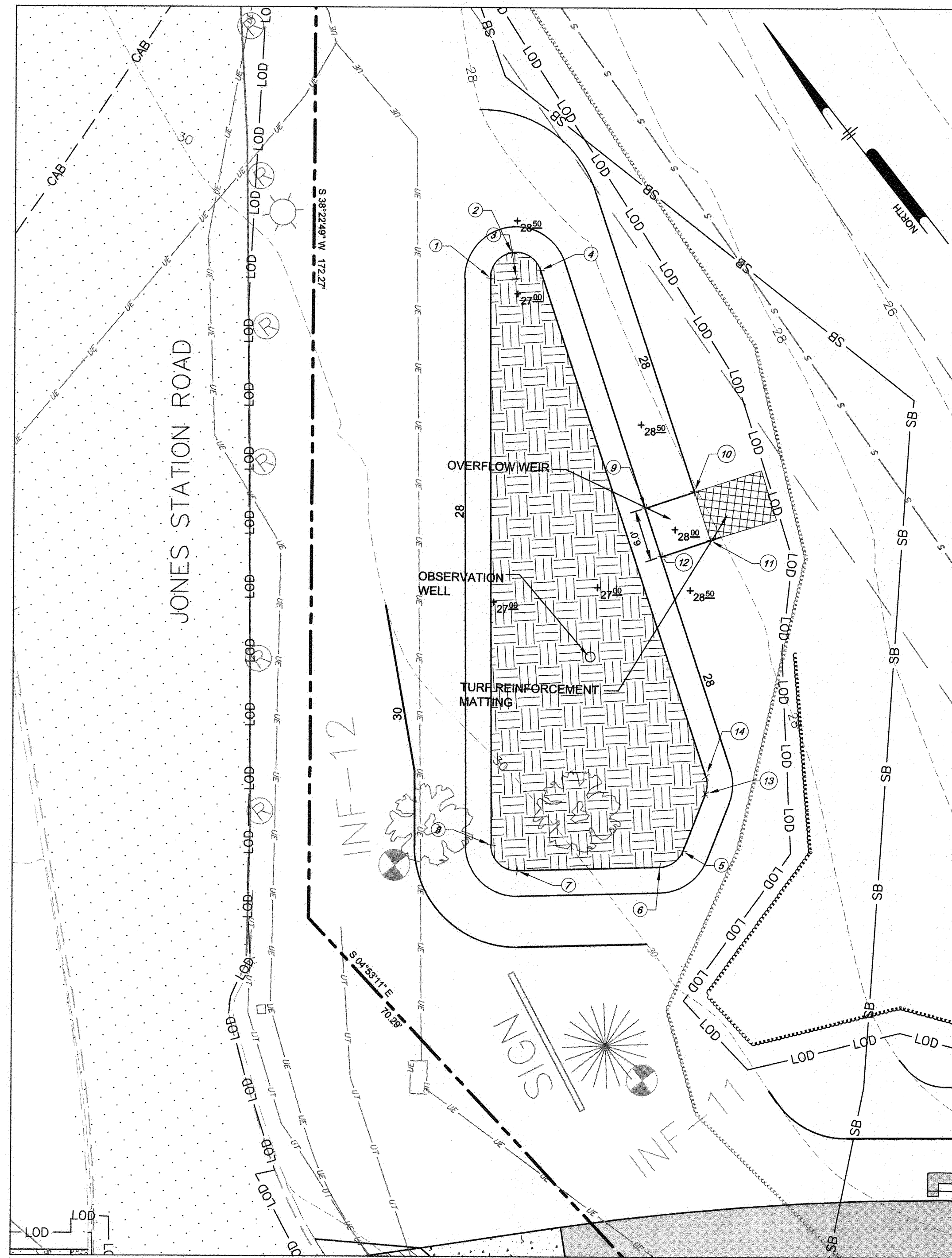
ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED DATE: [Signature] 4/15/21
APPROVED DATE: [Signature] 4/16/21

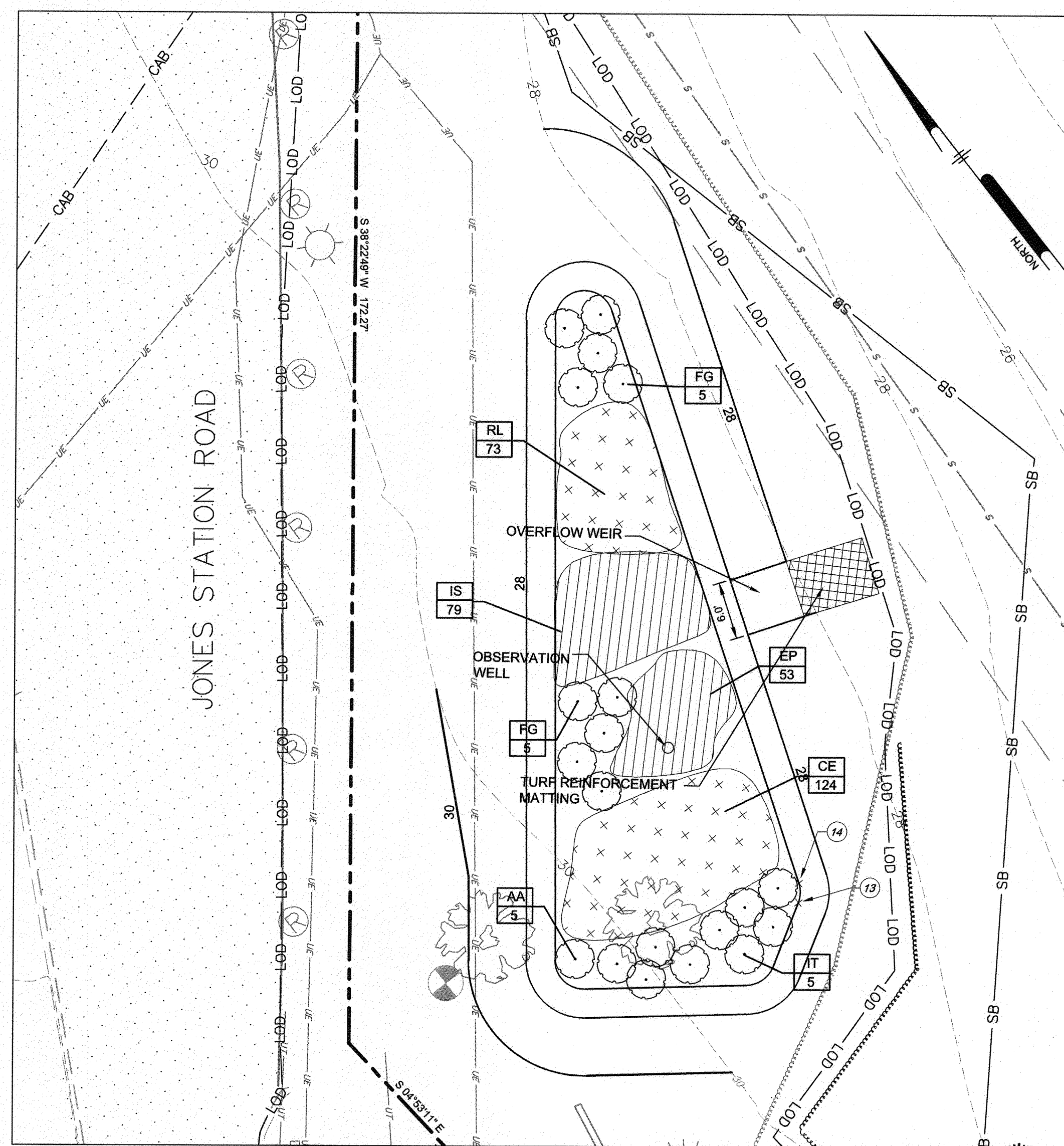
SCALE: 1" = 40'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 56 OF 137
PROJECT #: P504100
PROPOSAL #:

GP# G02017905 DWG NO: DD080

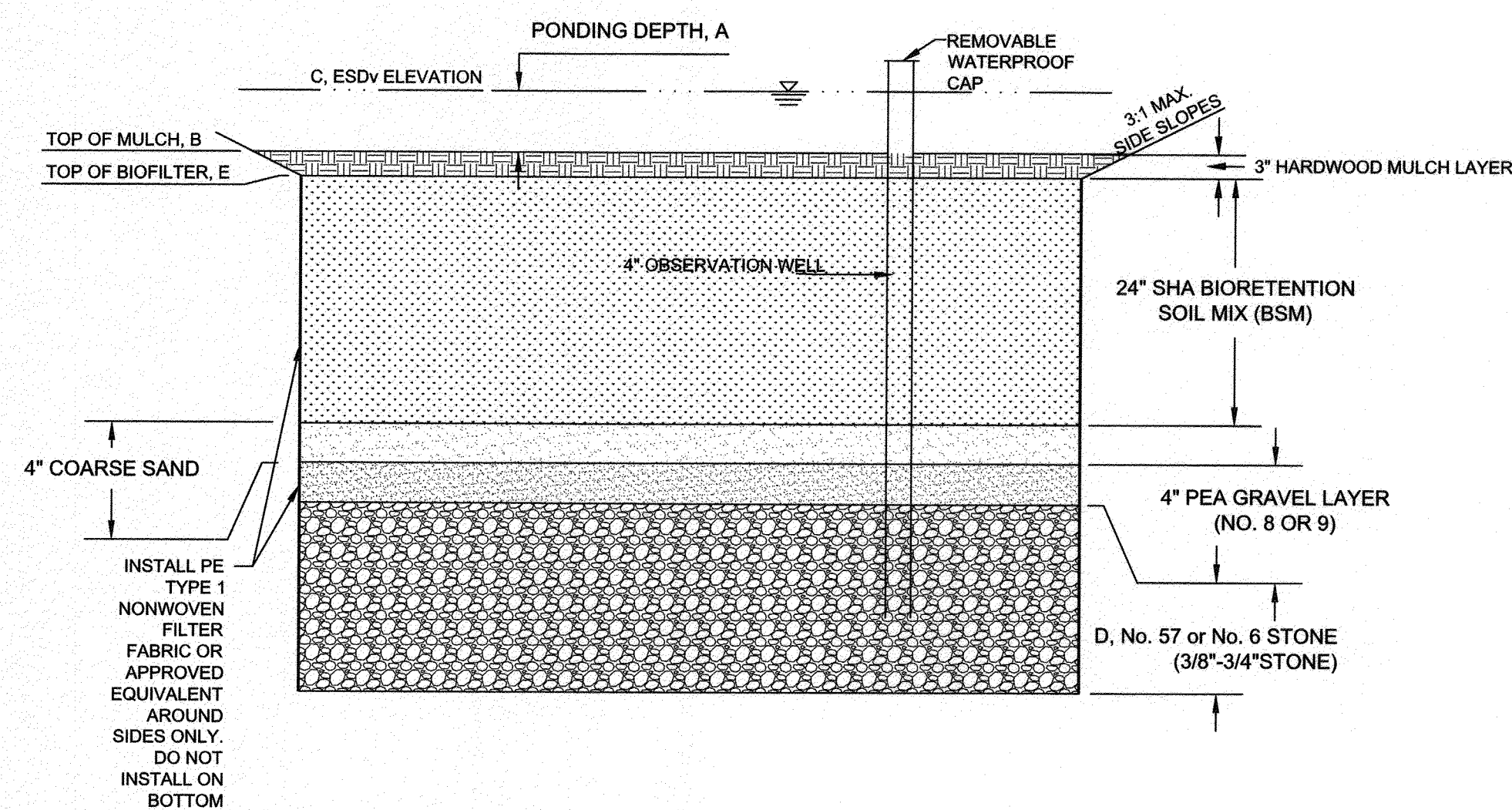
97124 APRIL 5, 2021
STORMWATER MANAGEMENT PLAN
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019



MICRO-BIORETENTION #13 DETAIL PLAN
SCALE: 1"=10'



MICRO-BIORETENTION #13 LANDSCAPE PLAN
SCALE: 1"=10'

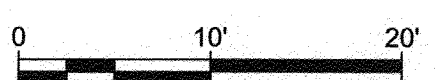


1 MICROBIORETENTION FACILITY TYPICAL CROSS SECTION
57 NOT TO SCALE

MICRO-BIORETENTION #2 PLANT SCHEDULE					
SYMBOL	QTY.	SCIENTIFIC/ COMMON NAME	SIZE	ROOT	REMARKS
AA	5	ARONIA ARBUTIFOLIA 'BRILLIANTISSIMA' RED CHOKEBERRY	24-30"	CONT.	AS SHOWN
FG	10	FOTHERGILLA GARDENII 'MT. AIRY' MT. AIRY DWARF FOTHERGILLA	24-30"	CONT.	AS SHOWN
IT	5	ITEA VIRGINICA 'HENRY'S GARNET' HENRY'S GARNET VIRGINIA SWEETSPIRE	24-30"	CONT.	AS SHOWN
CE	124	CAREX PLANTAGINEA SEERSUCKER SEDGE	1 QUART	CONT.	18" ON CENTER
EP	53	EUPATORIUM PURPUREUM JOE PYE WEED	1 QUART	CONT.	18" ON CENTER
IS	79	IRIS VERSICOLOR 'BLUE FLAG' BLUE FLAG IRIS	1 QUART	CONT.	18" ON CENTER
RL	73	RUDBECKIA LACINIATA 'GOLDQUELLE' GOLDQUELLE CONEFLOWER	1 QUART	CONT.	18" ON CENTER

MICRO-BIORETENTION DESIGN DATA		
	2	AS-BUILT
PONDING DEPTH, A	12"	
TOP OF MULCH, B	27.25	
ESDv ELEVATION, C	28.00	
No. 57 or No. 6 STONE (3/8"-3/4" STONE), D	12"	
TOP OF BIOFILTER, E	27.00	
SURFACE AREA AT E (SF)	1,114	
OVERFLOW STRUCTURE	N/A	N/A
OVERFLOW ELEVATION	28.00	
UNDERDRAIN INVERT	NO UNDERDRAIN	NO UNDERDRAIN

MICROBIORETENTION #13 STAKEOUT TABLE				
Point #	Proposed Elevation	Northing	Easting	
1	27.00	505410.7297	1452094.2193	
2	27.00	505411.5147	1452098.0342	
3	27.00	505408.8870	1452096.5867	
4	27.00	505407.8707	1452099.4093	
5	27.00	505343.8486	1452070.7377	
6	27.00	505344.0291	1452067.4249	
7	27.00	505354.0455	1452053.9810	
8	27.00	505358.2939	1452053.4060	
9	28.00	505378.2623	1452092.0541	
10	28.00	505376.2464	1452097.7053	
11	28.00	505370.5952	1452095.8895	
12	28.00	505372.6110	1452090.0383	
13	27.00	505347.4908	1452076.9326	
14	27.00	505349.0607	1452078.2347	



PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE

Penioni
PENIONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

GP# G02017905 DWG NO: DD08P

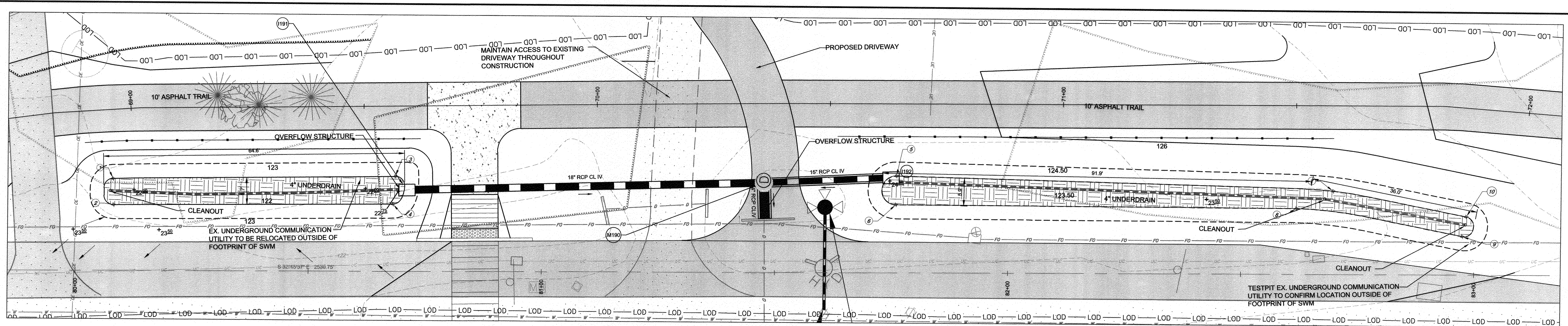
ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED DATE: 4/15/21
CHIEF ENGINEER: [Signature]

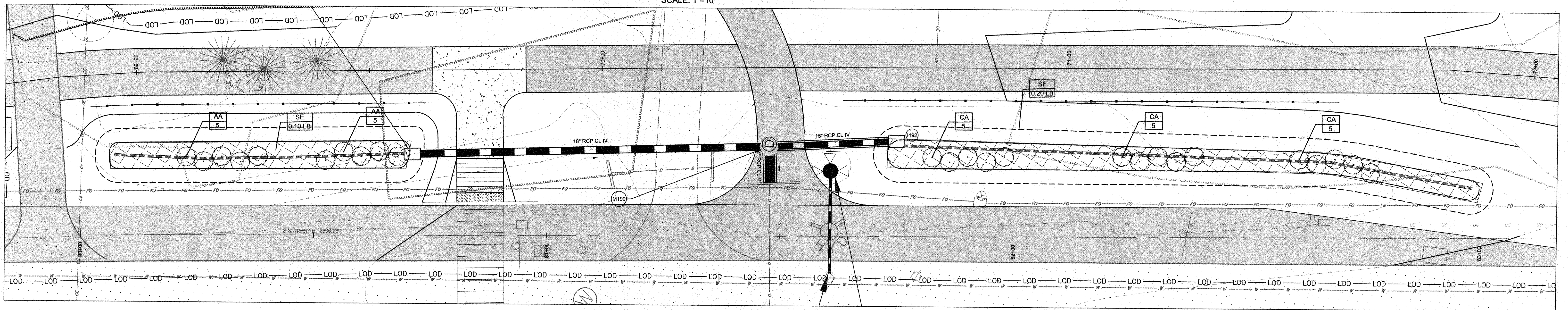
APPROVED DATE: 4/16/21
CHIEF, RIGHT OF WAY SERVICES: [Signature]

SCALE: 1" = 40'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 57 OF 137
PROJECT #: P504100
PROPOSAL #:

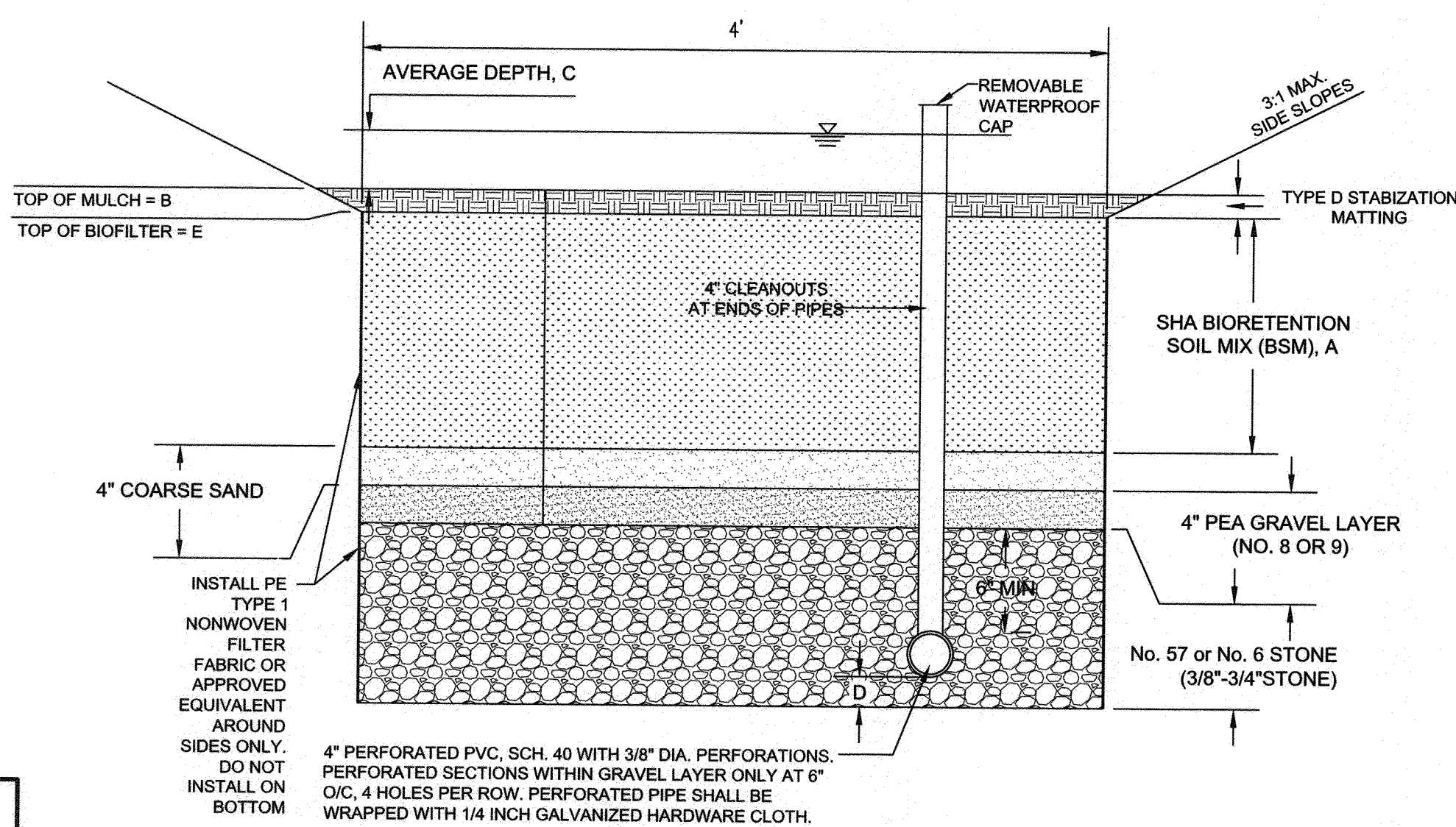
97125 APRIL 5, 2021
STORMWATER MANAGEMENT DETAILS
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 35, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019



BIO-SWALE #10.3 AND #10.4 DETAIL PLAN
SCALE: 1"=10'



BIO-SWALE #10.3 AND #10.4 LANDSCAPE PLAN
SCALE: 1"=10'

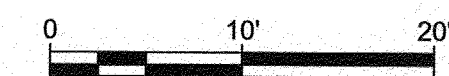


1 BIO-SWALE TYPICAL CROSS SECTION
58 NOT TO SCALE

BIO-SWALE #9 PLANT SCHEDULE					
SYMBOL	QTY.	SCIENTIFIC/ COMMON NAME	SIZE	ROOT	REMARKS
SE	0.30 LB	ERNST SEEDS SOUTHEAST RAIN GARDEN MIX	LB	SEEDS	AS SHOWN
CA	15	CLETHRA ALNIFOLIA SWEET PEPPERBUSH	24-30"	CONT.	AS SHOWN
AA	10	ARONIA ARBUTIFOLIA RED CHOKEBERRY	24-30"	CONT.	AS SHOWN

BIO-SWALE DESIGN DATA				
	#10.3	AS-BUILT	#10.4	AS-BUILT
PLANTING MEDIA DEPTH, A	24"		14"	
TOP OF MULCH, B	123.50		122.00	
AVERAGE DEPTH, C	12"		9"	
No. 57 or No. 6 STONE (3/8"-3/4" STONE), D	3"		3"	
TOP OF BIOFILTER, E	123.50		122.00	
SURFACE AREA AT E (SF)	620		360	
OVERFLOW STRUCTURE	124.50		122.75	
OVERFLOW RIM ELEVATION	124.50		122.75	
UNDERDRAIN INVERT	119.52		119.70	

BIOSWALE #10 STAKEOUT TABLE				
Point #	Proposed Elevation	Northing	Easting	
1	122.00	502817.6170	1454595.5865	
9	123.50	502566.8266	1454740.4698	
2	122.00	502814.5496	1454590.9297	
3	122.00	502766.8010	1454628.4773	
4	122.00	502764.0357	1454623.2144	
5	123.50	502676.1508	1454686.1926	
6	123.50	502672.9543	1454680.9506	
7	123.50	502595.4180	1454733.7818	
8	123.50	502600.0649	1454726.4044	
10	123.50	502568.3629	1454744.4860	

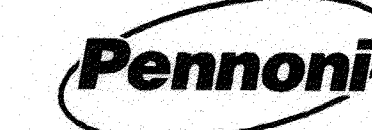
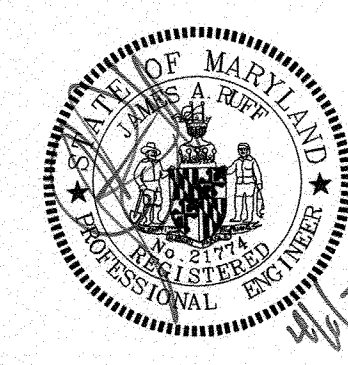


GP# G02017905

DWG NO: DD08Q

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774. EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE



PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED DATE: [Signature] 4/15/21
 APPROVED DATE: [Signature] 4/15/21
 APPROVED DATE: [Signature] 4/15/21
 APPROVED DATE: [Signature] 4/15/21

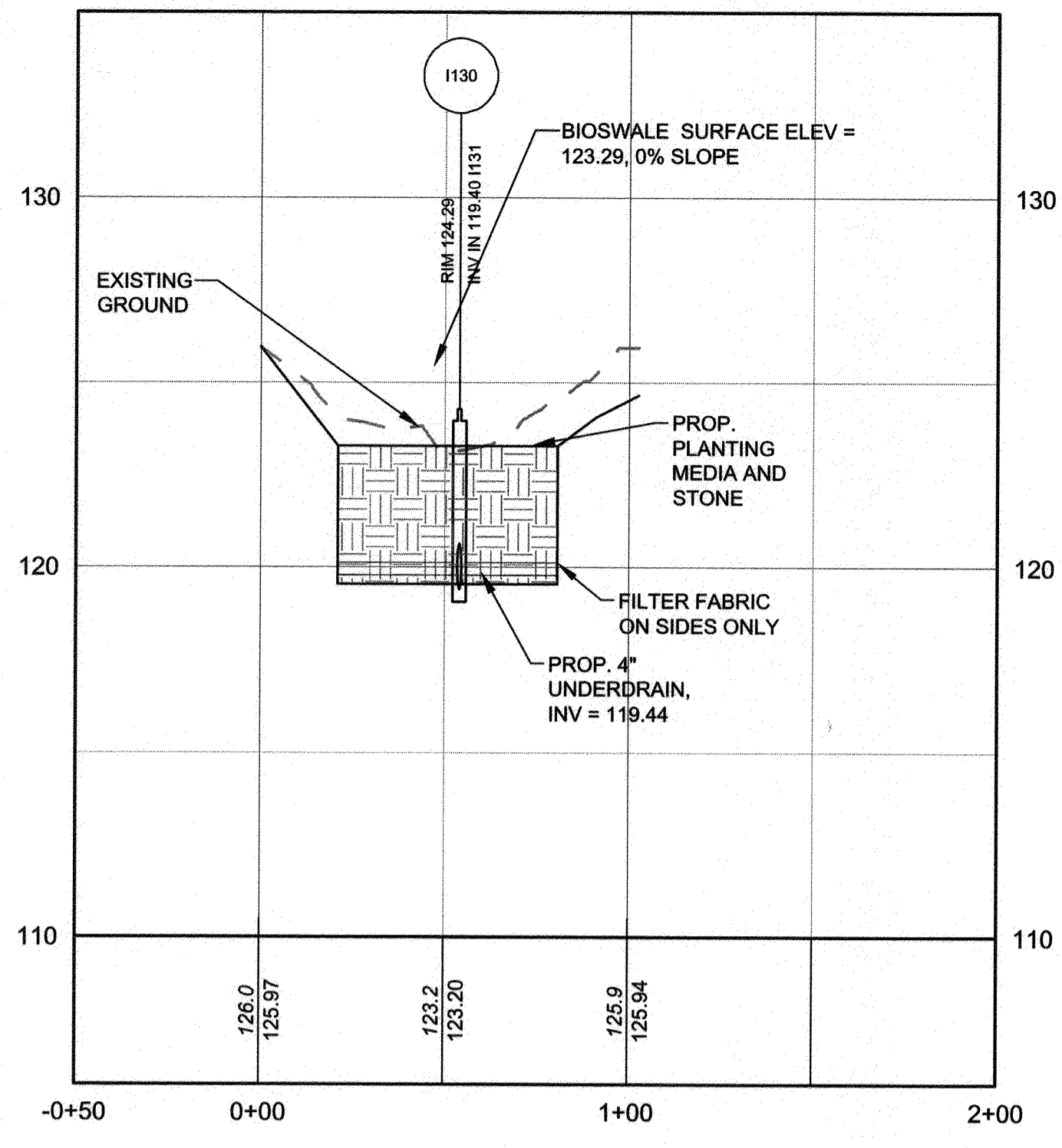
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 DRAWN BY: PAI
 CHECKED BY: PJS/JAR
 SHEET 58 of 137
 PROJECT #: P504100
 PROPOSAL #:

97126

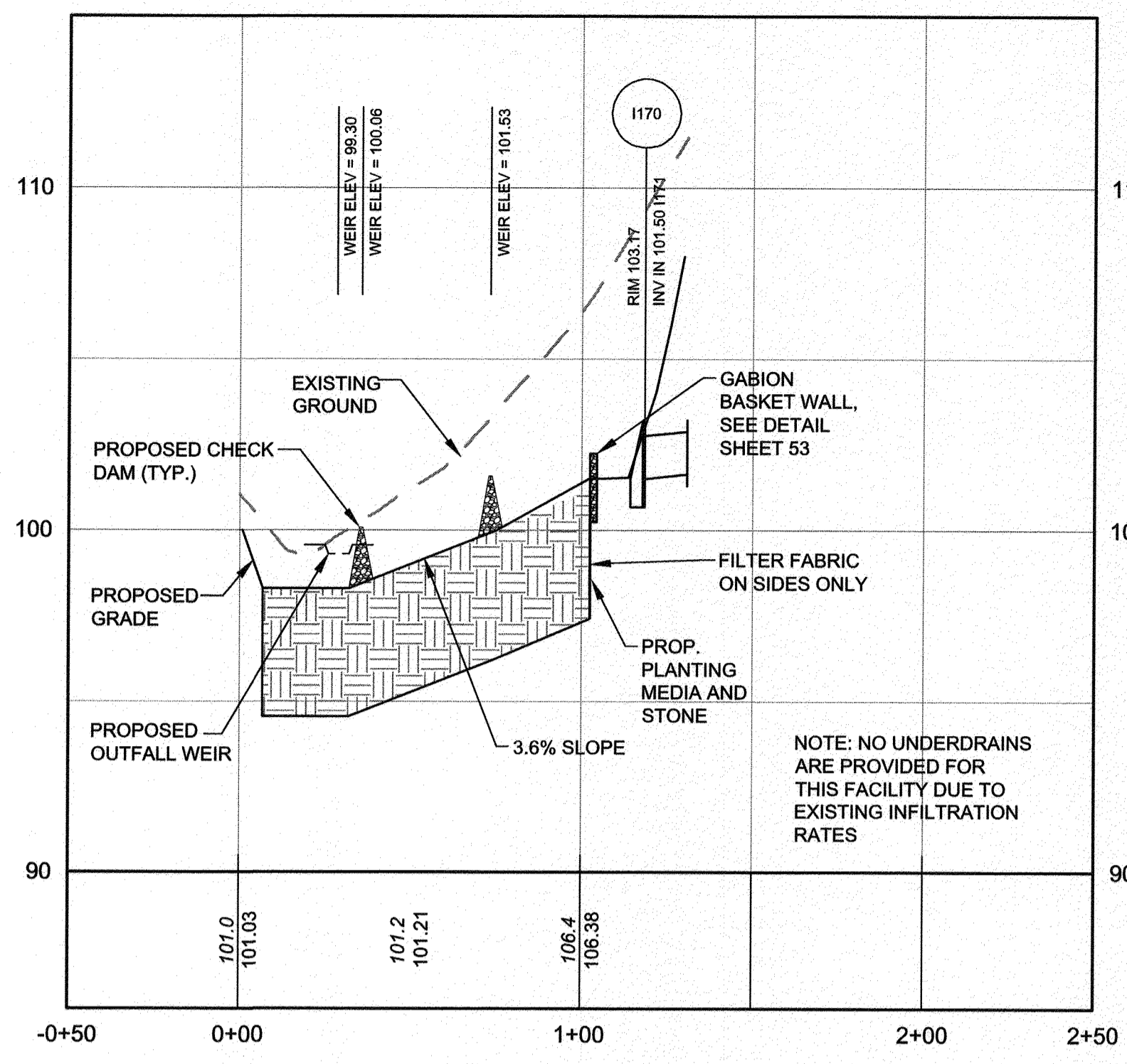
APRIL 5, 2021

STORMWATER MANAGEMENT DETAILS

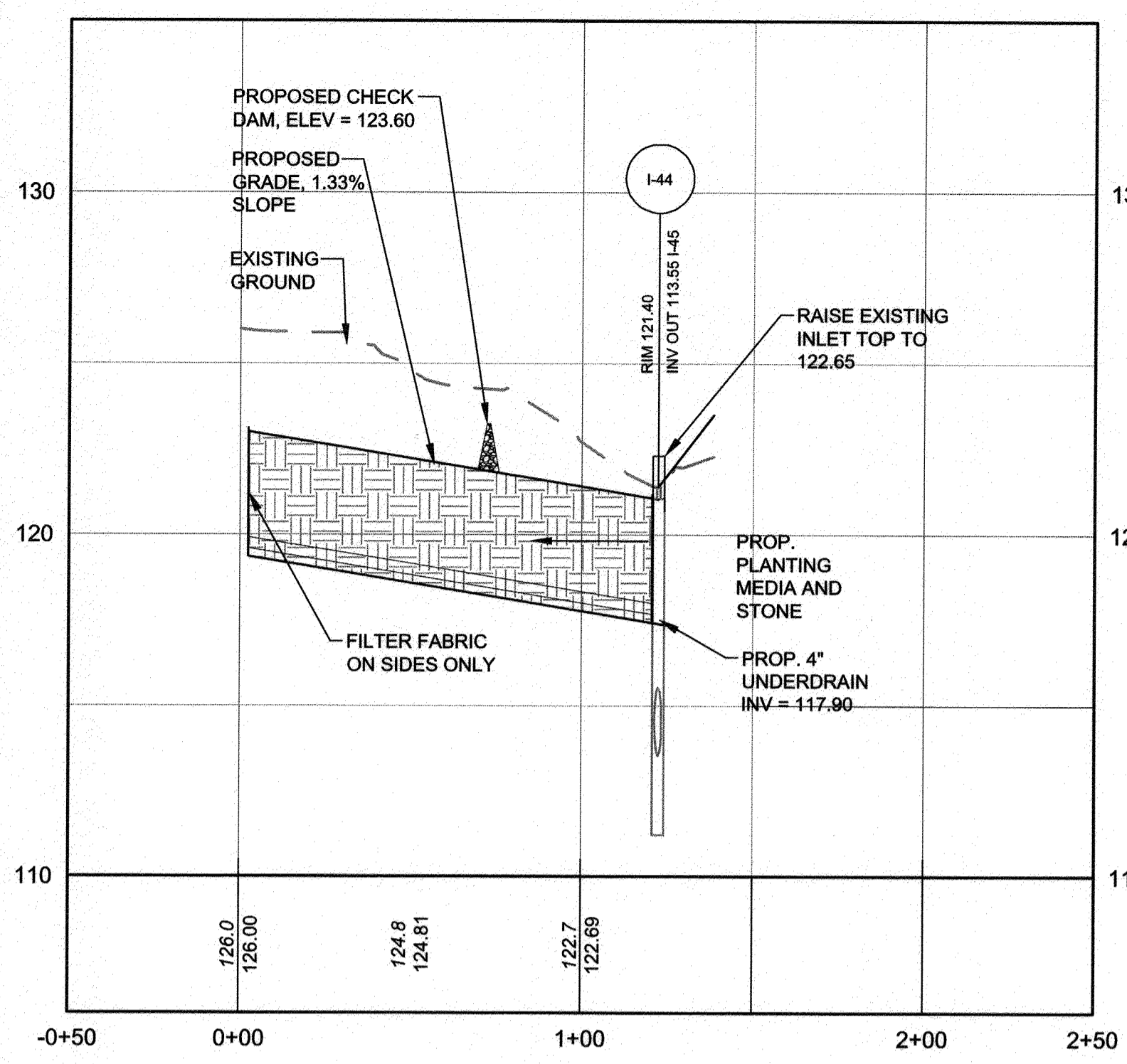
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 36, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019



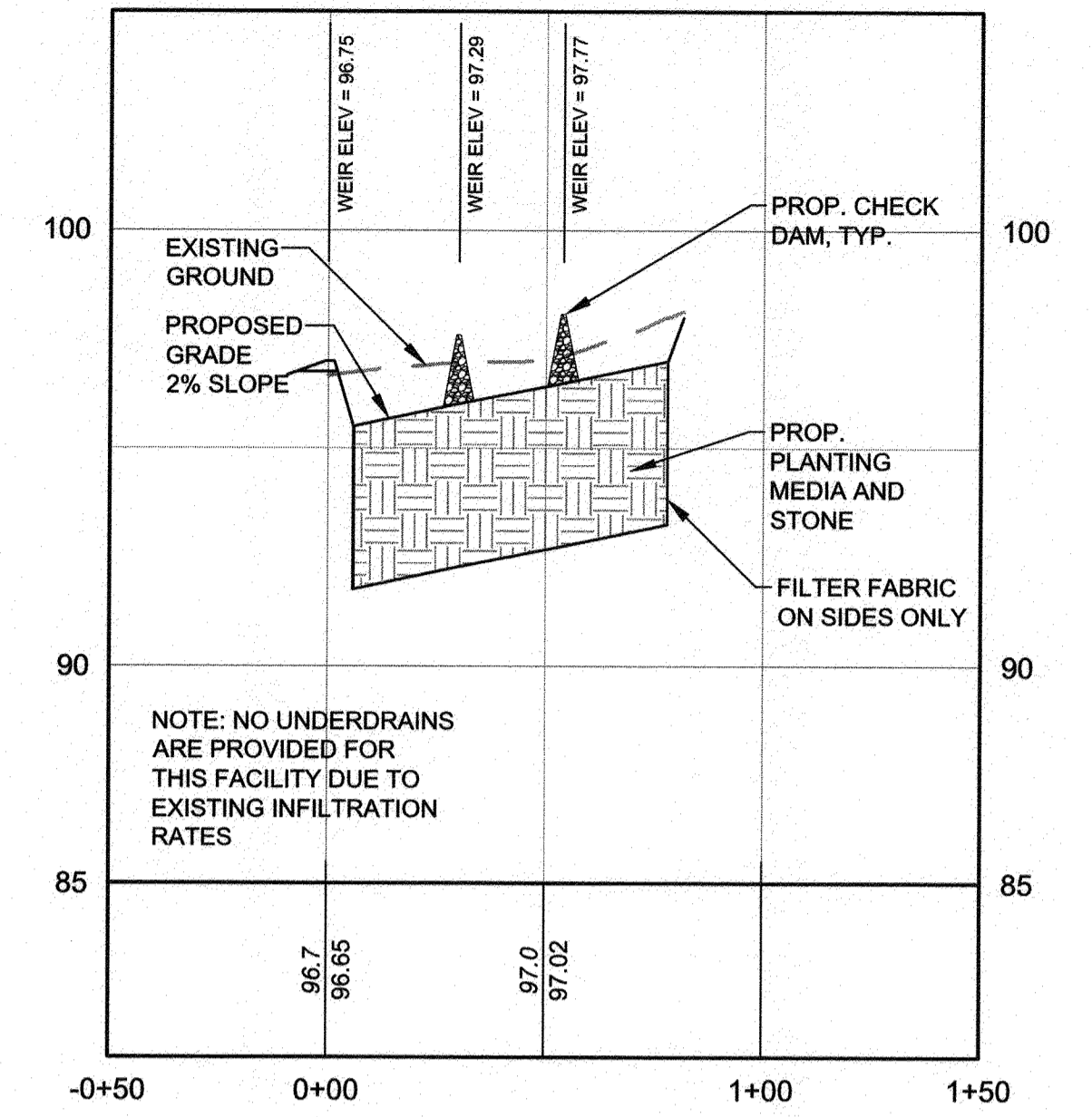
BIO-SWALE #5
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



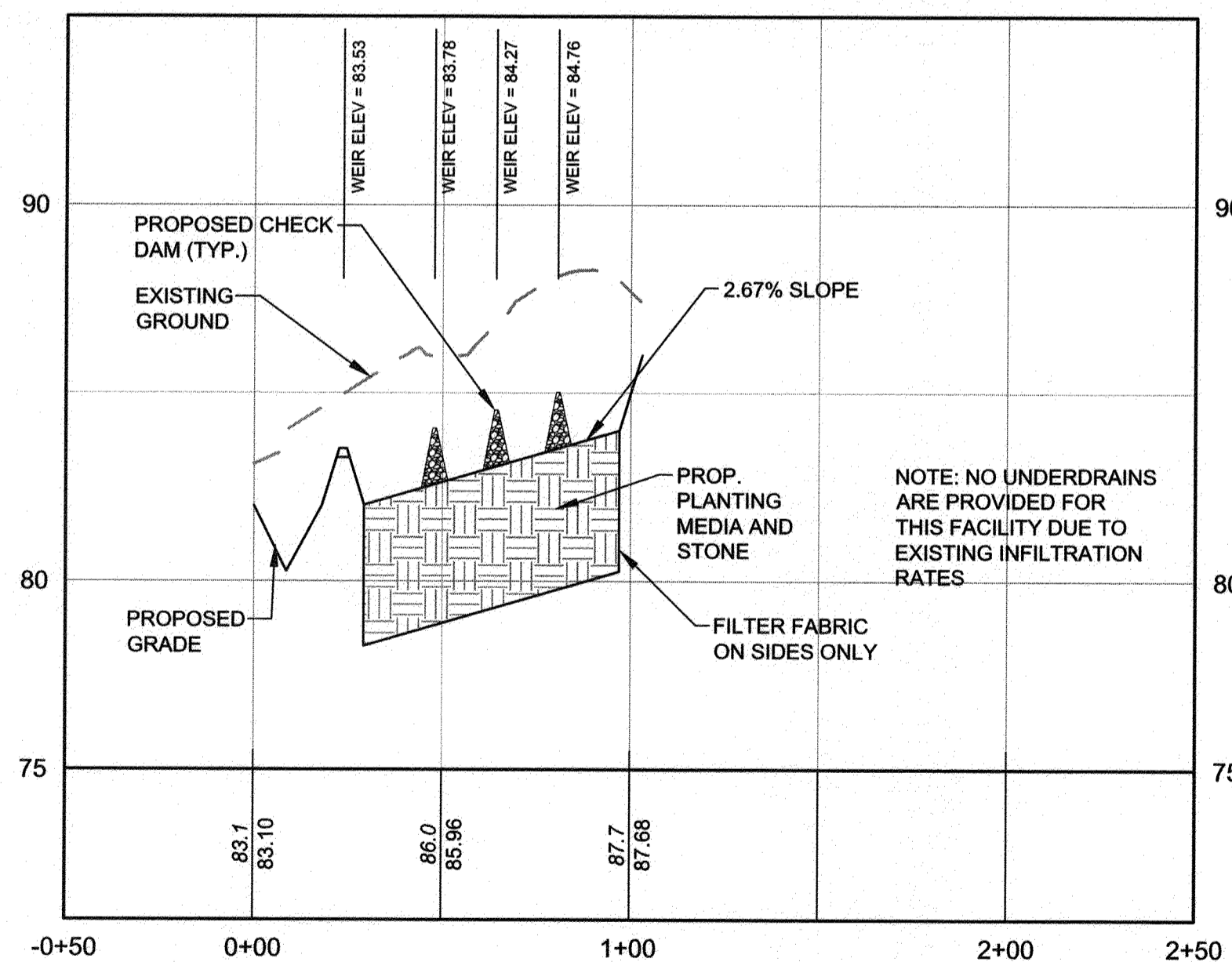
BIO-SWALE #8
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



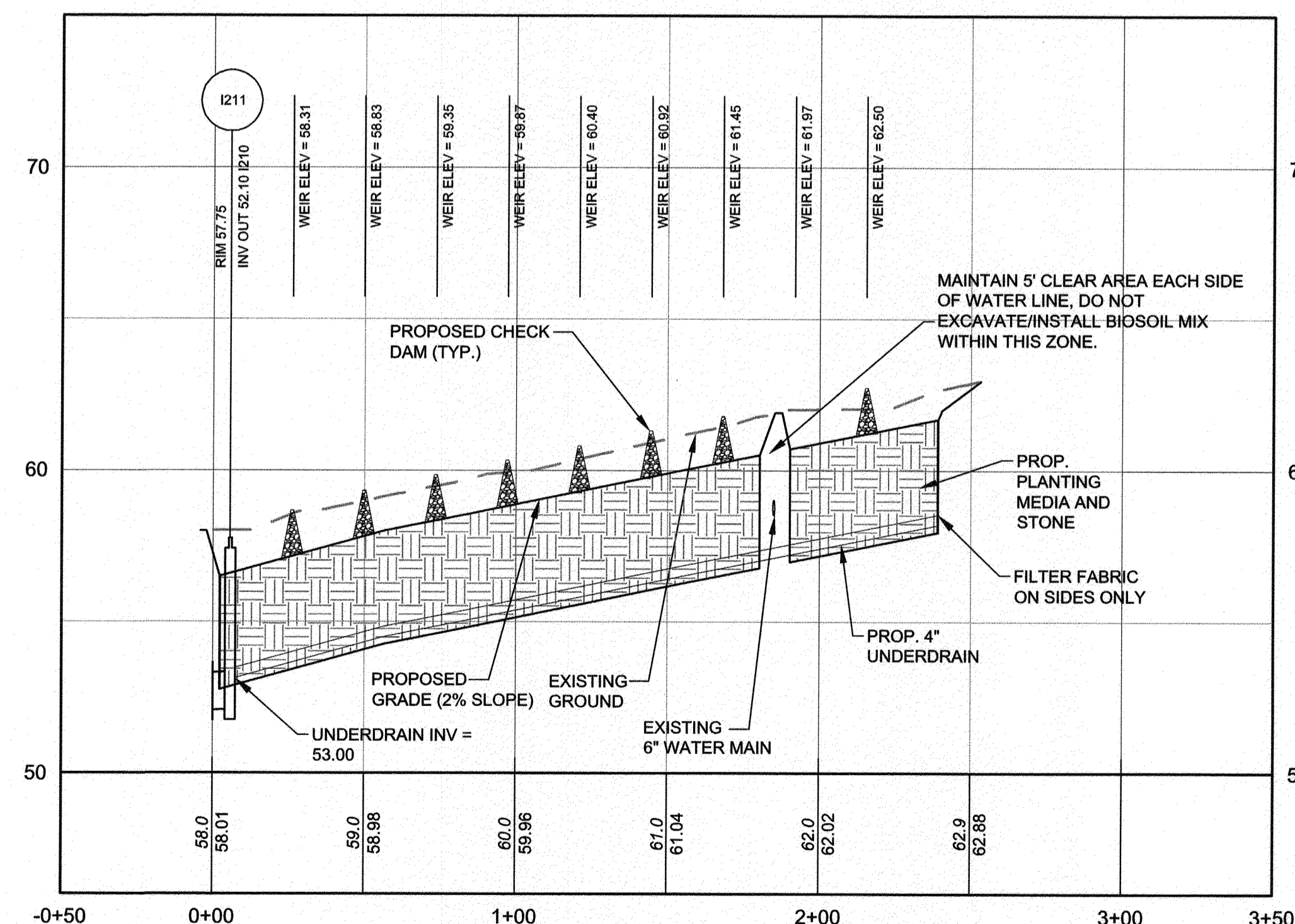
BIO-SWALE #9
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



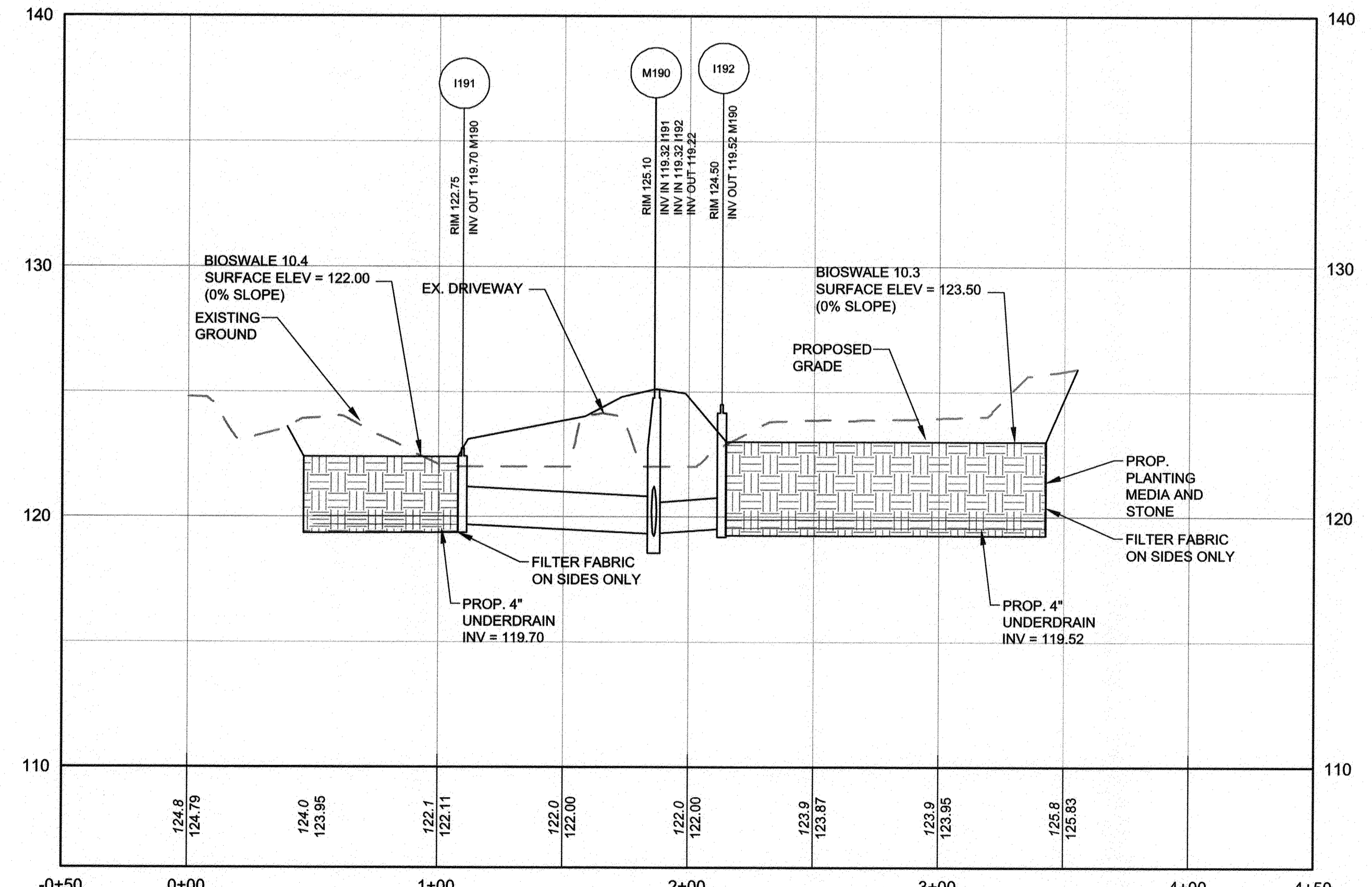
BIO-SWALE #10.1
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



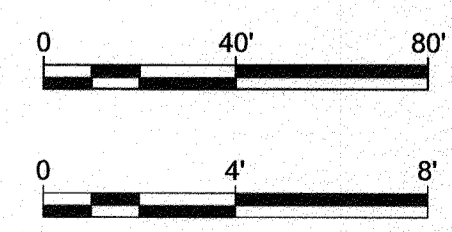
BIO-SWALE #10.2
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



BIO-SWALE #12
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'

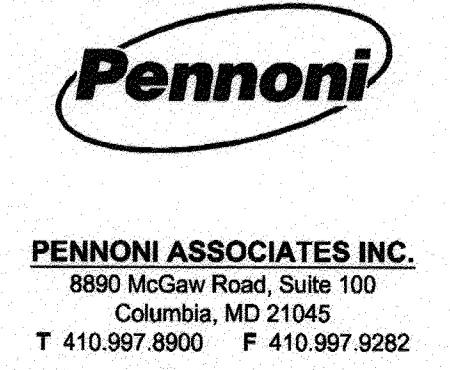


BIO-SWALE 10.3 AND 10.4 5+00
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



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#	REVISIONS DESCRIPTION	APPROVED BY	DATE



GP# G02017905 DWG NO: DD08R

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97127 APRIL 5, 2021

BIO-SWALE PROFILES

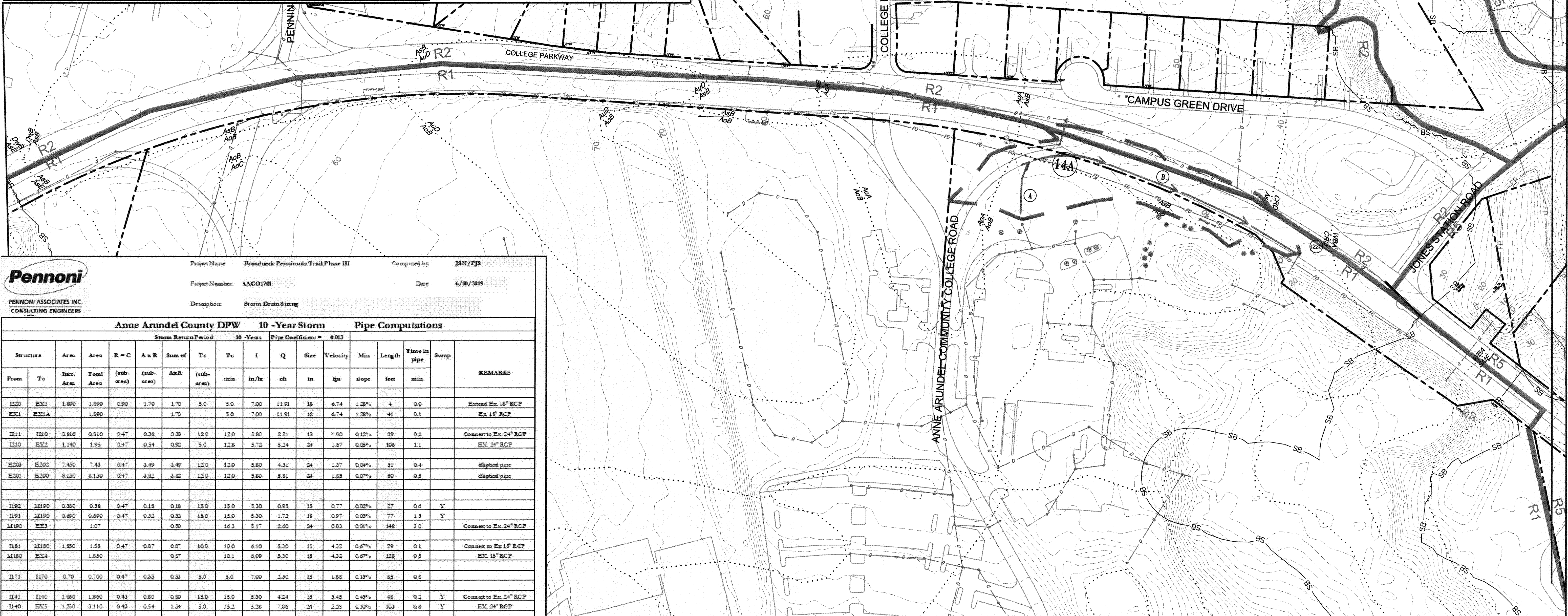
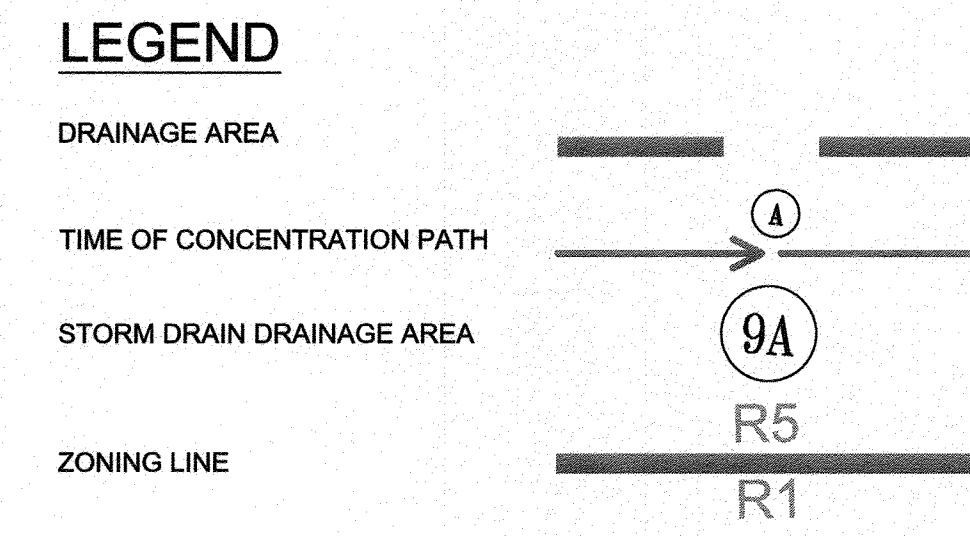
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

APPROVED <i>[Signature]</i> DATE 5/6/21 CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE 4/15/21 PROJECT MANAGER	SCALE: AS SHOWN
APPROVAL <i>[Signature]</i> DATE 4/23/21 ASSISTANT CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE 4/16/21 CHIEF, RIGHT OF WAY SERVICES	DRAWN BY: PAI CHECKED BY: PJS/JAR SHEET 59 of 137 PROJECT #: P504100 PROPOSAL #:

PROPOSED STORM DRAIN DRAINAGE AREA TABLE				
DRAINAGE DESIGNATION	AREA (ACRES)	WEIGHTED C FACTOR (SEE NOTE #1)	TC (MIN) (SEE NOTE #2)	RECEIVING STRUCTURE
2A	2.58	0.47	9.0	E111
2B	1.62	0.47	9.0	I110
4A	0.88	0.47	5.0	I121
5A	0.91	0.43	5.0	I131
5B	1.84	0.43	12.0	I130
6A	1.86	0.43	19.0	I141
6B	1.25	0.43	5.0	I140
8A	0.70	0.47	5.0	I171
8B	1.85	0.47	10.0	I181
9A	0.38	0.47	15.0	I191
9B	0.69	0.47	15.0	I190
10A	7.43	0.47	12.0	E203
11A	8.13	0.47	12.0	E201
12A	0.81	0.47	12.0	I211
14A	1.89	0.90	5.0	I220

NOTES:

- PER ANNE ARUNDEL COUNTY DESIGN MANUAL TABLE SD-2.01 THE C-FACTORS USED TO DETERMINE THE WEIGHTED C VALUE PER DRAINAGE AREA ARE AS FOLLOWS:
R1 ZONING = 0.43
R5 ZONING = 0.47
- MINIMUM TIME OF CONCENTRATION IS 5 MINUTES.
- SEE SOILS LEGEND ON SHEET 3.



Pennoni
PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS

Project Name: Broadneck Peninsula Trail Phase III
Project Number: AAC01781
Description: Storm Drain Sizing

Computed by: JSN/PJS
Date: 6/30/2019

Anne Arundel County DPW 10 -Year Storm Pipe Computations																
Structure		Area	Area	R = C	A x R	Sum of	Tc	I	Q	Size	Velocity	Min	Length	Time in pipe	Stump	REMARKS
From	To	Incr. Area	Total Area	(sub-area)	(sub-area)	(sub-area)	min	in/hr	cfs	in	fps	slope	feet	min		
E220	EX1	1.890	1.890	0.90	1.70	1.70	5.0	7.00	11.91	18	6.74	1.28%	4	0.0		Extend Ex. 18" RCP
EX1	EX1A		1.890		1.70	1.70	5.0	7.00	11.91	18	6.74	1.28%	41	0.1		Ex. 18" RCP
E111	E110	0.810	0.810	0.47	0.38	0.38	12.0	3.80	2.21	15	1.80	0.12%	69	0.8		Connect to Ex. 24" RCP
E110	EX2	1.140	1.95	0.47	0.54	0.92	5.0	12.8	3.72	24	1.67	0.08%	106	1.1		EX. 24" RCP
E203	E202	7.430	7.43	0.47	3.49	3.49	12.0	5.80	4.31	24	1.37	0.04%	31	0.4		eliptical pipe
E201	E200	8.130	8.130	0.47	3.82	3.82	12.0	5.80	5.81	24	1.85	0.07%	60	0.5		eliptical pipe
I192	M190	0.380	0.38	0.47	0.18	0.18	15.0	3.30	0.95	15	0.77	0.02%	27	0.6	Y	
I191	M190	0.690	0.690	0.47	0.32	0.32	15.0	3.30	1.72	18	0.97	0.03%	77	1.3	Y	
M190	EX3		1.07		0.30		16.3	3.17	2.60	24	0.83	0.01%	148	3.0		Connect to Ex. 24" RCP
I181	M180	1.850	1.85	0.47	0.87	0.87	10.0	6.10	3.30	15	4.32	0.67%	29	0.1		Connect to Ex. 18" RCP
M180	EX4		1.850		0.87		10.1	6.09	3.30	15	4.32	0.67%	128	0.5		EX. 18" RCP
I171	I170	0.70	0.700	0.47	0.33	0.33	5.0	7.00	2.30	15	1.86	0.13%	85	0.8		
I141	I140	1.860	1.860	0.43	0.80	0.80	13.0	5.30	4.24	15	3.45	0.49%	46	0.2	Y	Connect to Ex. 24" RCP
I140	EX5	1.290	3.110	0.43	0.54	1.34	5.0	19.2	9.28	24	2.55	0.10%	103	0.8	Y	EX. 24" RCP
I131	I130	0.910	0.910	0.43	0.39	0.39	5.0	7.00	2.74	15	2.23	0.18%	31	0.4	Y	Connect to Ex. 24" RCP
I130	EX6	1.040	2.730	0.43	0.79	1.18	12.0	5.80	6.86	24	2.18	0.09%	99	0.8		EX. 24" RCP
E121	E120	0.880	0.880	0.47	0.41	0.41	5.0	7.00	6.86	15	3.59	1.12%	30	0.1	Y	
E111	I110	2.58	3.580	0.47	1.21	1.21	9.0	6.30	7.64	24	2.43	0.11%	31	0.2	Y	Connect to Ex. 24" CMP
I110	EX7	1.620	4.20	0.47	0.76	1.97	3.0	7.00	13.82	24	4.40	0.37%	147	0.6	N	EX. 24" CMP

FLOW TABULATIONS



PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

Pennoni
PENNONI ASSOCIATES INC.
8890 McCaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

APPROVED: [Signature] DATE: 5/16/21
CHIEF ENGINEER

APPROVED: [Signature] DATE: 4/15/21
PROJECT MANAGER

APPROVED: [Signature] DATE: 4/16/21
CHIEF, RIGHT OF WAY SERVICES

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

GP# G02017905 DWG NO: DD09A

97128 APRIL 5, 2021

SCALE: 1" = 100'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 60 of 137
PROJECT # P504100
PROPOSAL #

STORM DRAIN DRAINAGE AREA MAP
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

MATCHLINE - SEE SHEET 62



LEGEND

DRAINAGE AREA



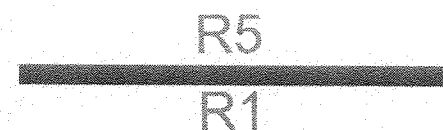
TIME OF CONCENTRATION PATH



STORM DRAIN DRAINAGE AREA



ZONING LINE



PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

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ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97129

APRIL 5, 2021

APPROVED DATE
[Signature] 5/16/21
CHIEF ENGINEER

APPROVAL DATE
[Signature] 4/16/21
ASSISTANT CHIEF ENGINEER

APPROVED DATE
[Signature] 4/15/21
PROJECT MANAGER

APPROVED DATE
[Signature] 4/16/21
CHIEF, RIGHT OF WAY SERVICES

SCALE: 1" = 100'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 61 of 137
PROJECT #: P504100
PROPOSAL #:

STORM DRAIN DRAINAGE AREA MAP
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

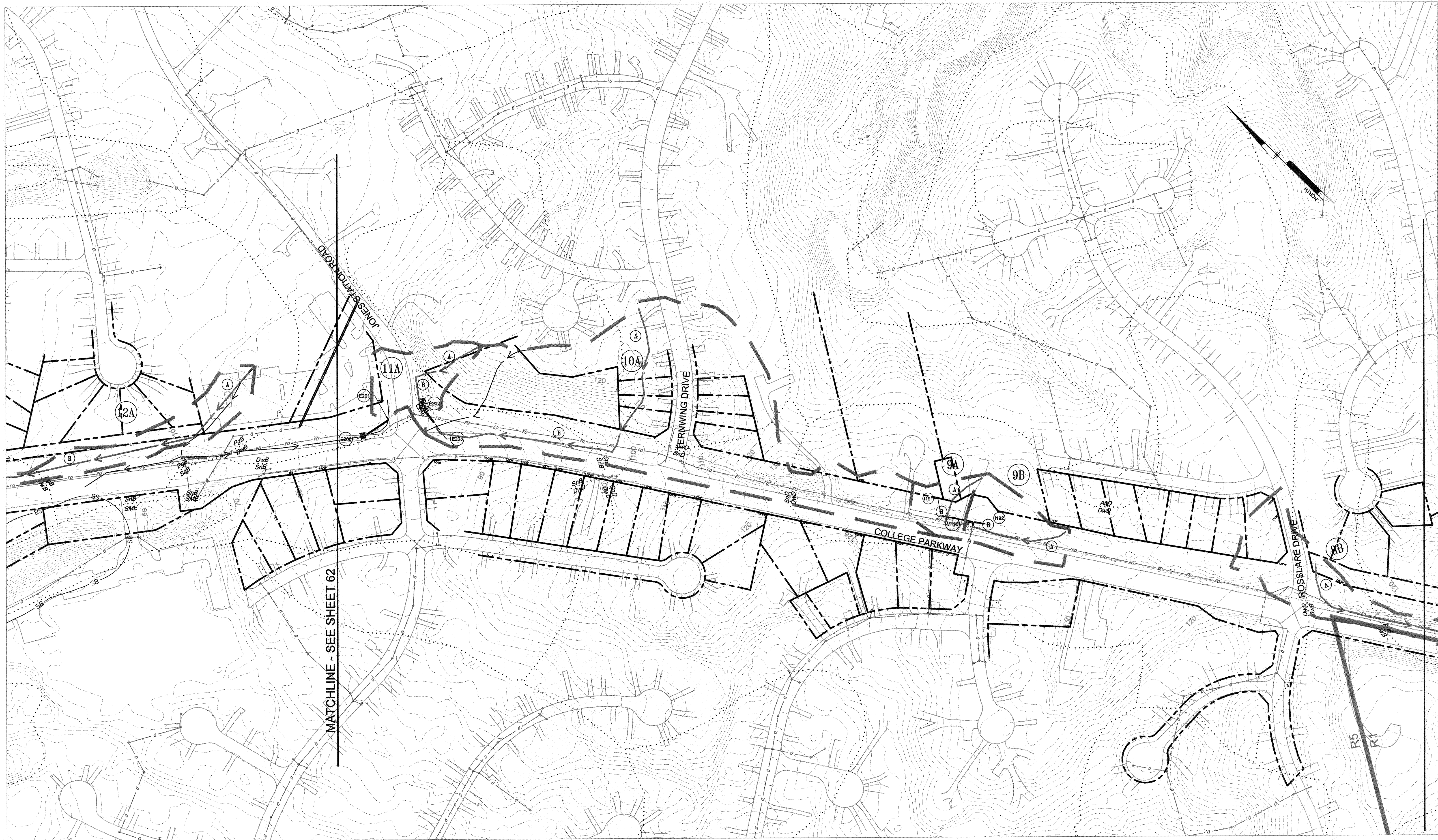
GP# G02017905

DWG NO: DD09B

DWG NO:

MATCHLINE - SEE SHEET 63

MATCHLINE - SEE SHEET 61



MATCHLINE - SEE SHEET 64

LEGEND

- DRAINAGE AREA
- TIME OF CONCENTRATION PATH A
- STORM DRAIN DRAINAGE AREA 9A
- ZONING LINE

R5
R1

PROFESSIONAL CERTIFICATION: I, JAMES A. RUEF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

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Pennoni
PENNONI ASSOCIATES INC.
 8890 McGaw Road, Suite 100
 Columbia, MD 21045
 T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

APPROVED <i>[Signature]</i> DATE <u>4/15/21</u> CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE <u>4/15/21</u> PROJECT MANAGER
APPROVAL <i>[Signature]</i> DATE <u>4/15/21</u> ASSISTANT CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE <u>4/15/21</u> CHIEF, RIGHT OF WAY SERVICES

SCALE: 1" = 100'
 DRAWN BY: PAI
 CHECKED BY: PJS/JAR
 SHEET 62 of 137
 PROJECT #: P504100
 PROPOSAL #:

97130 APRIL 5, 2021

STORM DRAIN DRAINAGE AREA MAP

BROADNECK TRAIL - PHASE III
 CONSTRUCTION DOCUMENTS

ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
 ANNE ARUNDEL COUNTY, MD
 NOVEMBER 2019

GP# G02017905 DWG NO: DD09C

MATCHLINE - SEE SHEET 62

DPW No.:



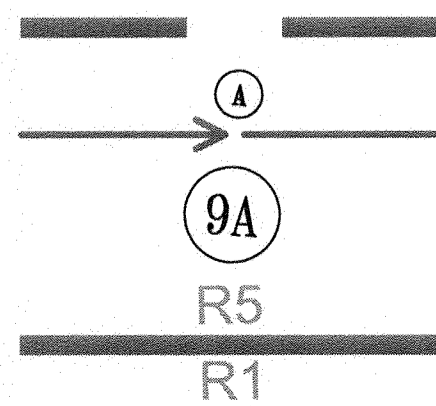
LEGEND

DRAINAGE AREA

TIME OF CONCENTRATION PATH

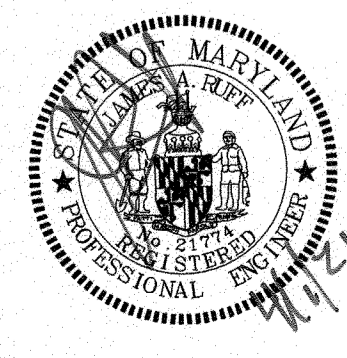
STORM DRAIN DRAINAGE AREA

ZONING LINE



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T 410.997.8900 F 410.997.9282

APPROVED		DATE	APPROVED		DATE
<i>[Signature]</i>	CHIEF ENGINEER	5/2/21	<i>[Signature]</i>	PROJECT MANAGER	4/15/21
<i>[Signature]</i>	ASSISTANT CHIEF ENGINEER	4/21/21	<i>[Signature]</i>	CHIEF, RIGHT OF WAY SERVICES	4/15/21

SCALE: 1" = 100'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 63 of 137
PROJECT #: P504100
PROPOSAL #:

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97131

STORM DRAIN DRAINAGE AREA MAP

BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER, 2019

GP# G02017905

DWG NO: DD09D

APRIL 5, 2021

MATCHLINE - SEE SHEET 63

MATCHLINE - SEE SHEET 65

DSW INC.



LEGEND

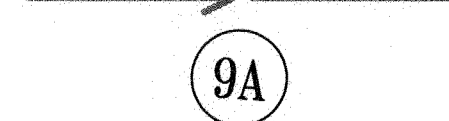
DRAINAGE AREA



TIME OF CONCENTRATION PATH



STORM DRAIN DRAINAGE AREA



ZONING LINE

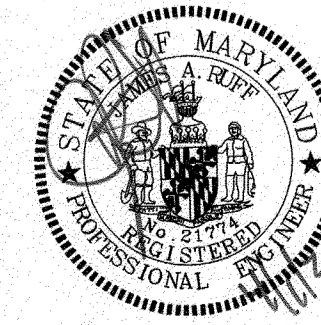


GP# G02017905

DWG NO: DD09E

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE



PENNONI ASSOCIATES INC.
8830 McCaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97132

APRIL 5, 2021

APPROVED DATE
James A. Ruff 4/15/21
CHIEF ENGINEER

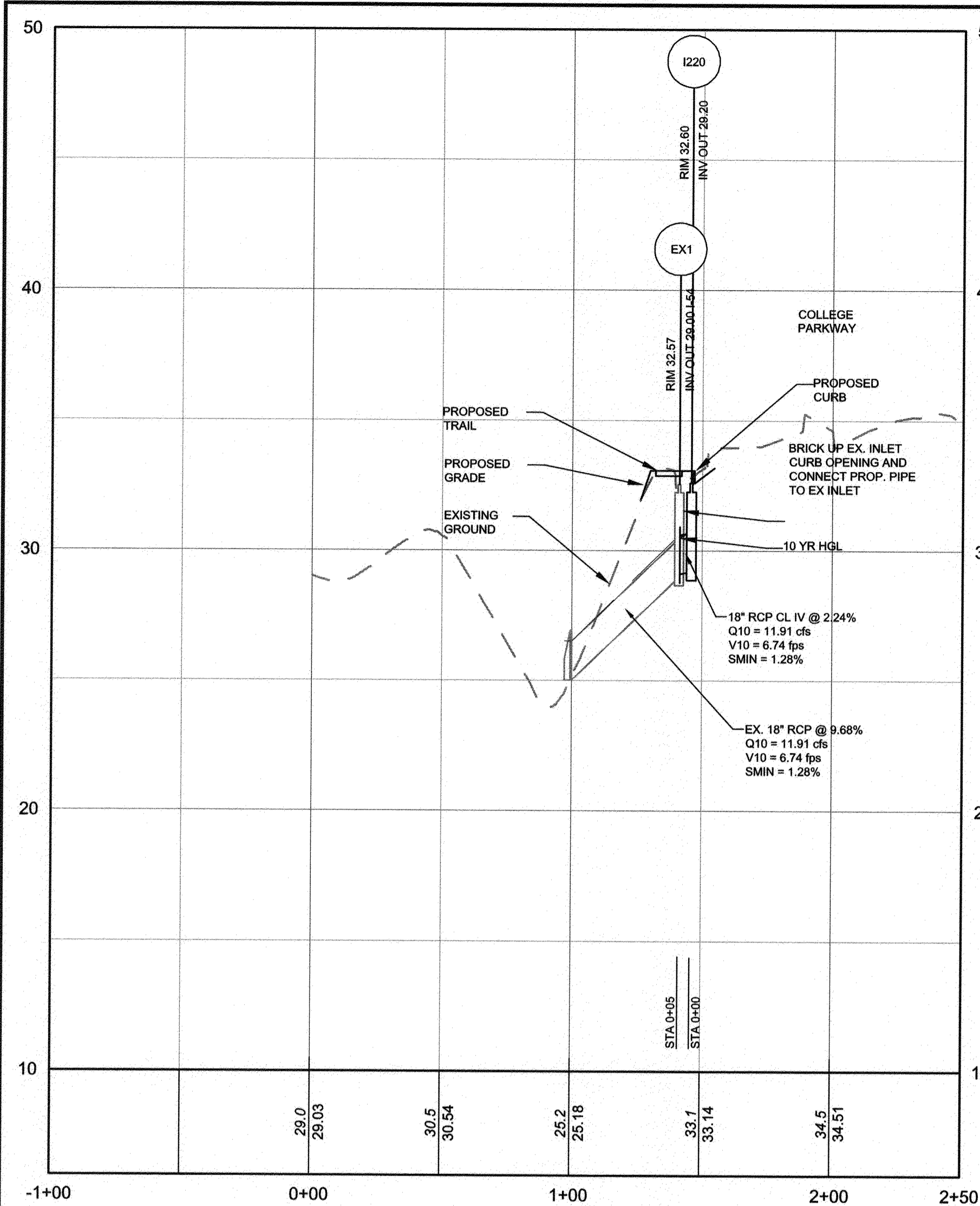
APPROVAL DATE
James A. Ruff 4/15/21
ASSISTANT CHIEF ENGINEER

APPROVED DATE
Paul J. Jar 4/15/21
PROJECT MANAGER

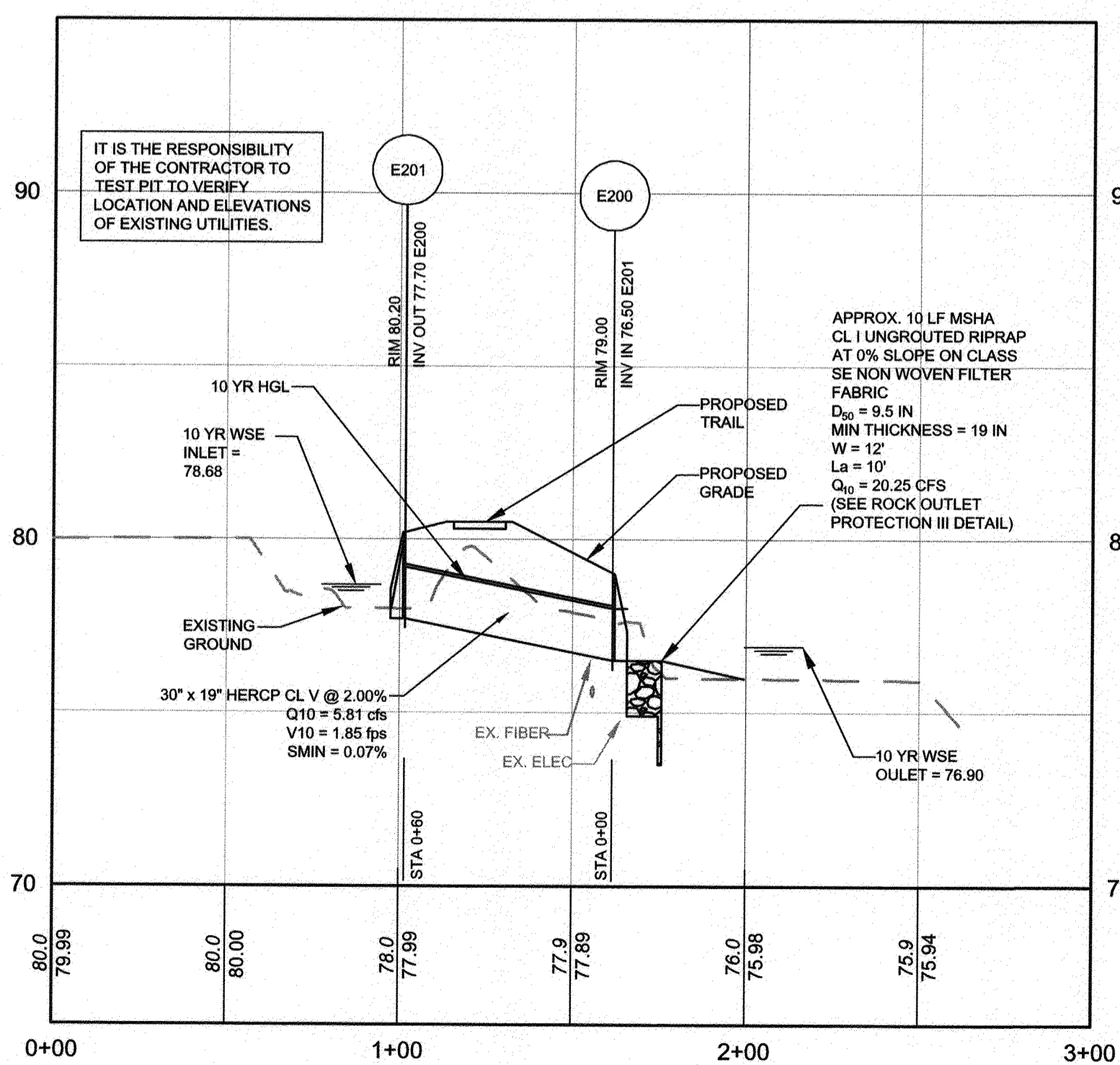
APPROVED DATE
Paul J. Jar 4/15/21
CHIEF, RIGHT OF WAY SERVICES

SCALE: 1" = 100'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 64 of 137
PROJECT #: P504100
PROPOSAL #:

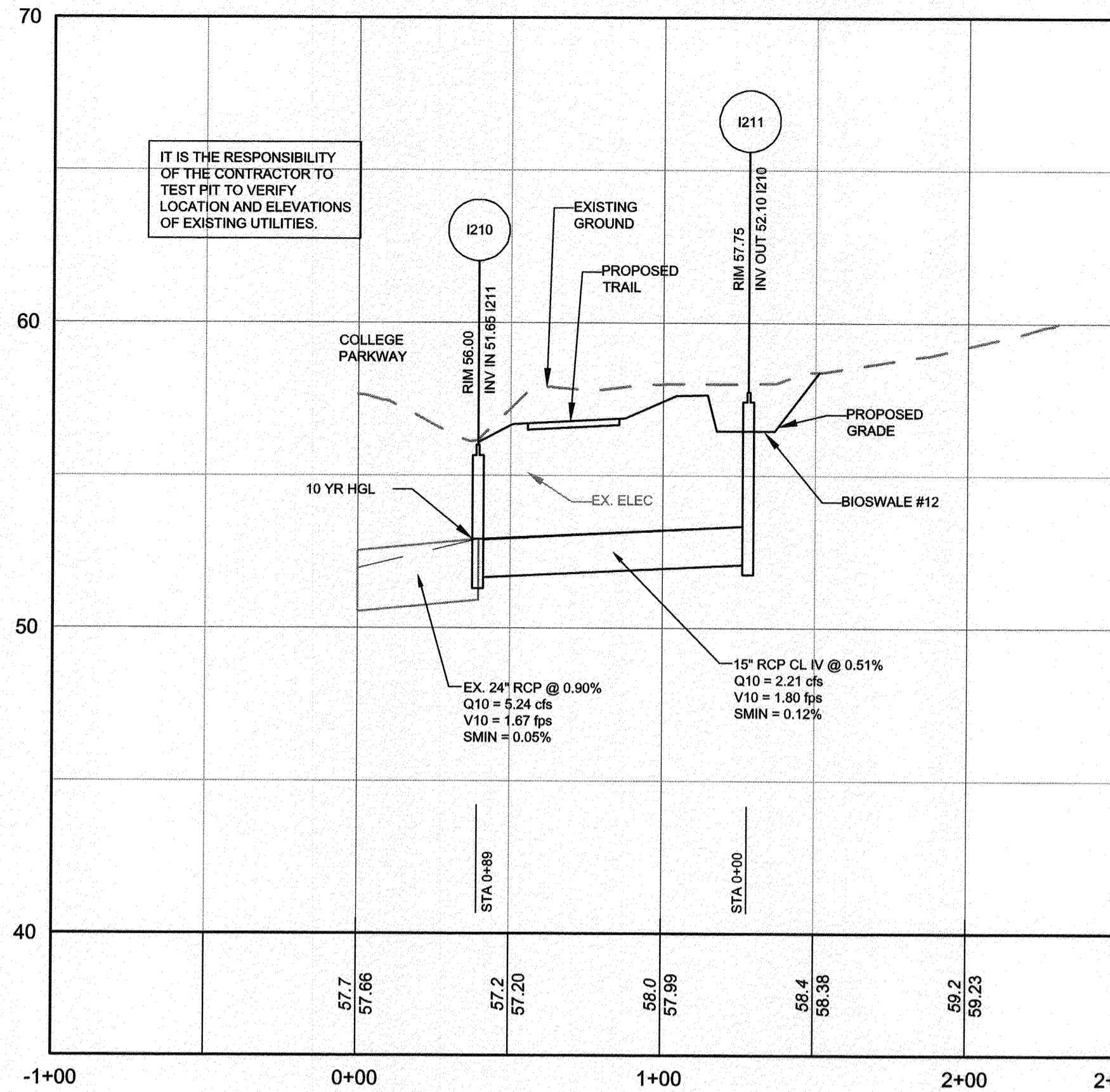
STORM DRAIN DRAINAGE AREA MAP
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019



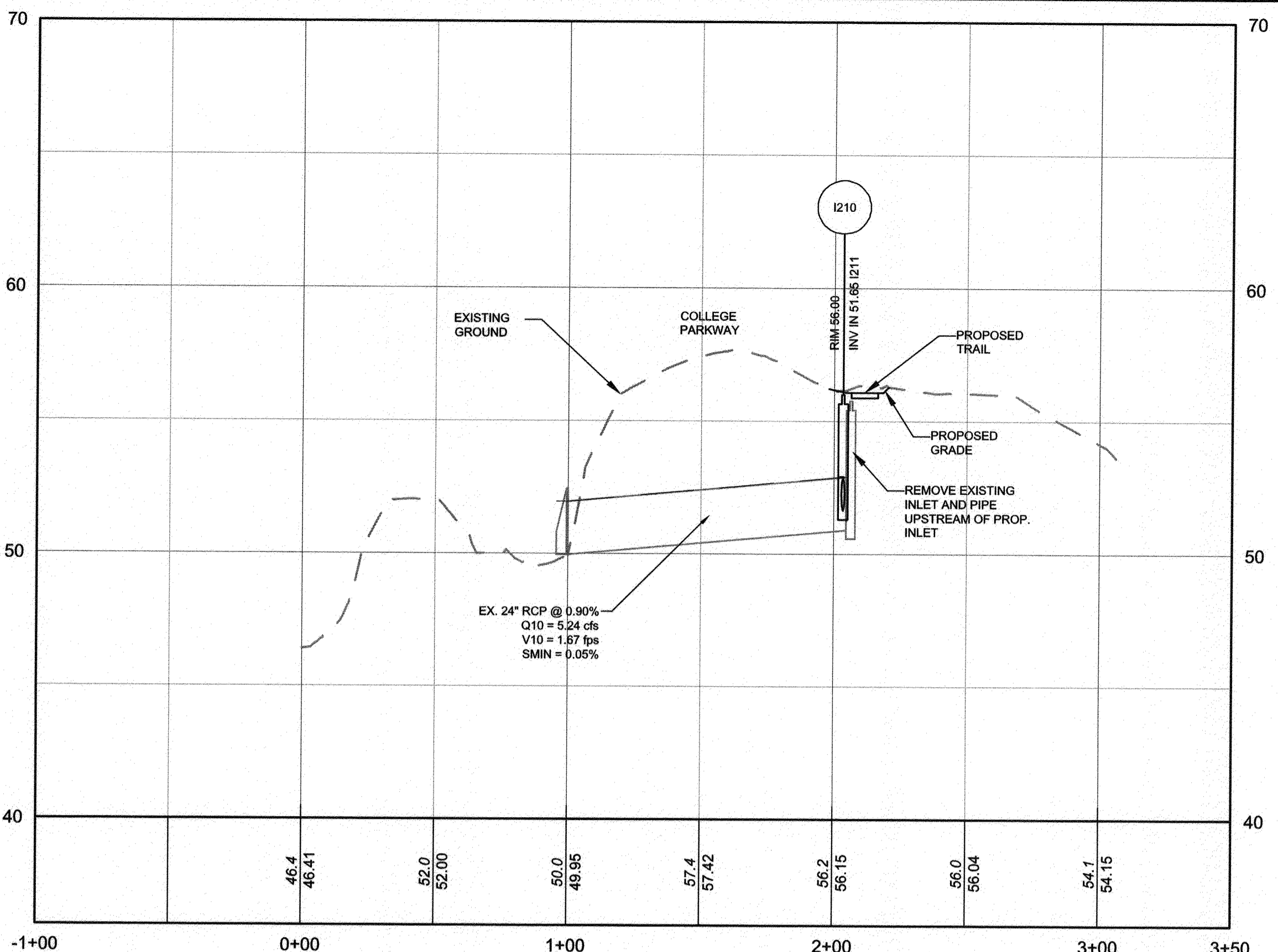
EX 18 INCH SD AT COLLEGE PARKWAY STATION 41+50
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



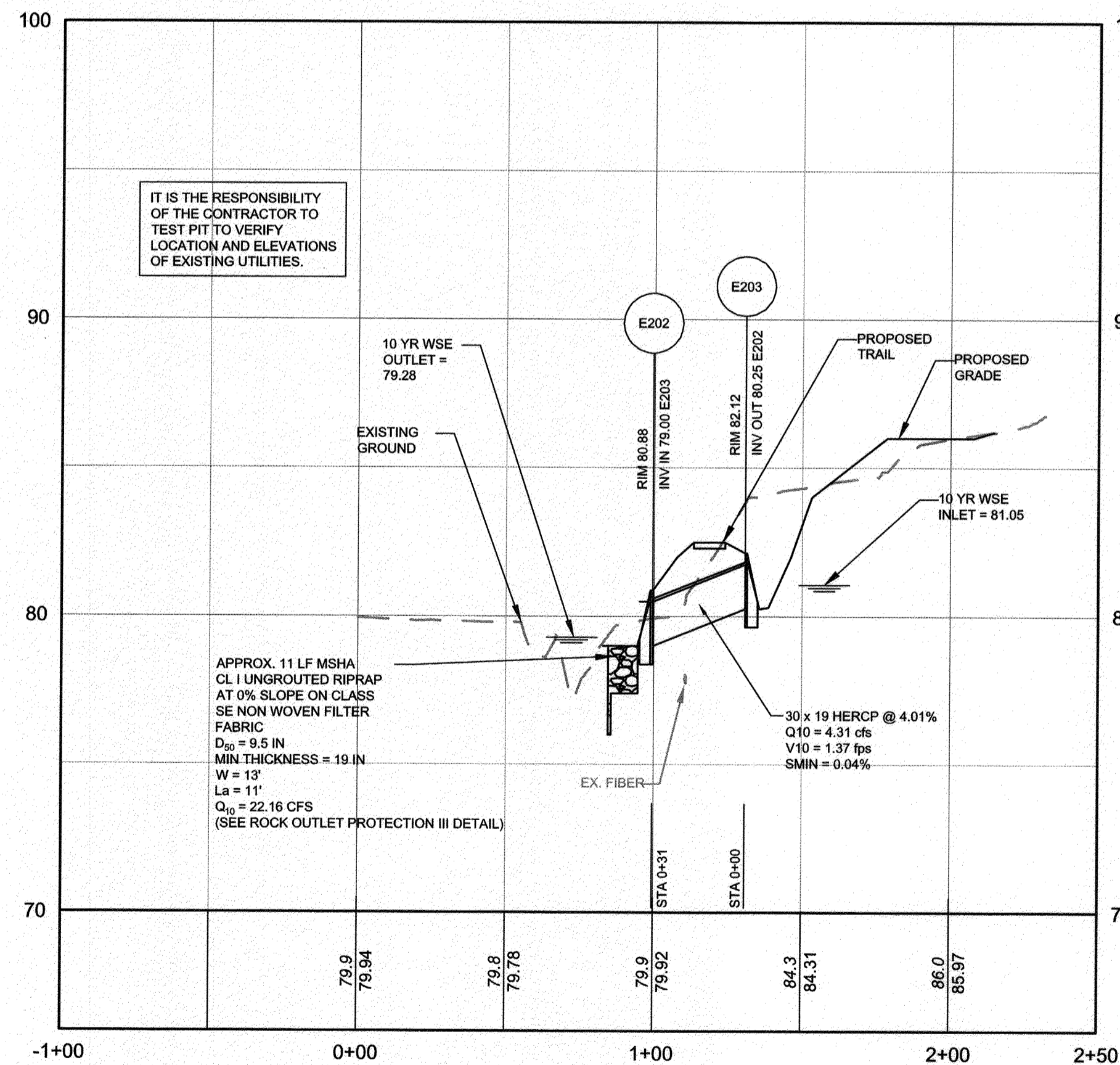
E201 TO E200
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



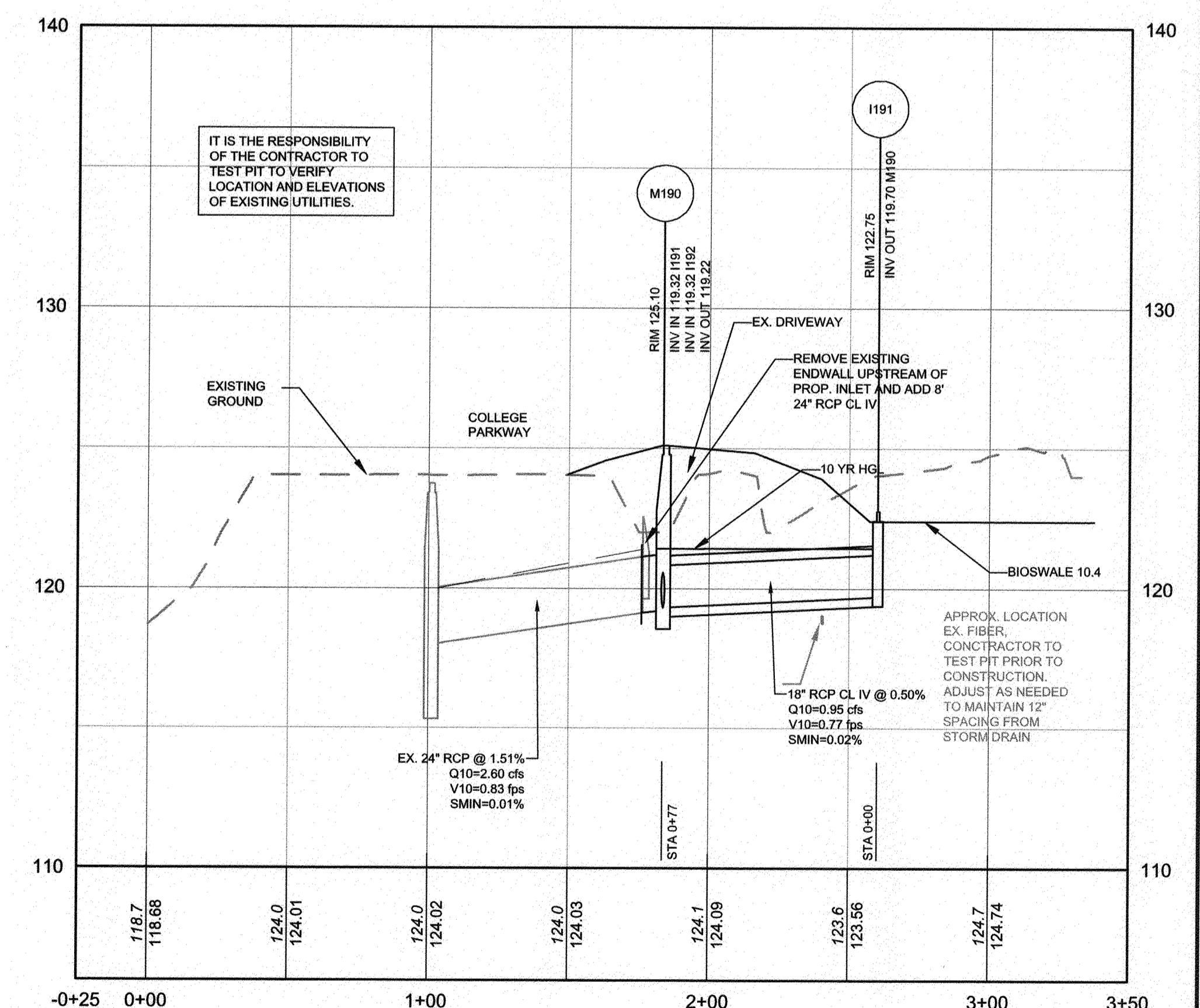
I211 TO I210
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VERTICAL SCALE: 1" = 4'



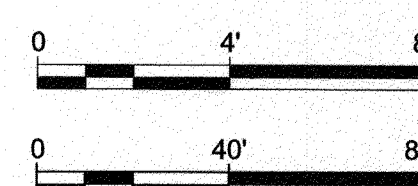
EX 24 INCH SD AT COLLEGE PARKWAY STATION 55+50
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



E203 TO E202
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



EX 24 INCH SD AT COLLEGE PARKWAY STATION 81+50
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



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#	REVISIONS	APPROVED
	DESCRIPTION	BY / DATE

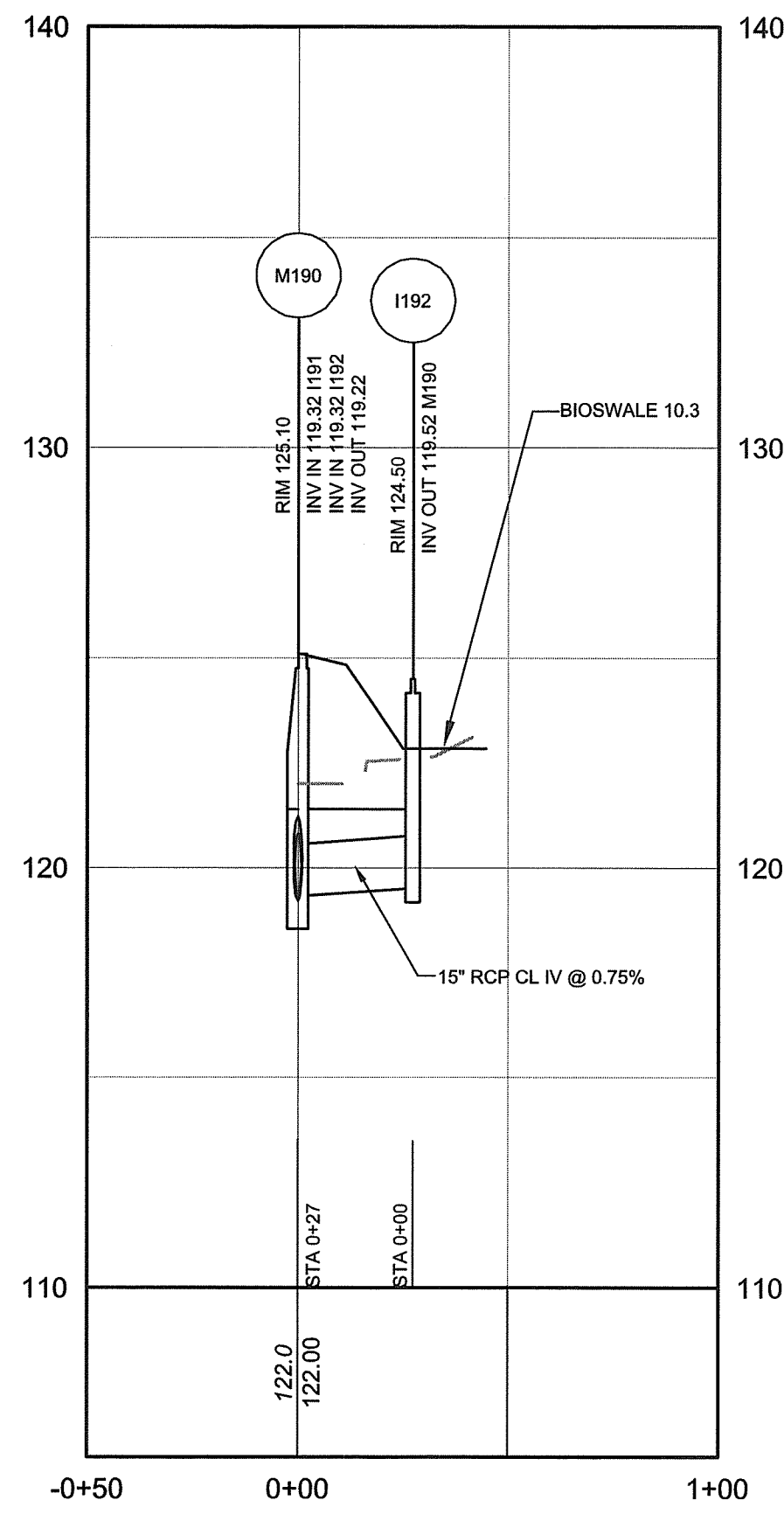
Penioni
PENNIONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS
97133
APRIL 5, 2021

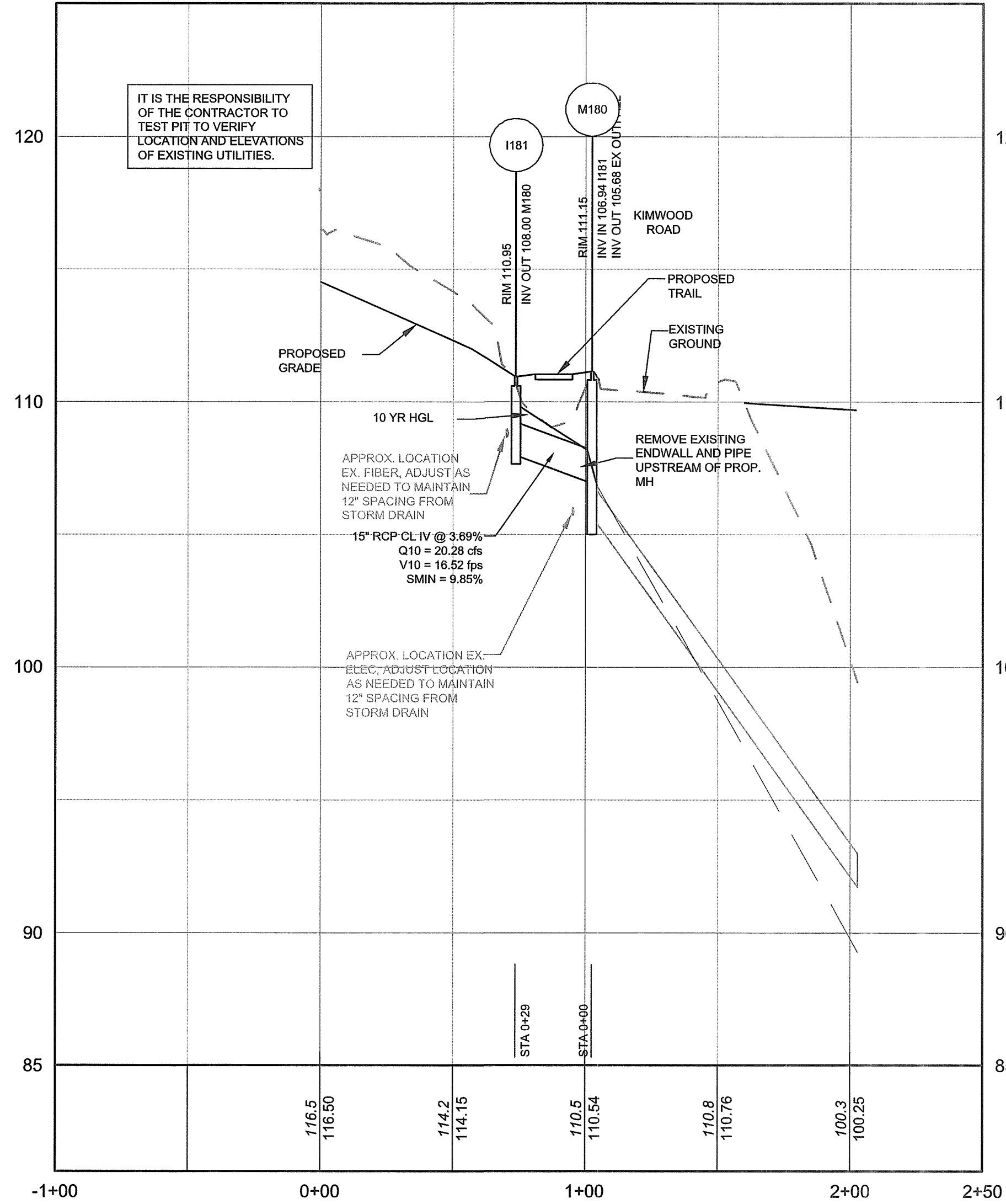
GP# G02017905 DWG NO: DD09F

APPROVED DATE <i>[Signature]</i> 5/16/21 CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/15/21 PROJECT MANAGER	SCALE: AS SHOWN	STORM DRAIN PROFILES
APPROVED DATE <i>[Signature]</i> 4/24/21 ASSISTANT CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/16/21 CHIEF, RIGHT OF WAY SERVICES	DRAWN BY: PAI	
CHECKED BY: PJS/JAR		SHEET 65 OF 137	

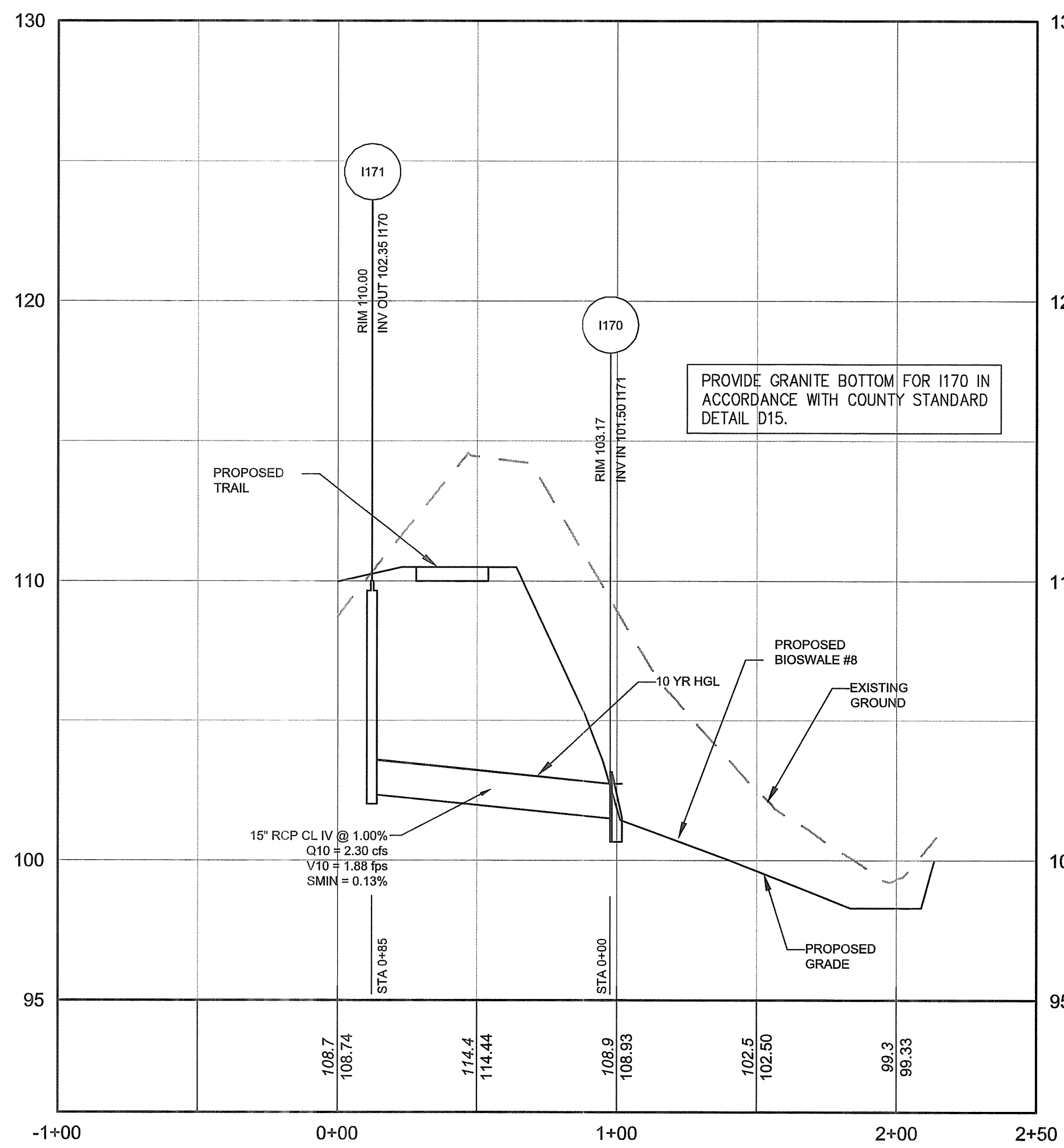
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 38, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019



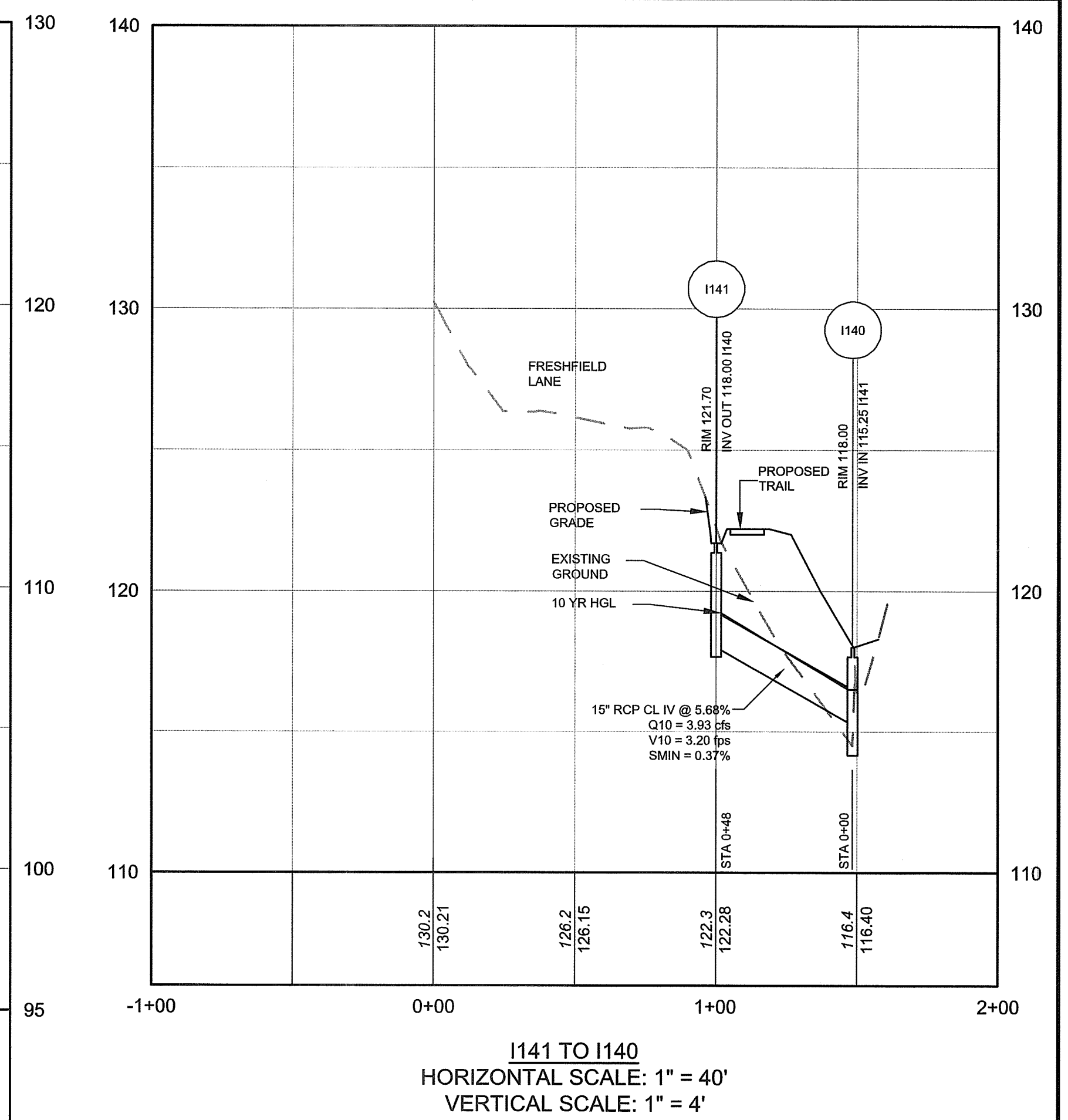
1192 TO M190
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



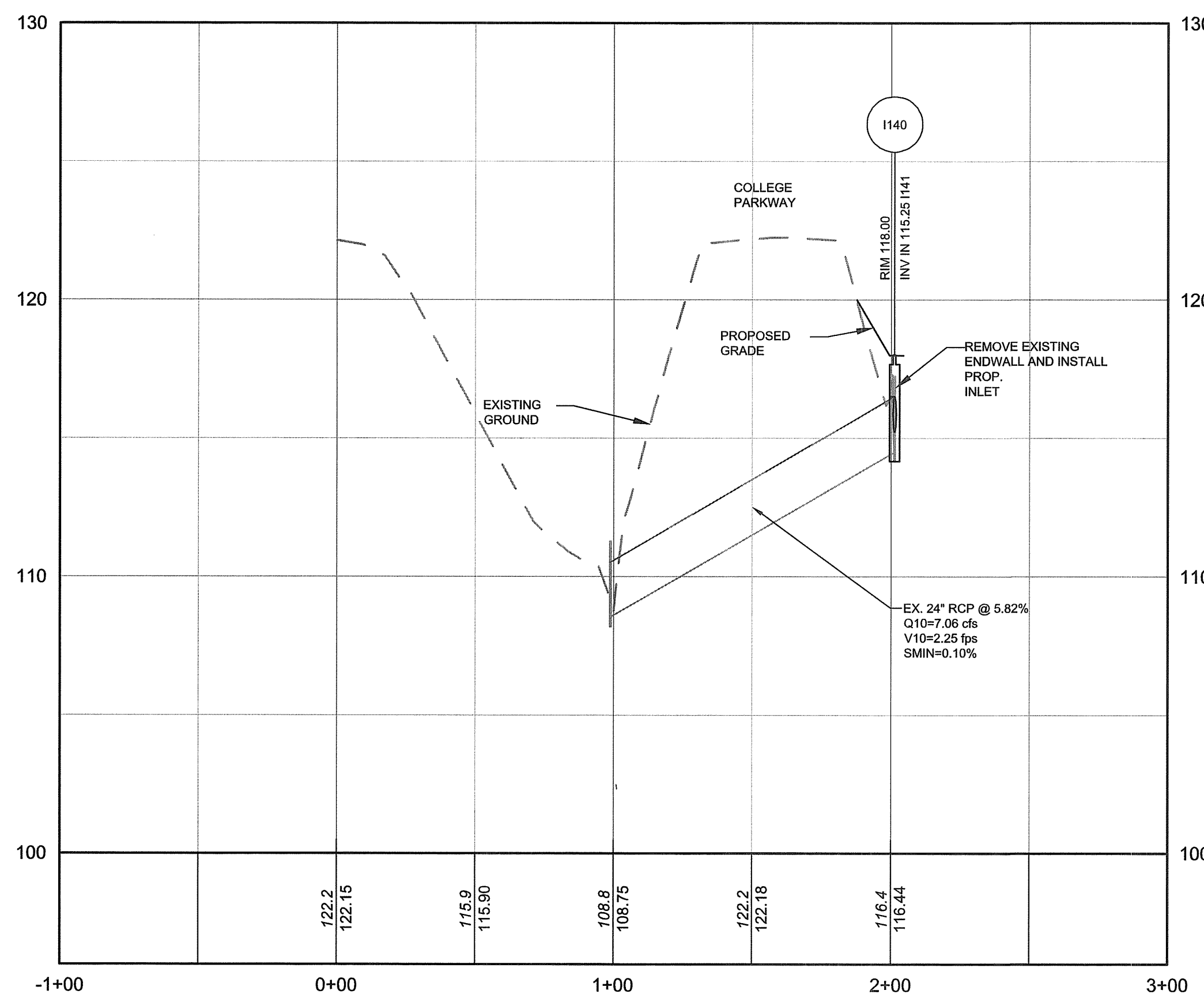
1181 TO 1180
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



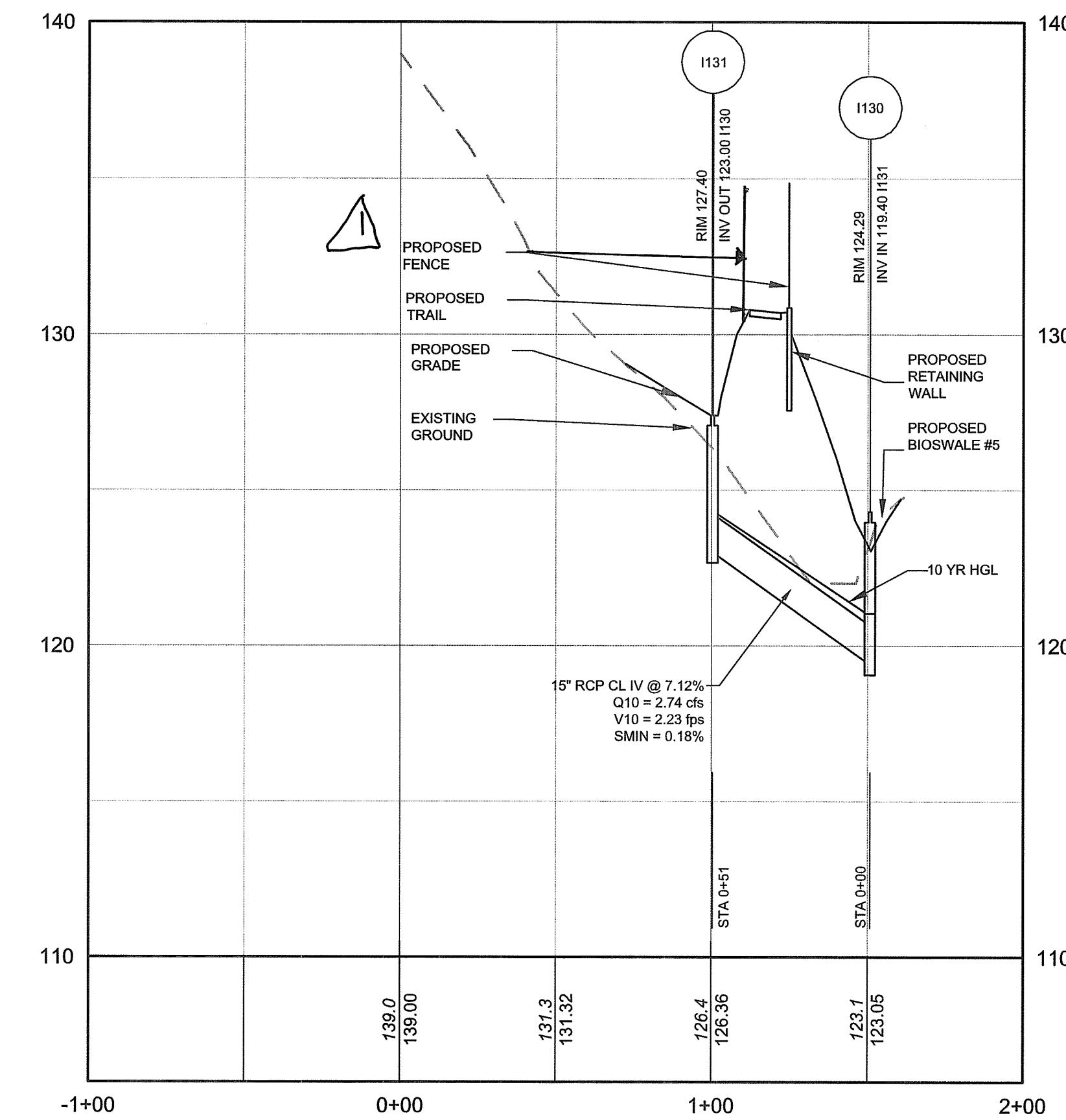
1171 TO 1170
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



1141 TO 1140
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



EX 24 INCH SD AT COLLEGE PARKWAY STATION 117+00
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



1131 TO 1130
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'

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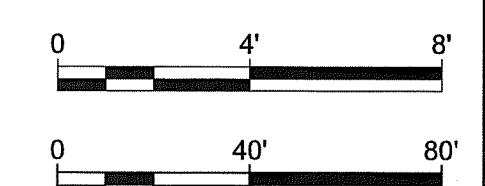
REVISIONS	DESCRIPTION	APPROVED BY	DATE
1	ADD FENCE AT I 131	JAR	11/27/21



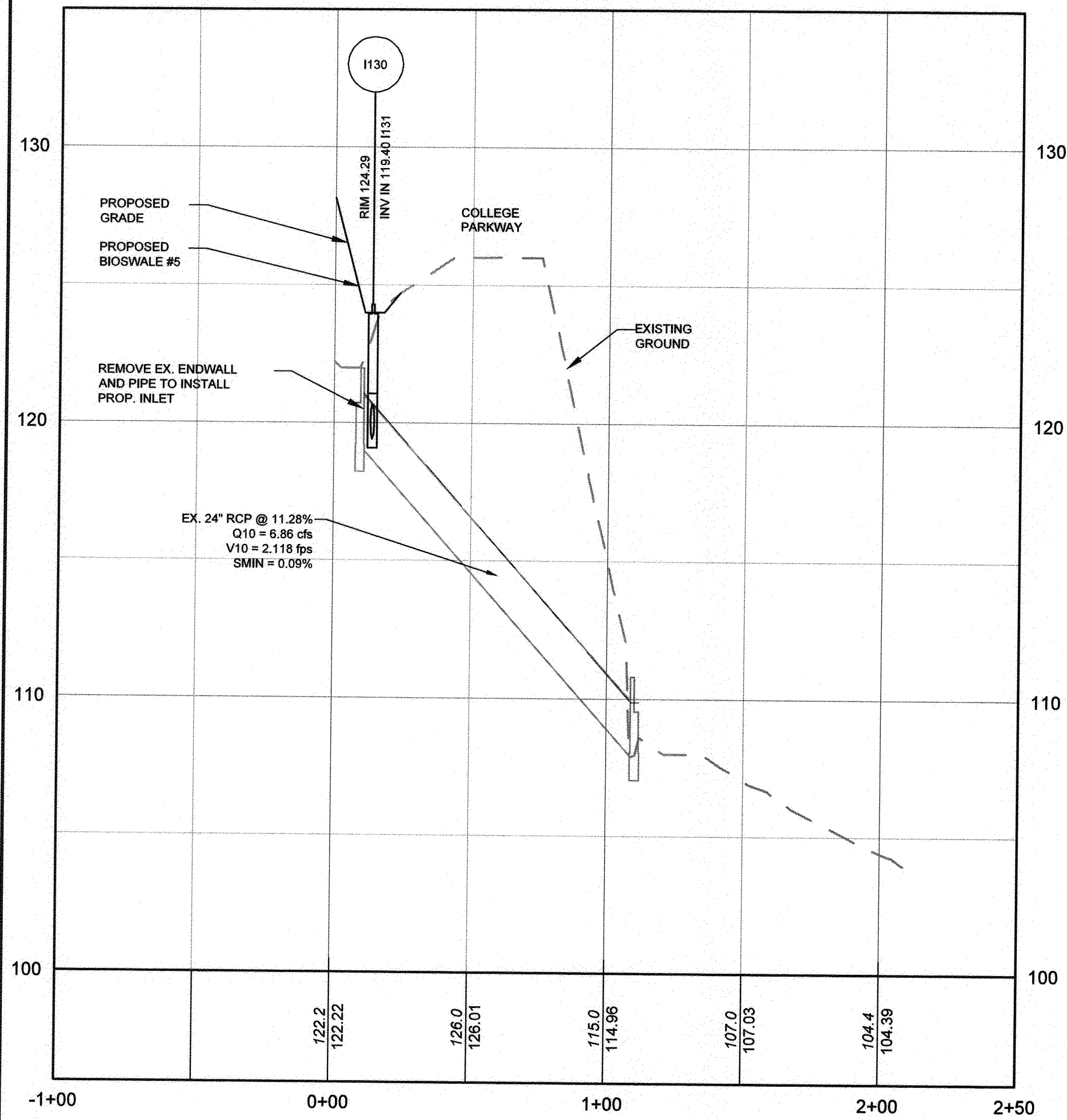
PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

APPROVED DATE		APPROVED DATE		SCALE: AS SHOWN
[Signature] 11/27/21		[Signature] 11/15/21		DRAWN BY: PAI
CHIEF ENGINEER		PROJECT MANAGER		CHECKED BY: PJS/JAR
APPROVAL DATE		APPROVED DATE		SHEET 66 of 137
[Signature] 11/27/21		[Signature] 11/15/21		PROJECT #: PS04100
ASSISTANT CHIEF ENGINEER		CHIEF/RIGHT OF WAY SERVICES		PROPOSAL #:

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS
97134
APRIL 5, 2021
STORM DRAIN PROFILES
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019



SPW No.:



EX 24 INCH SD AT COLLEGE PARKWAY STATION 121+00
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'

DETAIL D-4-1-C ROCK OUTLET PROTECTION III

STANDARD SYMBOL: ROP III

DISCHARGE TO AN UNCONFINED CHANNEL OR FLAT AREA

CONSTRUCTION SPECIFICATIONS

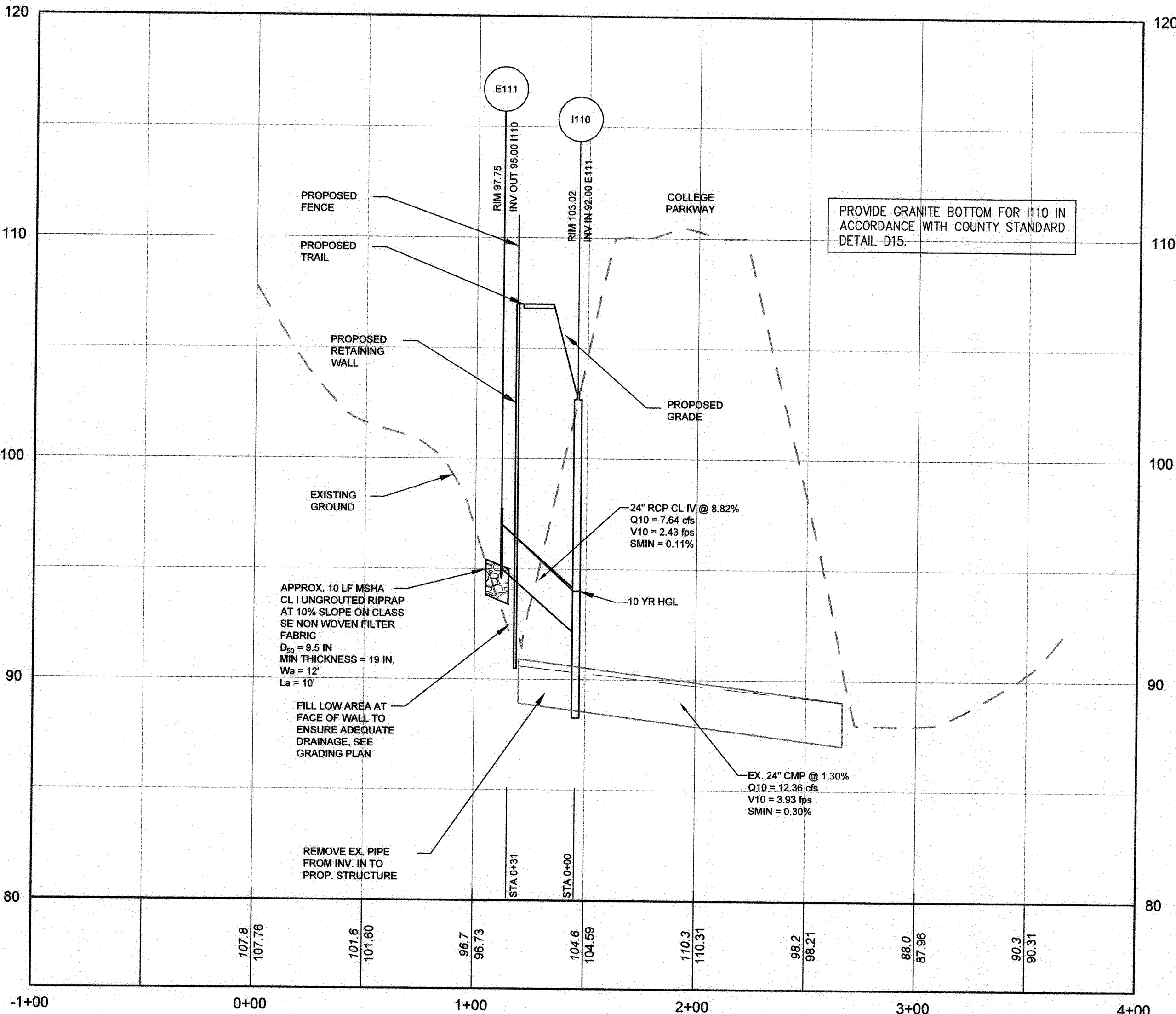
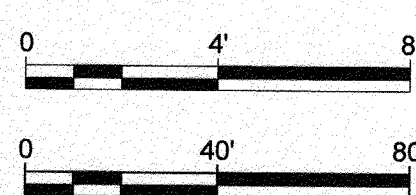
- RIPRAP AND STONE MUST CONFORM TO THE SPECIFIED CLASS.
- USE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, AND PROTECT FROM PUNCTURING, CUTTING, OR TEARING. REPAIR ANY DAMAGE OTHER THAN AN OCCASIONAL SMALL HOLE BY PLACING ANOTHER PIECE OF GEOTEXTILE OVER THE DAMAGED PART OR BY COMPLETELY REPLACING THE GEOTEXTILE. PROVIDE A MINIMUM OF ONE FOOT OVERLAP FOR ALL REPAIRS AND FOR JOINING TWO PIECES OF GEOTEXTILE TOGETHER.
- PREPARE THE SUBGRADE FOR GEOTEXTILE OR STONE FILTER (3/8 TO 1/2 INCH MINIMUM STONE FOR 6 INCH MINIMUM DEPTH) AND RIPRAP TO THE REQUIRED LINES AND GRADES. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO A DENSITY OF APPROXIMATELY THAT OF THE SURROUNDING UNDISTURBED MATERIAL.
- EXTEND GEOTEXTILE AT LEAST 6 INCHES BEYOND EDGES OF RIPRAP AND EMBED AT LEAST 4 INCHES AT SIDES OF RIPRAP.
- CONSTRUCT RIPRAP OUTLET TO FULL COURSE THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO AVOID DISPLACEMENT OF UNDERLYING MATERIALS. PLACE STONE FOR RIPRAP OUTLET IN A MANNER THAT WILL ENSURE THAT IT IS REASONABLY HOMOGENEOUS WITH THE SMALLER STONES AND SPALLS FILLING THE VOIDS BETWEEN THE LARGER STONES. PLACE RIPRAP IN A MANNER TO PREVENT DAMAGE TO THE FILTER BLANKET OR GEOTEXTILE. HAND PLACE TO THE EXTENT NECESSARY.
- WHERE NO ENDWALL IS USED, CONSTRUCT THE UPSTREAM END OF THE APRON SO THAT THE WIDTH IS TWO TIMES THE DIAMETER OF THE OUTLET PIPE, AND EXTEND THE STONE UNDER THE OUTLET BY A MINIMUM OF 18 INCHES.
- CONSTRUCT APRON WITH 0% SLOPE ALONG ITS LENGTH AND WITHOUT OBSTRUCTIONS. PLACE STONE SO THAT IT BLENDS IN WITH EXISTING GROUND.
- MAINTAIN LINE, GRADE AND CROSS SECTION. KEEP OUTLET FREE OF EROSION. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. AFTER HIGH FLOWS INSPECT FOR SCOUR AND RIPRAP DISLODGED RIPRAP. MAKE NECESSARY REPAIRS IMMEDIATELY.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE 2011 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

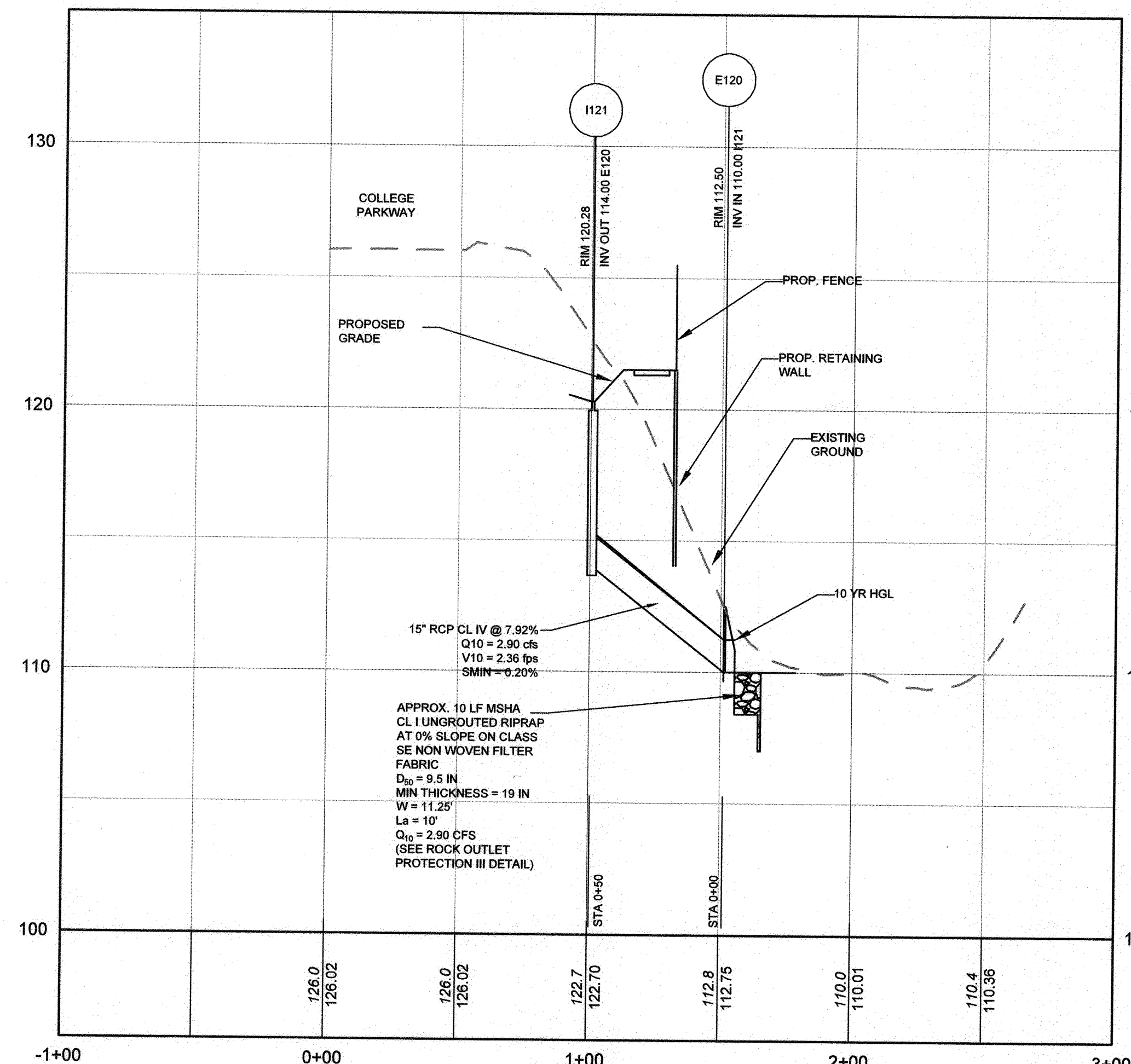
STORM STRUCTURE INSTALLATION NOTES:

- WHERE EXISTING ENDWALLS ARE BEING REMOVED AND REPLACED WITH INLETS OR MANHOLES, CONTRACTOR SHALL:
 - VERIFY INVERTS
 - REMOVE EX. END WALL AVOIDING DAMAGE TO PIPE.
 - ADJUST PIPE LENGTH PER PLANS, EITHER SHORTENING PIPE OR ADDING ADDITIONAL PIPE
 - EXCAVATE AS NECESSARY TO INSTALL PROPOSED STRUCTURE
 - INSTALL STRUCTURE AT PIPE
 - GROUT PIPE IN PLACE AT STRUCTURE TO ENSURE WATER TIGHT OPENING.
 - BACKFILL STRUCTURE AND INSTALL INLET PROTECTION IN ACCORDANCE WITH SEDIMENT CONTROL PLANS.
- WHERE EXISTING INLET IS TO BE RAISED, CONTRACTOR SHALL VERIFY EXISTING TOP ELEVATION, AND THEN RAISE INLET ELEVATION TO THAT SPECIFIED WITH PRECAST ADJUSTMENT RINGS, CAST IN PLACE CONCRETE, OR BRICK MASONRY. ALL METHODS OF RAISING ELEVATION SHALL BE SECURELY FASTENED TO EXISTING STRUCTURE. WHERE BRICK MASONRY IS USED, BRICK SHALL BE PARGED IN ACCORDANCE ANNE ARUNDEL COUNTY AND/OR MARYLAND STATE HIGHWAY ADMINISTRATION SPECIFICATIONS.

ID	INV OUT	AS-BUILT INV OUT	INV IN	AS-BUILT INV IN	DIAMETER (in)	MATERIAL	DESCRIPTION	LENGTH (ft)	SLOPE
E111 TO E110	95.00		92.00		24"	RCP CL IV	24 in RCP CL IV	34'	8.82%
E201 TO E200	77.70		76.50		30"	HERCP	30" x 19" HERCP CL V	60'	2.00%
E203 TO E202	80.25		79.00		30"	HERCP	30 x 19 HERCP	31'	4.01%
I121 TO E120	114.00		110.00		15"	RCP CL IV	15 in RCP CL IV	50'	7.92%
I131 TO I130	123.00		119.40		15"	RCP CL IV	15 in RCP CL IV	51'	7.12%
I141 TO I140	118.00		115.25		15"	RCP CL IV	15 in RCP CL IV	48'	5.68%
I171 TO I170	102.35		101.50		15"	RCP CL IV	15 in RCP CL IV	85'	1.00%
I181 TO M180	108.00		106.94		15"	RCP CL IV	15 in RCP CL IV	29'	3.89%
I192 TO M190	119.52		119.32		15"	RCP CL IV	15 in RCP CL IV	27'	0.75%
I210 TO I211	51.65		52.10		15"	RCP CL IV	15 in RCP CL IV	89'	0.51%
I220 TO	29.20		29.10		18"	RCP CL IV	18 in RCP CL IV	4'	2.24%
M180 TO EX OFFFALL	106.68		88.03		15"	RCP CL IV	15 in RCP CL IV	127'	13.91%
M190 TO	119.22		119.14		24"	RCP	24 in RCP	8'	1.00%
M190 TO I191	119.32		119.70		18"	RCP CL IV	18 in RCP CL IV	77'	0.50%



E111 TO I110
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'



I121 TO E120
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 4'

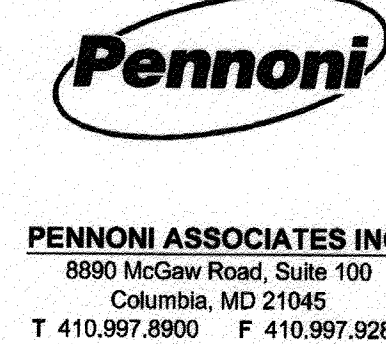
STORM DRAIN STRUCTURE SCHEDULE

ID	RIM ELEVATION	AS-BUILT RIM ELEVATION	INV IN (FROM)	AS BUILT INV IN	INV OUT (TO)	AS-BUILT INV OUT	TYPE	NORTHING	EASTING
E111	97.75				95.00 (24" RCP CL IV) I110		105 W X 37 H X 6 D CONCRETE HEADWALL	499746.0790	1459346.8444
E120	112.50		110.00 (15" RCP CL IV @ 7.92%) I121				PRECAST CONC. END SECTION - AA CO DTL D-74	499888.0433	1458039.8351
E200	79.00		76.50 (30" HERCP @ 2.00%) E201				PRECAST CONC. END SECTION - AA CO DTL D-74	503850.0143	1453828.8215
E201	80.20				77.70 (30" HERCP) E200		PRECAST CONC. END SECTION - AA CO DTL D-74	503837.7812	1453888.4629
E202	80.88		79.00 (30" HERCP @ 4.01%) E203				PRECAST CONC. END SECTION - AA CO DTL D-74	503788.7880	1453962.6946
E203	82.12				80.25 (30" HERCP) E202		PRECAST CONC. END SECTION - AA CO DTL D-74	503767.8938	1453958.3409
EX OFFFALL	89.71		88.03 (15" RCP CL IV @ 13.91%) M180				NULL STRUCTURE	501316.8620	1455696.2825
I110	103.02		92.00 (24" RCP CL IV @ 8.82%) E111				48" MH W/ OPEN GRATE TOP - AA CO DTL D-12	499717.2108	1459328.8690
I121	120.28				114.00 (15" RCP CL IV) E120		PRECAST YARD INLET - MSHA DTL MD 318.01	499855.8816	1458078.7542
I130	124.29		119.40 (15" RCP CL IV @ 7.12%) I131				PRECAST YARD INLET - MSHA DTL 318.01	499964.2331	1457306.2197
I131	127.40				123.00 (15" RCP CL IV) I130		PRECAST YARD INLET - MSHA DTL 318.01	500003.2870	1457338.3436
I140	118.00		115.25 (15" RCP CL IV @ 5.68%) I141				PRECAST YARD INLET - MSHA DTL 318.01	500083.2973	1456952.0977
I141	121.70				118.00 (15" RCP CL IV) I140		PRECAST YARD INLET - MSHA DTL 318.01	500130.4237	1458940.9669
I170	103.17		101.50 (15" RCP CL IV @ 1.00%) I171				PRECAST CONC. END SECTION, AA CO DTL D-74	500905.2059	1455842.6666
I171	110.00				102.35 (15" RCP CL IV) I170		PRECAST YARD INLET - MSHA DTL 318.01	500828.0843	1455678.7663
I181	110.95				108.00 (15" RCP CL IV) M180		PRECAST YARD INLET - MSHA DTL MD 318.01	501424.8701	1455455.3284
I191	122.75				119.70 (18" RCP CL IV) M190		PRECAST YARD INLET - MSHA DTL MD 318.01	502763.1703	1454627.3585
I192	124.50				119.52 (15" RCP CL IV) M190		PRECAST YARD INLET - MSHA DTL MD 318.01	502676.9361	1454685.2813
I210	56.00		51.65 (15" RCP CL IV @ 0.51%) I211				PRECAST YARD INLET, MSHA DTL 318.01	504601.3489	1452919.2870
I211	57.75				52.10 (15" RCP CL IV) I210		PRECAST YARD INLET - MSHA DETAIL MD 318.01	504653.8259	1452994.1079
I220	32.60				29.20 (18" RCP CL IV)		PRECAST A1 INLET, AA CO DTL D-23	505387.3644	1451761.3934
M180	111.15		106.94 (15" RCP CL IV @ 3.89%) I181		106.68 (15" RCP CL IV) EX OFFFALL		48" PRECAST MH - AACO DTL D-12	501409.5000	1454579.6032
M190	125.10		119.32 (18" RCP CL IV @ 0.50%) I191 119.32 (15" RCP CL IV @ 0.75%) I192		119.22 (24" RCP)		48" PRECAST MH - AACO DTL D-12	502699.3766	1454669.7142

GP # G02017905 DWG NO: DD09H

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REVISIONS	DESCRIPTION	APPROVED BY	DATE

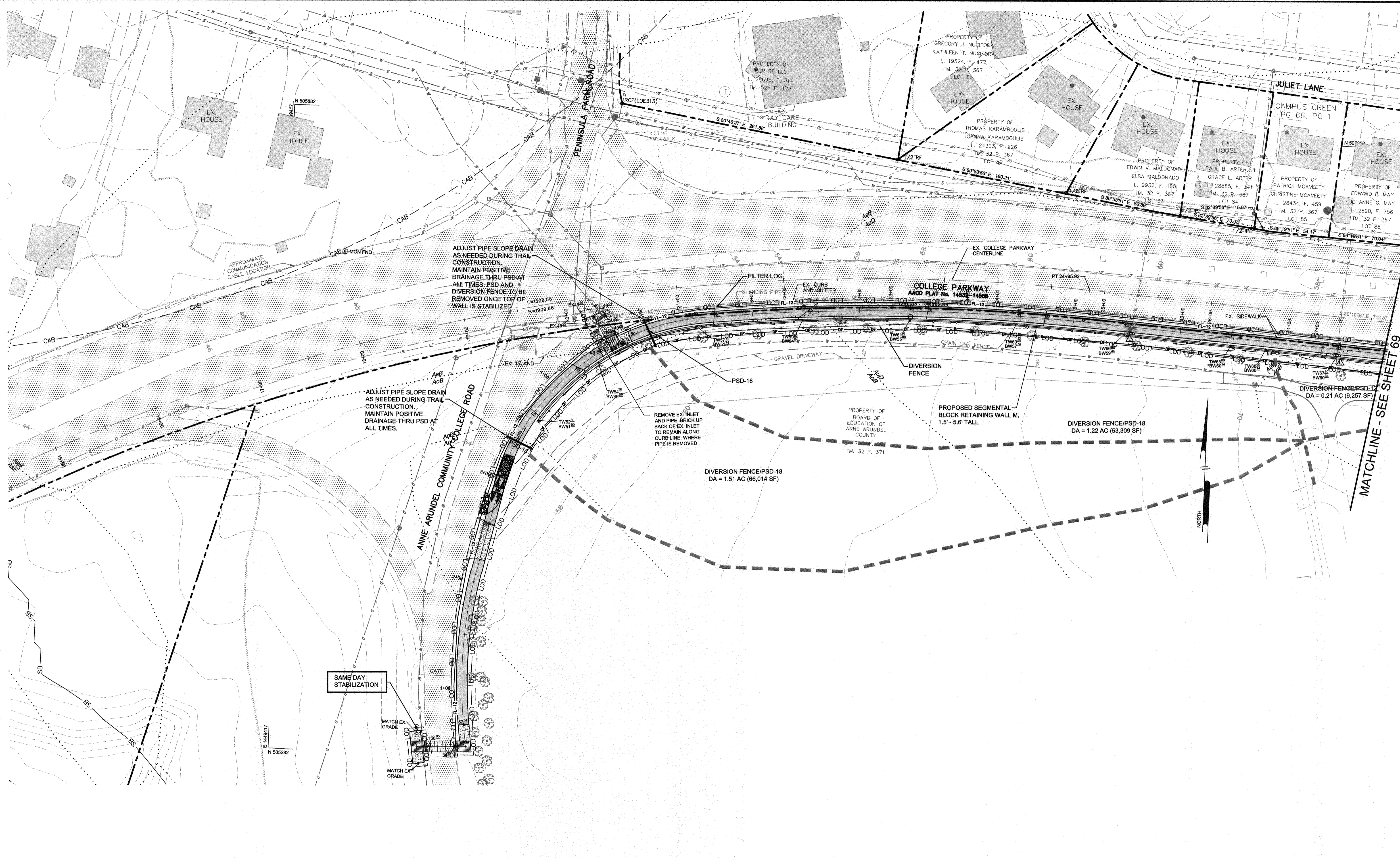


ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED DATE: 4/15/21
APPROVED DATE: 4/15/21

SCALE: AS SHOWN
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 67 of 137
PROJECT # P504100
PROPOSAL #

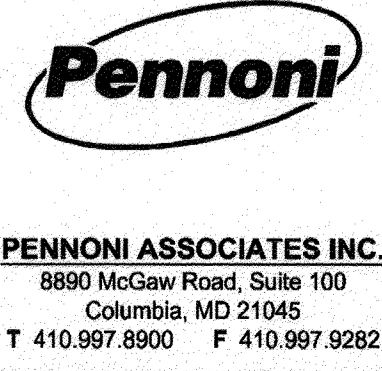
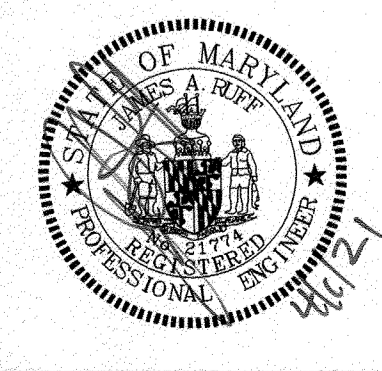
97135
APRIL 5, 2021
STORM DRAIN PROFILES
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNDOL, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019



GP# G02017905 DWG NO: DD10A

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#	REVISIONS DESCRIPTION	APPROVED BY	DATE



APPROVED	DATE	APPROVED	DATE
<i>[Signature]</i>	5/16/21	<i>[Signature]</i>	4/15/21
CHIEF ENGINEER		PROJECT MANAGER	
<i>[Signature]</i>	4/21/21	<i>[Signature]</i>	4/16/21
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES	

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

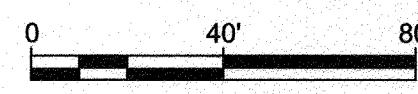
97136 APRIL 5, 2021

SEDIMENT CONTROL PLAN

BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS

TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

SCALE: 1" = 40'
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 68 of 137
PROJECT #: P504100
PROPOSAL #:



DRAW NO:

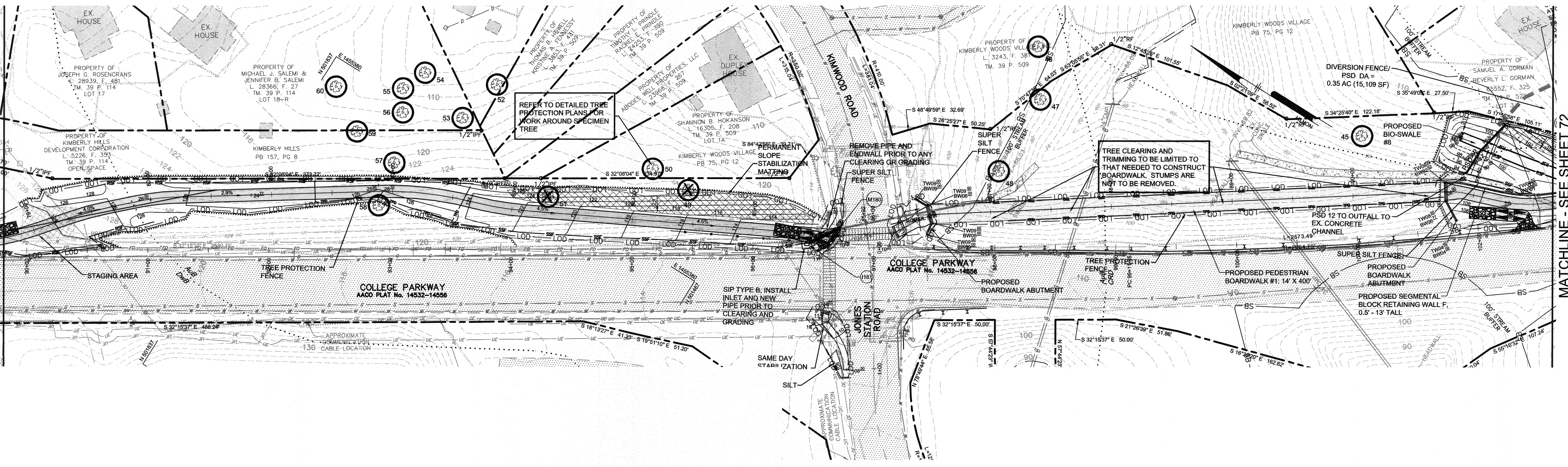
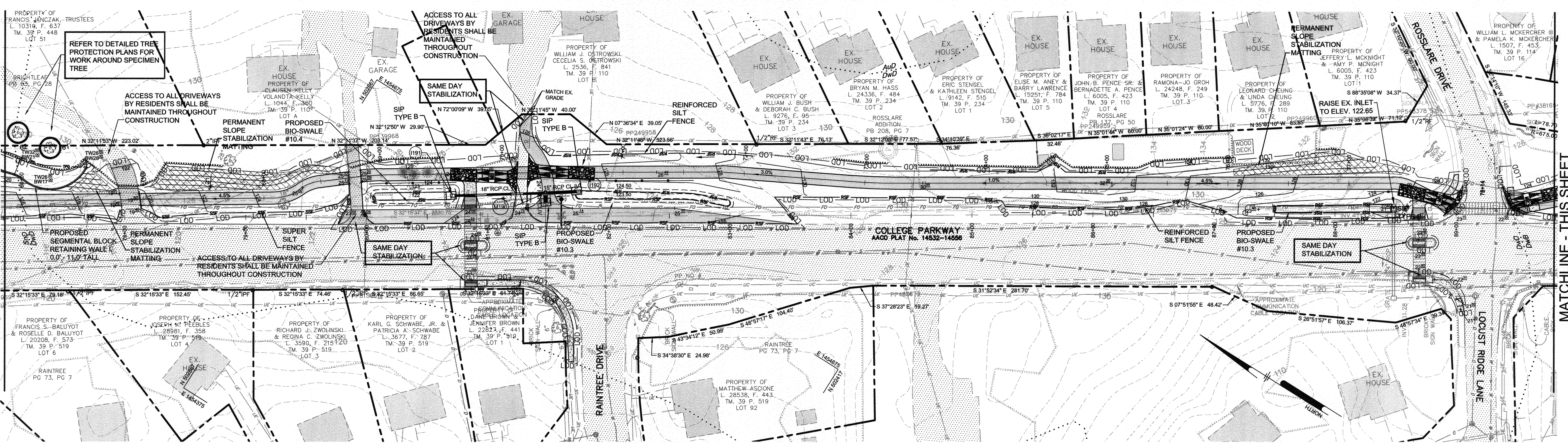
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GP# G02017905 DWG NO: DD10D

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

REVISIONS	APPROVED		
#	DESCRIPTION	BY	DATE

Pennoni

PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.987.8900 F 410.987.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97139 APRIL 5, 2021

SEDIMENT CONTROL PLAN

BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS

ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

APPROVED	DATE	APPROVED	DATE
<i>[Signature]</i>	5/15/21	<i>[Signature]</i>	4/15/21
CHIEF ENGINEER		PROJECT MANAGER	
APPROVAL	DATE	APPROVED	DATE
<i>[Signature]</i>	4/15/21	<i>[Signature]</i>	4/15/21
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES	

SCALE: 1" = 40'

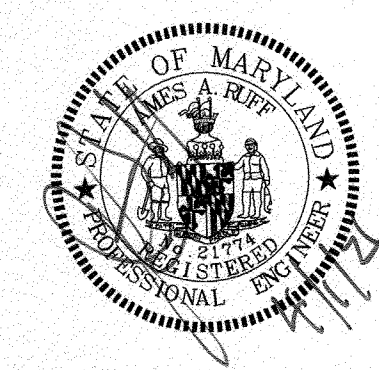
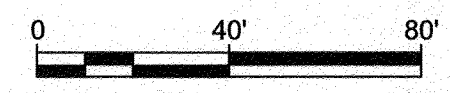
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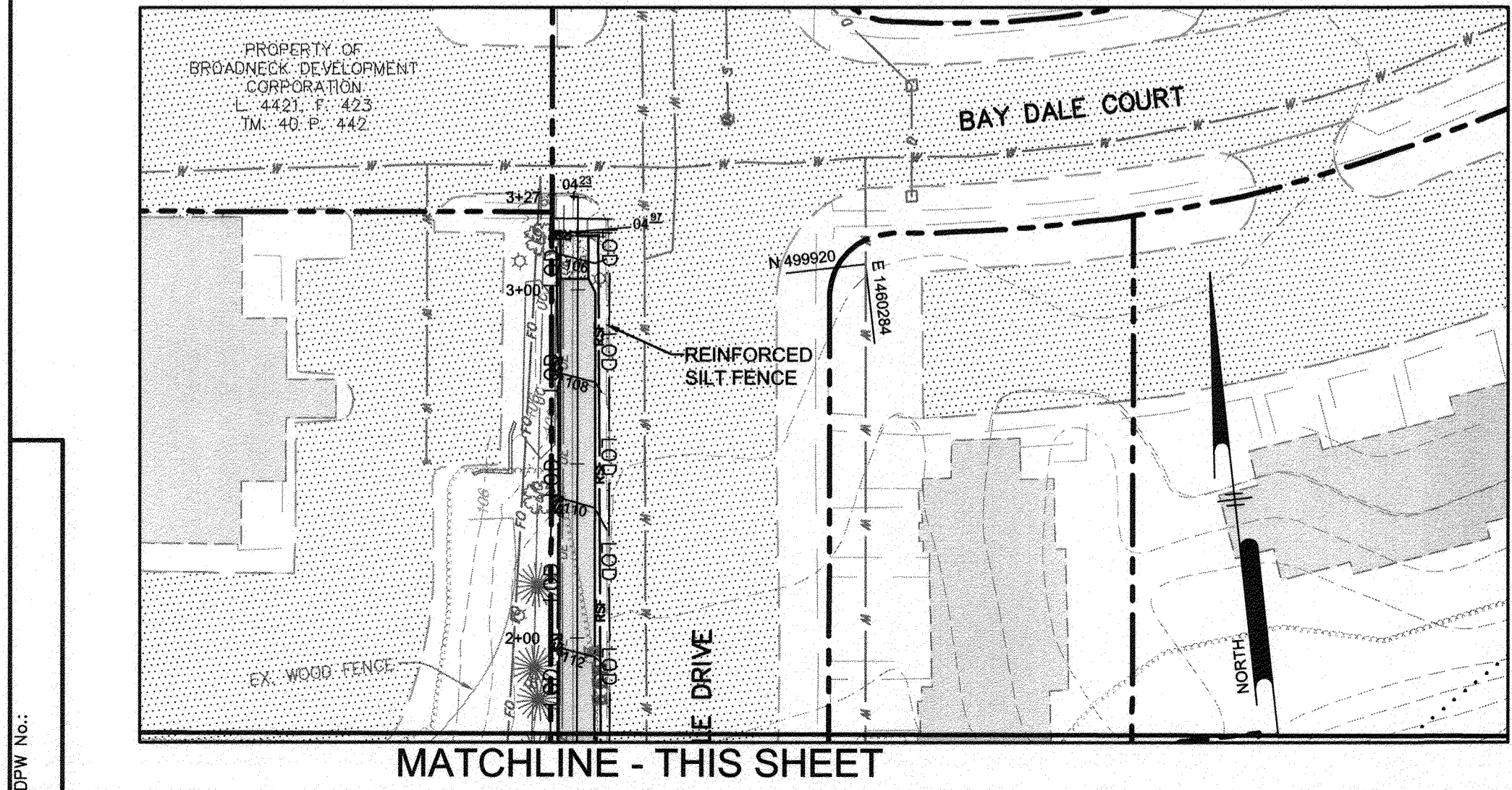
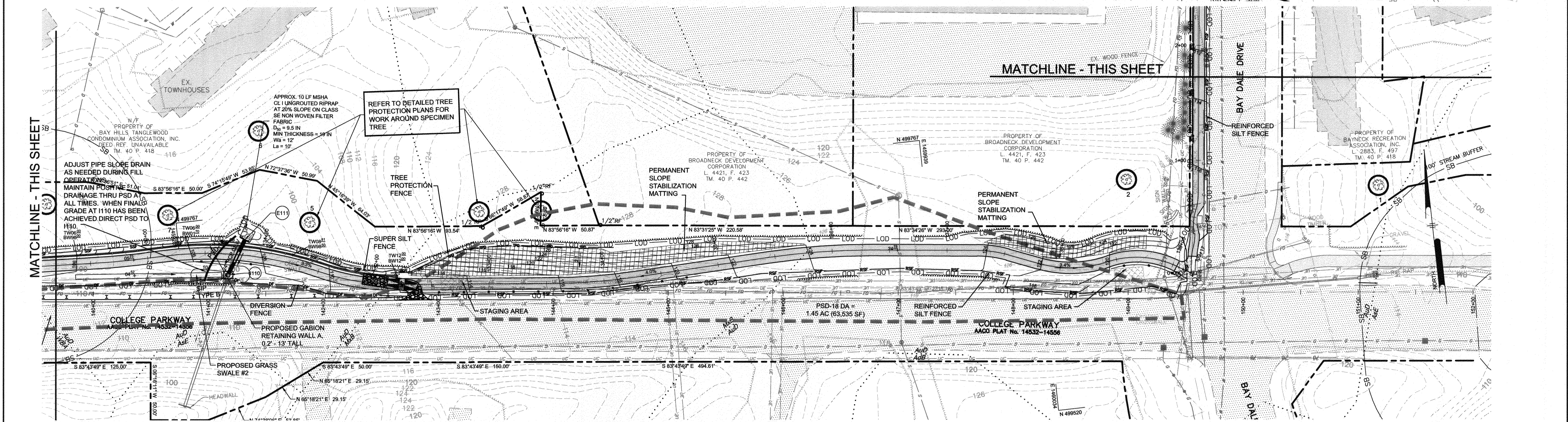
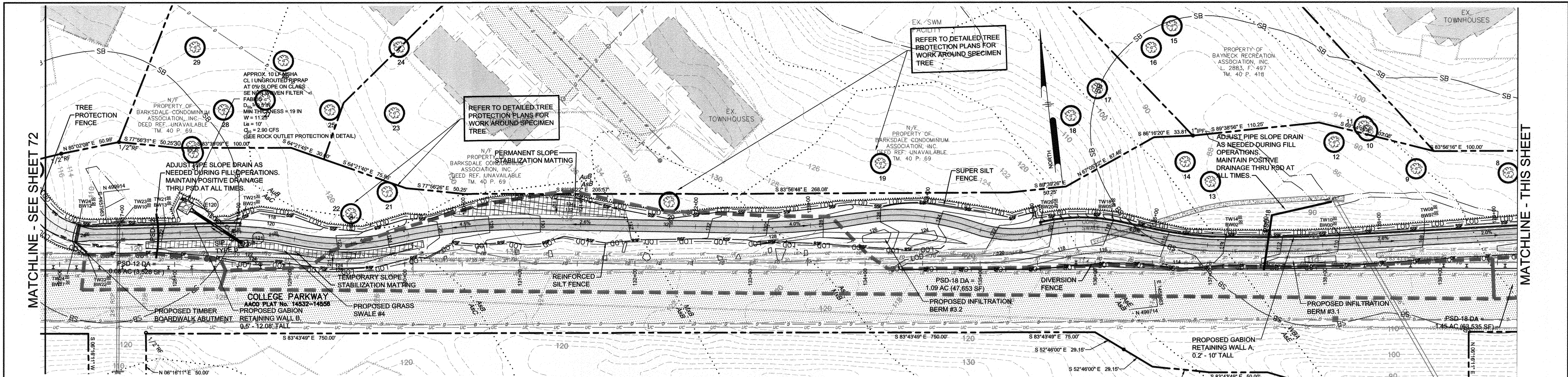
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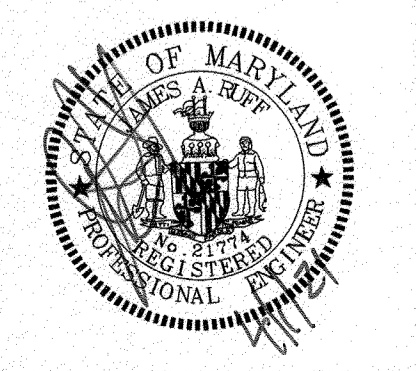
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DWG NO.

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#	REVISIONS DESCRIPTION	APPROVED BY	DATE



Pennoni
PENNONI ASSOCIATES INC.
 8890 McGaw Road, Suite 100
 Columbia, MD 21045
 T 410.997.8900 F 410.997.8282

APPROVED	DATE	APPROVED	DATE
<i>[Signature]</i>	5/14/21	<i>[Signature]</i>	4/15/21
CHIEF ENGINEER		PROJECT MANAGER	
<i>[Signature]</i>	1/21/21	<i>[Signature]</i>	4/14/21
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES	

ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS
97141
 APRIL 5, 2021
 SCALE: 1" = 40'
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 CHECKED BY: PJS/JAR
 SHEET 73 of 137
 PROJECT #: P504100
 PROPOSAL #:
 SEDIMENT CONTROL PLAN
BROADNECK TRAIL - PHASE III
 CONSTRUCTION DOCUMENTS
 TAX MAP 32, 39, AND 40
 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
 ANNE ARUNDEL COUNTY, MD
 NOVEMBER 2019

GP# G02017905 DWG NO: DD10F

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B-4-2 STANDARDS AND SPECIFICATIONS FOR SOIL PREPARATION, TOPSOILING, AND SOIL AMENDMENTS

DEFINITION
THE PROCESS OF PREPARING THE SOILS TO SUSTAIN ADEQUATE VEGETATIVE STABILIZATION.

PURPOSE

TO PROVIDE A SUITABLE SOIL MEDIUM FOR VEGETATIVE GROWTH.

CONDITIONS WHERE PRACTICE APPLIES

WHERE VEGETATIVE STABILIZATION IS TO BE ESTABLISHED.

CRITERIA

A. SOIL PREPARATION

1. TEMPORARY STABILIZATION

a. SEEDBED PREPARATION CONSISTS OF LOOSENING SOIL TO A DEPTH OF 3 TO 5 INCHES BY MEANS OF SUITABLE AGRICULTURAL OR CONSTRUCTION EQUIPMENT, SUCH AS DISC HARROWS OR CHISEL PLOW OR RIPPERS MOUNTED ON CONSTRUCTION EQUIPMENT. AFTER THE SOIL IS LOOSENEED, IT MUST NOT BE ROLLED OR DRAGGED SMOOTH BUT LEFT IN THE ROUGHENED CONDITION. SLOPES 3:1 OR FLATTER ARE TO BE TRACKED WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE.

b. APPLY FERTILIZER AND LIME AS PRESCRIBED ON THE PLANS.

c. INCORPORATE LIME AND FERTILIZER INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISKING OR OTHER SUITABLE MEANS.

2. PERMANENT STABILIZATION

a. A SOIL TEST IS REQUIRED FOR ANY EARTH DISTURBANCE OF 5 ACRES OR MORE. THE MINIMUM SOIL CONDITIONS REQUIRED FOR PERMANENT VEGETATIVE ESTABLISHMENT ARE:

i. SOIL PH BETWEEN 6.0 AND 7.0.

ii. SOLUBLE SALTS LESS THAN 500 PARTS PER MILLION (PPM).

iii. SOIL CONTAINS LESS THAN 40 PERCENT CLAY BUT ENOUGH FINE GRAINED MATERIAL (GREATER THAN 30 PERCENT SILT PLUS CLAY) TO PROVIDE THE CAPACITY TO HOLD A MODERATE AMOUNT OF MOISTURE. AN EXCEPTION: IF LOVEGRASS WILL BE PLANTED, THEN A SANDY SOIL (LESS THAN 30 PERCENT SILT PLUS CLAY) WOULD BE ACCEPTABLE.

iv. SOIL CONTAINS 1.5 PERCENT MINIMUM ORGANIC MATTER BY WEIGHT.

v. SOIL CONTAINS SUFFICIENT PORE SPACE TO PERMIT ADEQUATE ROOT PENETRATION.

b. APPLICATION OF AMENDMENTS OR TOPSOIL IS REQUIRED IF ON-SITE SOILS DO NOT MEET THE ABOVE CONDITIONS.

c. GRADED AREAS MUST BE MAINTAINED IN A TRUE AND EVEN GRADE AS SPECIFIED ON THE APPROVED PLAN, THEN SCARIFIED OR OTHERWISE LOOSENEED TO A DEPTH OF 3 TO 5 INCHES.

d. APPLY SOIL AMENDMENTS AS SPECIFIED ON THE APPROVED PLAN OR AS INDICATED BY THE RESULTS OF A SOIL TEST.

e. MIX SOIL AMENDMENTS INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISKING OR OTHER SUITABLE MEANS. RAKE LAWN AREAS TO SMOOTH THE SURFACE. REMOVE LARGE OBJECTS LIKE STONES AND BRANCHES, AND READY THE AREA FOR SEED APPLICATION. LOOSEN SURFACE SOIL BY DRAGGING WITH A HEAVY CHAIN OR OTHER EQUIPMENT TO ROUGHEN THE SURFACE WHERE SITE CONDITIONS WILL NOT PERMIT NORMAL SEEDBED PREPARATION. TRACK SLOPES 3:1 OR FLATTER WITH TRACKED EQUIPMENT LEAVING THE SOIL IN AN IRREGULAR CONDITION WITH RIDGES RUNNING PARALLEL TO THE CONTOUR OF THE SLOPE. LEAVE THE TOP 1 TO 3 INCHES OF SOIL LOOSE AND FRIABLE. SEEDBED LOOSENING MAY BE UNNECESSARY ON NEWLY DISTURBED AREAS.

B. TOPSOILING

1. TOPSOIL IS PLACED OVER PREPARED SUBSOIL PRIOR TO ESTABLISHMENT OF PERMANENT VEGETATION. THE PURPOSE IS TO PROVIDE A SUITABLE SOIL MEDIUM FOR VEGETATIVE GROWTH. SOILS OF CONCERN HAVE LOW MOISTURE CONTENT, LOW NUTRIENT LEVELS, LOW PH, MATERIALS TOXIC TO PLANTS, AND/OR UNACCEPTABLE SOIL GRADATION.

2. TOPSOIL SALVAGED FROM AN EXISTING SITE MAY BE USED PROVIDED IT MEETS THE STANDARDS AS SET FORTH IN THESE SPECIFICATIONS. TYPICALLY, THE DEPTH OF TOPSOIL TO BE SALVAGED FOR A GIVEN SOIL TYPE CAN BE FOUND IN THE REPRESENTATIVE SOIL PROFILE SECTION IN THE SOIL SURVEY PUBLISHED BY USDA-NRCS.

3. TOPSOILING IS LIMITED TO AREAS HAVING 2:1 OR FLATTER SLOPES WHERE:

a. THE TEXTURE OF THE EXPOSED SUBSOIL/PARENT MATERIAL IS NOT ADEQUATE TO PRODUCE VEGETATIVE GROWTH.

b. THE SOIL MATERIAL IS SO SHALLOW THAT THE ROOTING ZONE IS NOT DEEP ENOUGH TO SUPPORT PLANTS OR FURNISH CONTINUING SUPPLIES OF MOISTURE AND PLANT NUTRIENTS.

c. THE ORIGINAL SOIL TO BE VEGETATED CONTAINS MATERIAL TOXIC TO PLANT GROWTH.

d. THE SOIL IS SO ACIDIC THAT TREATMENT WITH LIMESTONE IS NOT FEASIBLE.

4. AREAS HAVING SLOPES STEEPER THAN 2:1 REQUIRE SPECIAL CONSIDERATION AND DESIGN.

5. TOPSOIL SPECIFICATIONS: SOIL TO BE USED AS TOPSOIL MUST MEET THE FOLLOWING CRITERIA:

a. TOPSOIL MUST BE A LOAM, SANDY LOAM, CLAY LOAM, SILT LOAM, SANDY CLAY LOAM, OR LOAMY SAND. OTHER SOILS MAY BE USED IF RECOMMENDED BY AN AGRONOMIST OR SOIL SCIENTIST AND APPROVED BY THE APPROPRIATE APPROVAL AUTHORITY. TOPSOIL MUST NOT BE A MIXTURE OF CONTRASTING TEXTURED SUBSOILS AND MUST CONTAIN LESS THAN 5 PERCENT BY VOLUME OF CINDERS, STONES, SLAG, COARSE FRAGMENTS, GRAVEL, STICKS, ROOTS, TRASH, OR OTHER MATERIALS LARGER THAN 1 1/2 INCHES IN DIAMETER.

b. TOPSOIL MUST BE FREE OF NOXIOUS PLANTS OR PLANT PARTS SUCH AS BERMUDA GRASS, QUACK GRASS, JOHNSON GRASS, NUT SEDGE, POISON IVY, THISTLE, OR OTHERS AS SPECIFIED.

c. TOPSOIL SUBSTITUTES OR AMENDMENTS, AS RECOMMENDED BY A QUALIFIED AGRONOMIST OR SOIL SCIENTIST AND APPROVED BY THE APPROPRIATE APPROVAL AUTHORITY, MAY BE USED IN LIEU OF NATURAL TOPSOIL.

6. TOPSOIL APPLICATION

a. EROSION AND SEDIMENT CONTROL PRACTICES MUST BE MAINTAINED WHEN APPLYING TOPSOIL.

b. UNIFORMLY DISTRIBUTE TOPSOIL IN A 5 TO 8 INCH LAYER AND LIGHTLY COMPACT TO A MINIMUM THICKNESS OF 4 INCHES. SPREADING IS TO BE PERFORMED IN SUCH

A MANNER THAT SODDING OR SEEDING CAN PROCEED WITH A MINIMUM OF ADDITIONAL SOIL PREPARATION AND TILLAGE. ANY IRREGULARITIES IN THE SURFACE RESULTING FROM TOPSOILING OR OTHER OPERATIONS MUST BE CORRECTED IN ORDER TO PREVENT THE FORMATION OF DEPRESSIONS OR WATER POCKETS.

c. TOPSOIL MUST NOT BE PLACED IF THE TOPSOIL OR SUBSOIL IS IN A FROZEN OR MUDDY CONDITION, WHEN THE SUBSOIL IS EXCESSIVELY WET OR IN A CONDITION THAT MAY OTHERWISE BE DETRIMENTAL TO PROPER GRADING AND SEEDBED PREPARATION.

C. SOIL AMENDMENTS (FERTILIZER AND LIME SPECIFICATIONS)

1. SOIL TESTS MUST BE PERFORMED TO DETERMINE THE EXACT RATIOS AND APPLICATION RATES FOR BOTH LIME AND FERTILIZER ON SITES HAVING DISTURBED AREAS OF 5 ACRES OR MORE. SOIL ANALYSIS MAY BE PERFORMED BY A RECOGNIZED PRIVATE OR COMMERCIAL LABORATORY. SOIL SAMPLES TAKEN FOR ENGINEERING PURPOSES MAY ALSO BE USED FOR CHEMICAL ANALYSES.

2. FERTILIZERS MUST BE UNIFORM IN COMPOSITION, FREE FLOWING AND SUITABLE FOR ACCURATE APPLICATION BY APPROPRIATE EQUIPMENT. MANURE MAY BE SUBSTITUTED FOR FERTILIZER WITH PRIOR APPROVAL FROM THE APPROPRIATE APPROVAL AUTHORITY. FERTILIZERS MUST ALL BE DELIVERED TO THE SITE FULLY LABELED ACCORDING TO THE APPLICABLE LAWS AND MUST BEAR THE NAME, TRADE NAME OR TRADEMARK AND WARRANTY OF THE PRODUCER.

3. LIME MATERIALS MUST BE GROUND LIMESTONE (HYDRATED OR BURNT LIME MAY BE SUBSTITUTED EXCEPT WHEN HYDROSEEDING) WHICH CONTAINS AT LEAST 90 PERCENT TOTAL OXIDES (CALCIUM OXIDE PLUS MAGNESIUM OXIDE). LIMESTONE MUST BE GROUND TO SUCH FINENESS THAT AT LEAST 90 PERCENT WILL PASS THROUGH A #100 MESH SIEVE AND 98 TO 100 PERCENT WILL PASS THROUGH A #20 MESH SIEVE.

4. LIME AND FERTILIZER ARE TO BE EVENLY DISTRIBUTED AND INCORPORATED INTO THE TOP 3 TO 5 INCHES OF SOIL BY DISKING OR OTHER SUITABLE MEANS.

5. WHERE THE SUBSOIL IS EITHER HIGHLY ACIDIC OR COMPOSED OF HEAVY CLAYS, SPREAD GROUND LIMESTONE AT THE RATE OF 4 TO 8 TONS PER ACRE (200-400 POUNDS PER 1,000 SQUARE FEET) PRIOR TO THE PLACEMENT OF TOPSOIL.

B-4-3 STANDARDS AND SPECIFICATIONS FOR SEEDING AND MULCHING

DEFINITION

THE APPLICATION OF SEED AND MULCH TO ESTABLISH VEGETATIVE COVER.

PURPOSE

TO PROTECT DISTURBED SOILS FROM EROSION DURING AND AT THE END OF CONSTRUCTION.

CONDITIONS WHERE PRACTICE APPLIES

TO THE SURFACE OF ALL PERIMETER CONTROLS, SLOPES, AND ANY DISTURBED AREA NOT UNDER ACTIVE GRADING.

CRITERIA

A. SEEDING

1. SPECIFICATIONS

a. ALL SEED MUST MEET THE REQUIREMENTS OF THE MARYLAND STATE SEED LAW. ALL SEED MUST BE SUBJECT TO RE-TESTING BY A RECOGNIZED SEED LABORATORY. ALL SEED USED MUST HAVE BEEN TESTED WITHIN THE 6 MONTHS IMMEDIATELY PRECEDING THE DATE OF SOWING SUCH MATERIAL ON ANY PROJECT. REFER TO TABLE B.4 REGARDING THE QUALITY OF SEED. SEED TAGS MUST BE AVAILABLE UPON REQUEST TO THE INSPECTOR TO VERIFY TYPE OF SEED AND SEEDING RATE.

b. MULCH ALONE MAY BE APPLIED BETWEEN THE FALL AND SPRING SEEDING DATES ONLY IF THE GROUND IS FROZEN. THE APPROPRIATE SEEDING MIXTURE MUST BE APPLIED WHEN THE GROUND THAWS.

c. INOCULANTS: THE INOCULANT FOR TREATING LEGUME SEED IN THE SEED MIXTURES MUST BE A PURE CULTURE OF NITROGEN FIXING BACTERIA PREPARED SPECIFICALLY FOR THE SPECIES. INOCULANTS MUST NOT BE USED LATER THAN THE DATE INDICATED ON THE CONTAINER. ADD FRESH INOCULANTS AS DIRECTED ON THE PACKAGE. USE FOUR TIMES THE RECOMMENDED RATE WHEN HYDROSEEDING. NOTE: IT IS VERY IMPORTANT TO KEEP INOCULANT AS COOL AS POSSIBLE UNTIL USED. TEMPERATURES ABOVE 75 TO 80 DEGREES FAHRENHEIT CAN WEAKEN BACTERIA AND MAKE THE INOCULANT LESS EFFECTIVE.

d. SOD OR SEED MUST NOT BE PLACED ON SOIL WHICH HAS BEEN TREATED WITH SOIL STERILANTS OR CHEMICALS USED FOR WEED CONTROL UNTIL SUFFICIENT TIME HAS ELAPSED (14 DAYS MIN.) TO PERMIT DISSIPATION OF PHYTO-TOXIC MATERIALS.

2. APPLICATION

a. DRY SEEDING: THIS INCLUDES USE OF CONVENTIONAL DROP OR BROADCAST SPREADERS.

i. INCORPORATE SEED INTO THE SUBSOIL AT THE RATES PRESCRIBED ON TEMPORARY SEEDING TABLE B.1, PERMANENT SEEDING TABLE B.3, OR SITE-SPECIFIC SEEDING SUMMARIES.

ii. APPLY SEED IN TWO DIRECTIONS, PERPENDICULAR TO EACH OTHER. APPLY HALF THE SEEDING RATE IN EACH DIRECTION. ROLL THE SEEDING AREA WITH A WEIGHTED ROLLER TO PROVIDE GOOD SEED TO SOIL CONTACT.

b. DRILL OR CULTIPACKER SEEDING: MECHANIZED SEEDERS THAT APPLY AND COVER SEED WITH SOIL.

i. CULTIPACKING SEEDERS ARE REQUIRED TO BURY THE SEED IN SUCH A FASHION AS TO PROVIDE AT LEAST 1/4 INCH OF SOIL COVERING. SEEDBED MUST BE FIRM AFTER PLANTING.

ii. APPLY SEED IN TWO DIRECTIONS, PERPENDICULAR TO EACH OTHER. APPLY HALF THE SEEDING RATE IN EACH DIRECTION.

c. HYDROSEEDING: APPLY SEED UNIFORMLY WITH HYDROSEEDER (SLURRY INCLUDES SEED AND FERTILIZER).

i. IF FERTILIZER IS BEING APPLIED AT THE TIME OF SEEDING, THE APPLICATION RATES SHOULD NOT EXCEED THE FOLLOWING: NITROGEN, 100 POUNDS PER ACRE TOTAL OF SOLUBLE NITROGEN; P2O5 (PHOSPHOROUS), 200 POUNDS PER ACRE; K2O (POTASSIUM), 200 POUNDS PER ACRE.

ii. LIME: USE ONLY GROUND AGRICULTURAL LIMESTONE (UP TO 3 TONS PER ACRE MAY BE APPLIED BY HYDROSEEDING). NORMALLY, NOT MORE THAN 2 TONS ARE APPLIED BY HYDROSEEDING AT ANY ONE TIME. DO NOT USE BURNT OR HYDRATED LIME WHEN HYDROSEEDING.

iii. MIX SEED AND FERTILIZER ON SITE AND SEED IMMEDIATELY AND WITHOUT INTERRUPTION.

iv. WHEN HYDROSEEDING DO NOT INCORPORATE SEED INTO THE SOIL.

B. MULCHING

1. MULCH MATERIALS (IN ORDER OF PREFERENCE)

a. STRAW CONSISTING OF THOROUGHLY THRESHED WHEAT, RYE, OAT, OR BARLEY AND REASONABLY BRIGHT IN COLOR. STRAW IS TO BE FREE OF NOXIOUS WEED SEEDS AS SPECIFIED IN THE MARYLAND SEED LAW AND NOT MUSTY, MOLDY,

CAKED, DECAYED, OR EXCESSIVELY DUSTY. NOTE: USE ONLY STERILE STRAW MULCH IN AREAS WHERE ONE SPECIES OF GRASS IS DESIRED.

b. WOOD CELLULOSE FIBER MULCH (WCFM) CONSISTING OF SPECIALLY PREPARED WOOD CELLULOSE PROCESSED INTO A UNIFORM FIBROUS PHYSICAL STATE.

i. WCFM IS TO BE DYED GREEN OR CONTAIN A GREEN DYE IN THE PACKAGE THAT WILL PROVIDE AN APPROPRIATE COLOR TO FACILITATE VISUAL INSPECTION OF THE UNIFORMLY SPREAD SLURRY.

ii. WCFM, INCLUDING DYE, MUST CONTAIN NO GERMINATION OR GROWTH INHIBITING FACTORS.

iii. WCFM MATERIALS ARE TO BE MANUFACTURED AND PROCESSED IN SUCH A MANNER THAT THE WOOD CELLULOSE FIBER MULCH WILL REMAIN IN UNIFORM SUSPENSION IN WATER UNDER AGITATION AND WILL BLEND WITH SEED, FERTILIZER AND OTHER ADDITIVES TO FORM A HOMOGENEOUS SLURRY. THE MULCH MATERIAL MUST FORM A BLOTTER-LIKE GROUND COVER, ON APPLICATION, HAVING MOISTURE ABSORPTION AND PERCOLATION PROPERTIES AND MUST COVER AND HOLD GRASS SEED IN CONTACT WITH THE SOIL WITHOUT INHIBITING THE GROWTH OF THE GRASS SEEDLINGS.

iv. WCFM MATERIAL MUST NOT CONTAIN ELEMENTS OR COMPOUNDS AT CONCENTRATION LEVELS THAT WILL BE PHYTO-TOXIC.

v. WCFM MUST CONFORM TO THE FOLLOWING PHYSICAL REQUIREMENTS: FIBER LENGTH OF APPROXIMATELY 10 MILLIMETERS, DIAMETER APPROXIMATELY 1 MILLIMETER, PH RANGE OF 4.0 TO 8.5, ASH CONTENT OF 1.8 PERCENT MAXIMUM AND WATER HOLDING CAPACITY OF 0.9 PERCENT MINIMUM.

2. APPLICATION

a. APPLY MULCH TO ALL SEEDING AREAS IMMEDIATELY AFTER SEEDING.

b. WHEN STRAW MULCH IS USED, SPREAD IT OVER ALL SEEDING AREAS AT THE RATE OF 2 TONS PER ACRE TO A UNIFORM LOOSE DEPTH OF 1 TO 2 INCHES. APPLY MULCH TO ACHIEVE A UNIFORM DISTRIBUTION AND DEPTH SO THAT THE SOIL SURFACE IS NOT EXPOSED. WHEN USING A MULCH ANCHORING TOOL, INCREASE THE APPLICATION RATE TO 2.5 TONS PER ACRE.

c. WOOD CELLULOSE FIBER USED AS MULCH MUST BE APPLIED AT A NET DRY WEIGHT OF 1500 POUNDS PER ACRE. MIX THE WOOD CELLULOSE FIBER WITH WATER TO ATTAIN A MIXTURE WITH A MAXIMUM OF 50 POUNDS OF WOOD CELLULOSE FIBER PER 100 GALLONS OF WATER.

3. ANCHORING

a. PERFORM MULCH ANCHORING IMMEDIATELY FOLLOWING APPLICATION OF MULCH TO MINIMIZE LOSS BY WIND OR WATER. THIS MAY BE DONE BY ONE OF THE FOLLOWING METHODS (LISTED BY PREFERENCE), DEPENDING UPON THE SIZE OF THE AREA AND EROSION HAZARD:

i. A MULCH ANCHORING TOOL IS A TRACTOR DRAWN IMPLEMENT DESIGNED TO PUNCH AND ANCHOR MULCH INTO THE SOIL SURFACE A MINIMUM OF 2 INCHES. THIS PRACTICE IS MOST EFFECTIVE ON LARGE AREAS, BUT IS LIMITED TO FLATTER SLOPES WHERE EQUIPMENT CAN OPERATE SAFELY. IF USED ON SLOPING LAND, THIS PRACTICE SHOULD FOLLOW THE CONTOUR.

ii. WOOD CELLULOSE FIBER MAY BE USED FOR ANCHORING STRAW. APPLY THE FIBER BINDER AT A NET DRY WEIGHT OF 750 POUNDS PER ACRE. MIX THE WOOD CELLULOSE FIBER WITH WATER AT A MAXIMUM OF 50 POUNDS OF WOOD CELLULOSE FIBER PER 100 GALLONS OF WATER.

iii. SYNTHETIC BINDERS SUCH AS ACRYLIC DLR (AGRO-TACK), DCA-70, PETROSET, TERRA TAX II, TERRA TACK AR OR OTHER APPROVED EQUAL MAY BE USED. FOLLOW APPLICATION RATES AS SPECIFIED BY THE MANUFACTURER. APPLICATION OF LIQUID BINDERS NEEDS TO BE HEAVIER AT THE EDGES WHERE WIND CATCHES MULCH, SUCH AS IN VALLEYS AND ON CRESTS OF BANKS. USE OF ASPHALT BINDERS IS STRICTLY PROHIBITED.

iv. LIGHTWEIGHT PLASTIC NETTING MAY BE STAPLED OVER THE MULCH ACCORDING TO MANUFACTURER RECOMMENDATIONS. NETTING IS USUALLY AVAILABLE IN ROLLS 4 TO 15 FEET WIDE AND 300 TO 3,000 FEET LONG.

B-4-4 STANDARDS AND SPECIFICATIONS FOR TEMPORARY STABILIZATION

DEFINITION

TO STABILIZE DISTURBED SOILS WITH VEGETATION FOR UP TO 6 MONTHS.

PURPOSE

TO USE FAST GROWING VEGETATION THAT PROVIDES COVER ON DISTURBED SOILS.

CONDITIONS WHERE PRACTICE APPLIES

EXPOSED SOILS WHERE GROUND COVER IS NEEDED FOR A PERIOD OF 6 MONTHS OR LESS. FOR LONGER DURATION OF TIME, PERMANENT STABILIZATION PRACTICES ARE REQUIRED.

CRITERIA

1. SELECT ONE OR MORE OF THE SPECIES OR SEED MIXTURES LISTED IN TABLE B.1 FOR THE APPROPRIATE PLANT HARDINESS ZONE (FROM FIGURE B.3), AND ENTER THEM IN THE TEMPORARY SEEDING SUMMARY BELOW ALONG WITH APPLICATION RATES, SEEDING DATES AND SEEDING DEPTHS. IF THIS SUMMARY IS NOT PUT ON THE PLAN AND COMPLETED, THEN TABLE B.1 PLUS FERTILIZER AND LIME RATES MUST BE PUT ON THE PLAN.

2. FOR SITES HAVING SOIL TESTS PERFORMED, USE AND SHOW THE RECOMMENDED RATES BY THE TESTING AGENCY. SOIL TESTS ARE NOT REQUIRED FOR TEMPORARY SEEDING.

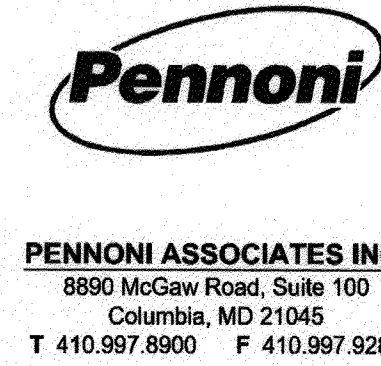
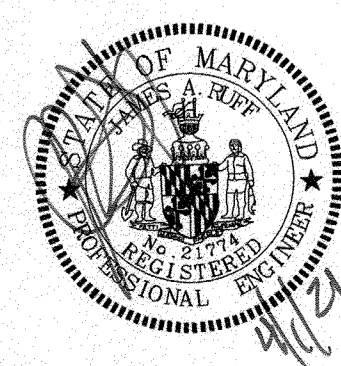
3. WHEN STABILIZATION IS REQUIRED OUTSIDE OF A SEEDING SEASON, APPLY SEED AND MULCH OR STRAW MULCH ALONE AS PRESCRIBED IN SECTION B-4-3.A.1.B AND MAINTAIN UNTIL THE NEXT SEEDING SEASON.

TEMPORARY SEEDING SUMMARY

Hardness Zone (from Figure B.3): Seed Mixture (from Table B.1):		7A		Fertilizer Rate (10-20-20)	Lime Rate
No.	Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths	
	ANNUAL RYEGRASS	40	FEB 15 TO APR 30; AUG 15 TO NOV 30	0.5	
	BARLEY	96	FEB 15 TO APR 30; AUG 15 TO NOV 30	1.0	436 lb/ac (10 lb/1000 sq ft)
	GATS	72	FEB 15 TO APR 30; AUG 15 TO NOV 30	1.0	2 tons/ac (90 lb/1000 sq ft)
	PEARL MILLET	20	MAY 1 TO AUG 14	0.5	

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774, EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE



B-4-5 STANDARDS AND SPECIFICATIONS FOR PERMANENT STABILIZATION

DEFINITION

TO STABILIZE DISTURBED SOILS WITH PERMANENT VEGETATION.

PURPOSE

TO USE LONG-LIVED PERENNIAL GRASSES AND LEGUMES TO ESTABLISH PERMANENT GROUND COVER ON DISTURBED SOILS. CONDITIONS WHERE PRACTICE APPLIES

EXPOSED SOILS WHERE GROUND COVER IS NEEDED FOR 6 MONTHS OR MORE.

CRITERIA

A. SEED MIXTURES

1. GENERAL USE

a. SELECT ONE OR MORE OF THE SPECIES OR MIXTURES LISTED IN TABLE B.3 FOR THE APPROPRIATE PLANT HARDINESS ZONE (FROM FIGURE B.3) AND BASED ON THE SITE CONDITION OR PURPOSE FOUND ON TABLE B.2. ENTER SELECTED MIXTURE(S), APPLICATION RATES, AND SEEDING DATES IN THE PERMANENT SEEDING SUMMARY. THE SUMMARY IS TO BE PLACED ON THE PLAN.

b. ADDITIONAL PLANTING SPECIFICATIONS FOR EXCEPTIONAL SITES SUCH AS SHORELINES, STREAM BANKS, OR DUNES OR FOR SPECIAL PURPOSES SUCH AS WILDLIFE OR AESTHETIC TREATMENT MAY BE FOUND IN USDA-NRCS TECHNICAL FIELD OFFICE GUIDE, SECTION 342 - CRITICAL AREA PLANTING.

c. FOR SITES HAVING DISTURBED AREA OVER 5 ACRES, USE AND SHOW THE RATES RECOMMENDED BY THE SOIL TESTING AGENCY.

d. FOR AREAS RECEIVING LOW MAINTENANCE, APPLY UREA FORM FERTILIZER (46-0-0) AT 3 1/2 POUNDS PER 1000 SQUARE FEET (150 POUNDS PER ACRE) AT THE TIME OF SEEDING IN ADDITION TO THE SOIL AMENDMENTS SHOWN IN THE PERMANENT SEEDING SUMMARY.

2. TURFGRASS MIXTURES

a. AREAS WHERE TURFGRASS MAY BE DESIRED INCLUDE LAWNS, PARKS, PLAYGROUNDS, AND COMMERCIAL SITES WHICH WILL RECEIVE A MEDIUM TO HIGH LEVEL OF MAINTENANCE.

b. SELECT ONE OR MORE OF THE SPECIES OR MIXTURES LISTED BELOW BASED ON THE SITE CONDITIONS OR PURPOSE. ENTER SELECTED MIXTURE(S), APPLICATION RATES, AND SEEDING DATES IN THE PERMANENT SEEDING SUMMARY. THE SUMMARY IS TO BE PLACED ON THE PLAN.

i. KENTUCKY BLUEGRASS: FULL SUN MIXTURE: FOR USE IN AREAS THAT RECEIVE INTENSIVE MANAGEMENT. IRRIGATION REQUIRED IN THE AREAS OF CENTRAL MARYLAND AND EASTERN SHORE. RECOMMENDED CERTIFIED KENTUCKY BLUEGRASS CULTIVARS SEEDING RATE: 1.5 TO 2.0 POUNDS PER 1000 SQUARE FEET. CHOOSE A MINIMUM OF THREE KENTUCKY BLUEGRASS CULTIVARS WITH EACH RANGING FROM 10 TO 35 PERCENT OF THE TOTAL MIXTURE BY WEIGHT.

ii. KENTUCKY BLUEGRASS/PERENNIAL RYE: FULL SUN MIXTURE: FOR USE IN FULL SUN AREAS WHERE RAPID ESTABLISHMENT IS NECESSARY AND WHEN TURF WILL RECEIVE MEDIUM TO INTENSIVE MANAGEMENT. CERTIFIED PERENNIAL RYEGRASS CULTIVARS/CERTIFIED KENTUCKY BLUEGRASS SEEDING RATE: 2 POUNDS MIXTURE PER 1000 SQUARE FEET. CHOOSE A MINIMUM OF THREE KENTUCKY BLUEGRASS CULTIVARS WITH EACH RANGING FROM 10 TO 35 PERCENT OF THE TOTAL MIXTURE BY WEIGHT.

iii. TALL FESCUE/KENTUCKY BLUEGRASS: FULL SUN MIXTURE: FOR USE IN DROUGHT PRONE AREAS AND/OR FOR AREAS RECEIVING LOW TO MEDIUM MANAGEMENT IN FULL SUN TO MEDIUM SHADE. RECOMMENDED MIXTURE INCLUDES: CERTIFIED TALL FESCUE CULTIVARS 95 TO 100 PERCENT, CERTIFIED KENTUCKY BLUEGRASS CULTIVARS 0 TO 5 PERCENT. SEEDING RATE: 5 TO 8 POUNDS PER 1000 SQUARE FEET. ONE OR MORE CULTIVARS MAY BE BLENDED.

iv. KENTUCKY BLUEGRASS/FINE FESCUE: SHADE MIXTURE: FOR USE IN AREAS WITH SHADE IN BLUEGRASS LAWNS. FOR ESTABLISHMENT IN HIGH QUALITY, INTENSIVELY MANAGED TURF AREA. MIXTURE INCLUDES: CERTIFIED KENTUCKY BLUEGRASS CULTIVARS 30 TO 40 PERCENT AND CERTIFIED FINE FESCUE AND 60 TO 70 PERCENT. SEEDING RATE: 1 1/2 TO 3 POUNDS PER 1000 SQUARE FEET.

NOTES:

SELECT TURFGRASS VARIETIES FROM THOSE LISTED IN THE MOST CURRENT UNIVERSITY OF MARYLAND PUBLICATION, AGRONOMY MEMO #77, "TURFGRASS CULTIVAR RECOMMENDATIONS FOR MARYLAND"

CHOOSE CERTIFIED MATERIAL. CERTIFIED MATERIAL IS THE BEST GUARANTEE OF CULTIVAR PURITY. THE CERTIFICATION PROGRAM OF THE MARYLAND DEPARTMENT OF AGRICULTURE, TURF AND SEED SECTION, PROVIDES A RELIABLE MEANS OF CONSUMER PROTECTION AND ASSURES A PURE GENETIC LINE

c. IDEAL TIMES OF SEEDING FOR TURF GRASS MIXTURES

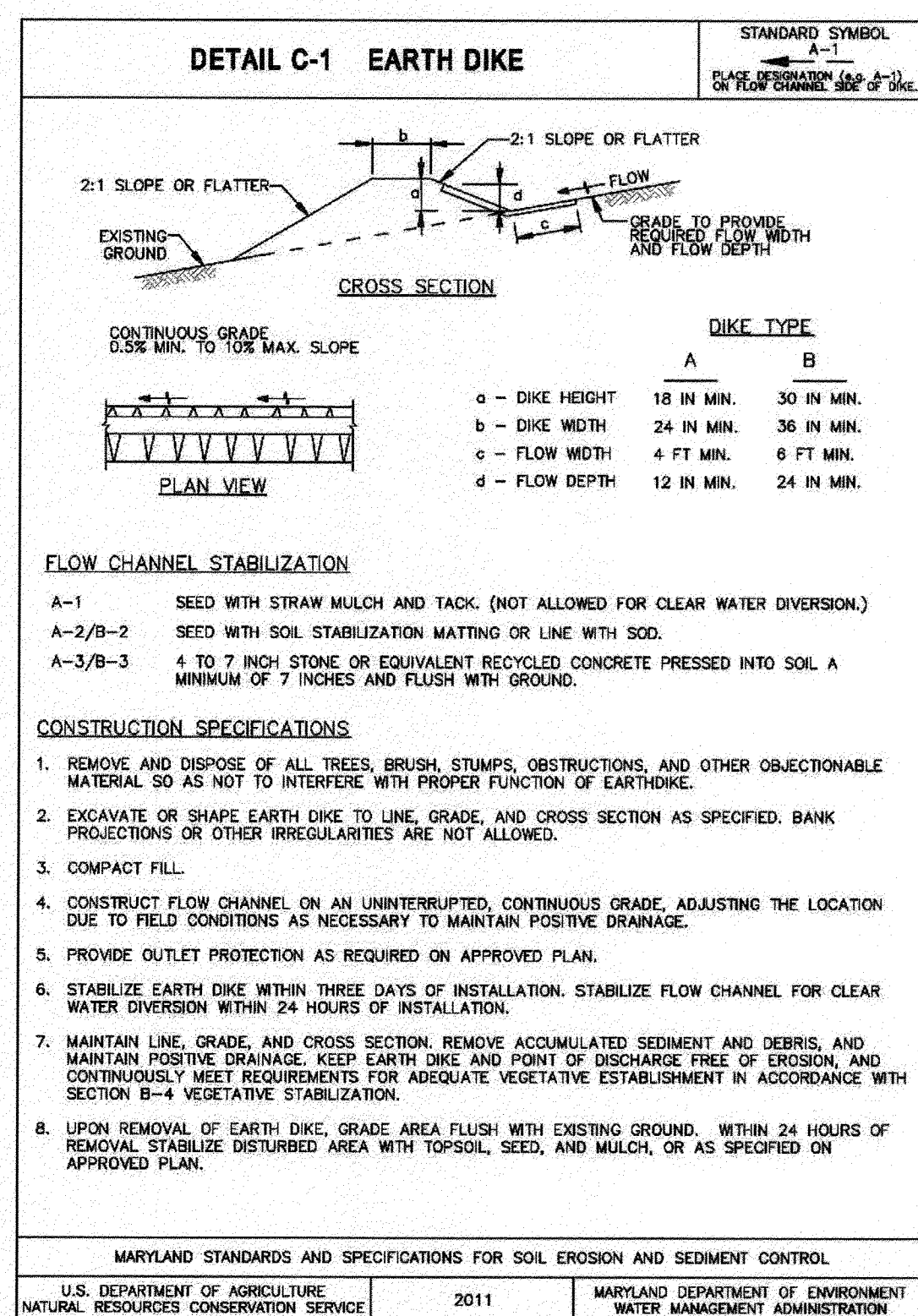
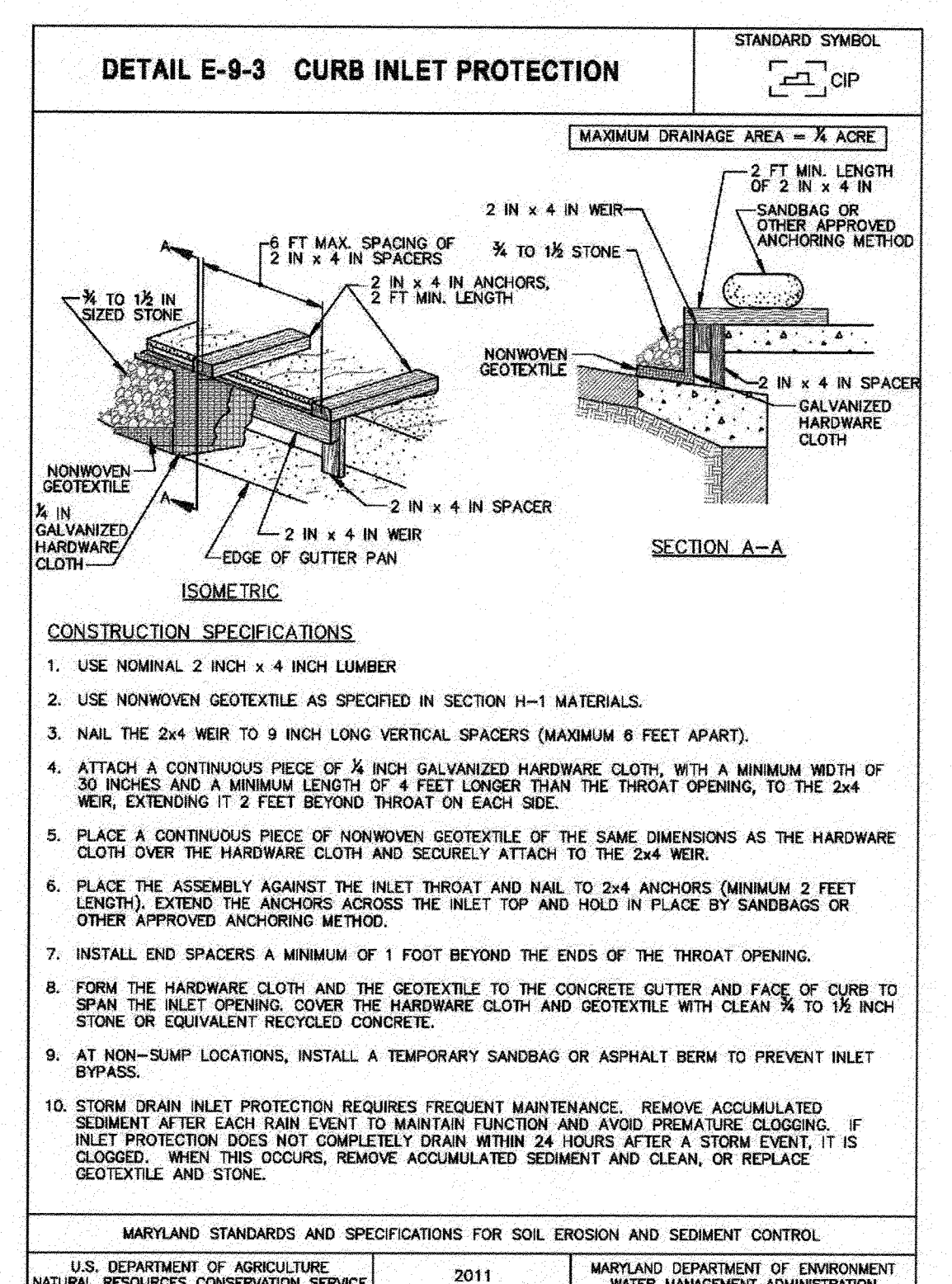
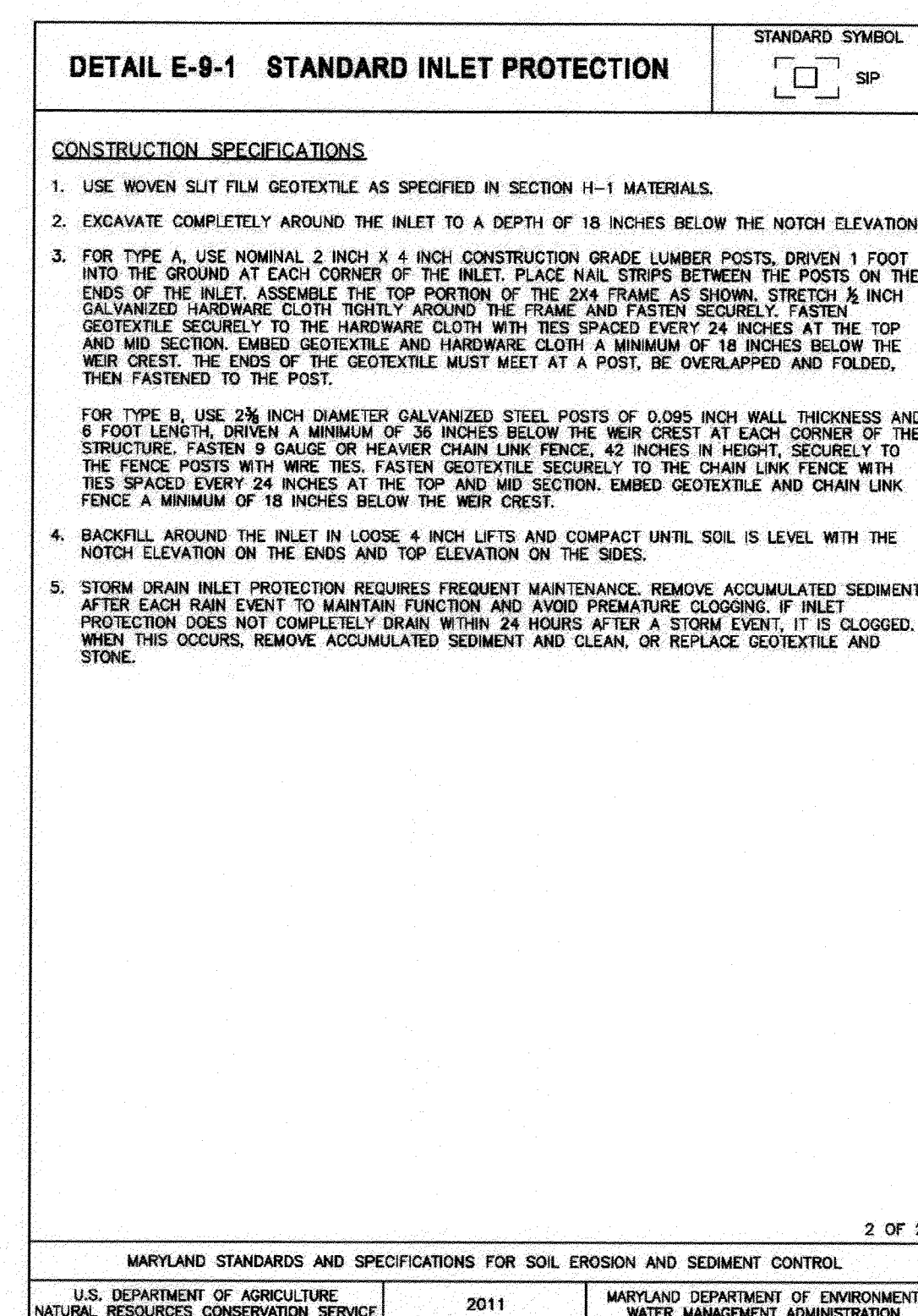
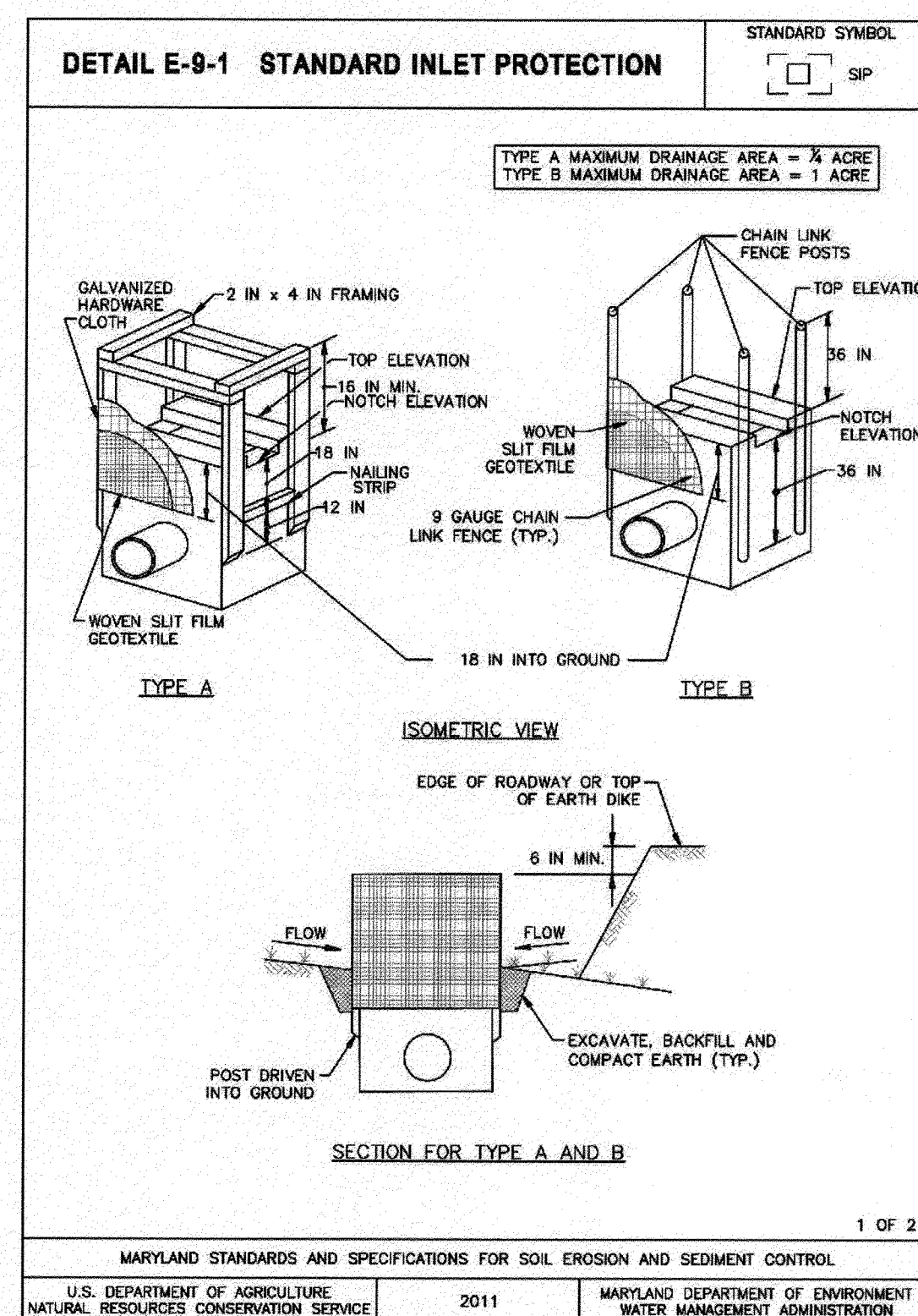
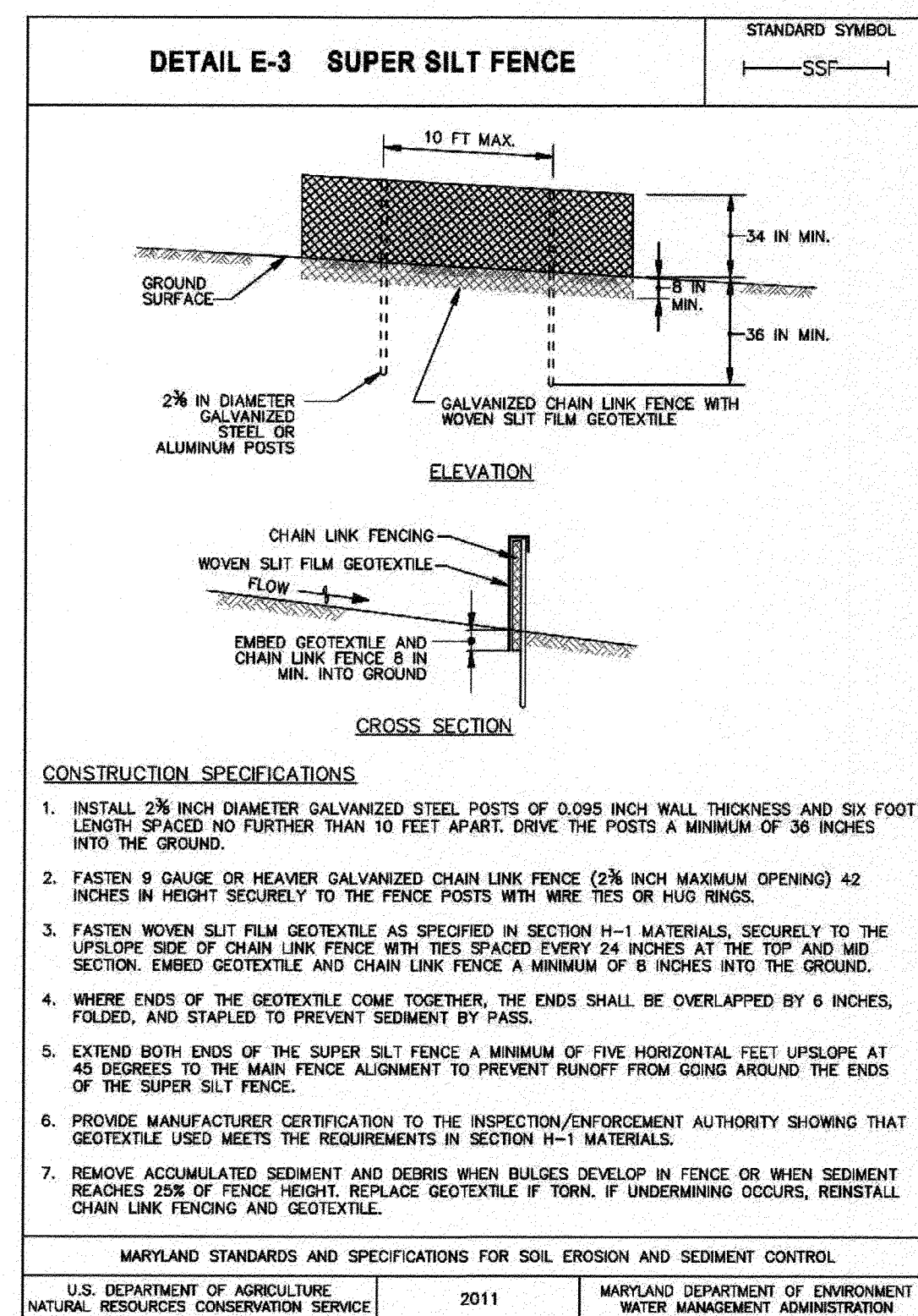
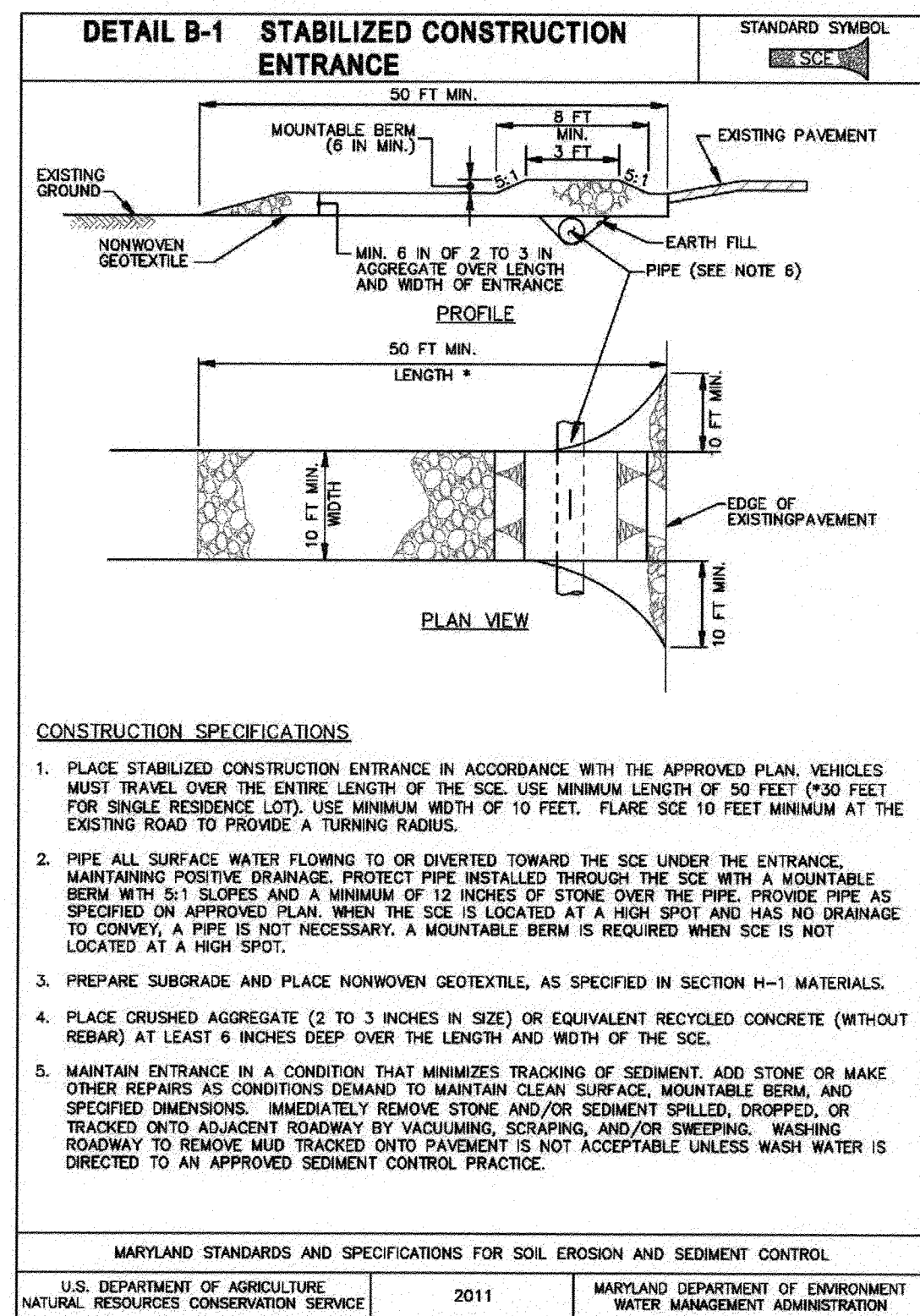
WESTERN MD: MARCH 15 TO JUNE 1, AUGUST 1 TO OCTOBER 1 (HARDINESS ZONES: 5B, 6A)
CENTRAL

MD: MARCH 1 TO MAY 15, AUGUST 15 TO OCTOBER 15 (HARDINESS ZONE: 6B)

SOUTHERN MD, EASTERN SHORE: MARCH 1 TO MAY 15, AUGUST 15 TO OCTOBER 15 (HARDINESS ZONES: 7A, 7B)

d. TILL AREAS TO RECEIVE SEED BY DISKING OR OTHER APPROVED METHODS TO A DEPTH OF 2 TO 4 INCHES, LEVEL AND RAKE THE AREAS TO PREPARE A PROPER SEEDBED. REMOVE STONES AND DEBRIS OVER 1 1/2 INCHES IN DIAMETER. THE RESULTING SEEDBED MUST BE IN SUCH CONDITION THAT FUTURE MOWING OF GRASSES WILL POSE NO DIFFICULTY.

e. IF SOIL MOISTURE IS DEFICIENT, SUPPLY NEW SEEDINGS WITH ADEQUATE WATER FOR PLANT GROWTH (1/2 TO 1 INCH EVERY 3 TO 4 DAYS DEPENDING ON SOIL TEXTURE) UNTIL THEY ARE FIRMLY ESTABLISHED. THIS IS ESPECIALLY TRUE WHEN SEEDINGS ARE MADE LATE



DPW No.:

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE

Pennoni
 PENNONI ASSOCIATES INC.
 8890 McGaw Road, Suite 100
 Columbia, MD 21045
 T 410.997.8900 F 410.997.9282

CP# G02017905 DWG NO: DD10H

ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

97143 APRIL 5, 2021

SEDIMENT CONTROL DETAILS

BROADNECK TRAIL - PHASE III
 CONSTRUCTION DOCUMENTS

TAX MAP 32, 39, AND 40
 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
 ANNE ARUNDEL COUNTY, MD
 NOVEMBER 2019

APPROVED	DATE	APPROVED	DATE
<i>[Signature]</i>	5/16/21	<i>[Signature]</i>	4/15/21
PROJECT MANAGER		PROJECT MANAGER	
<i>[Signature]</i>	4/16/21	<i>[Signature]</i>	4/16/21
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES	

SCALE: AS SHOWN
 DRAWN BY: PAI
 CHECKED BY: PJS/JAR
 SHEET 75 of 137
 PROJECT #: P504100
 PROPOSAL #:

2018 VEGETATIVE ESTABLISHMENT

Following initial soil disturbances or redistribution, permanent or temporary stabilization shall be completed within three calendar days for the surface of all perimeter controls, dikes, swales, ditches, perimeter slopes, and all slopes greater than 3 horizontal to 1 vertical (3:1) and seven days for all other disturbed or graded areas on the project site.

1. Permanent Seeding:

- A. Soil Tests: Lime and fertilizer will be applied per soil tests results for sites greater than 5 acres. Soil tests will be done at completion of initial rough grading or as recommended by the sediment control inspector. Rates and analyses will be provided to the grading inspector as well as the contractor.

Occurrence of acid sulfate soils (grayish black color) will require covering with a minimum of 12 inches of clean soil with 6 inches minimum capping of top soil. No stockpiling of material is allowed. If needed, soil tests should be done before and after a 6-week incubation period to allow oxidation of sulfates.

The minimum soil conditions required for permanent vegetative establishment are:

- a. Soil pH shall be between 6.0 and 7.0.
- b. Soluble salts shall be less than 500 parts per million (ppm).
- c. The soil shall contain less than 40% clay but enough fine grained material (> 30% silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception is if lovegrass or sericea lespedeza is to be planted, then a sandy soil (< 30% silt plus clay) would be acceptable.
- d. Soil shall contain 1.5% minimum organic matter by weight.
- e. Soil must contain sufficient pore space to permit adequate root penetration.
- f. If these conditions cannot be met by soils on site, adding topsoil is required in accordance with the Standard and Specification for Soil Preparation, Topsoiling and Soil Amendments from the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control or amendments made as recommended by a certified agronomist.

- B. Seedbed Preparation: Area to be seeded shall be loose and friable to a depth of at least 3-5 inches. The top layer shall be loosened by raking, disking or other acceptable means before seeding occurs. For sites less than 5 acres, apply 100 pounds dolomitic limestone and 21 pounds of 10-10-10 fertilizer per 1,000 square feet. Harrow or disk lime and fertilizer into the soil to a depth of at least 3-5 inches on slopes flatter than 3:1.

- C. Seeding: Apply 5-6 pounds per 1,000 square feet of tall fescue between February 1 and April 30 or between August 15 and October 31. Apply seed uniformly on a moist firm seedbed with a cyclone seeder, cultipacker seeder or hydroseeder (slurry includes seeds and fertilizer, recommended on steep slopes only). Maximum seed depth should be 1/4 inch in clayey soils and 1/2 inch in sandy soils when using other than the hydroseeder method. Irrigate where necessary to support adequate growth until vegetation is firmly established. If other seed mixes are to be used, select from Table B3 and B5 of the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control.

- D. Mulching: Mulch shall be applied to all seeded areas immediately after seeding. During the time periods when seeding is not permitted, mulch shall be applied immediately after grading. Mulch shall be unrotted, unchopped, small grain straw applied at a rate of 2 tons per acre or 90 pounds per 1,000 square feet (2 bales). Apply mulch to achieve a uniform distribution and depth so that the soil surface is not exposed. If a mulch-anchoring tool is used, apply 2.5 tons per acre. Mulch materials shall be relatively free of all kinds of weeds and shall be completely free of prohibited noxious weeds. Spread mulch uniformly, mechanically or by hand, to a depth of 1-2 inches.

- E. Securing Straw Mulch: Straw mulch shall be secured immediately following mulch application to minimize movement by wind or water. The following methods are permitted:

- i. Use a mulch-anchoring tool which is designed to punch and anchor mulch into the soil surface to a minimum depth of 2 inches. This is the most effective method for securing mulch, however, it is limited to relatively flat areas where equipment can operate safely.
- ii. Wood cellulose fiber may be used for anchoring straw. Apply the fiber binder at a net dry weight of 750 pounds per acre. If mixed with water, use 50 pounds of wood cellulose fiber per 100 gallons of water.
- iii. Liquid binders may be used. Apply at higher rates at the edges where wind catches mulch, such as in valleys and on crests of slopes. The remainder of the area should appear uniform after binder application. Binders listed in the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control or approved equal shall be applied at rates recommended by the manufacturers.
- iv. Lightweight plastic netting may be used to secure mulch. The netting will be stapled to the ground according to manufacturer's recommendations.

2. Temporary Seeding:

- Lime: 100 pounds of dolomitic limestone per 1,000 square feet.
- Fertilizer: 15 pounds of 10-10-10 per 1,000 square feet.
- Seed: Perennial rye - 0.92 pounds per 1,000 square feet (February 1 through April 30 or August 15 through October 31).
Millet - 0.92 pounds per 1,000 square feet (May 1 through August 15).
Same as 1 D and E above.

- 3. No fills may be placed on frozen ground. All fill is to be placed in approximately horizontal layers, each layer having a loose thickness of not more than 8 inches. All compaction requirements are in accordance to Anne Arundel County Standard Specifications for Construction as well as the AA County Design Manual and Standard Details. Fills for pond embankments shall be compacted as per MD-378 Construction Specifications. All other fills shall be compacted sufficiently so as to be stable and prevent erosion and slippage.

4. Permanent Sod:

Installation of sod should follow permanent seeding dates. Seedbed preparation for sod shall be as noted in section (B) above. Permanent sod is to be tall fescue, state approved sod, lime and fertilizer per permanent seeding specifications and lightly irrigate soil prior to laying sod. Sod is to be laid on the contour with all ends tightly abutting. Joints are to be staggered between rows. Water and roll or tamp sod to insure positive root contact with the soil. All slopes steeper than 3:1, as shown, are to be permanently sodded or protected with an approved erosion control netting. Additional watering for establishment may be required. Sod is not to be installed on frozen ground. Sod shall not be transplanted when moisture content (dry or wet) and/or extreme temperature may adversely affect its survival. In the absence of adequate rainfall, irrigation should be performed to ensure establishment of sod.

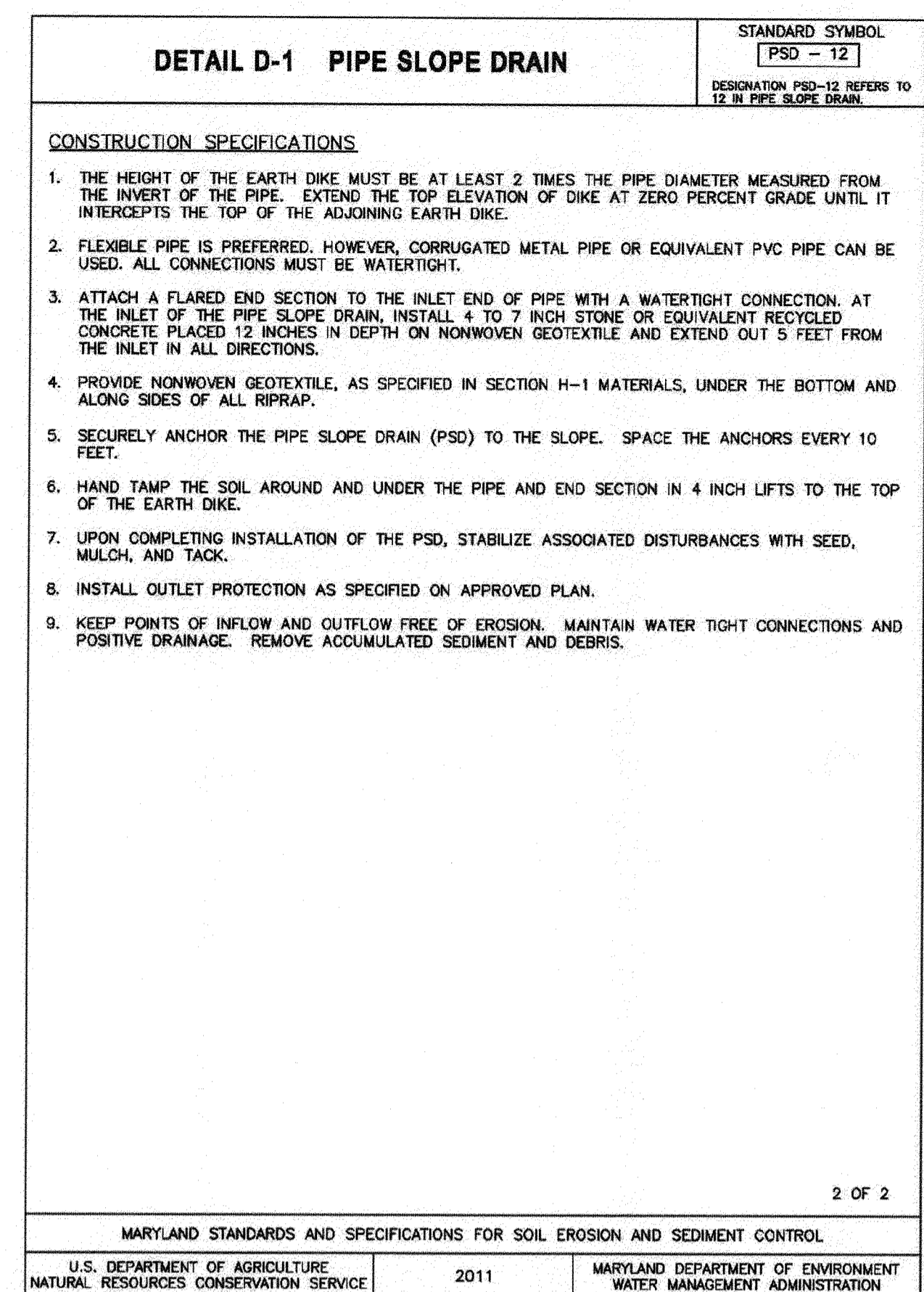
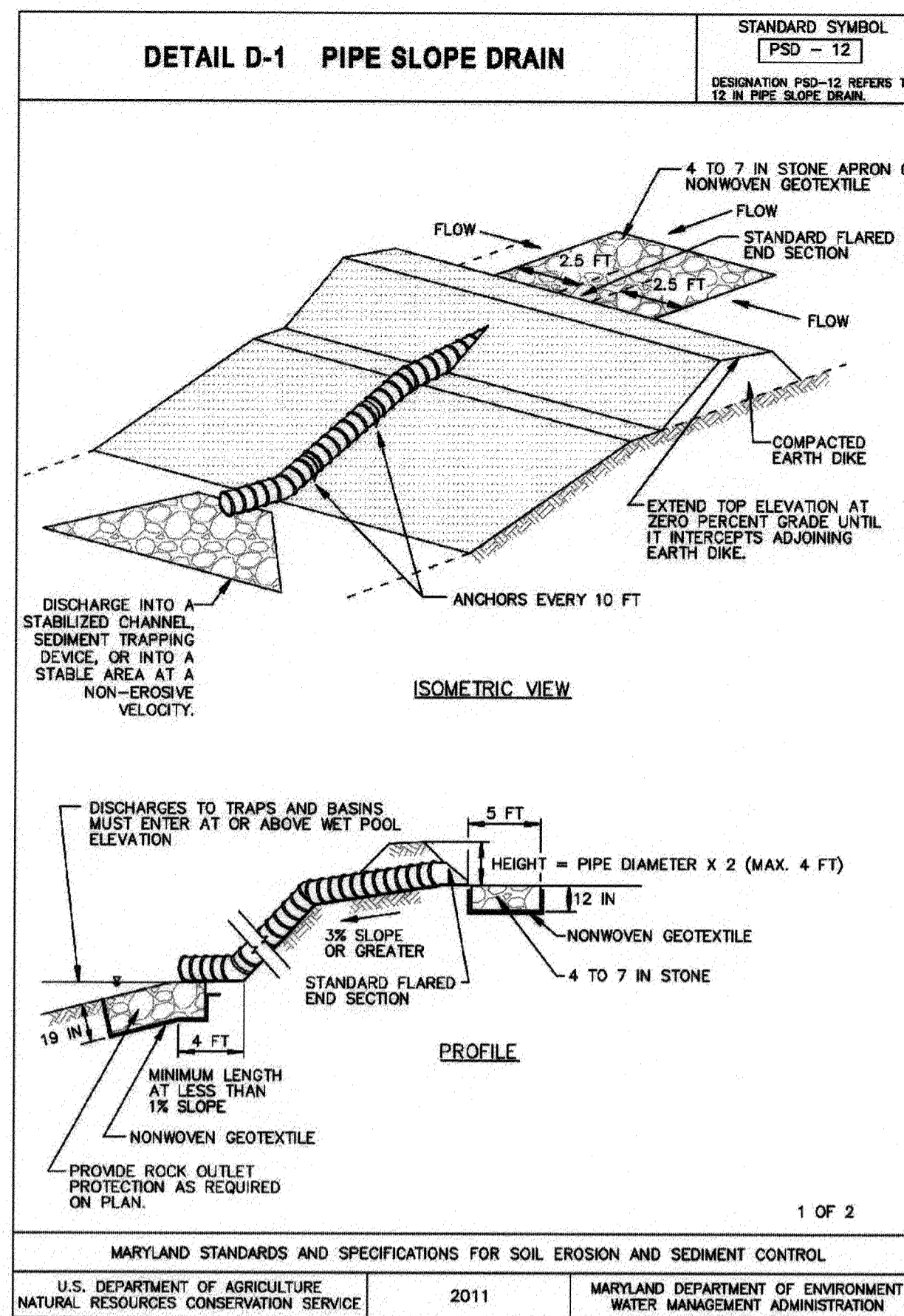
5. Mining Operations:

Sediment control plans for mining operations must include the following seeding dates and mixtures:

For seeding dates of February 1 through April 30 and August 15 through October 31, use seed mixture of tall fescue at the rate of 2 pounds per 1,000 square feet and sericea lespedeza at the minimum rate of 0.5 pounds per 1,000 square feet.

- 6. Topsoil shall be applied as per the Standard and Specifications for Soil Preparation, Topsoiling, and Soil Amendments from the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control.

- 7. Use of these Vegetative Establishment Specifications does not preclude the permittee or contractor from meeting all of the requirements set forth in the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control.

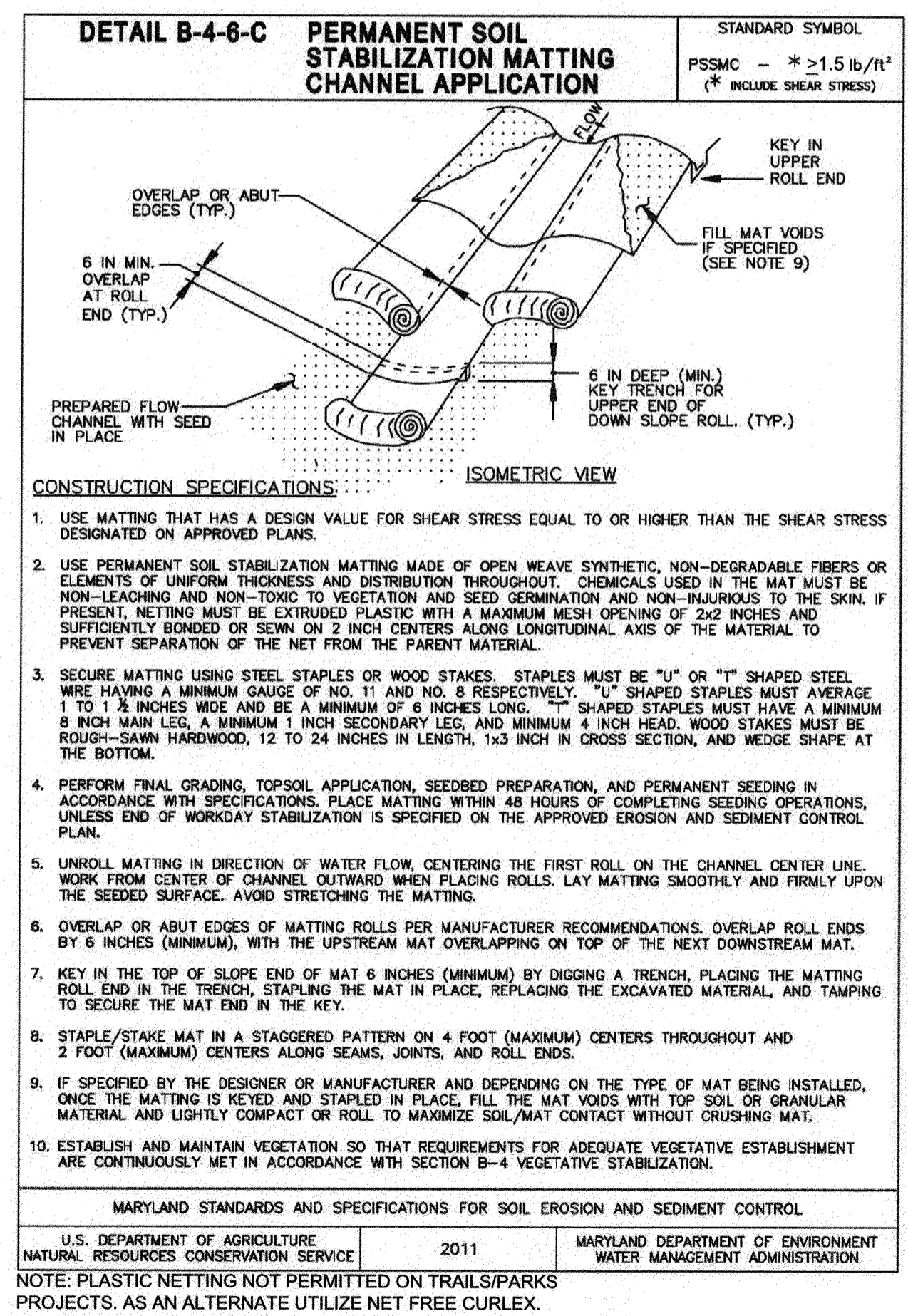
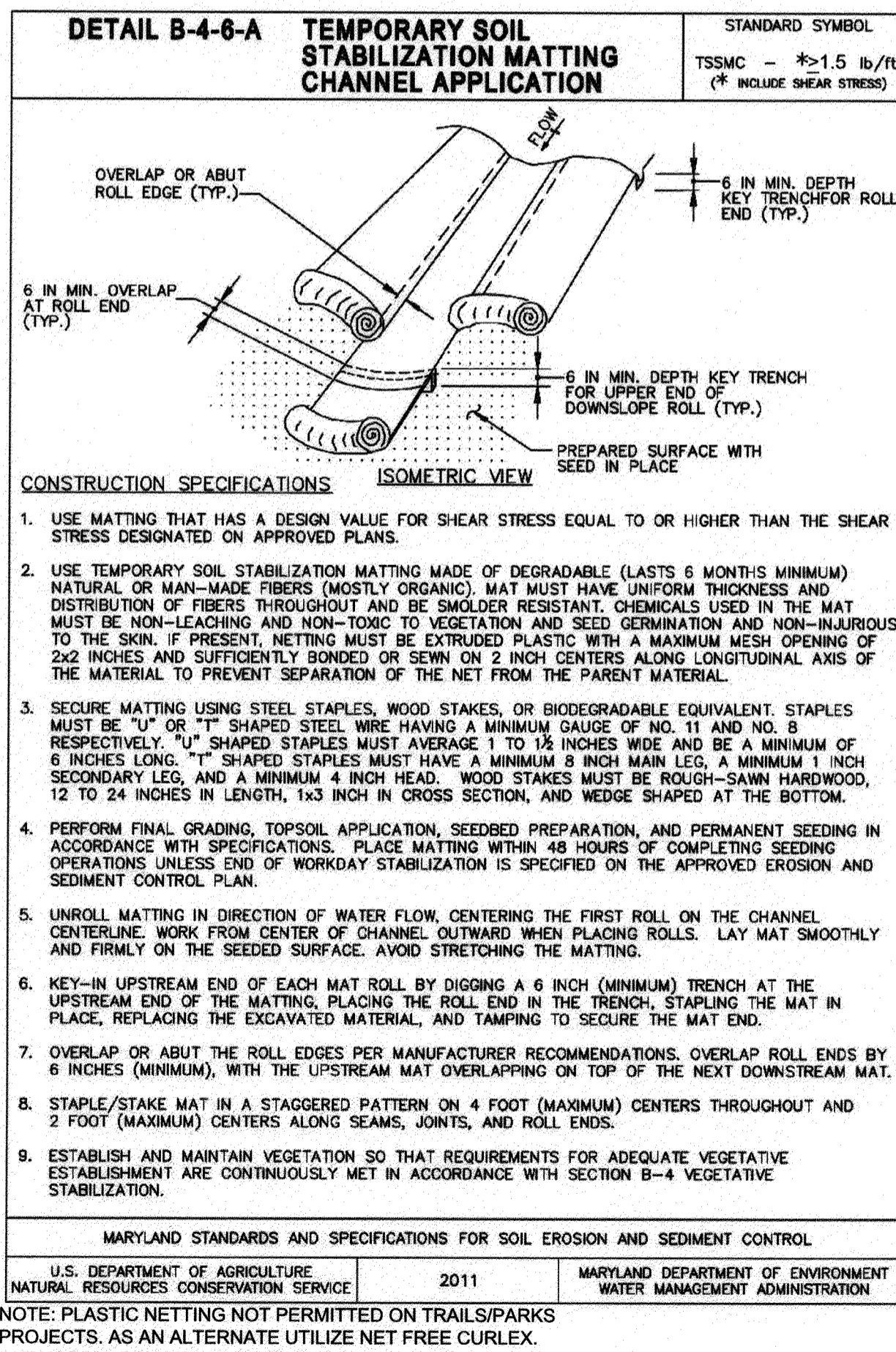


STANDARD SEDIMENT CONTROL NOTES

- ALL VEGETATIVE AND STRUCTURAL PRACTICES ARE TO BE INSTALLED ACCORDING TO THE PROVISIONS OF THIS PLAN AND ARE TO BE IN CONFORMANCE WITH THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL AND REVISIONS THERETO.
- FOLLOWING INITIAL SOIL DISTURBANCE OR RE-DISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITHIN:
 - A) THREE CALENDAR DAYS AS TO THE SURFACE OF ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES, AND ALL SLOPES GREATER THAN 3 HORIZONTAL TO 1 VERTICAL (3:1)
 - B) SEVEN DAYS AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE.
 - C) THE ABOVE REQUIREMENTS DO NOT APPLY TO THOSE AREAS WHICH ARE SHOWN ON THE PLAN AND ARE CURRENTLY BEING USED FOR MATERIAL STORAGE OR FOR THOSE AREAS ON WHICH ACTUAL CONSTRUCTION ACTIVITIES ARE CURRENTLY BEING PERFORMED OR TO INTERIOR AREAS OF A SURFACE MINE SITE WHERE THE STABILIZATION MATERIAL WOULD CONTAMINATE THE RECOVERABLE RESOURCE. MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE THAT THE STABILIZED AREAS CONTINUOUSLY MEET THE APPROPRIATE REQUIREMENTS OF THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL.
- ALL DISTURBED AREAS MUST BE STABILIZED WITHIN THE TIME PERIOD SPECIFIED ABOVE IN ACCORDANCE WITH THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL FOR PERMANENT SEEDING, SOD, TEMPORARY SEEDING, AND MULCHING (SEC. G). TEMPORARY STABILIZATION WITH MULCH ALONE SHALL ONLY BE DONE WHEN RECOMMENDED SEEDING DATES DO NOT ALLOW FOR PROPER GERMINATION AND ESTABLISHED OF GRASSES.
- ALL SEDIMENT CONTROL STRUCTURES ARE TO REMAIN IN PLACE AND ARE TO BE MAINTAINED IN OPERATIVE CONDITION UNTIL PERMISSION FOR THEIR REMOVAL HAS BEEN OBTAINED FROM THE SEDIMENT CONTROL INSPECTOR.
- SITE ANALYSIS:

TOTAL AREA OF SITE (LOD)	11.68 ACRES
AREA DISTURBED	11.68 ACRES
TOTAL CUT	15,951 CU. YARDS
TOTAL FILL	6,520 CU. YARDS

OFFSITE WASTE AREA LOCATION TO HAVE ACTIVE GRADING PERMIT
- ANY SEDIMENT CONTROL PRACTICE WHICH IS DISTURBED BY GRADING ACTIVITY FOR PLACEMENT OF UTILITIES MUST BE REPAIRED ON THE SAME DAY OF DISTURBANCE.
- ADDITIONAL SEDIMENT CONTROLS MUST BE PROVIDED, IF DEEMED NECESSARY BY THE SEDIMENT CONTROL INSPECTOR.
- ON ALL SITES WITH DISTURBED AREAS IN EXCESS OF 2 ACRES, APPROVAL OF THE INSPECTION AGENCY SHALL BE REQUESTED UPON COMPLETION OF INSTALLATION OF PERIMETER EROSION AND SEDIMENT CONTROLS, BUT BEFORE PROCEEDING WITH ANY OTHER EARTH DISTURBANCE OR GRADING. OTHER BUILDING OR GRADING INSPECTION APPROVALS MAY NOT BE AUTHORIZED UNTIL THIS INITIAL APPROVAL BY THE INSPECTION AGENCY IS MADE.
- TRENCHES FOR THE CONSTRUCTION OF UTILITIES IS LIMITED TO THREE PIPE LENGTHS OR THAT WHICH SHALL BE BACK-FILLED AND STABILIZED WITHIN ONE WORKING DAY, WHICHEVER IS SHORTER.
- SITE GRADING WILL BEGIN ONLY AFTER ALL PERIMETER SEDIMENT CONTROL MEASURES HAVE BEEN INSTALLED AND ARE IN A FUNCTIONING CONDITION.
- CUT AND FILL QUANTITIES PROVIDED UNDER SITE ANALYSIS DO NOT REPRESENT BID QUANTITIES. THESE QUANTITIES DO NOT DISTINGUISH BETWEEN TOPSOIL, STRUCTURAL FILL OR EMBANKMENT MATERIAL, NOR DO THEY REFLECT CONSIDERATION OF UNDERCUTTING OR REMOVAL OF UNSUITABLE MATERIAL. THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH SITE CONDITIONS WHICH MAY AFFECT THE WORK.
- STAGING AREAS SHALL BE MECHANICALLY STABILIZED WITH 6" (MIN.) OF WOODCHIPS, PREFERABLY FROM BRUSH CHIPPED ON SITE FROM THIS PROJECT.



GP# G02017905 DWG NO: DD101

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97144

APRIL 5, 2021

APPROVED DATE
[Signature] 5/6/21
CHIEF ENGINEER

APPROVED DATE
[Signature] 4/15/21
PROJECT MANAGER

APPROVED DATE
[Signature] 4/16/21
ASSISTANT CHIEF ENGINEER

APPROVED DATE
[Signature] 4/15/21
PROJECT MANAGER

APPROVED DATE
[Signature] 4/16/21
CHIEF, RIGHT OF WAY SERVICES

SCALE: AS SHOWN
DRAWN BY: PAI
CHECKED BY: PJS/JAR
SHEET 76 OF 137
PROJECT #: P504100
PROPOSAL #:

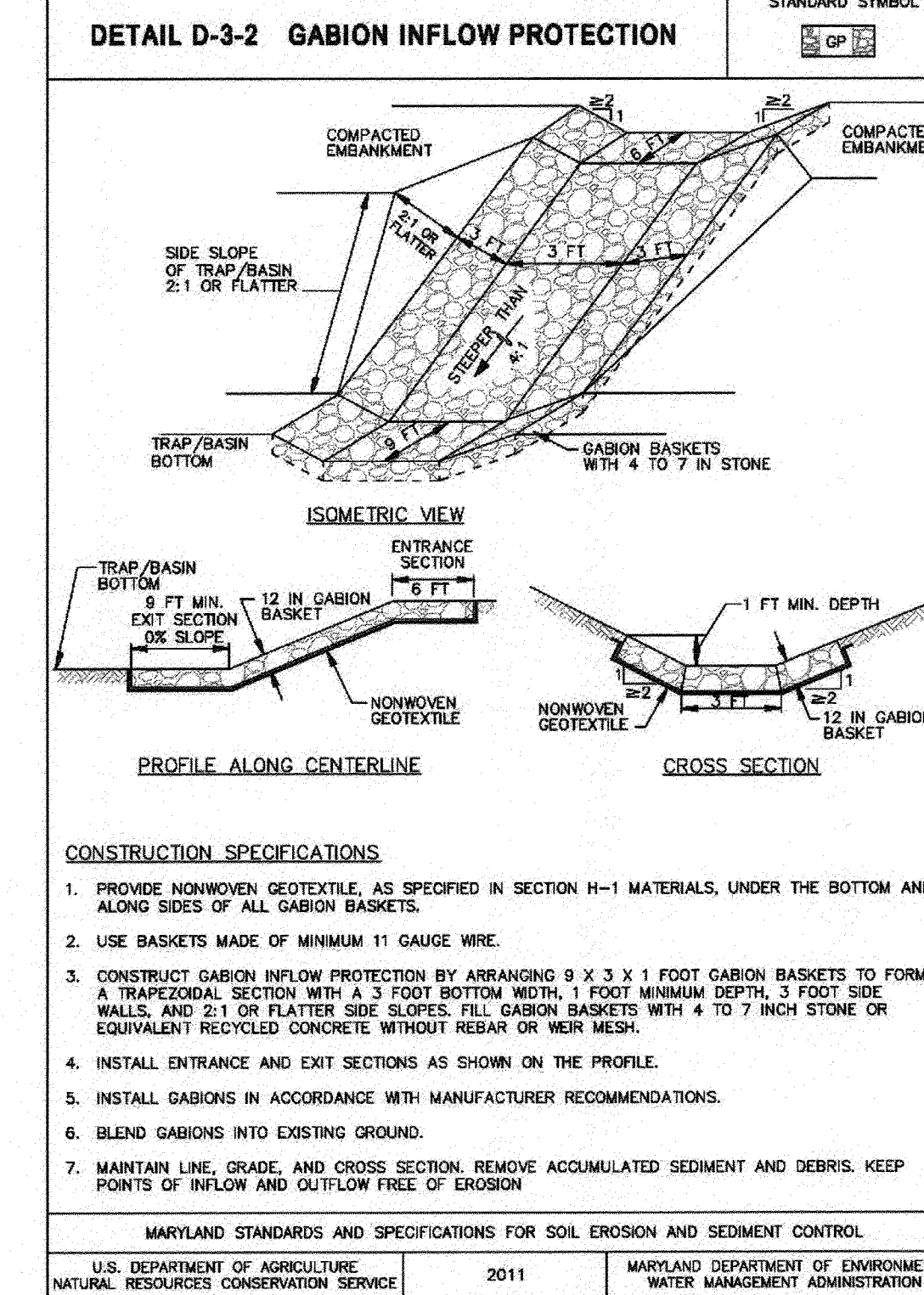
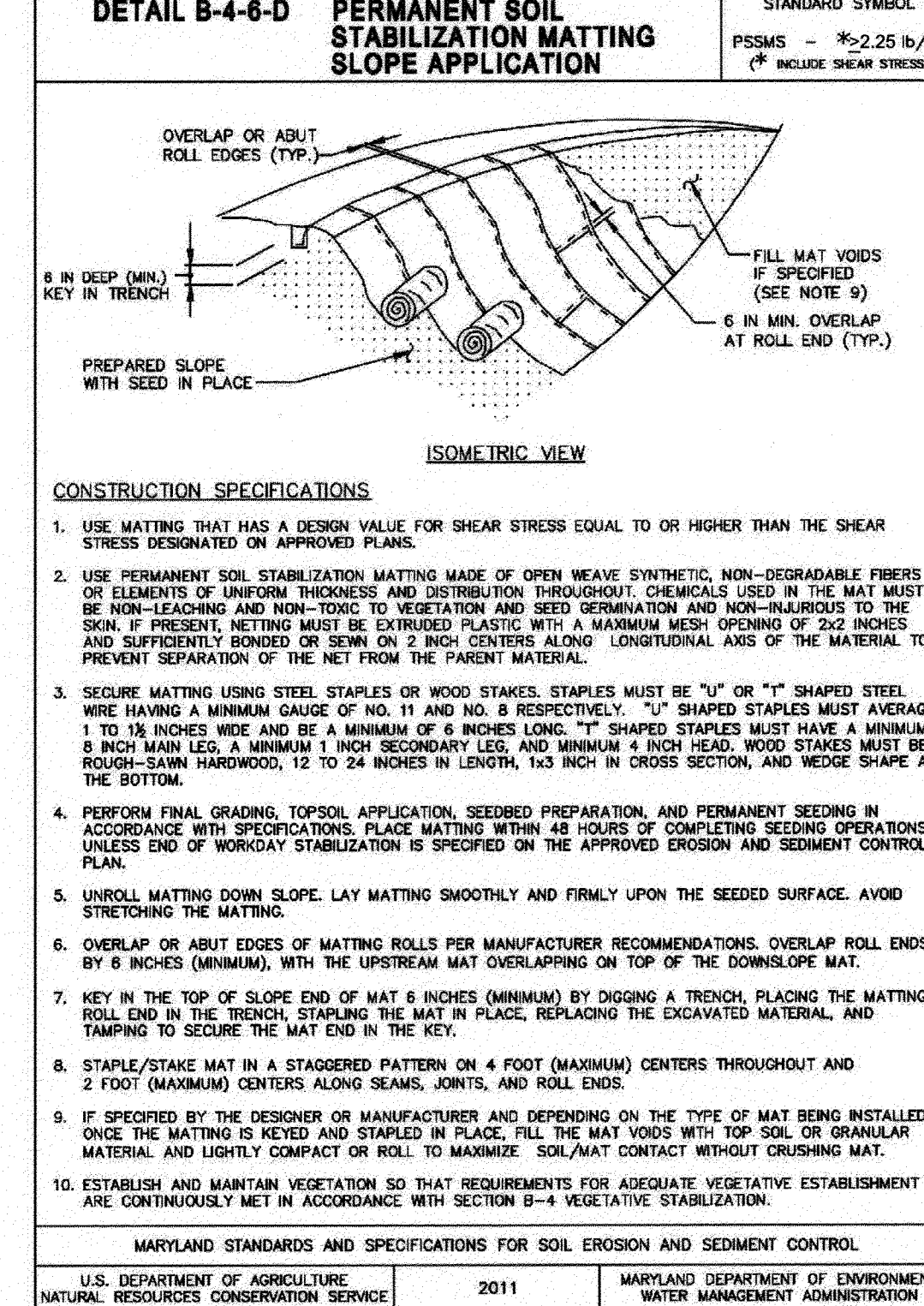
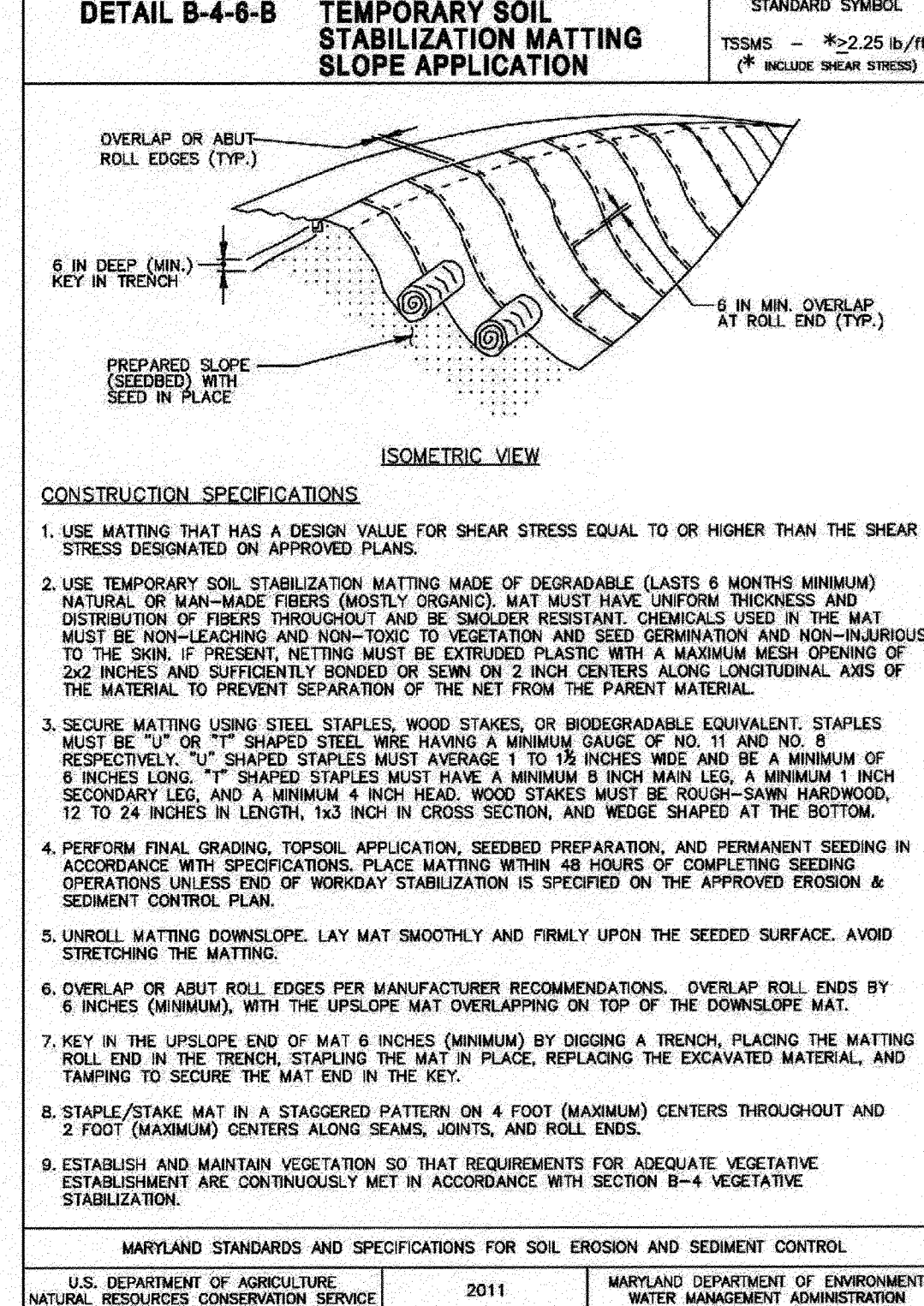
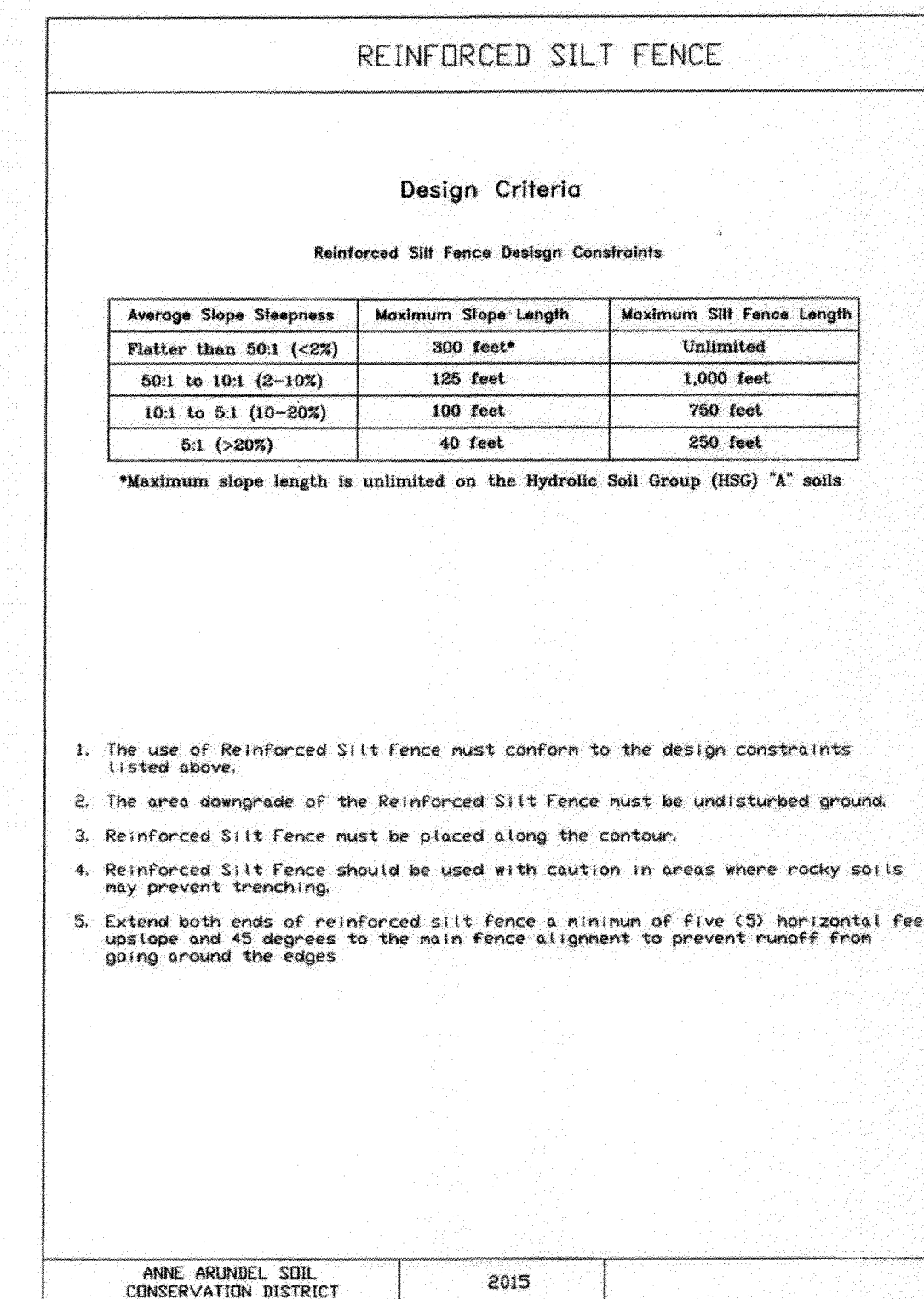
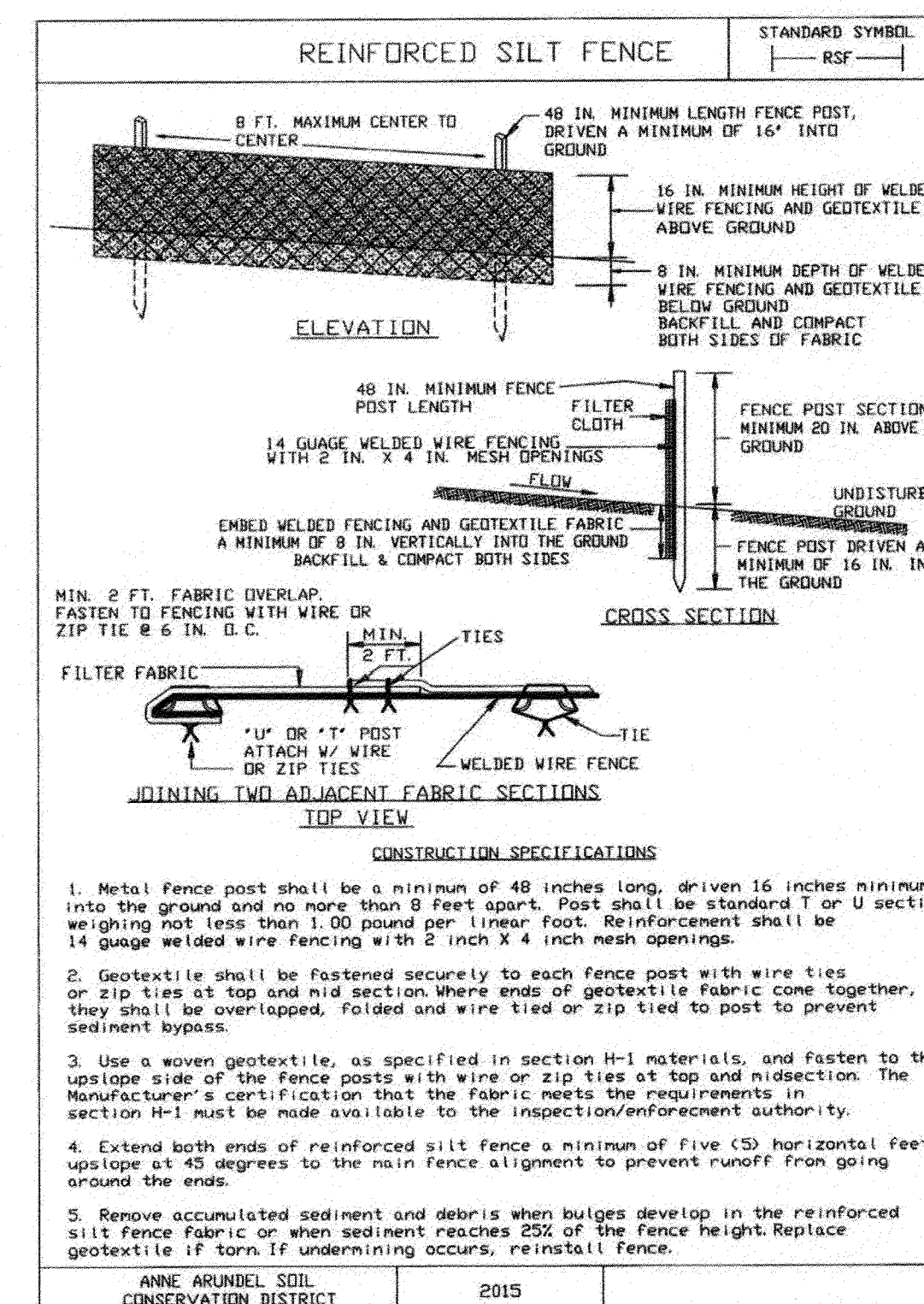
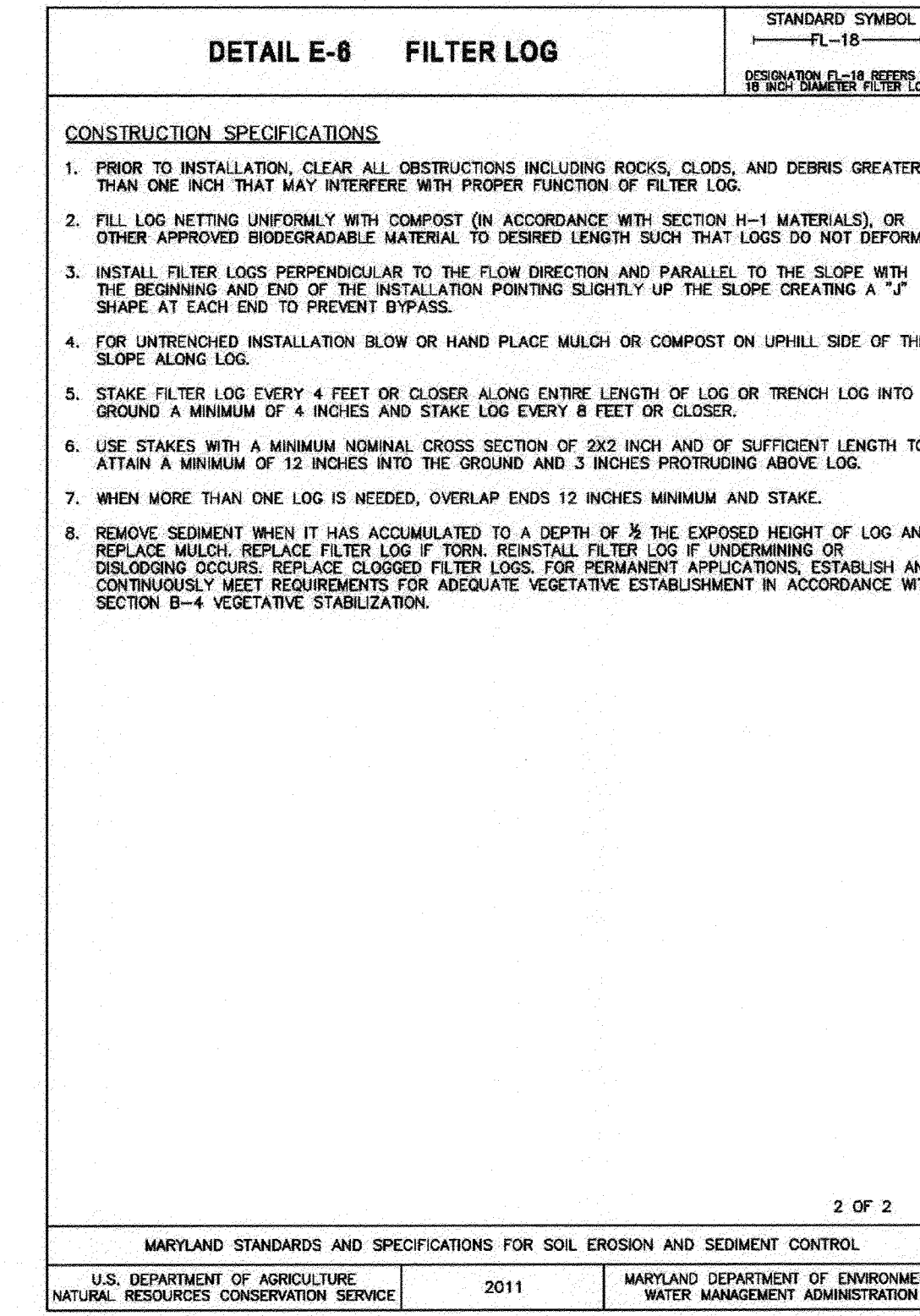
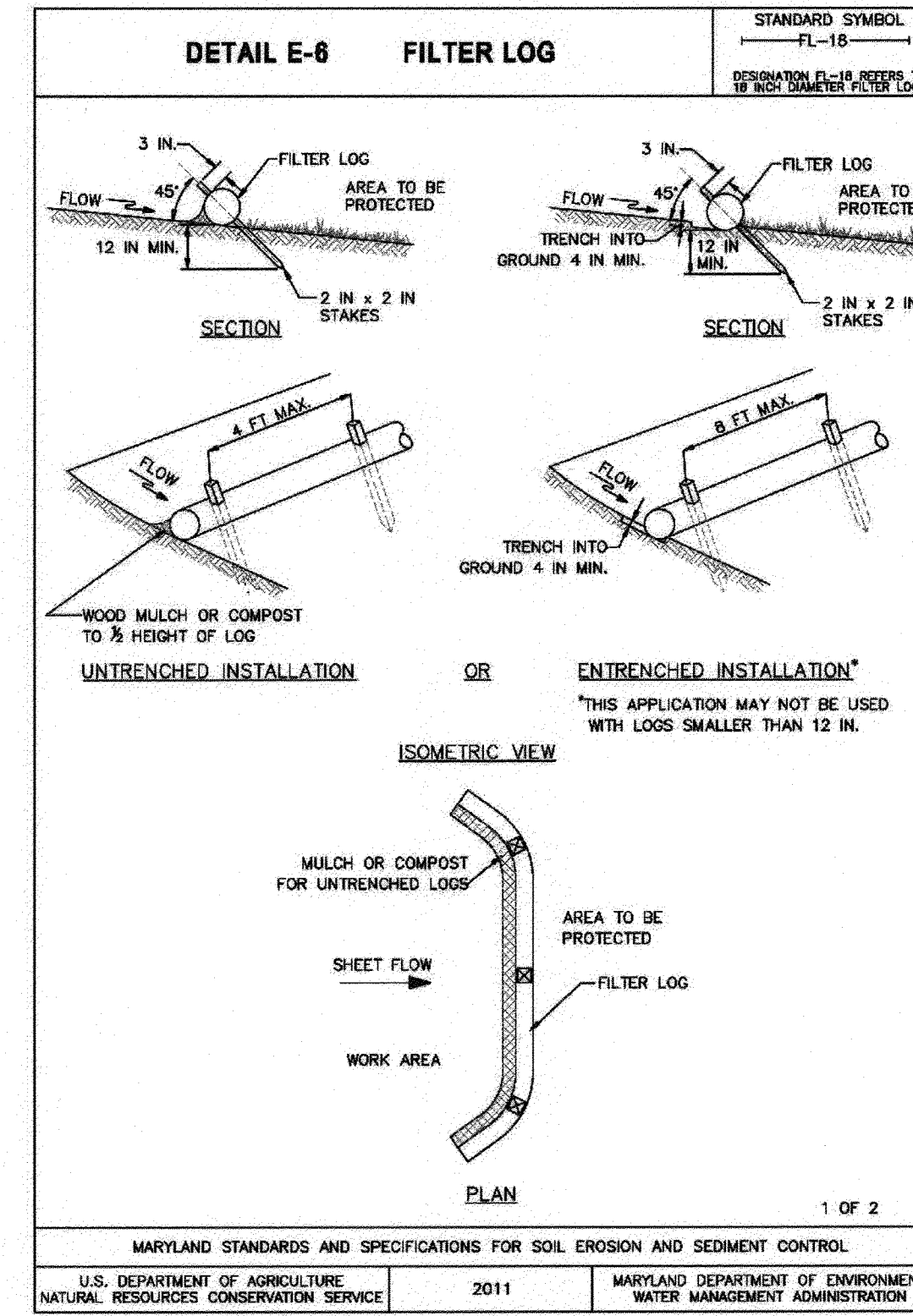
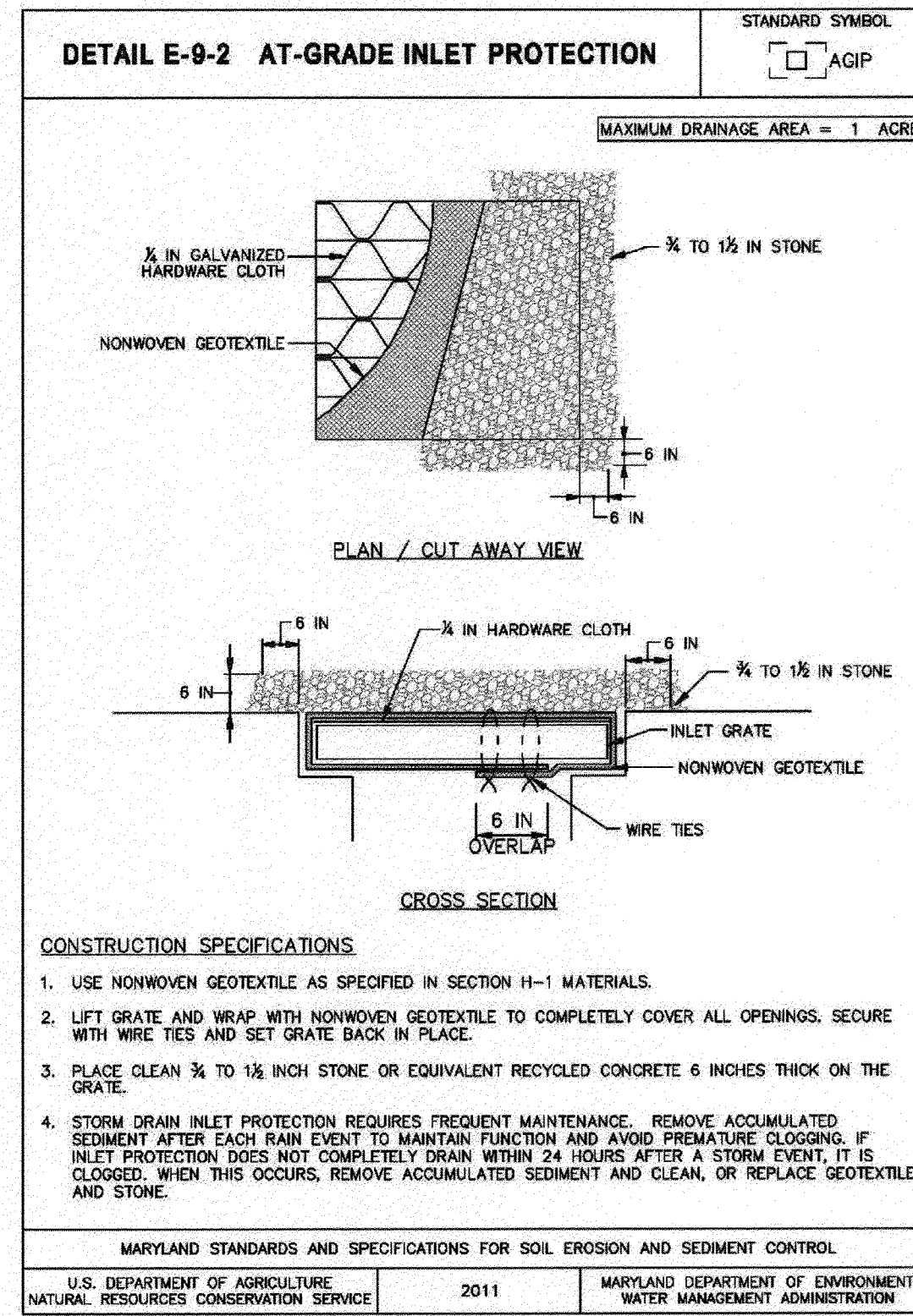
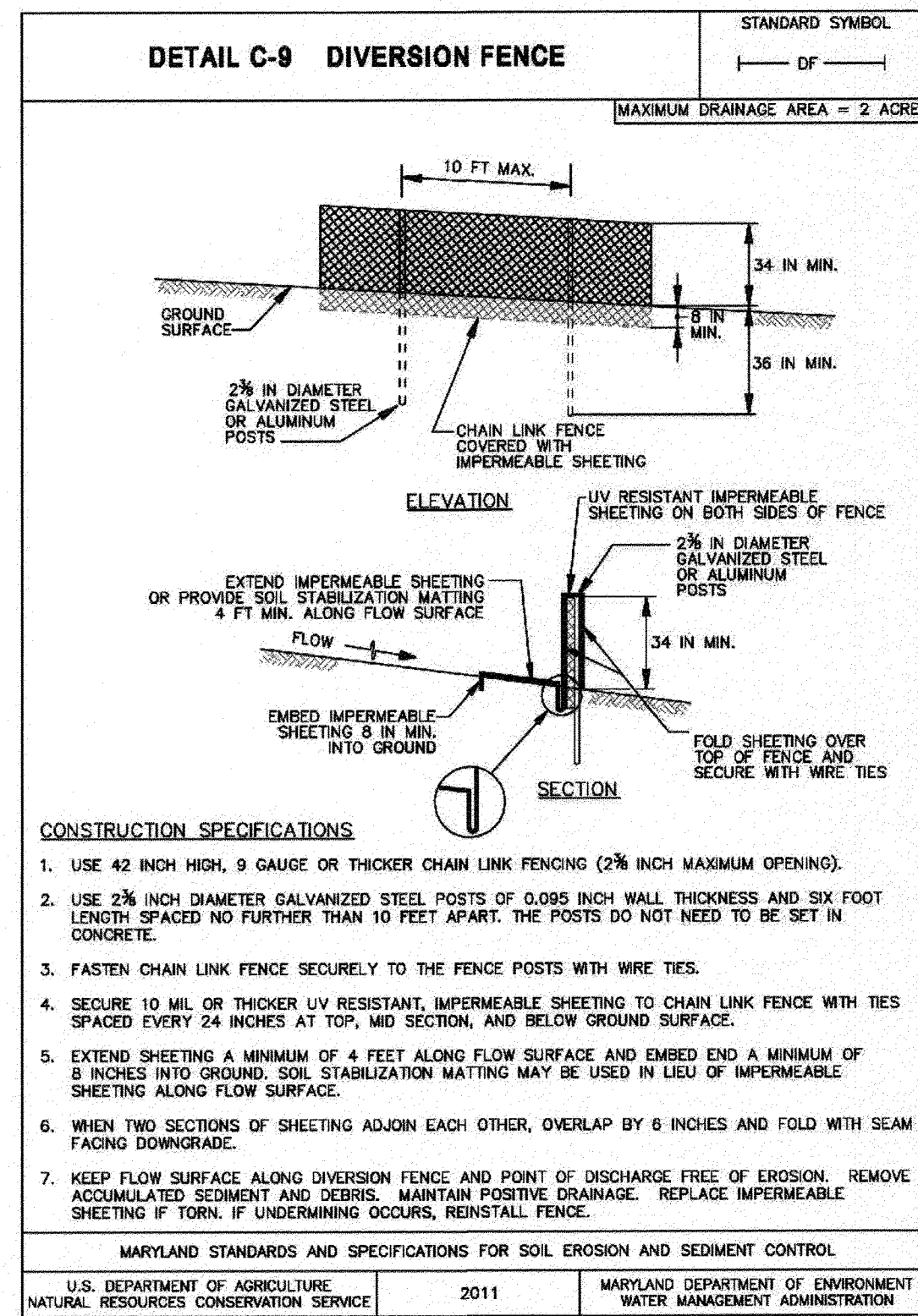
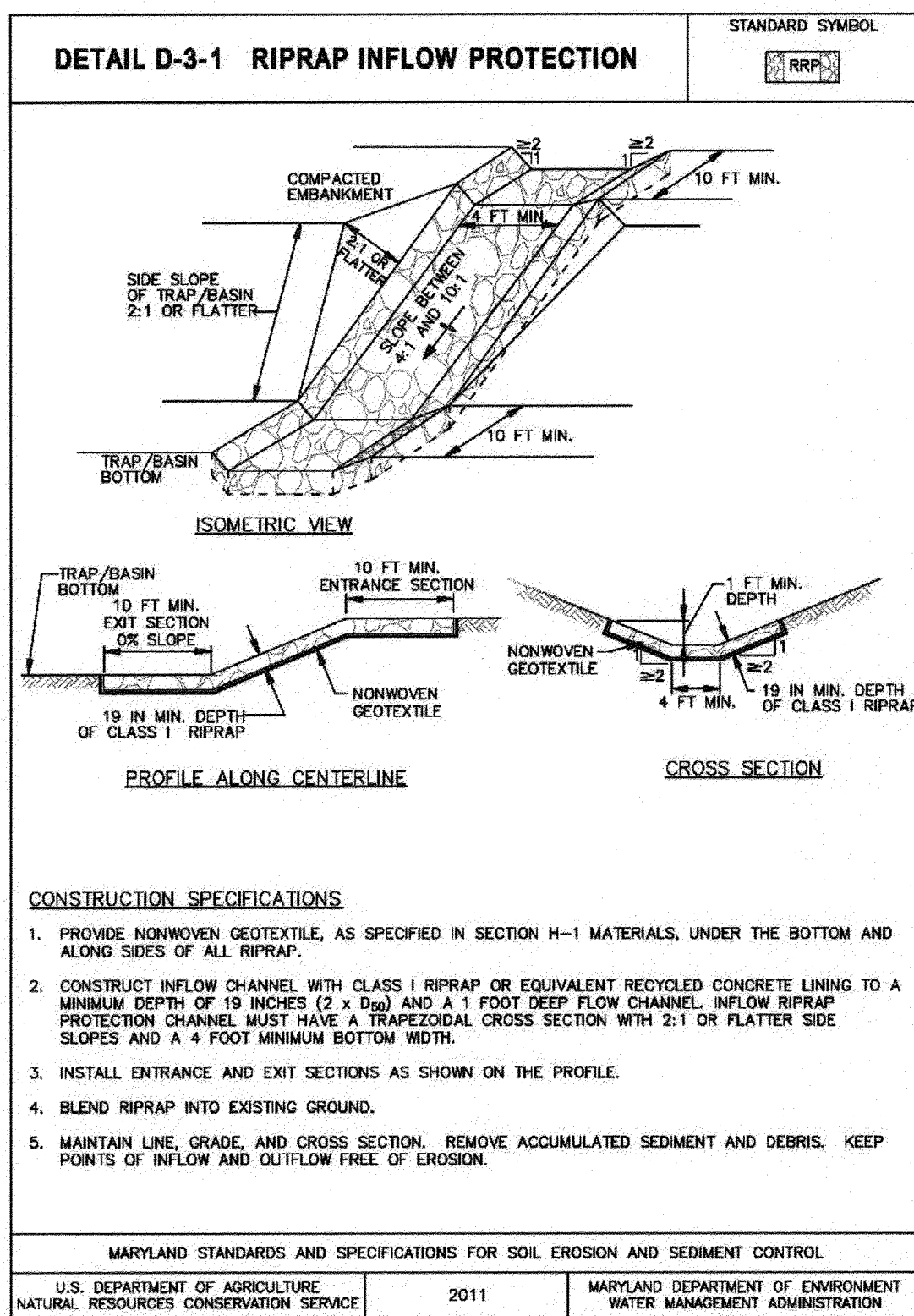
TYPICAL SECTIONS AND DETAILS
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2010

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE

Pennoni
PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE 2011 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION



PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

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Columbia, MD 21045
T 410.987.8900 F 410.987.8282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

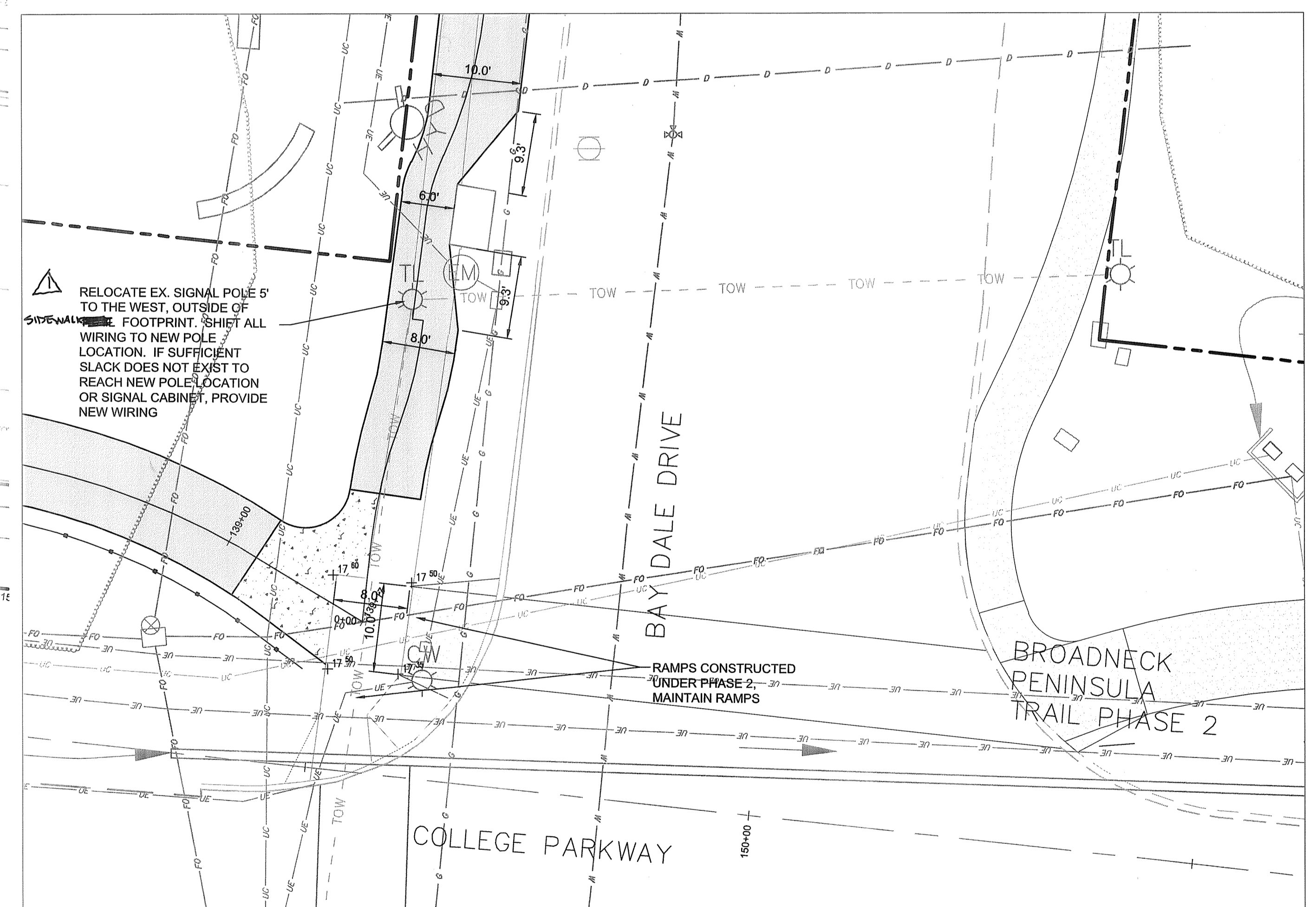
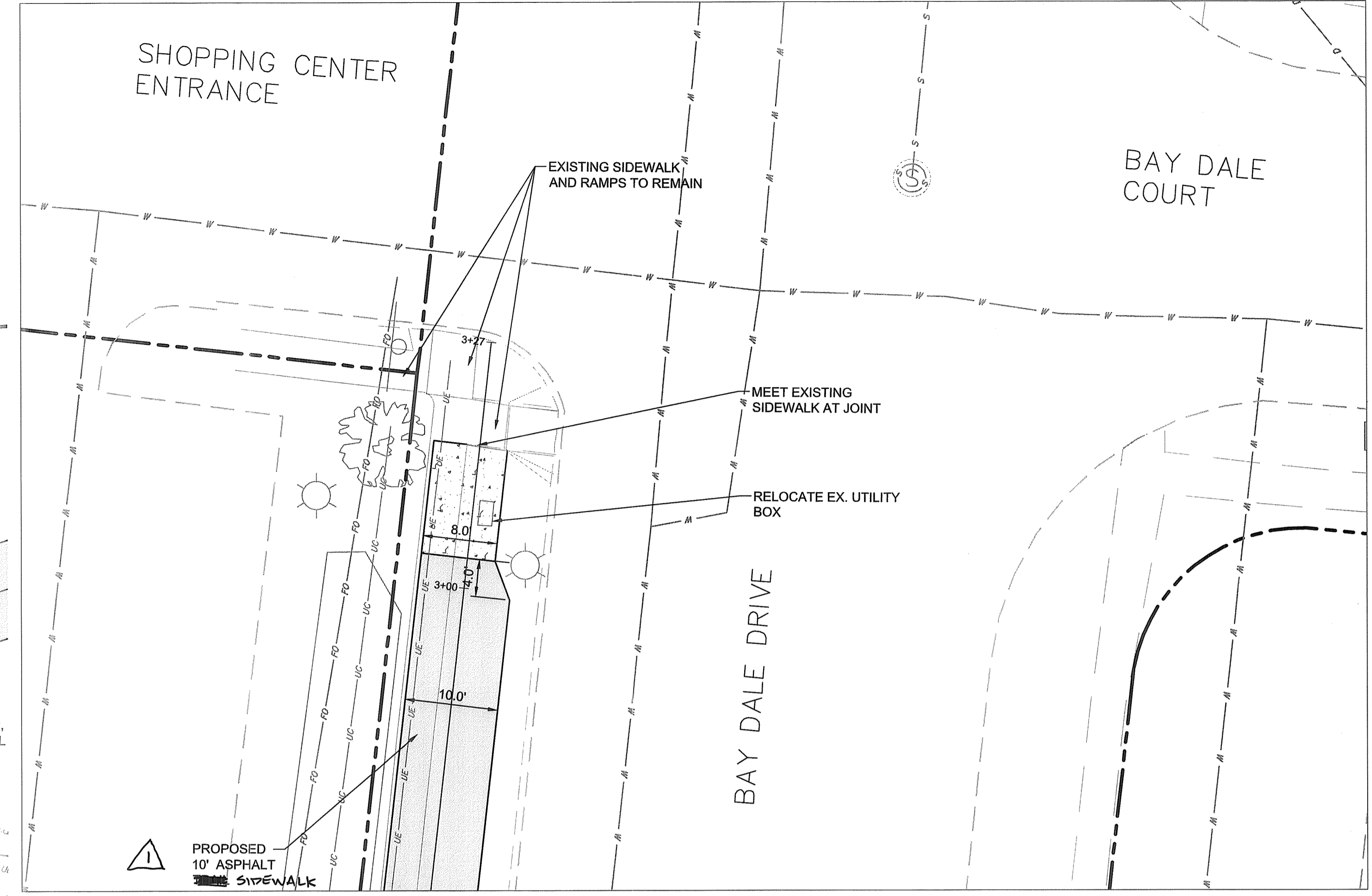
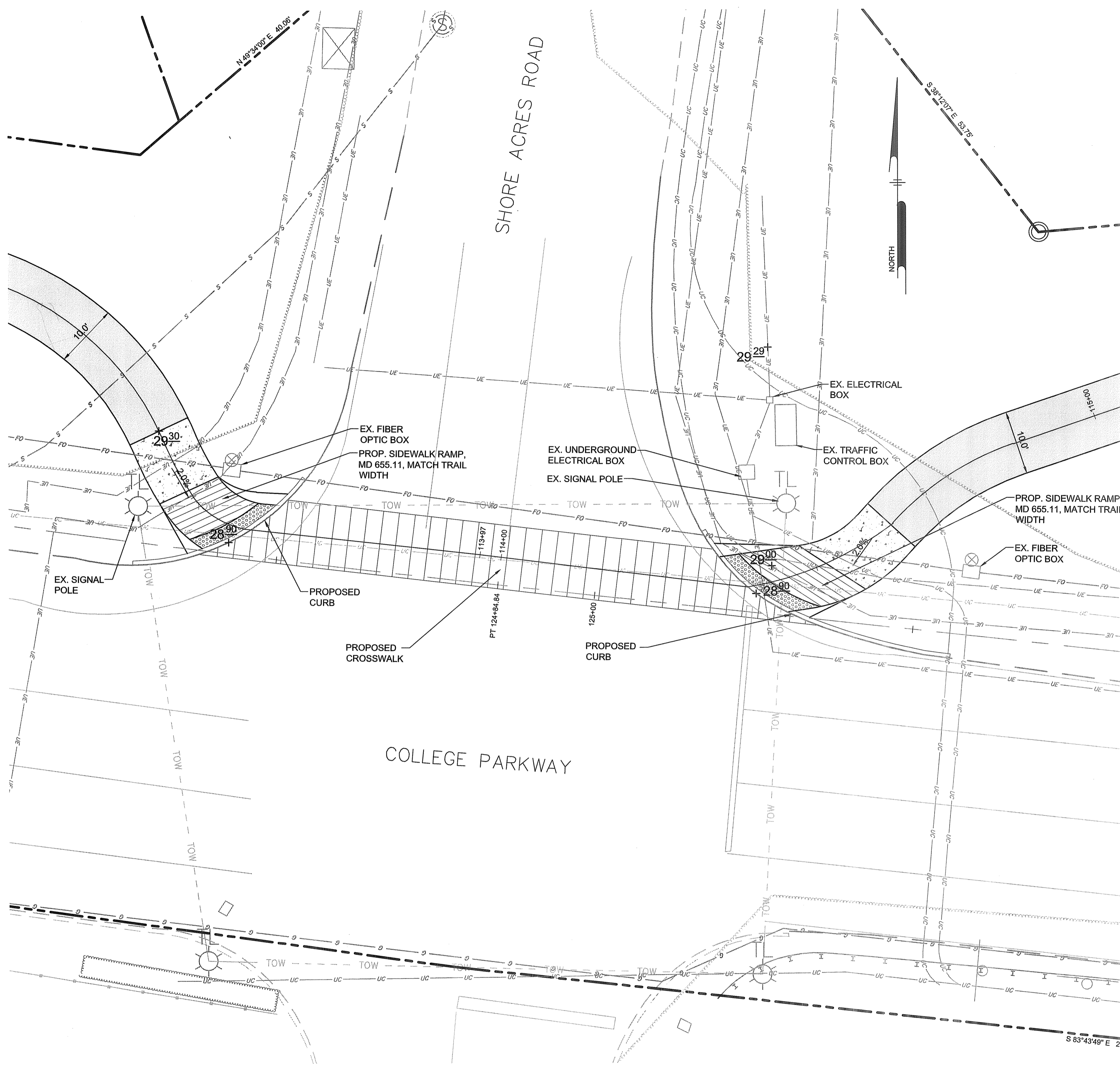
APPROVED DATE: [Signature] 5/10/21
APPROVED DATE: [Signature] 4/15/21
APPROVAL DATE: [Signature] 4/16/21
ASSISTANT CHIEF ENGINEER

APPROVED DATE: [Signature] 4/15/21
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SCALE: AS SHOWN
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97145
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SEDIMENT CONTROL DETAILS
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NOVEMBER 2019



NOTES

- CURB, RAMPS, AND SIDEWALK ELEVATIONS PROVIDED ARE FOR CONTRACTOR REFERENCE ONLY. ACTUAL FIELD CONDITIONS MAY VARY. PRIOR TO CONSTRUCTION, THESE ELEVATIONS SHALL BE CONFIRMED BY THE CONTRACTOR TO MEET THE REQUIREMENTS SET FORTH BY THE LATEST EDITION OF THE AMERICANS WITH DISABILITIES ACT AND THE MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION (MDOT SHA) "ACCESSIBILITY POLICY AND GUIDELINES FOR PEDESTRIAN FACILITIES ALONG STATE HIGHWAY (2010)." ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER. THE INTENT OF THESE PLANS IS TO MEET EXISTING GRADES WHERE THE PROPOSED TRAIL CONNECTS TO THE EXISTING ROAD; NO ROAD GRADE MODIFICATIONS OR ROAD REPAVING ARE INCLUDED IN THIS SCOPE UNLESS SPECIFICALLY NOTED.
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LEGEND

- PROPOSED 10' WIDE ASPHALT TRAIL
- PROPOSED CONCRETE PAVING
- PROPOSED CROSSWALK
- PROPOSED RETAINING WALL
- PROPOSED 4' BLACK VINYL CHAIN LINK FENCE
- PROPOSED SPLIT RAIL FENCE
- PROPOSED SPOT ELEVATION



PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY (DATE)
1	REVISE LABELS	PAW 11/11/21

Pennoni
 PENNONI ASSOCIATES INC.
 8990 McGaw Road, Suite 100
 Columbia, MD 21045
 T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
 DEPARTMENT OF PUBLIC WORKS

97146
 APRIL 5, 2021

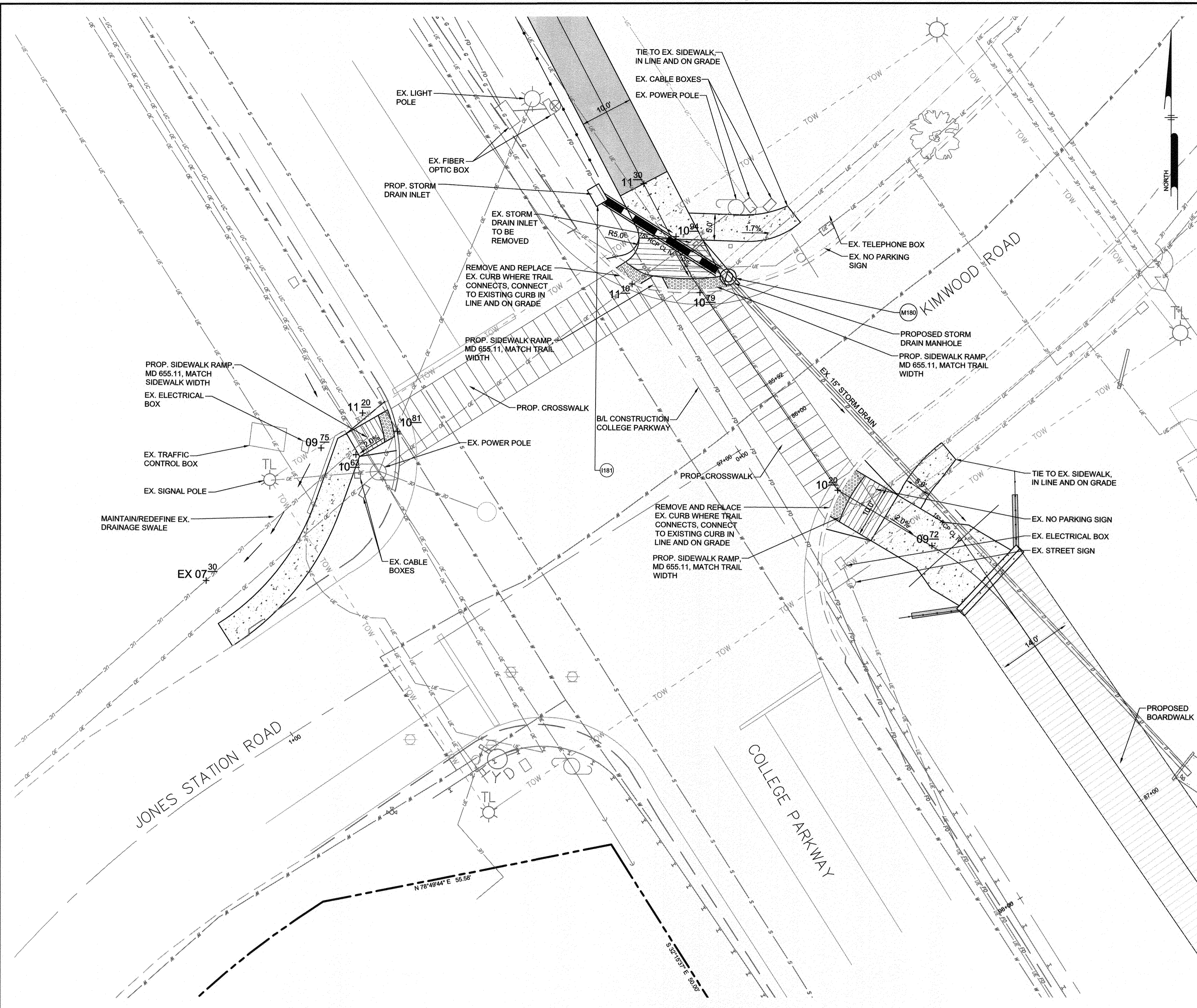
INTERSECTION DETAILS
BROADNECK TRAIL - PHASE III
 CONSTRUCTION DOCUMENTS
 TAX MAP 32, 39, AND 40
 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
 ANNE ARUNDEL COUNTY, MD
 NOVEMBER 2019

APPROVED <i>[Signature]</i> CHIEF ENGINEER	DATE 5/10/21	APPROVED <i>[Signature]</i> PROJECT MANAGER	DATE 4/15/21
APPROVAL <i>[Signature]</i> ASSISTANT CHIEF ENGINEER	DATE 4/14/21	APPROVED <i>[Signature]</i> CHIEF, RIGHT OF WAY SERVICES	DATE 4/16/21

SCALE: AS SHOWN
 DRAWN BY: PAI
 CHECKED BY: PJS/JAR
 SHEET 7B OF 137
 PROJECT #: P504100
 PROPOSAL #:

GP# G02017905 DWG NO: DD11A

DWG No.:

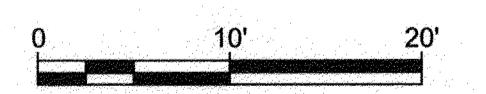


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LEGEND

- PROPOSED 10' WIDE ASPHALT TRAIL
- PROPOSED CONCRETE PAVING
- PROPOSED CROSSWALK
- PROPOSED RETAINING WALL
- PROPOSED 4' BLACK VINYL CHAIN LINK FENCE
- PROPOSED SPLIT RAIL FENCE
- PROPOSED SPOT ELEVATION



GP# G02017905 DWG NO: DD11B

#	REVISIONS DESCRIPTION	APPROVED BY	DATE

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Pennoni
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 8890 McGaw Road, Suite 100
 Columbia, MD 21045
 T 410.987.8900 F 410.987.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

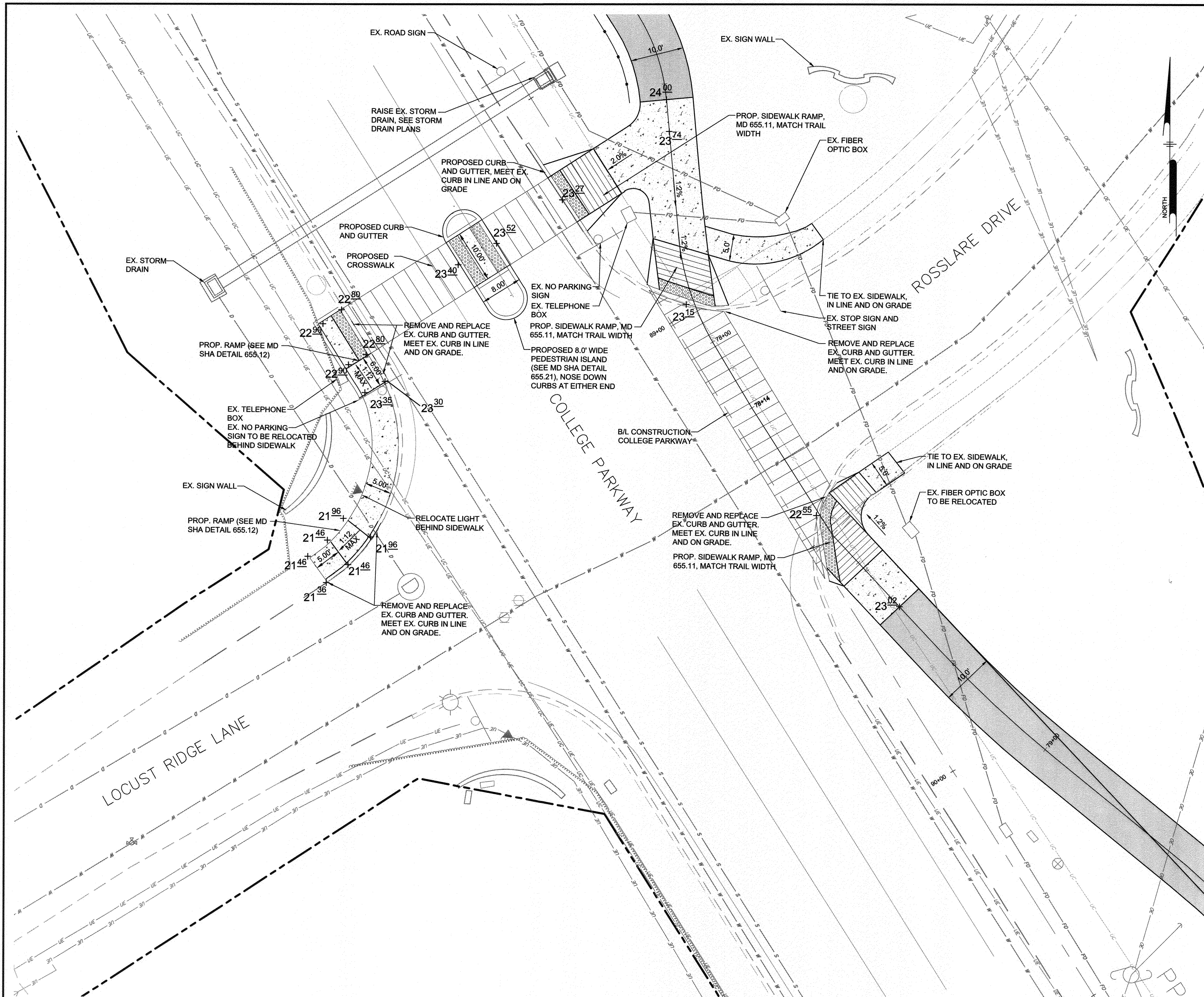
97147 APRIL 5, 2021

INTERSECTION DETAILS

BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
 TAX MAP 32, 39, AND 40
 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
 ANNE ARUNDEL COUNTY, MD
 NOVEMBER 2019

APPROVED DATE	APPROVED DATE	SCALE: AS SHOWN
<i>[Signature]</i> 4/15/21	<i>[Signature]</i> 4/15/21	DRAWN BY: PAI
CHIEF ENGINEER	PROJECT MANAGER	CHECKED BY: PJS/JAR
APPROVAL DATE	APPROVED DATE	SHEET 79 of 137
<i>[Signature]</i> 4/16/21	<i>[Signature]</i> 4/16/21	PROJECT #: P504100
ASSISTANT CHIEF ENGINEER	CHIEF, RIGHT OF WAY SERVICES	PROPOSAL #:

DWG No.:

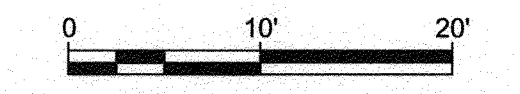


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LEGEND

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- PROPOSED CROSSWALK
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- PROPOSED SPLIT RAIL FENCE
- PROPOSED SPOT ELEVATION



GP# G02017905 DWG NO: DD11C

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE

Pennoni ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97148 APRIL 5, 2021

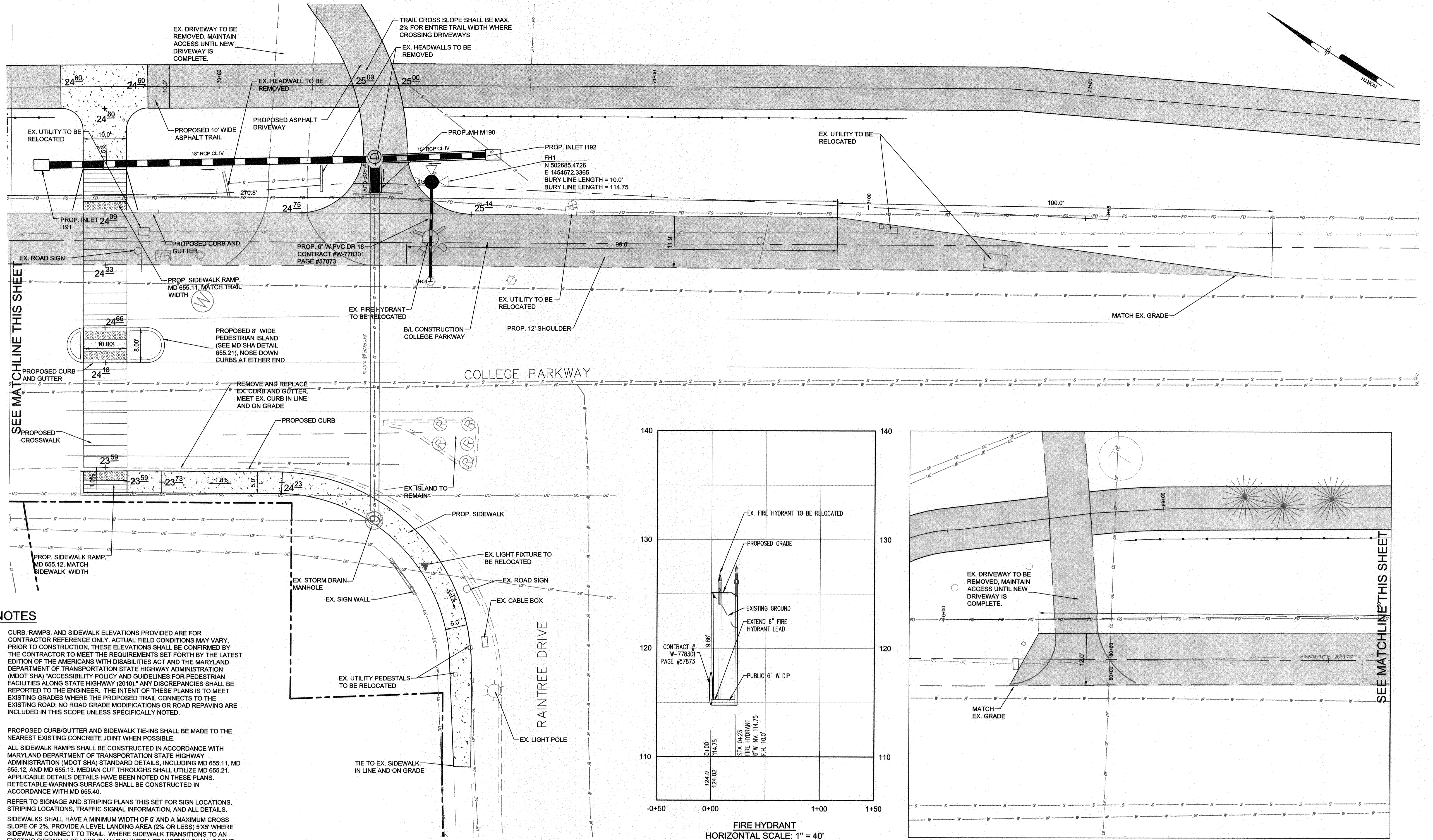
INTERSECTION DETAILS

BROADNECK TRAIL - PHASE III CONSTRUCTION DOCUMENTS

TAX MAP 32, 38, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

APPROVED <i>[Signature]</i> DATE <u>5/14/21</u> CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE <u>4/15/21</u> PROJECT MANAGER	SCALE: AS SHOWN DRAWN BY: PAI CHECKED BY: PJS/JAR SHEET <u>80</u> of <u>137</u> PROJECT # P504100 PROPOSAL #:
APPROVAL <i>[Signature]</i> DATE <u>4/14/21</u> ASSISTANT CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE <u>4/14/21</u> CHIEF, RIGHT OF WAY SERVICES	

DPW No.:



NOTES

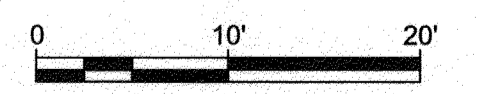
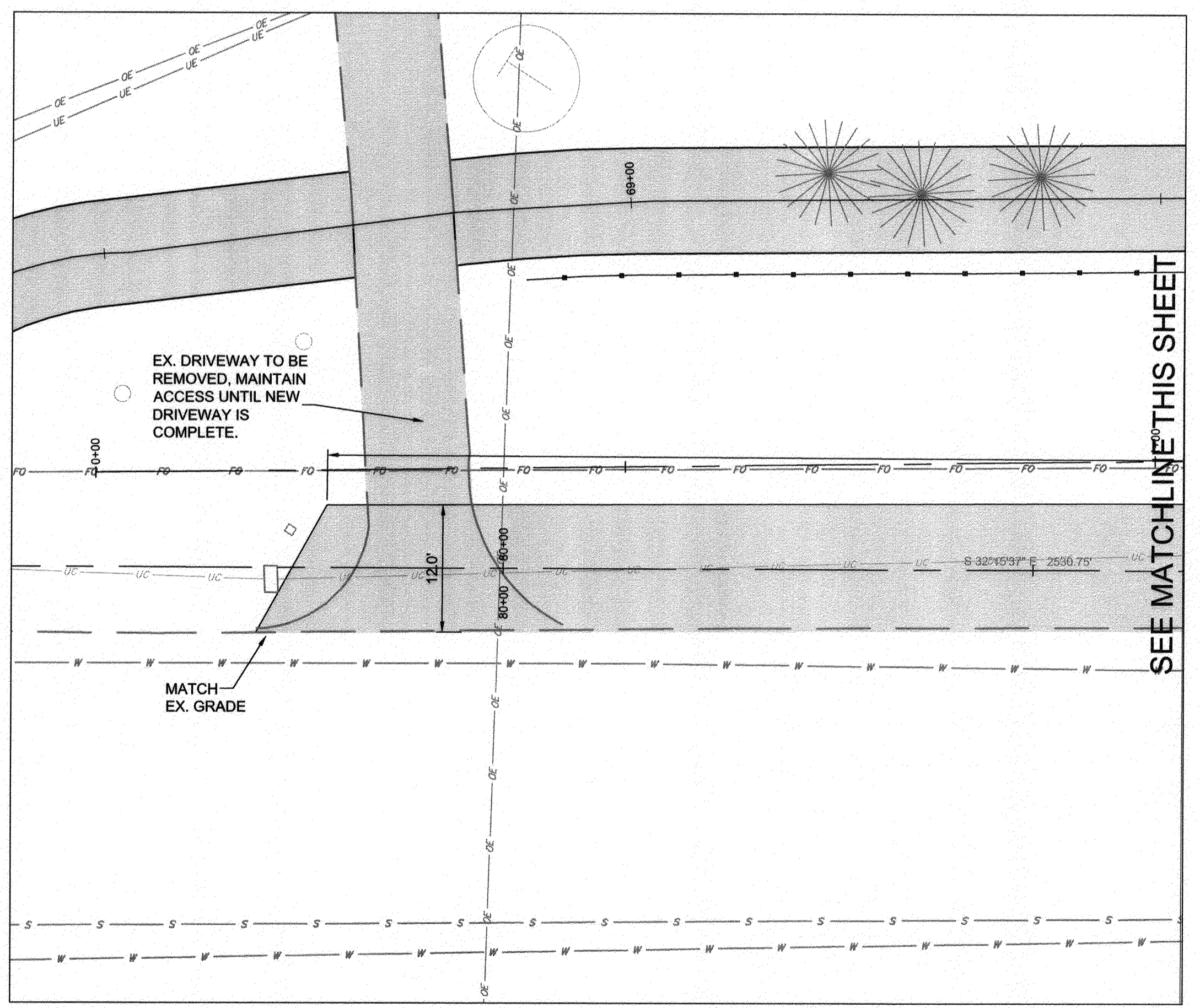
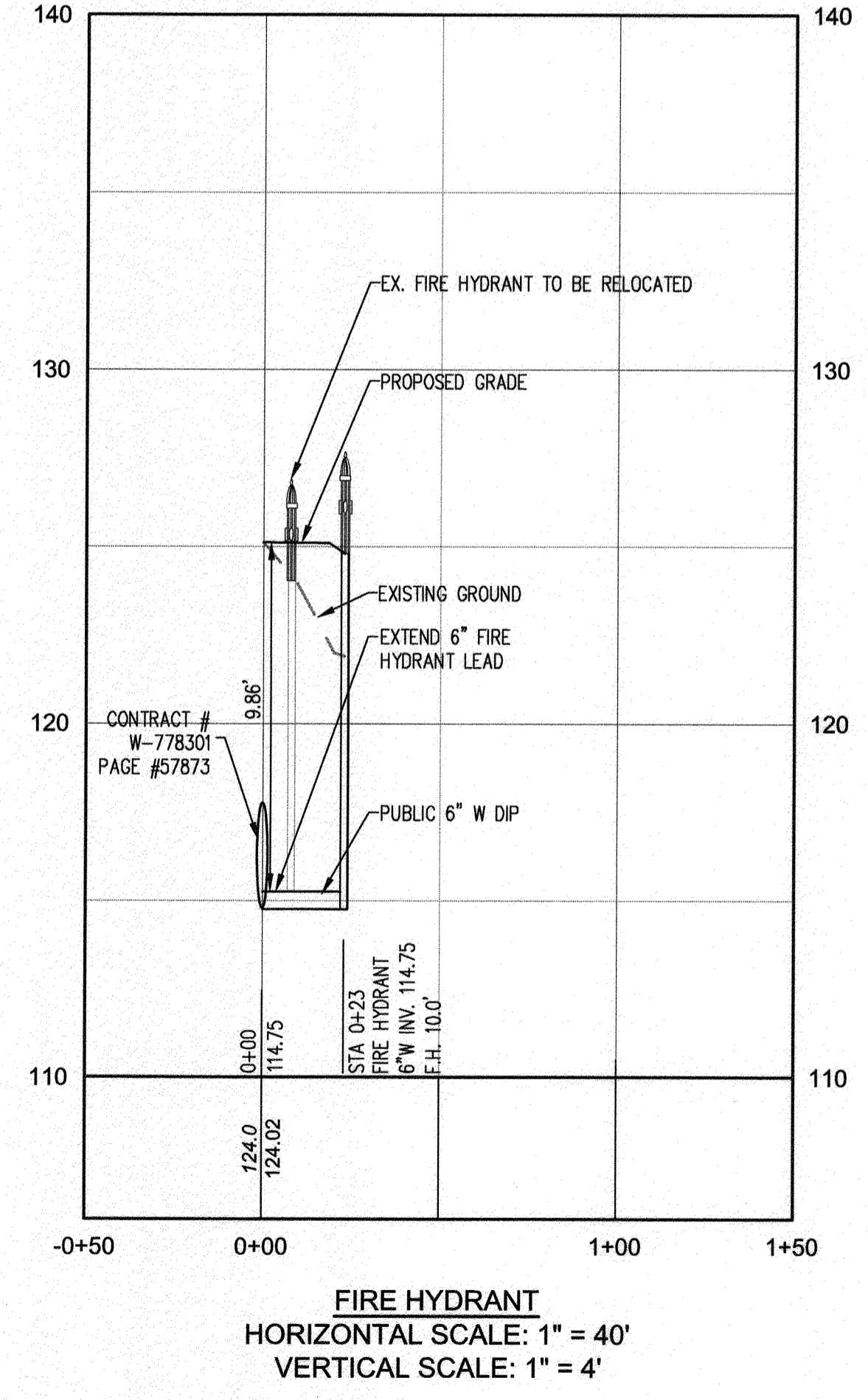
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- WHERE TRAIL CROSSES DRIVEWAYS, TRAIL SHALL HAVE A MAXIMUM OF 2% CROSS SLOPE FOR THE ENTIRE WIDTH OF THE TRAIL. PROVIDE A LEVEL LANDING AREA (2% OR LESS) 5'X5' WHERE SIDEWALKS CONNECT TO TRAIL. WHERE SIDEWALK TRANSITIONS TO AN EXISTING SIDEWALK OF LESS THAN 5' IN WIDTH, TRANSITION SHALL OCCUR OVER A MINIMUM OF 5'.

WATER NOTES

- ALL WATER MAIN SHALL BE INSTALLED IN ACCORDANCE WITH ANNE ARUNDEL COUNTY SPECIFICATIONS AND DETAILS, AND THE CURRENT DPW DESIGN MANUAL.
- ALL WATER PIPE SHALL BE DUCTILE IRON CLASS 54.

LEGEND

PROPOSED 10' WIDE ASPHALT TRAIL	
PROPOSED CONCRETE PAVING	
PROPOSED CROSSWALK	
PROPOSED RETAINING WALL	
PROPOSED 4' BLACK VINYL CHAIN LINK FENCE	
PROPOSED SPLIT RAIL FENCE	
PROPOSED SPOT ELEVATION	



GP# G02017905 DWG NO: DD11D

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774. EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE

Penioni
PENIONI ASSOCIATES INC.
 8890 McGaw Road, Suite 100
 Columbia, MD 21045
 T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97149 APRIL 5, 2021

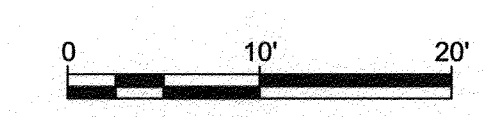
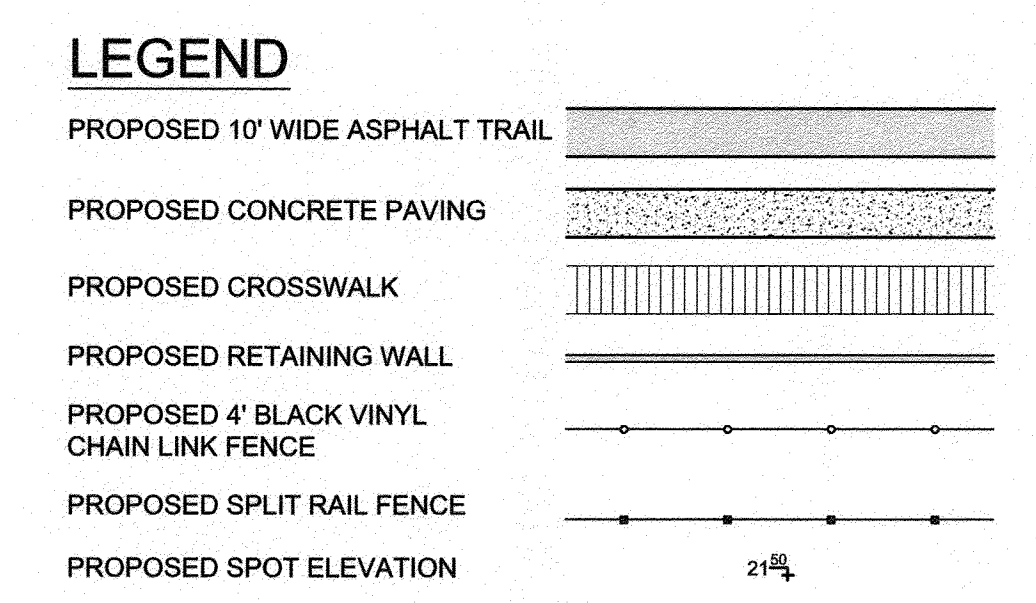
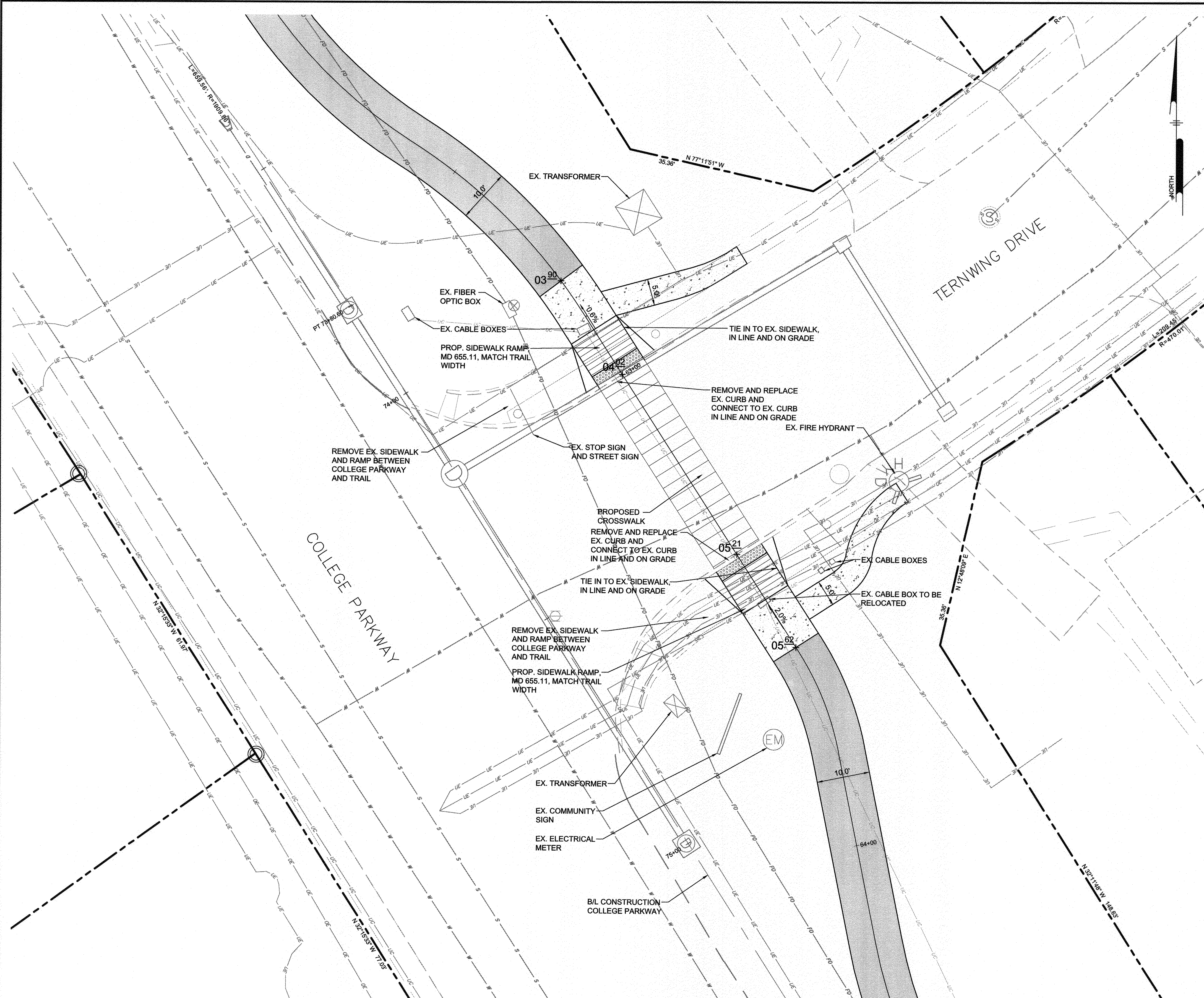
INTERSECTION DETAILS

APPROVED <i>[Signature]</i> DATE 5/6/21 CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE 4/13/21 PROJECT MANAGER	SCALE: AS SHOWN	BROADNECK TRAIL - PHASE III CONSTRUCTION DOCUMENTS TAX MAP 32, 39, AND 40 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT ANNE ARUNDEL COUNTY, MD NOVEMBER 2019
APPROVAL <i>[Signature]</i> DATE 4/21/21 ASSISTANT CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE 4/16/21 CHIEF, RIGHT OF WAY SERVICES	DRAWN BY: PAI	
SHEET 81 of 137		PROJECT #: P504100	

DPW No.:

NOTES


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GP# G02017905 DWG NO: DD11E

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#	REVISIONS DESCRIPTION	APPROVED BY	DATE



Pennoni

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8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97150

APRIL 5, 2021

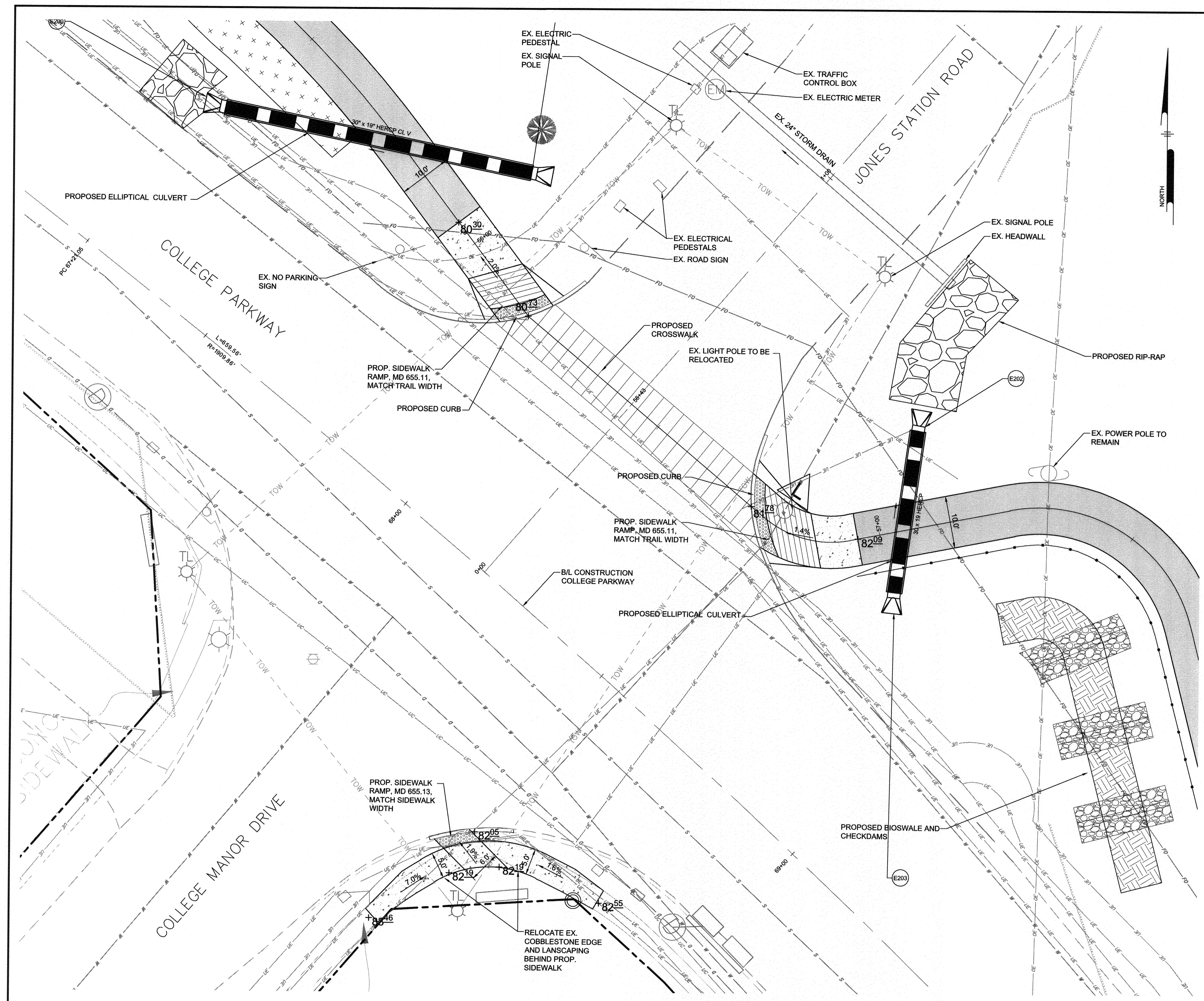
INTERSECTION DETAILS

BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS

TAX MAP 32, 38, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

APPROVED <i>[Signature]</i> CHIEF ENGINEER	DATE <i>4/15/21</i>	APPROVED <i>[Signature]</i> PROJECT MANAGER	DATE <i>4/15/21</i>	SCALE: AS SHOWN	DRAWN BY: PAI
APPROVAL <i>[Signature]</i> ASSISTANT CHIEF ENGINEER	DATE <i>4/16/21</i>	APPROVED <i>[Signature]</i> CHIEF, RIGHT OF WAY SERVICES	DATE <i>4/16/21</i>	CHECKED BY: PJS/JAR	SHEET <u>82</u> of <u>137</u>
				PROJECT #: P504100	PROPOSAL #:

DPW Inc.

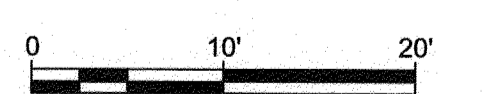


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LEGEND


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- PROPOSED SPOT ELEVATION



GP# G02017905 DWG NO: DD11F

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#	REVISIONS DESCRIPTION	APPROVED BY	DATE



Pennoni

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T 410.997.8900 F 410.997.9282

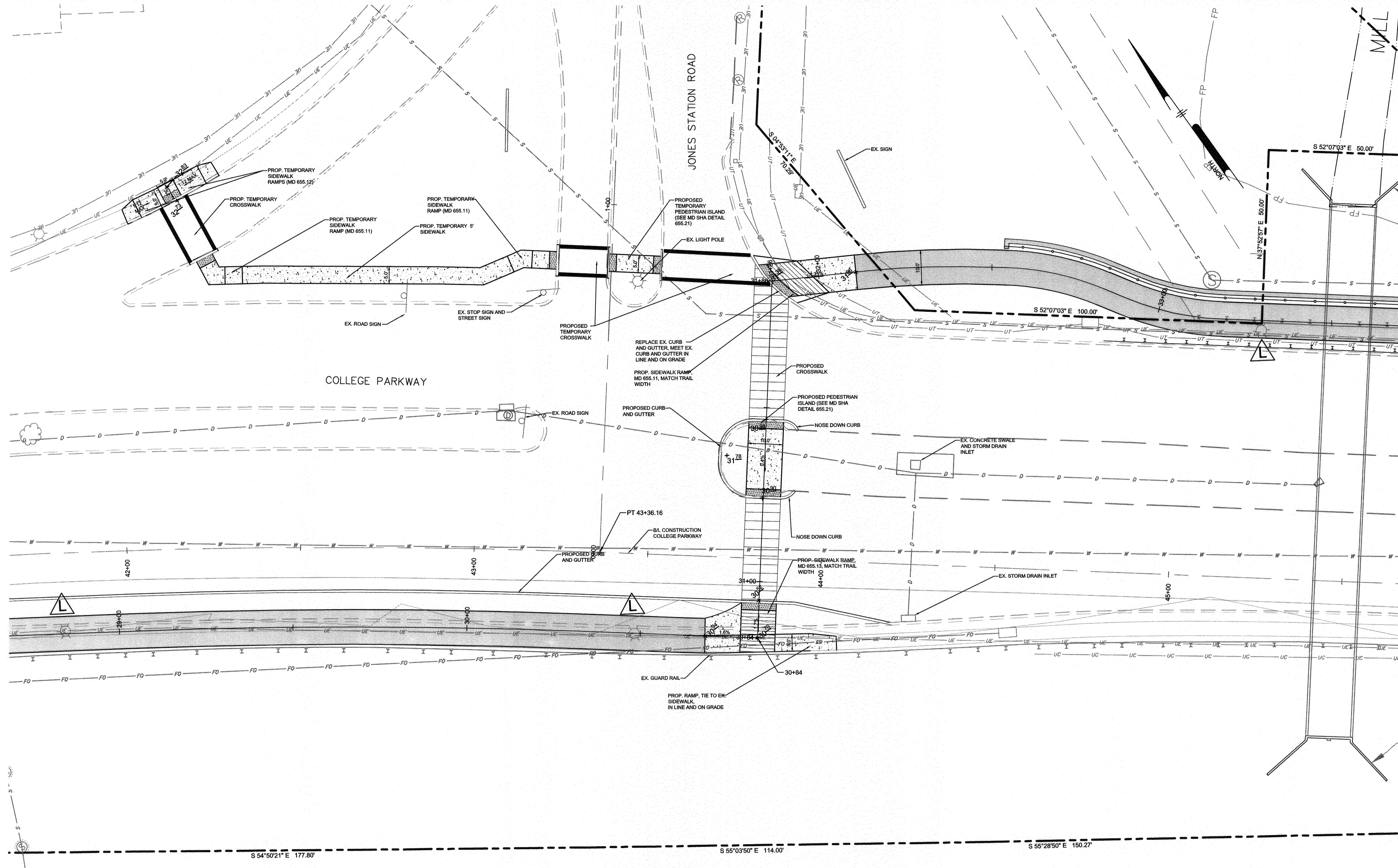
ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97151

APRIL 5, 2021

APPROVED <i>[Signature]</i> DATE 4/15/21 CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE 4/15/21 PROJECT MANAGER	SCALE: AS SHOWN DRAWN BY: PAI CHECKED BY: PJS/UAR	INTERSECTION DETAILS
APPROVAL <i>[Signature]</i> DATE 4/16/21 ASSISTANT CHIEF ENGINEER	APPROVED <i>[Signature]</i> DATE 4/16/21 CHIEF, RIGHT OF WAY SERVICES	SHEET <u>83</u> OF <u>137</u> PROJECT #: P504100 PROPOSAL #:	BROADNECK TRAIL - PHASE III CONSTRUCTION DOCUMENTS TAX MAP 32, 39, AND 40 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT ANNE ARUNDEL COUNTY, MD NOVEMBER 2019

DWG NO:

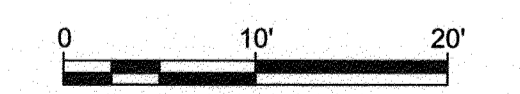


NOTES

1. CURB, RAMPS, AND SIDEWALK ELEVATIONS PROVIDED ARE FOR CONTRACTOR REFERENCE ONLY. ACTUAL FIELD CONDITIONS MAY VARY. PRIOR TO CONSTRUCTION, THESE ELEVATIONS SHALL BE CONFIRMED BY THE CONTRACTOR TO MEET THE REQUIREMENTS SET FORTH BY THE LATEST EDITION OF THE AMERICANS WITH DISABILITIES ACT AND THE MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION (MDOT SHA) "ACCESSIBILITY POLICY AND GUIDELINES FOR PEDESTRIAN FACILITIES ALONG STATE HIGHWAY (2010)." ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER. THE INTENT OF THESE PLANS IS TO MEET EXISTING GRADES WHERE THE PROPOSED TRAIL CONNECTS TO THE EXISTING ROAD; NO ROAD GRADE MODIFICATIONS OR ROAD REPAVING ARE INCLUDED IN THIS SCOPE UNLESS SPECIFICALLY NOTED.
2. PROPOSED CURB/GUTTER AND SIDEWALK TIE-INS SHALL BE MADE TO THE NEAREST EXISTING CONCRETE JOINT WHEN POSSIBLE.
3. ALL SIDEWALK RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION (MDOT SHA) STANDARD DETAILS, INCLUDING MD 655.11, MD 655.12, AND MD 655.13. MEDIAN CUT THROUGHS SHALL UTILIZE MD 655.21. APPLICABLE DETAILS HAVE BEEN NOTED ON THESE PLANS. DETECTABLE WARNING SURFACES SHALL BE CONSTRUCTED IN ACCORDANCE WITH MD 655.40.
4. REFER TO SIGNAGE AND STRIPING PLANS THIS SET FOR SIGN LOCATIONS, STRIPING LOCATIONS, TRAFFIC SIGNAL INFORMATION, AND ALL DETAILS.
5. SIDEWALKS SHALL HAVE A MINIMUM WIDTH OF 5' AND A MAXIMUM CROSS SLOPE OF 2%. PROVIDE A LEVEL LANDING AREA (2% OR LESS) 5'X5' WHERE SIDEWALKS CONNECT TO TRAIL. WHERE SIDEWALK TRANSITIONS TO AN EXISTING SIDEWALK OF LESS THAN 5' IN WIDTH, TRANSITION SHALL OCCUR OVER A MINIMUM OF 5'.
6. ALL SIDEWALKS NOTED AS TEMPORARY ARE TO BE INSTALLED TO FACILITATE THE CIRCULATION OF PEDESTRIANS AROUND THE WORK ZONE DURING CONSTRUCTION. AT THE COMPLETION OF CONSTRUCTION, THESE SIDEWALKS SHALL BE REMOVED AND THE AREA RESTORED TO THE PRE CONSTRUCTION CONDITION.
7. TEMPORARY CROSSWALKS SHALL BE INSTALLED AS NOTED. CROSSWALKS SHALL BE 8' WIDE AND SHALL CONSIST OF 12" SOLID WHITE LEAD FREE THERMOPLASTIC PAVEMENT MARKINGS. CROSSWALKS SHALL BE REMOVED AT THE COMPLETION OF CONSTRUCTION.

LEGEND


- PROPOSED 10' WIDE ASPHALT TRAIL
- PROPOSED CONCRETE PAVING
- PROPOSED CROSSWALK
- PROPOSED RETAINING WALL
- PROPOSED 4' BLACK VINYL CHAIN LINK FENCE
- PROPOSED SPLIT RAIL FENCE
- PROPOSED SPOT ELEVATION



GP# G02017905 DWG NO: DD11G

PROFESSIONAL CERTIFICATION: I, JAMES A. RUFF, PE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND LICENSE # 21774 EXPIRATION DATE 11/10/2021

#	REVISIONS DESCRIPTION	APPROVED BY	DATE



Pennoni

PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.8282

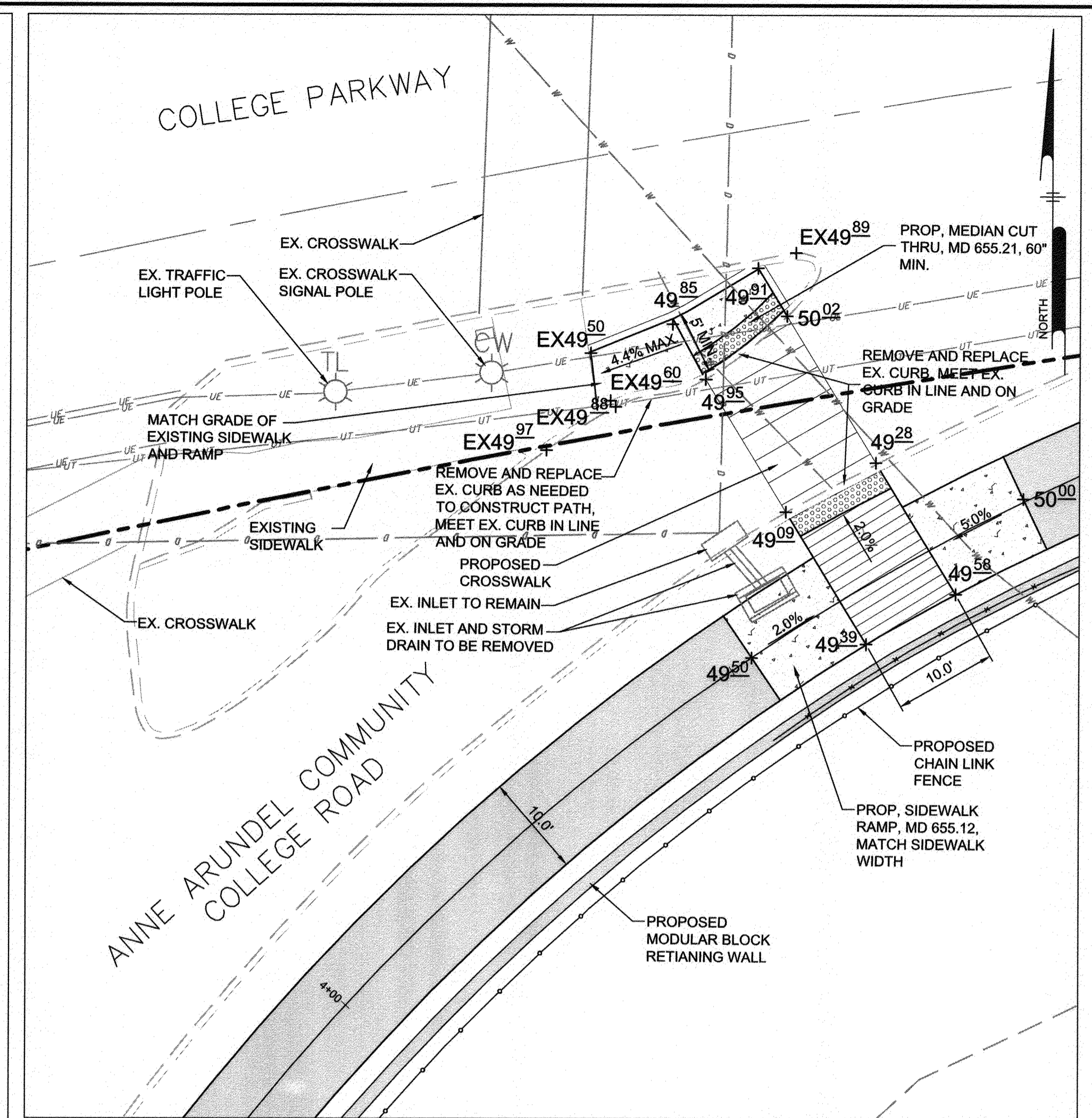
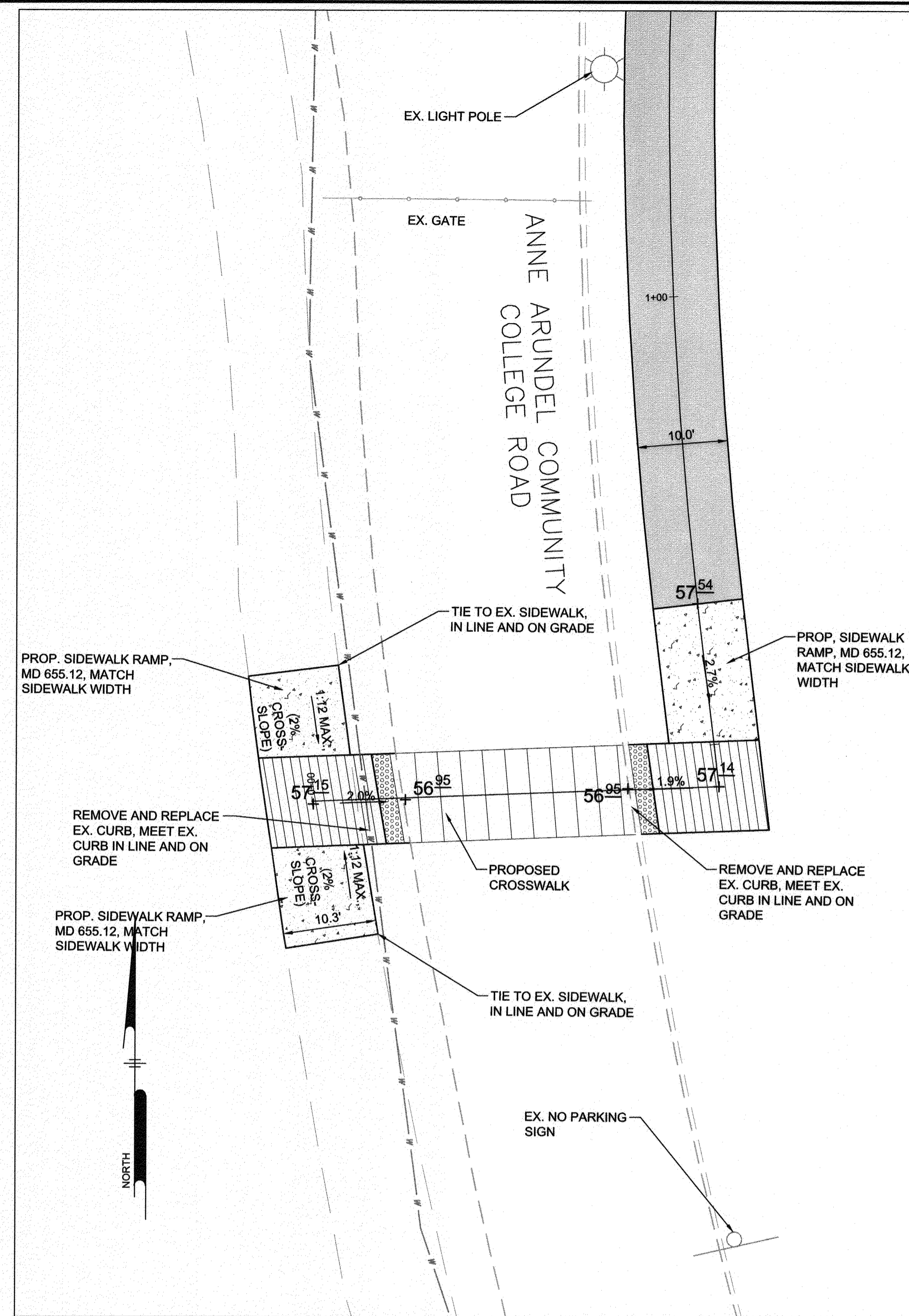
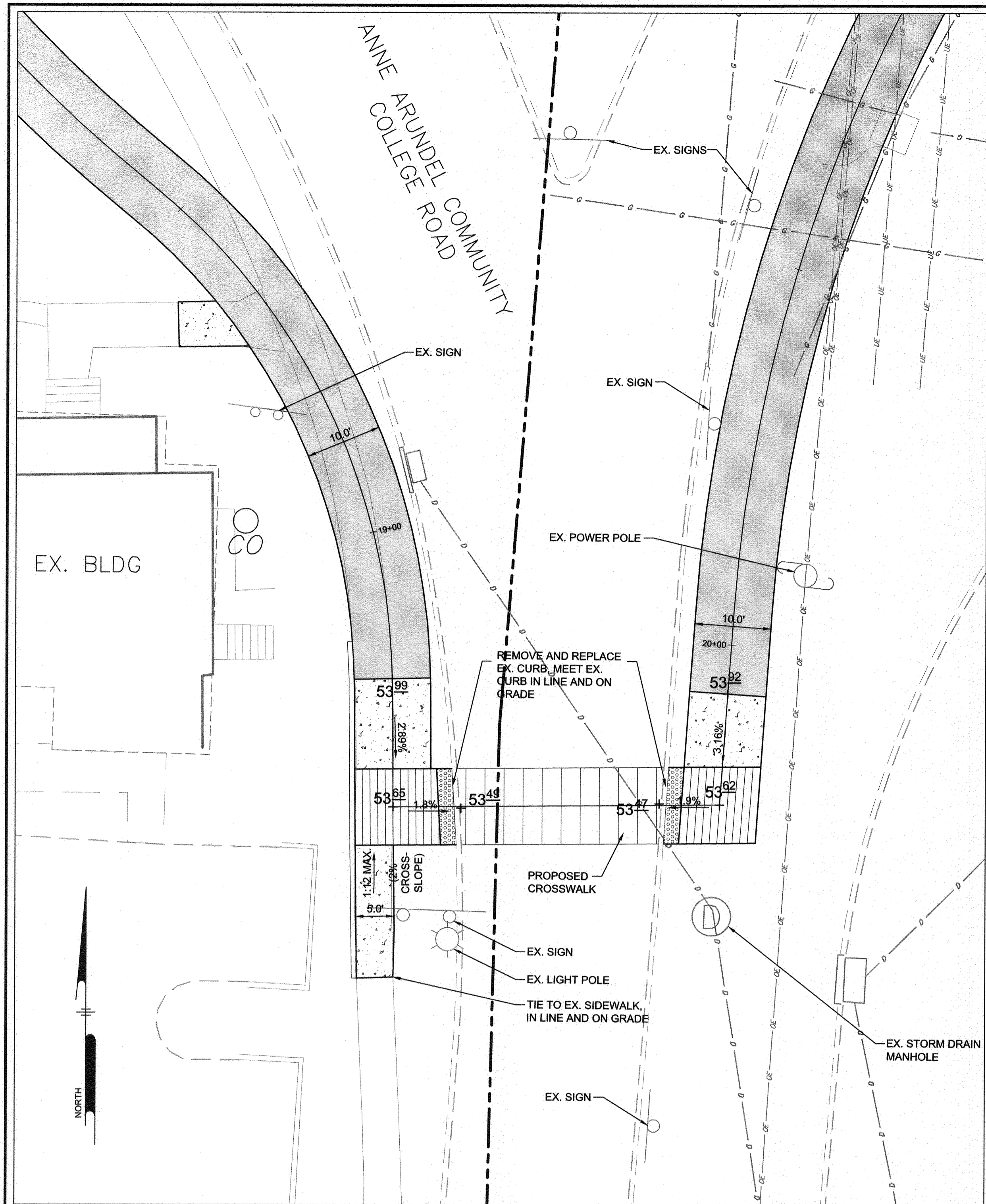
ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97152

APRIL 5, 2021

APPROVED DATE <i>[Signature]</i> 5/15/21 CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/15/21 PROJECT MANAGER	SCALE: AS SHOWN	INTERSECTION DETAILS BROADNECK TRAIL - PHASE III CONSTRUCTION DOCUMENTS <small>TAX MAP 32, 39, AND 40 ARNOLD, MD ZIP CODE 21012 3RD DISTRICT ANNE ARUNDEL COUNTY, MD NOVEMBER 2019</small>
APPROVAL DATE <i>[Signature]</i> 4/21/21 ASSISTANT CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/16/21 CHIEF, RIGHT OF WAY SERVICES	CHECKED BY: PJS/JAR	
		SHEET 84 of 137	
		PROJECT #: P504100 PROPOSAL #:	

DPW, Inc.

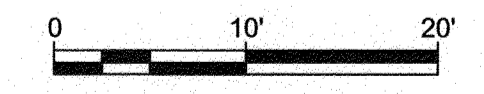


NOTES

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- REFER TO SIGNAGE AND STRIPING PLANS THIS SET FOR SIGN LOCATIONS, STRIPING LOCATIONS, TRAFFIC SIGNAL INFORMATION, AND ALL DETAILS.
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LEGEND

- PROPOSED 10' WIDE ASPHALT TRAIL
- PROPOSED CONCRETE PAVING
- PROPOSED CROSSWALK
- PROPOSED RETAINING WALL
- PROPOSED 4' BLACK VINYL CHAIN LINK FENCE
- PROPOSED SPLIT RAIL FENCE
- PROPOSED SPOT ELEVATION




GP# G02017905 DWG NO: DD11H

DPW No.:

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REVISIONS	APPROVED
#	DESCRIPTION



Pennoni

PENNONI ASSOCIATES INC.
8890 McGaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97153

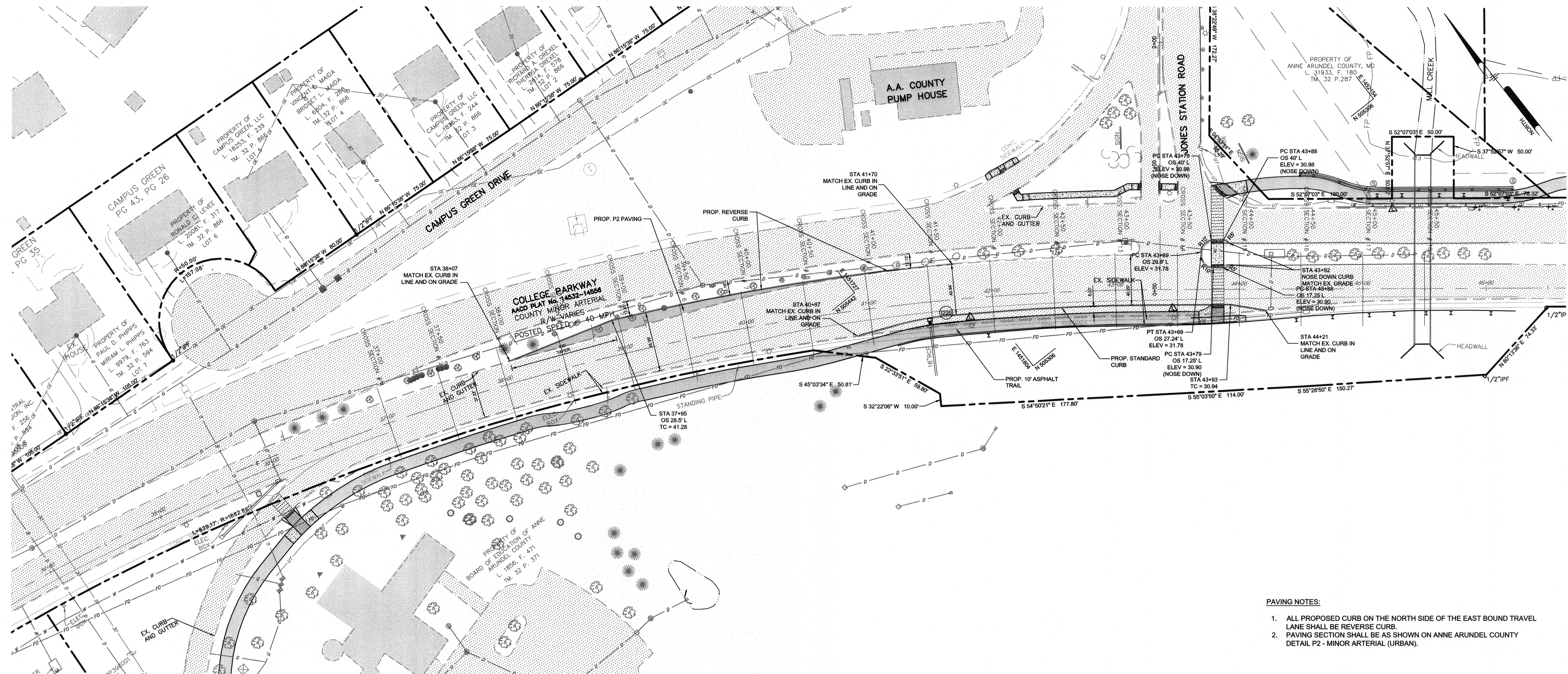
APRIL 5, 2021

INTERSECTION DETAILS

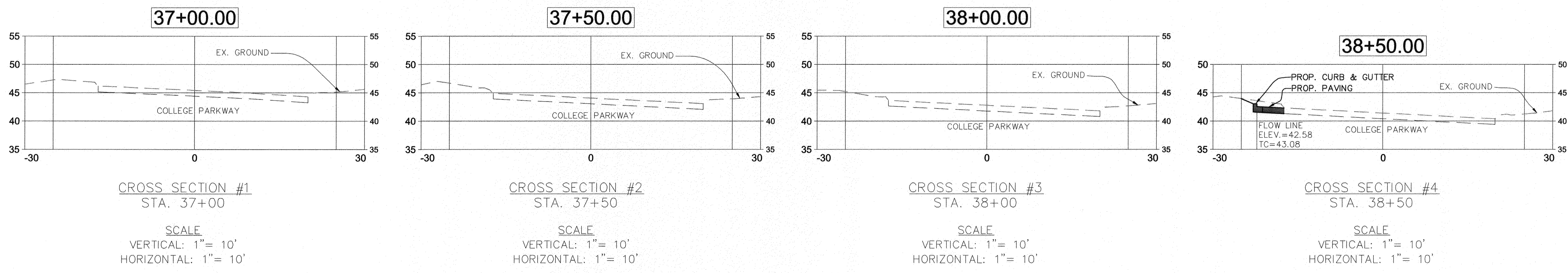
BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS

TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

APPROVED DATE <i>[Signature]</i> 4/15/21 PROJECT MANAGER	APPROVED DATE <i>[Signature]</i> 4/15/21 CHIEF, RIGHT OF WAY SERVICES	SCALE: AS SHOWN	DRAWN BY: PAI
APPROVAL DATE <i>[Signature]</i> 4/14/21 ASSISTANT CHIEF ENGINEER	APPROVED DATE <i>[Signature]</i> 4/14/21 CHIEF, RIGHT OF WAY SERVICES	CHECKED BY: PJS/JAR	SHEET 85 of 137
PROJECT # P504100		PROPOSAL #:	



- PAVING NOTES:**
- ALL PROPOSED CURB ON THE NORTH SIDE OF THE EAST BOUND TRAVEL LANE SHALL BE REVERSE CURB.
 - PAVING SECTION SHALL BE AS SHOWN ON ANNE ARUNDEL COUNTY DETAIL P2 - MINOR ARTERIAL (URBAN).



LEGEND

PROPOSED 10' WIDE ASPHALT TRAIL	
PROPOSED CONCRETE SIDEWALK	
EXISTING PAVING	

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Pennoni
PENNONI ASSOCIATES INC.
8830 McSaw Road, Suite 100
Columbia, MD 21045
T 410.997.8900 F 410.997.9282

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

GP# G02017905 DWG NO: DD12A

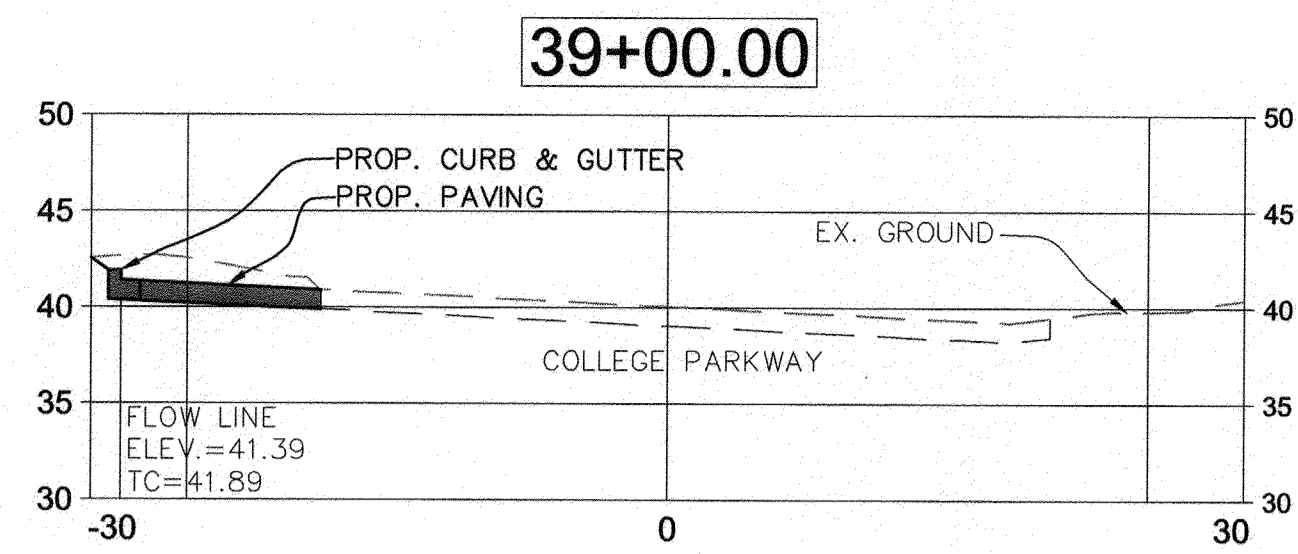
97154 APRIL 5, 2021

ROAD IMPROVEMENT PLAN AND CROSS SECTIONS

BROADNECK TRAIL - PHASE III
CONSTRUCTION DOCUMENTS
TAX MAP 32, 39, AND 40
ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD
NOVEMBER 2019

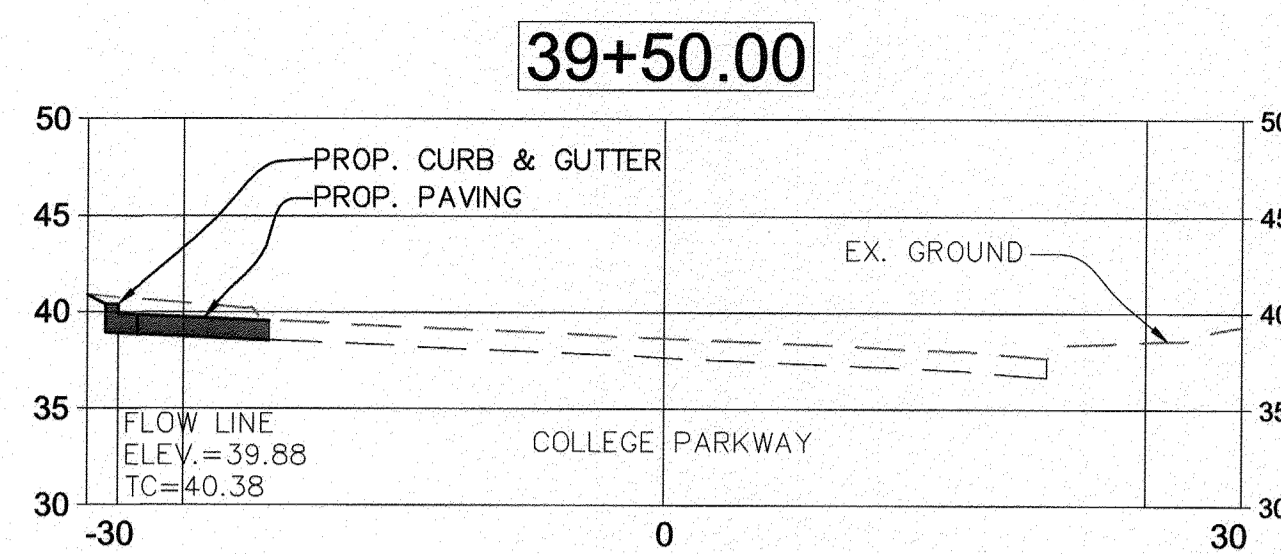
APPROVED DATE	APPROVED DATE	SCALE: 1" = 40'
<i>[Signature]</i> 4/15/21	<i>[Signature]</i> 4/15/21	DRAWN BY: PAI
CHEF ENGINEER	PROJECT MANAGER	CHECKED BY: PJS/JAR
APPROVAL DATE	APPROVED DATE	SHEET 86 OF 137
<i>[Signature]</i> 4/16/21	<i>[Signature]</i> 4/16/21	PROJECT #: P504100
ASSISTANT CHIEF ENGINEER	CHIEF, RIGHT OF WAY SERVICES	PROPOSAL #:

DWG NO:



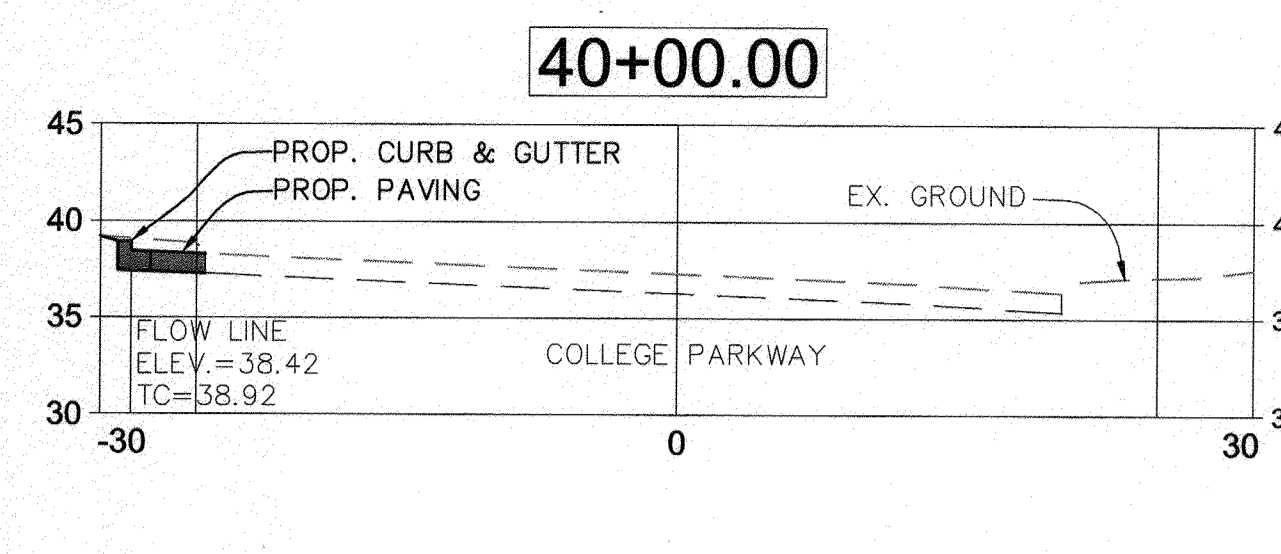
CROSS SECTION #5
STA. 39+00

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



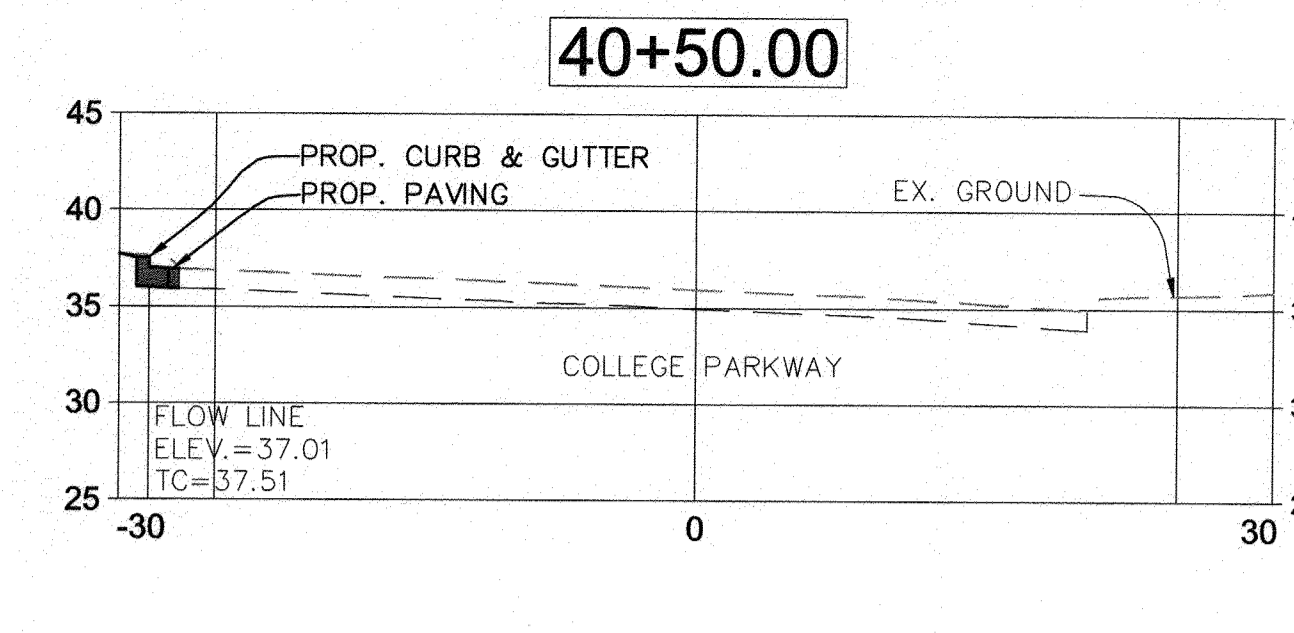
CROSS SECTION #6
STA. 39+50

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



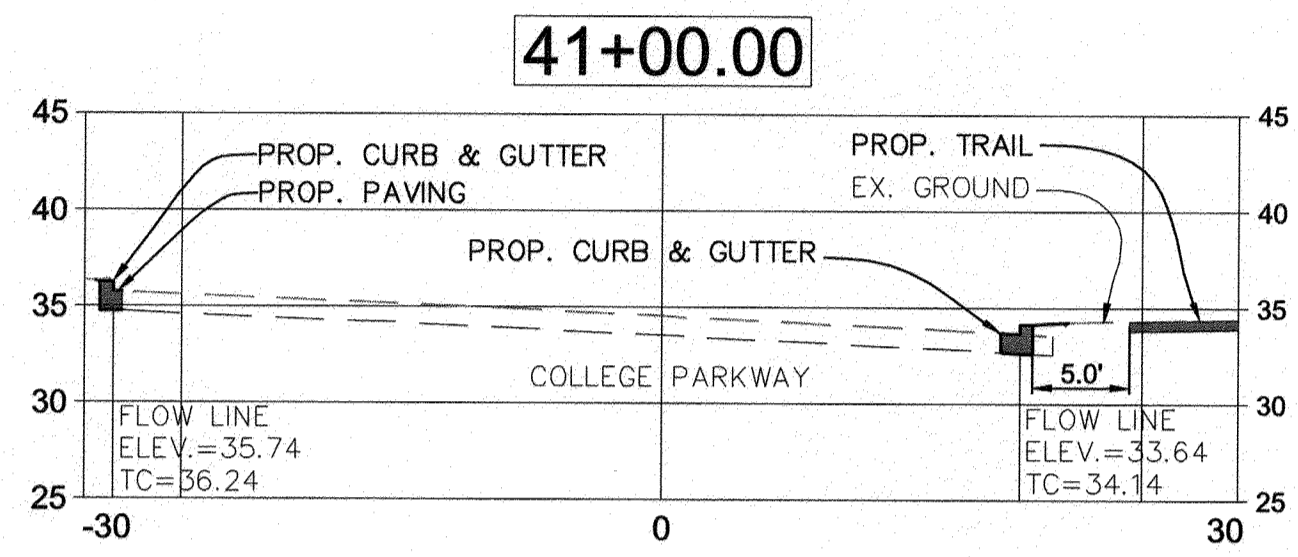
CROSS SECTION #7
STA. 40+00

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



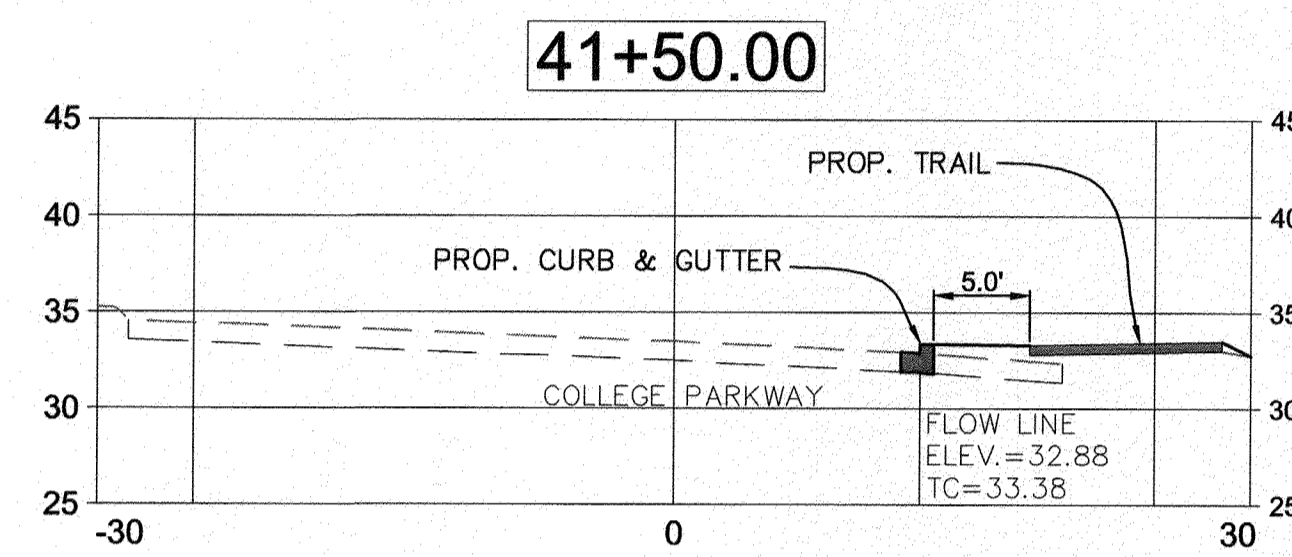
CROSS SECTION #8
STA. 40+50

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



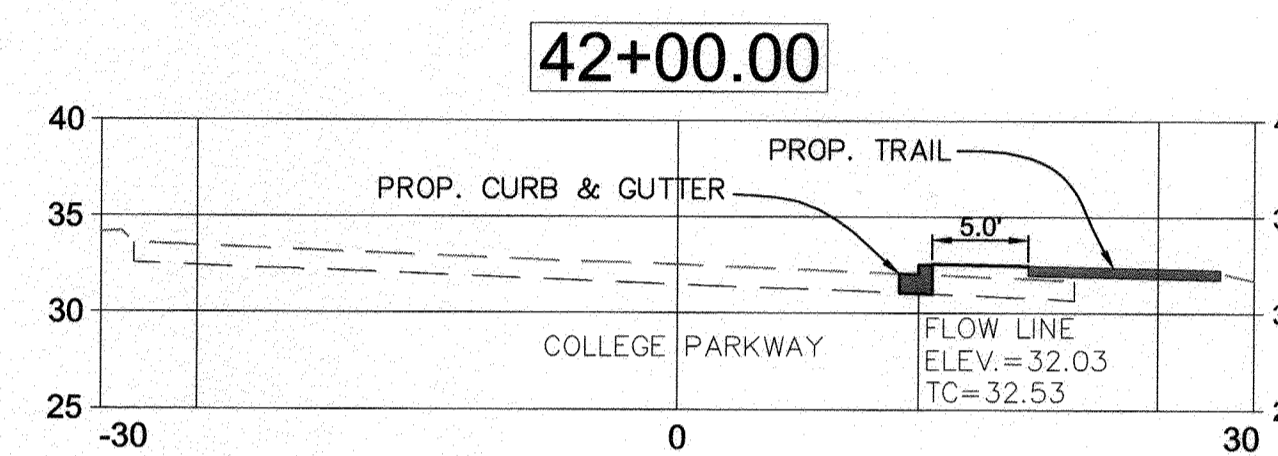
CROSS SECTION #9
STA. 41+00

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



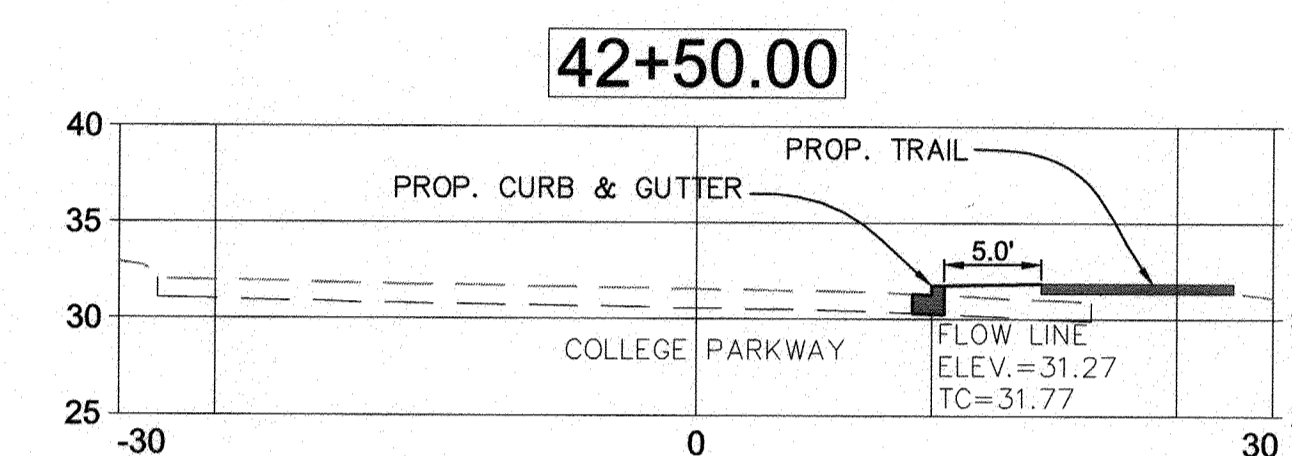
CROSS SECTION #10
STA. 41+50

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



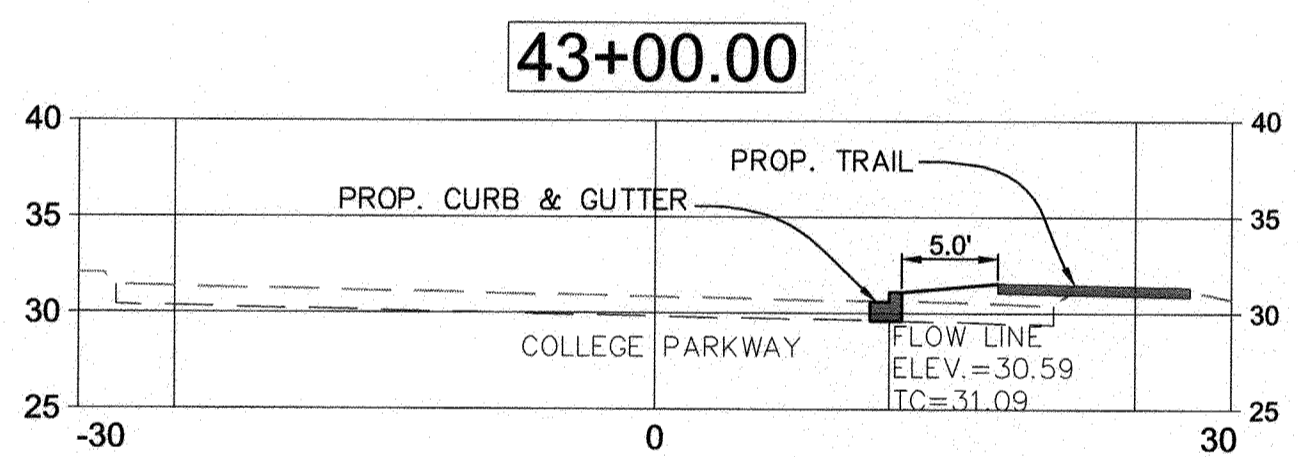
CROSS SECTION #11
STA. 42+00

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



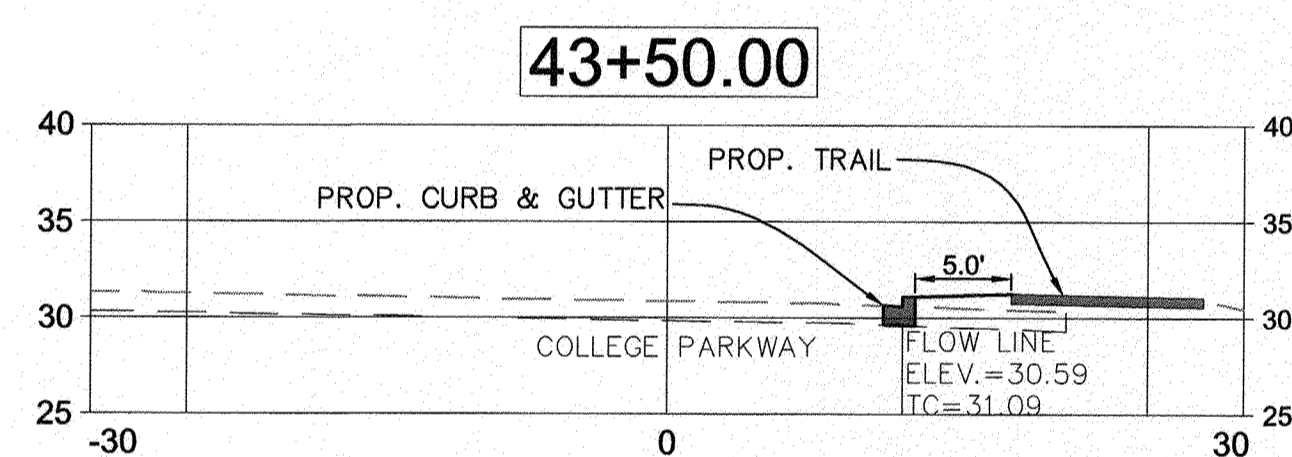
CROSS SECTION #12
STA. 42+50

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



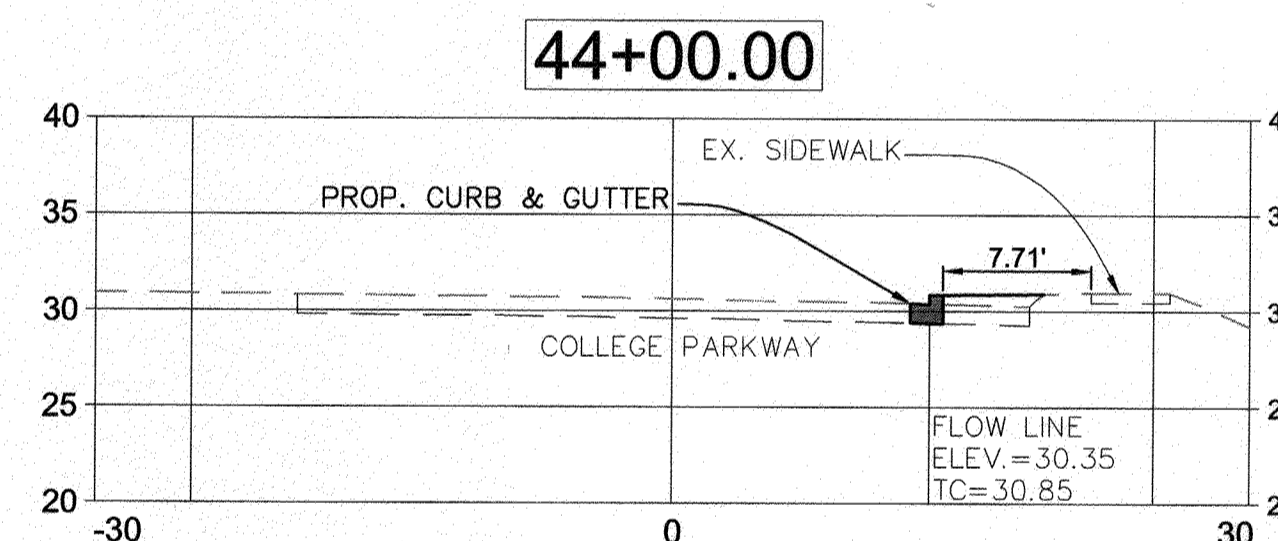
CROSS SECTION #13
STA. 43+00

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



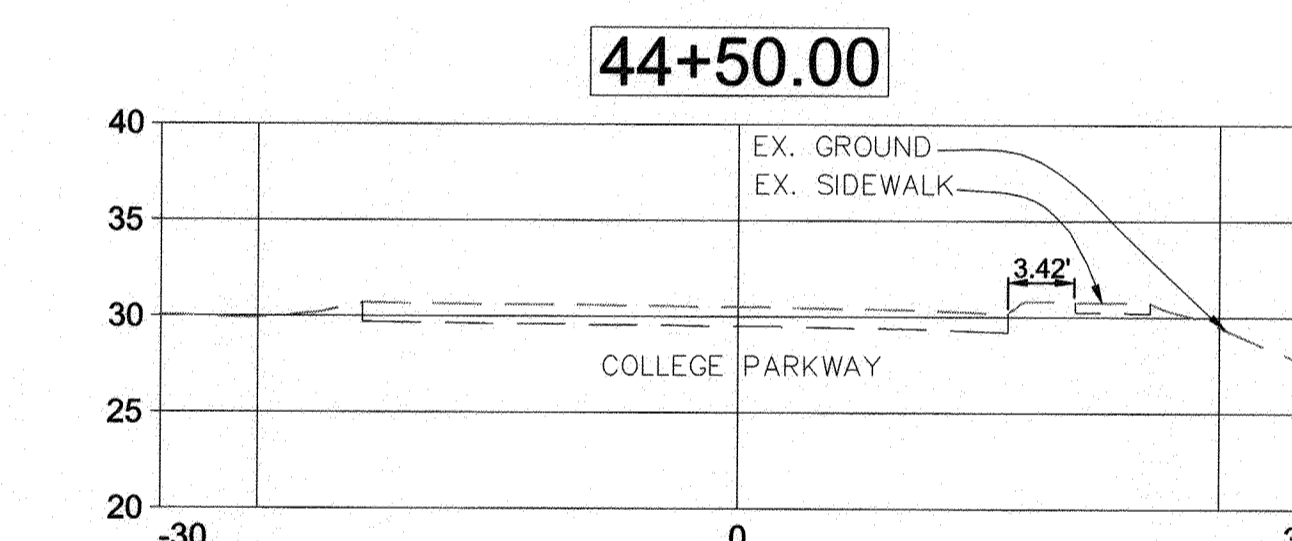
CROSS SECTION #14
STA. 43+50

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



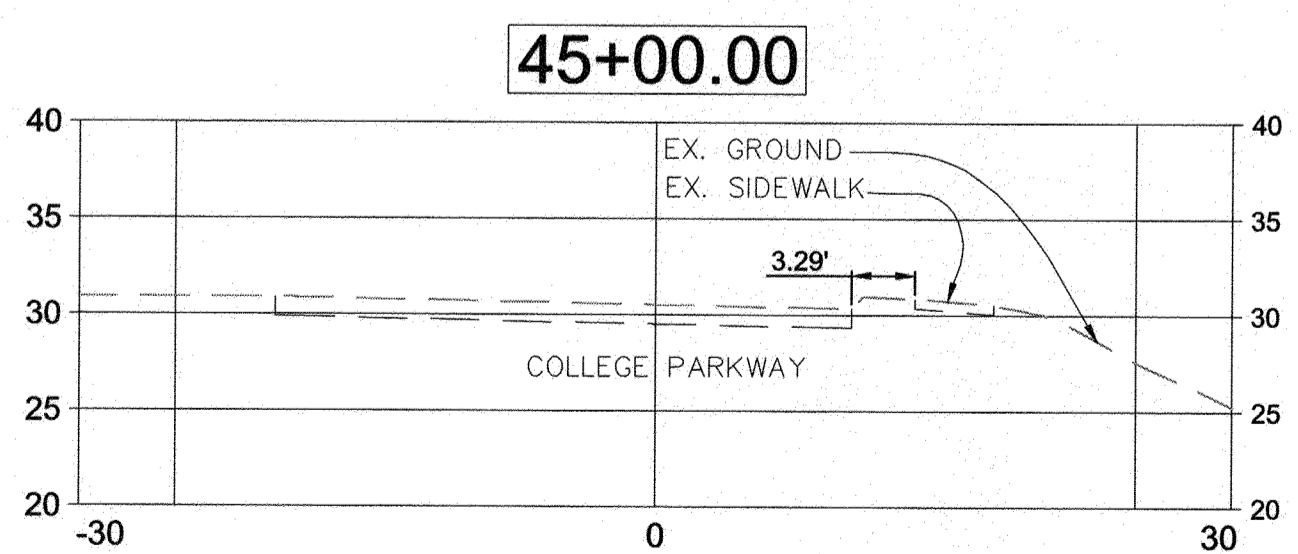
CROSS SECTION #15
STA. 44+00

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



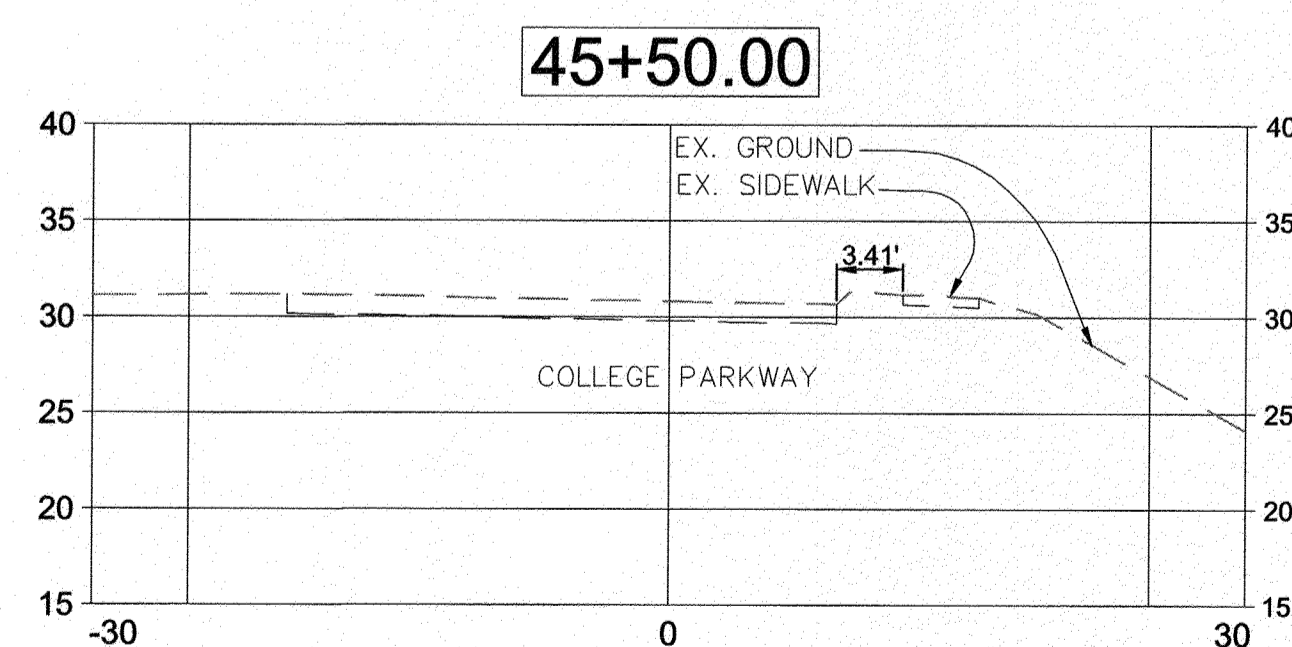
CROSS SECTION #16
STA. 44+50

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



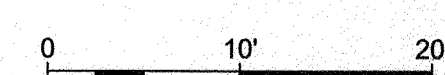
CROSS SECTION #17
STA. 45+00

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



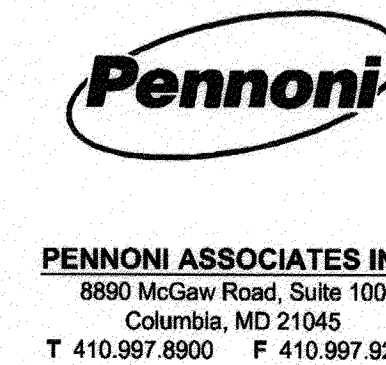
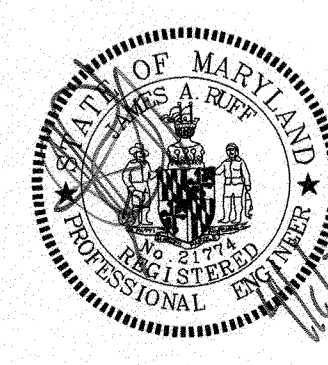
CROSS SECTION #18
STA. 45+50

SCALE
VERTICAL: 1" = 10'
HORIZONTAL: 1" = 10'



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#	REVISIONS DESCRIPTION	APPROVED BY	DATE



APPROVED DATE		APPROVED DATE		SCALE: 1" = 40'	ROAD CROSS SECTIONS
<i>[Signature]</i>	5/16/21	<i>[Signature]</i>	4/15/21		
CHIEF ENGINEER		PROJECT MANAGER		DRAWN BY: PAI	BROADNECK TRAIL - PHASE III CONSTRUCTION DOCUMENTS
APPROVAL DATE		APPROVED DATE			
<i>[Signature]</i>	4/24/21	<i>[Signature]</i>	4/16/21	CHECKED BY: PJS/JAR	TAX MAP 32, 39, AND 40
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES		SHEET 87 of 137	ARNOLD, MD ZIP CODE 21012 3RD DISTRICT
				PROJECT #: P504100	ANNE ARUNDEL COUNTY, MD
				PROPOSAL #:	NOVEMBER 2019

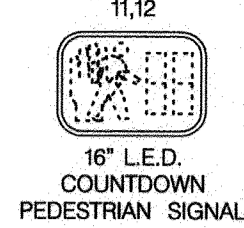
GP# G02017905 DWG NO: DD12B

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

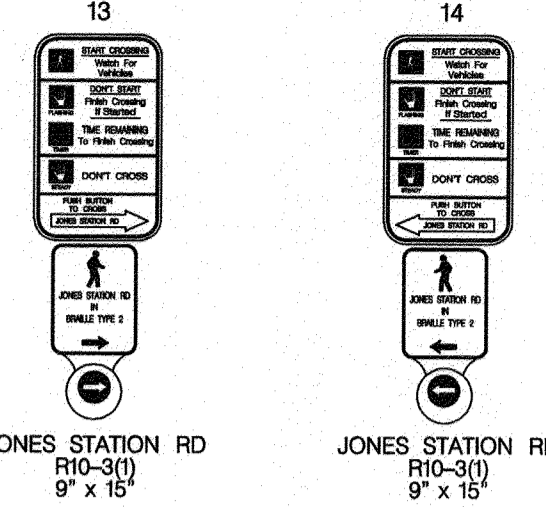
97155 APRIL 5, 2021

DWG No.:

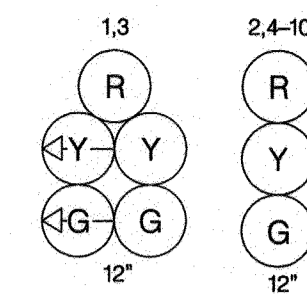
PROPOSED COUNTDOWN PEDESTRIAN SIGNAL HEADS



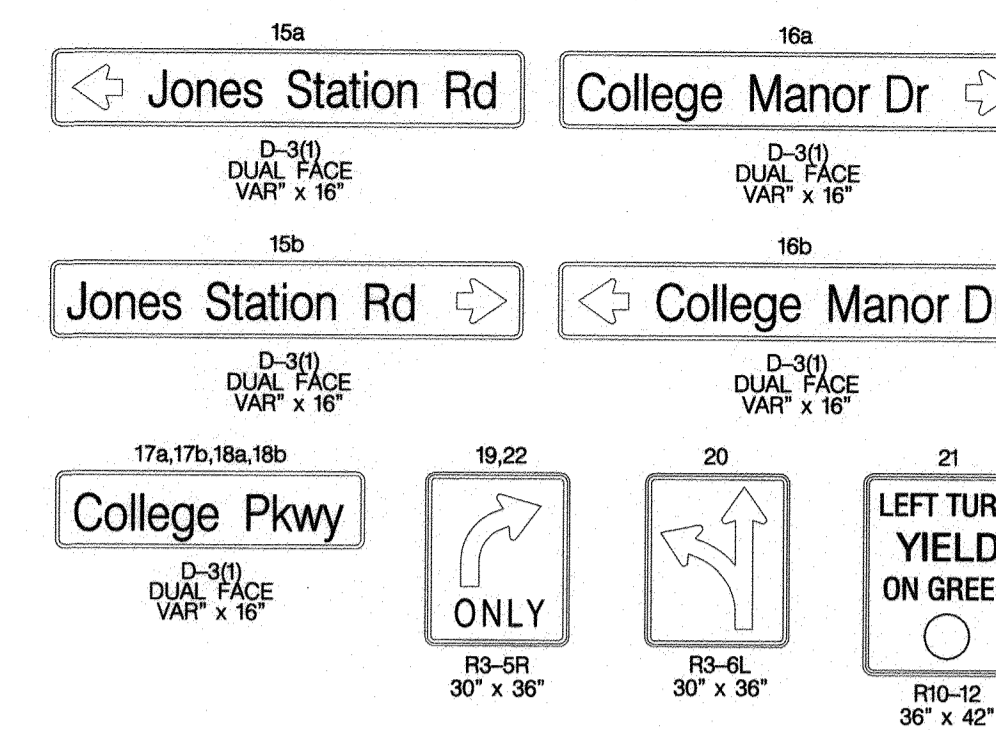
PROPOSED APS PEDESTRIAN PUSHBUTTONS AND SIGNS



EXISTING BLACKFACE L.E.D. TRAFFIC SIGNAL HEADS



EXISTING SIGNS



PHASE CHART

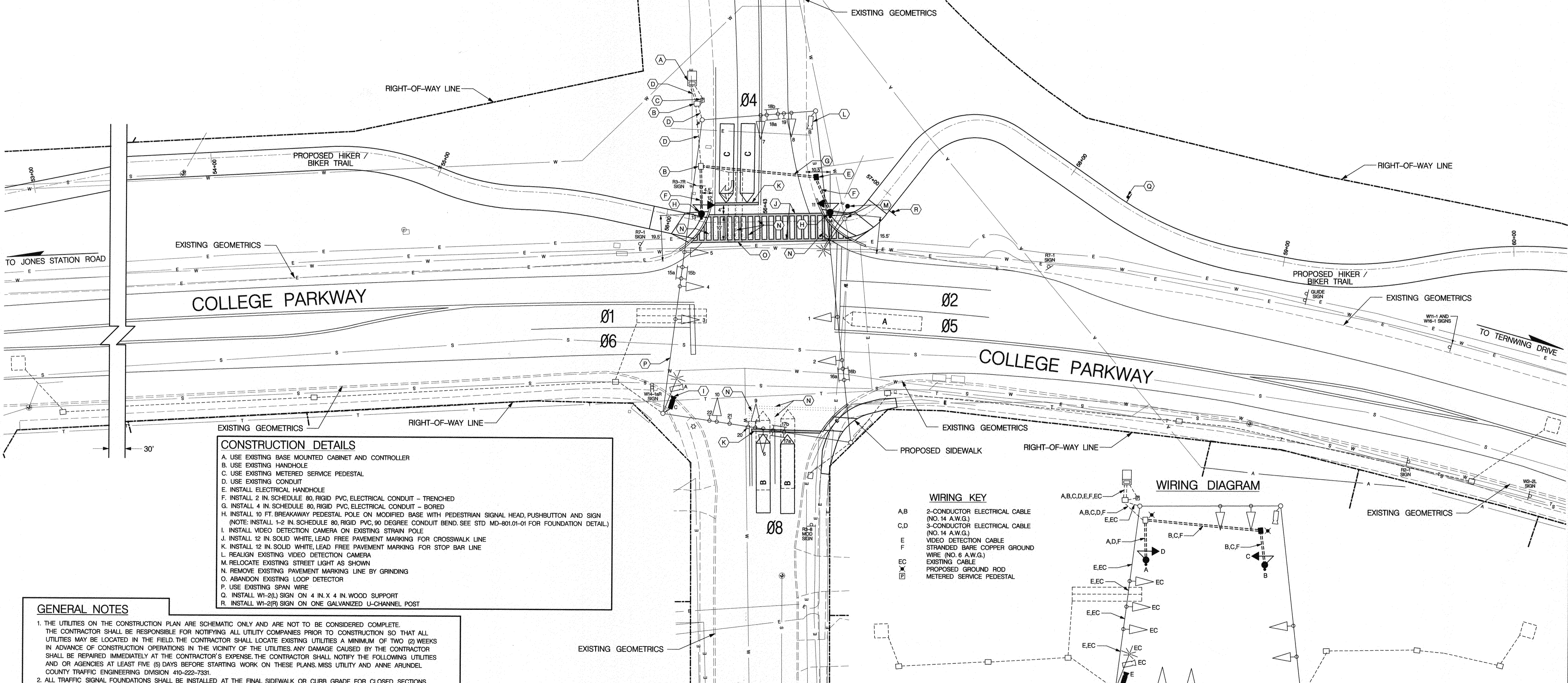
SIGNAL NUMBER	NON-CONFLICTING PHASES MAY TIME CONCURRENTLY								CONFLICTING PHASE							
	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
1	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R
2	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R
3	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R
4,5	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R
6,7,8	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R
9,10	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R
11,12	DW	DW	WK	FL	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DK
NON-CONFLICT PHASE	5,6	5,6			8	1,2	1,2									4
CONFLICT PHASE	2,4,8	1,4,8			1,2,5,6	4,6,8	4,5,8									1,2,5,8

COLLEGE PARKWAY IS ASSUMED TO RUN IN AN EAST-WEST DIRECTION

EXISTING VIDEO DETECTION CAMERAS



PROPOSED VIDEO DETECTION CAMERA



CONSTRUCTION DETAILS

- A. USE EXISTING BASE MOUNTED CABINET AND CONTROLLER
- B. USE EXISTING HANDHOLE
- C. USE EXISTING METERED SERVICE PEDESTAL
- D. USE EXISTING CONDUIT
- E. INSTALL ELECTRICAL HANDHOLE
- F. INSTALL 2 IN. SCHEDULE 80, RIGID PVC, ELECTRICAL CONDUIT - TRENCHED
- G. INSTALL 4 IN. SCHEDULE 80, RIGID PVC, ELECTRICAL CONDUIT - BORED
- H. INSTALL 10 FT. BREAKAWAY PEDESTAL POLE ON MODIFIED BASE WITH PEDESTRIAN SIGNAL HEAD, PUSHBUTTON AND SIGN
(NOTE: INSTALL 1-2 IN. SCHEDULE 80, RIGID PVC, 90 DEGREE CONDUIT BEND. SEE STD MD-801.01-01 FOR FOUNDATION DETAIL.)
- I. INSTALL VIDEO DETECTION CAMERA ON EXISTING STRAIN POLE
- J. INSTALL 12 IN. SOLID WHITE LEAD FREE PAVEMENT MARKING FOR CROSSWALK LINE
- K. INSTALL 12 IN. SOLID WHITE LEAD FREE PAVEMENT MARKING FOR STOP BAR LINE
- L. REALIGN EXISTING VIDEO DETECTION CAMERA
- M. RELOCATE EXISTING STREET LIGHT AS SHOWN
- N. REMOVE EXISTING PAVEMENT MARKING LINE BY GRINDING
- O. ABANDON EXISTING LOOP DETECTOR
- P. USE EXISTING SPAN WIRE
- Q. INSTALL W1-2(L) SIGN ON 4 IN. X 4 IN. WOOD SUPPORT
- R. INSTALL W1-2(R) SIGN ON ONE GALVANIZED U-CHANNEL POST

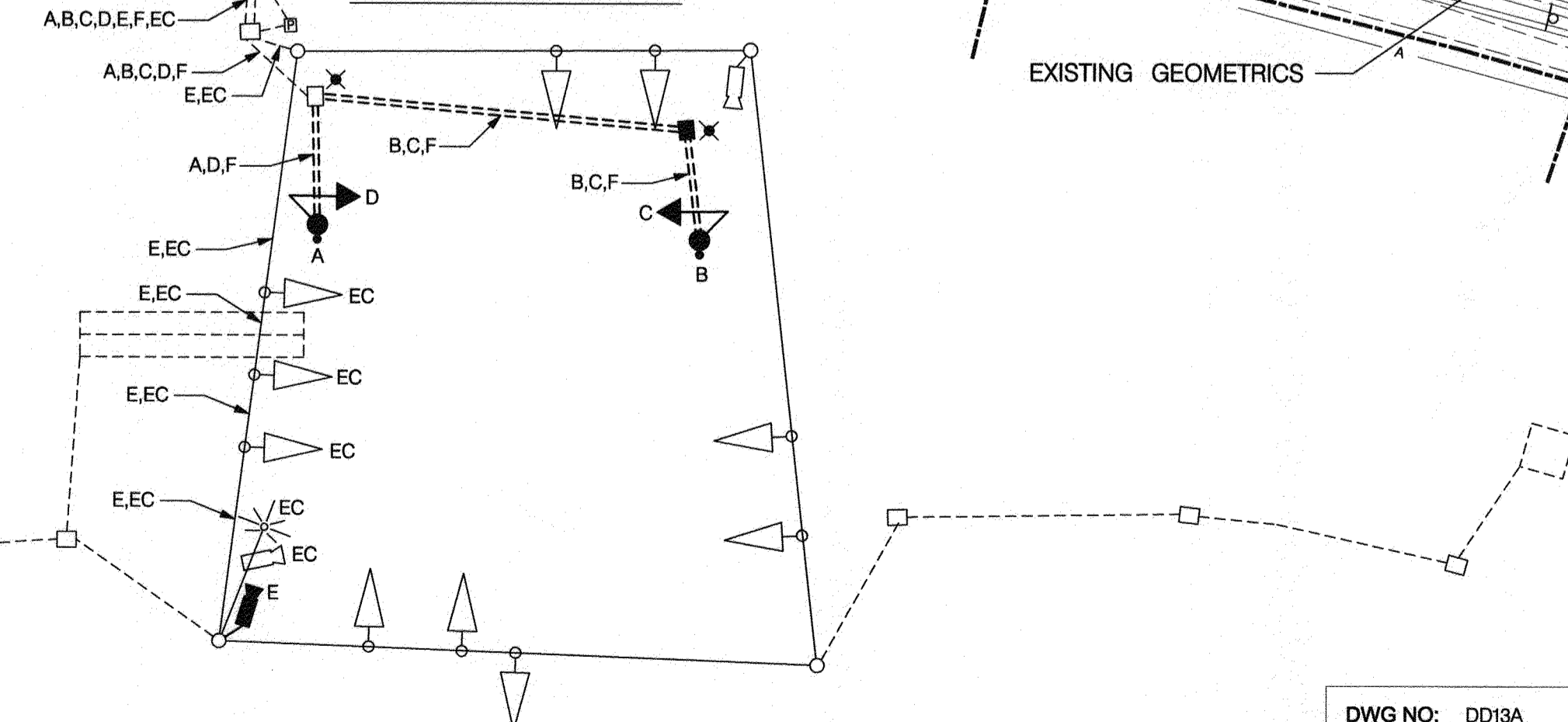
GENERAL NOTES

1. THE UTILITIES ON THE CONSTRUCTION PLAN ARE SCHEMATIC ONLY AND ARE NOT TO BE CONSIDERED COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY COMPANIES PRIOR TO CONSTRUCTION SO THAT ALL UTILITIES MAY BE LOCATED IN THE FIELD. THE CONTRACTOR SHALL LOCATE EXISTING UTILITIES A MINIMUM OF TWO (2) WEEKS IN ADVANCE OF CONSTRUCTION OPERATIONS IN THE VICINITY OF THE UTILITIES. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITIES AND OR AGENCIES AT LEAST FIVE (5) DAYS BEFORE STARTING WORK ON THESE PLANS, MISS UTILITY AND ANNE ARUNDEL COUNTY TRAFFIC ENGINEERING DIVISION 410-222-7331.
2. ALL TRAFFIC SIGNAL FOUNDATIONS SHALL BE INSTALLED AT THE FINAL SIDEWALK OR CURB GRADE FOR CLOSED SECTIONS, HIGHEST ROADWAY PROFILE GRADE FOR OPEN SECTIONS, TO MEET CLEARANCE AS SPECIFIED IN MD 816.03, MD 818.01, MD 818.02, MD 818.04. THE CONTRACTOR SHALL VERIFY ULTIMATE GRADES PRIOR TO THE INSTALLATION OF ALL SIGNAL EQUIPMENT.
3. THE LOCATION OF THE PROPOSED GEOMETRICS MUST BE CONFIRMED PRIOR TO THE INSTALLATION OF SIGNAL EQUIPMENT.
4. CONDUIT SHALL BE INSTALLED PRIOR TO THE INSTALLATION OF PAVEMENT MARKINGS.
5. CONSTRUCTION SHALL BE COMPLETED IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR CONSTRUCTION AND MATERIAL (MDOT SHA JULY 2020) AND THE ANNE ARUNDEL COUNTY STANDARD SPECIFICATIONS AND DETAILS, 2001, AND ALL AMENDMENTS TO EACH SPECIFICATION.
6. ALL NEW SIGNAL HEADS SHALL BE SECURELY WRAPPED AND OR BAGGED BY THE CONTRACTOR PRIOR TO THE SIGNAL BEING PLACED IN SERVICE.
7. ALL POLE, SIGNAL HEAD, AND DETECTOR LOCATIONS ARE TO BE MARKED IN THE FIELD AND APPROVED BY THE TRAFFIC ENGINEERING DIVISION PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL FURNISH THREE (3) COPIES OF THE AS-BUILT PLANS TO THE TRAFFIC ENGINEERING DIVISION.
8. THE SIGNAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL PAVEMENT MARKINGS CALLED OUT TO BE INSTALLED ON THE PLAN.
9. ADEQUATE CLEARANCE MUST BE MAINTAINED BETWEEN SIGNAL EQUIPMENT AND AERIAL UTILITY LINES.
10. THE CONTRACTOR SHALL REMOVE ALL UNUSED CABLE.
11. ALL TRAIL STRIPING AND SIGNING SHALL BE RETROREFLECTORIZED.

WIRING KEY

- A,B 2-CONDUCTOR ELECTRICAL CABLE (NO. 14 A.W.G.)
- C,D 3-CONDUCTOR ELECTRICAL CABLE (NO. 14 A.W.G.)
- E VIDEO DETECTION CABLE
- F STRANDED BARE COPPER GROUND WIRE (NO. 6 A.W.G.)
- EC EXISTING CABLE
- EC PROPOSED GROUND ROD
- EC METERED SERVICE PEDESTAL

WIRING DIAGRAM



DWG NO: DD13A

Professional Certification: I, James Kyle Schmid, certify that these documents were prepared by or approved by me and that I am a duly licensed Professional Engineer under the laws of the State of Maryland License # 42413 Expiration Date 6-6-2022

TRAFFIC CONCEPTS, INC.
7525 Connelley Drive
Suite B
Hanover, MD 21076
(410) 760-2911
FAX: (410) 760-2915
EMAIL: TRAFFIC@TRAFFIC-CONCEPTS.COM

STATE OF MARYLAND
JAMES KYLE SCHMID
No. 42413
PROFESSIONAL ENGINEER

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97156
TRAFFIC SIGNAL PLAN
COLLEGE PKWY. & COLLEGE MANOR DRIVE / JONES STATION ROAD

TAX MAP 32, 39, AND 40
ARNDOLD, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD

APPROVED	DATE	APPROVED	DATE
<i>[Signature]</i>	5/16/21	<i>[Signature]</i>	4/15/21
CHIEF ENGINEER		PROJECT MANAGER	
APPROVAL	DATE	APPROVED	DATE
<i>[Signature]</i>	4/16/21	<i>[Signature]</i>	4/16/21
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES	

SCALE: 1" = 20'
DRAWN BY: B. PEEK
CHECKED BY: J. K. SCHMID
SHEET 88 of 137
PROJECT # P504104
PROPOSAL #:

1342013485Signal/College Pkwy. @ Jones Station Rd. (East London)/Jones Sta. East.dgn
Monday, March 22, 2021 AT 02:30 PM

PROJECT DESCRIPTION

THIS PROJECT INVOLVES THE MODIFICATION OF THE EXISTING TRAFFIC CONTROL SIGNAL AT THE INTERSECTION OF COLLEGE PARKWAY AND JONES STATION ROAD/COLLEGE MANOR DRIVE IN ANNE ARUNDEL COUNTY. THE WORK IS NECESSITATED BY THE CONSTRUCTION OF A NEW TRAIL ACROSS JONES STATION ROAD. COLLEGE PARKWAY IS ASSUMED TO RUN IN AN EAST-WEST DIRECTION.

INTERSECTION OPERATION

THE INTERSECTION CURRENTLY OPERATES IN A NEMA SIX-PHASE, FULLY-ACTUATED MODE WITH EXCLUSIVE-PERMISSIVE LEFT TURN PHASES FOR BOTH APPROACHES OF COLLEGE PARKWAY AND CONCURRENT SIDE STREET PHASING. THE INTERSECTION WILL NOW OPERATE WITH A CONCURRENT PEDESTRIAN PHASE TO CROSS JONES STATION ROAD.

CONTROLLER REQUIREMENTS

THE EXISTING EIGHT-PHASE, FULLY-ACTUATED CONTROLLER HOUSED IN A BASE MOUNTED CABINET WILL BE USED.

APS PEDESTRIAN SIGNAL NOTES

1. PUSHBUTTONS ARE TO BE LOCATED SO THEY CAN BE ACTIVATED BY A PERSON IN A WHEELCHAIR REACHING LESS THAN 18" FROM A 60" X 60" LEVEL LANDING AREA WITH A CROSS SLOPE OF LESS THAN OR EQUAL TO 2%.
2. THE 10" SEPARATION BETWEEN PUSHBUTTONS IS TO BE MEASURED FROM THE FACE OF THE PUSHBUTTON TO THE FACE OF THE PUSHBUTTON, NOT CENTER TO CENTER OF POLE.
3. PUSHBUTTON ARROWS ARE TO BE PARALLEL TO THE CROSSING FOR WHICH THEY ARE INTENDED.
4. LOCATION OF ACCESSABLE PEDESTRIAN SIGNAL PUSHBUTTONS MUST MEET LOCATION REQUIREMENTS OF MUTCD SEC. 4E.08 + 4E.10 AND FIG. 4E-3 + 4E-4 AND THE NCHRP PUBLICATION, "ACCESSIBLE PEDESTRIAN SIGNALS: GUIDE TO BEST PRACTICE". IF NOT MET, THE CONTRACTOR IS TO STOP WORK ON PUSHBUTTON LOCATION UNTIL A DESIGN WAIVER IS OBTAINED AND APPROVED BY ANNE ARUNDEL COUNTY TRAFFIC ENGINEERING.
5. ALL APS CENTRAL CONTROL UNITS SHALL BE DELIVERED TO ANNE ARUNDEL COUNTY TRAFFIC ENGINEERING FOR PROGRAMMING AND TESTING PRIOR TO INSTALLATION.

APS NOTES

- TO CROSS JONES STATION ROAD:
- A. WHEN PEDESTRIAN LOCATES AND PRESSES PUSHBUTTON FOR AN EXTENDED TIME, THE PUSHBUTTON UNIT WILL ANNOUNCE, "WAIT TO CROSS JONES STATION AT COLLEGE PARKWAY, WAIT."
 - B. WHEN WALK PHASE BEGINS, THE MESSAGE WILL BE A RAPID TICK, WHICH WILL LAST FOR THE DURATION OF THE WALK PHASE.

EQUIPMENT LIST "A"

A. EQUIPMENT TO BE FURNISHED BY THE COUNTY AND INSTALLED BY THE CONTRACTOR

QUANTITY	DESCRIPTION
NONE	

EQUIPMENT LIST "B"

B. EQUIPMENT TO BE FURNISHED AND /OR INSTALLED BY CONTRACTOR. ALL EQUIPMENT SHALL HAVE CATALOG CUTS SUBMITTED AND APPROVED BY ANNE ARUNDEL COUNTY PRIOR TO INSTALLATION.

QUANTITY	DESCRIPTION
LS	MAINTENANCE OF TRAFFIC
2 CY	TEST PIT EXCAVATION
2 EA	THIRD PARTY CONCRETE TESTING
170 LF	12 IN. WHITE, LEAD FREE, HEAT APPLIED THERMOPLASTIC PAVEMENT MARKING
155 LF	REMOVAL OF EXISTING PAVEMENT MARKING LINES ANY WIDTH
0.5 CY	CONCRETE FOR SIGNAL FOUNDATION
180 LF	NO. 6 AWG STRANDED BARE COPPER GROUND WIRE
55 LF	4 IN. SCHEDULE 80 RIGID PVC CONDUIT - BORED
40 LF	2 IN. SCHEDULE 80 RIGID PVC CONDUIT - TRENCHED
1 EA	FURNISH AND INSTALL ELECTRICAL HANDHOLE
1 EA	"TRAFICON" VIDEO DETECTION INTERFACE EQUIPMENT (VIP MODULE)
1 EA	"TRAFICON FLIR" VIDEO DETECTION CAMERA WITH THERMAL SENSOR AND CABLE
1 EA	REALIGN EXISTING VIDEO DETECTION CAMERA
1 EA	W1-2(L) SIGN (18" X 18") - GROUND MOUNT
1 EA	W1-2(R) SIGN (18" X 18") - GROUND MOUNT
15 LF	WOOD SIGN SUPPORTS 4 INCH X 4 INCH
15 LF	GALVANIZED U-CHANNEL SUPPORT FOR GROUND MOUNTED SIGN
2 EA	10 FT. BREAKAWAY PEDESTAL POLE
2 EA	GROUND ROD - 3 / 4 IN. DIAMETER X 10 FT. LENGTH
200 LF	16 IN. COUNTDOWN PEDESTRIAN SIGNAL HEAD - POLE MOUNT
210 LF	ELECTRICAL CABLE - 2 CONDUCTOR (NO. 14 AWG)
2 EA	ELECTRICAL CABLE - 3 CONDUCTOR (NO. 14 AWG)
1 EA	POLARA 2-WIRE APS PUSHBUTTON STATION AND SIGNS
1 EA	RELOCATE EXISTING LIGHT POLE
1 EA	POLARA CCU

EQUIPMENT LIST "C"

C. EXISTING EQUIPMENT TO BE REMOVED BY THE CONTRACTOR AND DELIVERED TO THE ANNE ARUNDEL COUNTY TRAFFIC MAINTENANCE SHOP LOCATED AT 409 BROADNECK RD., ANNAPOLIS MD 21401. THE CONTRACTOR SHALL NOTIFY MR. ERIC WINKELMEYER AT (410) 222-1940 AT LEAST THREE DAYS IN ADVANCE OF DELIVERY.

QUANTITY	DESCRIPTION
NONE	

ALL SIGNAL EQUIPMENT TO BE REMOVED AND NOT RETURNED TO THE COUNTY SHALL BECOME THE PROPERTY OF THE CONTRACTOR.

EQUIPMENT PURCHASE INFORMATION

"CHAPEL HILL" TRAFFIC SIGNAL HEADS	TRAFFIC PARTS, TEXAS CONTACT MS. JONI FEXER 1-800-345-6329
L.E.D.'S AND PEDESTRIAN COUNTDOWN SIGNALS	J.O. HERBERT COMPANY OF MIDLOTHIAN, VA CONTACT MR. JACK HERBERT (804)763-6480
TRAFICON EQUIPMENT	CONTROL TECHNOLOGIES CONTACT MR. JIM LAMPE (703) 595-2980
EAGLE EQUIPMENT	MOBOTREX CONTACT MR. WILLIAM LAMIE (804) 893-8413
PHILIPS HADCO RX2 LEDGINE LED	BGE OUTDOOR LIGHTING CONTACT MR. NICK COSTA (410)470-8413

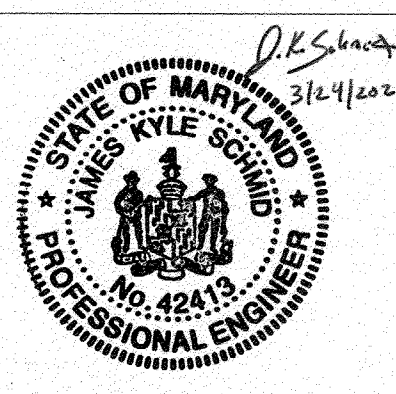
ANNE ARUNDEL COUNTY CONTACTS

DESIGN CONTACT	MR. BO ZHOU, P.E., PTOE (410) 222 7331
CONSTRUCTION CONTACT	MR. ERIC WINKELMEYER (410) 222-1940

DWG NO: DD13B

Professional Certification: I, James Kyle Schmid, certify that these documents were prepared by or approved by me and that I am a duly licensed Professional Engineer under the laws of the State of Maryland License # 42413 Expiration Date 6-6-2022

#	REVISIONS DESCRIPTION	APPROVED BY	DATE



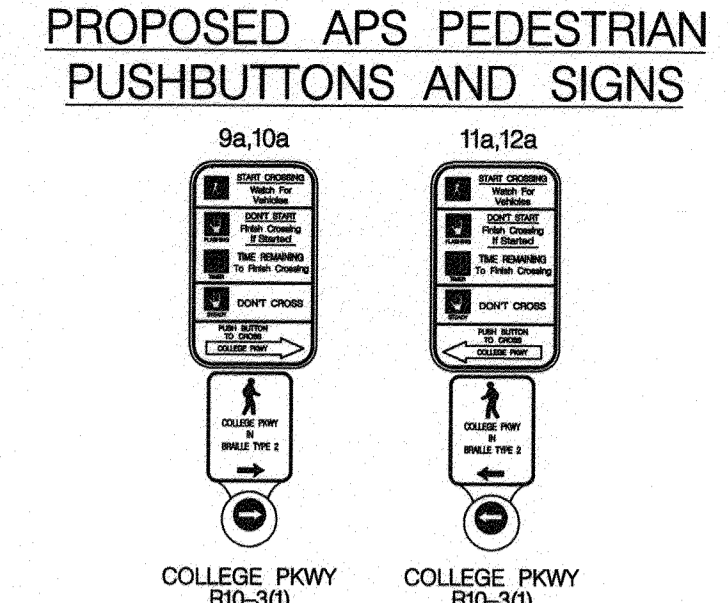
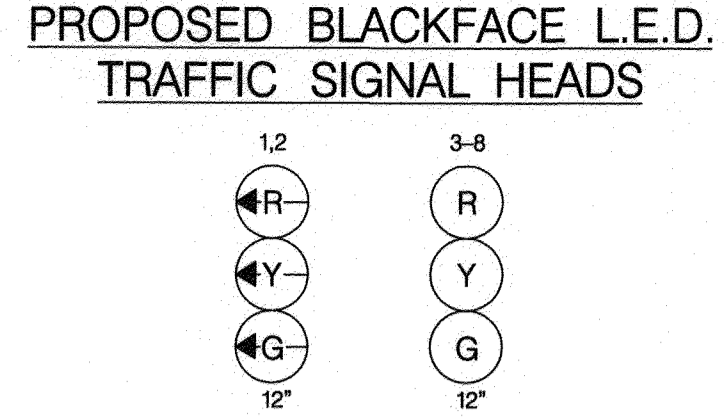
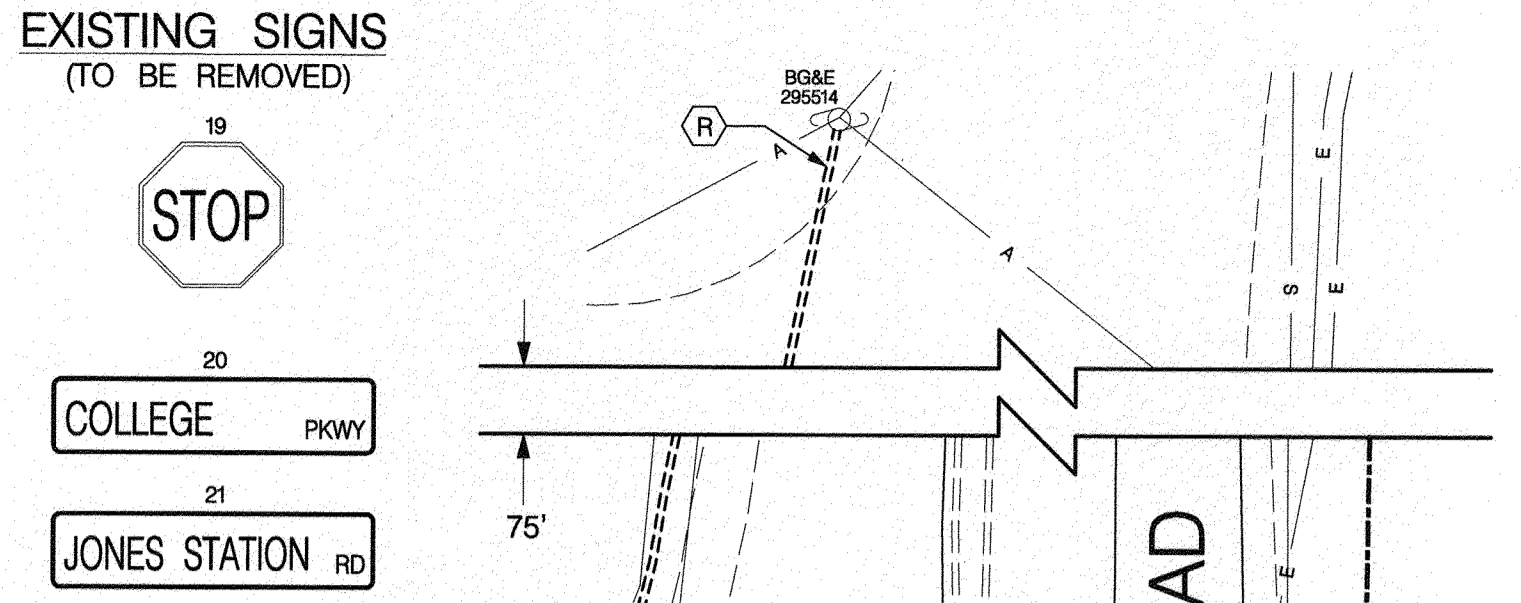
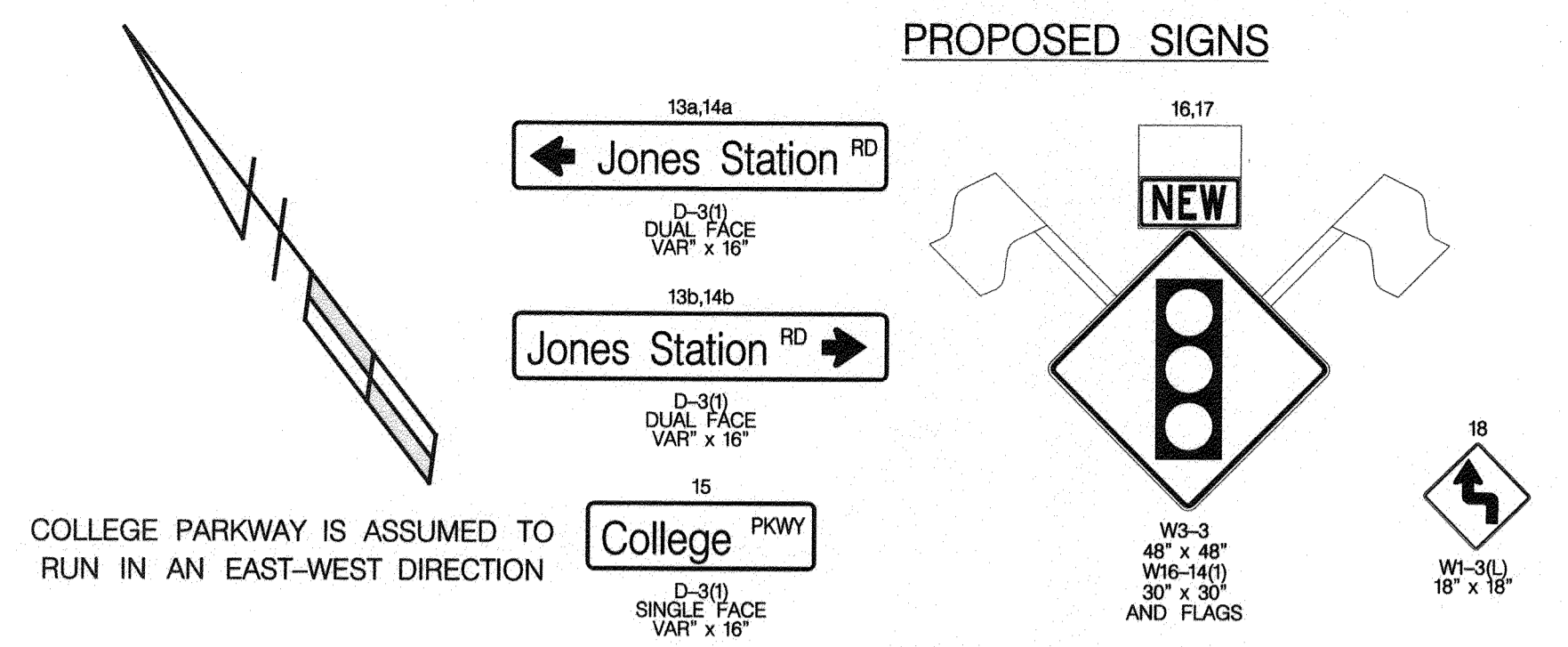
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7525 Connelley Drive
Suite B
Hanover, MD 21076
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ANNE ARUNDEL COUNTY			
DEPARTMENT OF PUBLIC WORKS			
APPROVED		APPROVED	
DATE	DATE	DATE	DATE
<i>[Signature]</i> 5/16/21	<i>[Signature]</i> 4/15/21	<i>[Signature]</i> 4/15/21	<i>[Signature]</i> 4/16/21
CHIEF ENGINEER	PROJECT MANAGER	APPROVED	CHIEF, RIGHT OF WAY SERVICES
ASSISTANT CHIEF ENGINEER			
SCALE: NONE	DRAWN BY: B. PEEK	CHECKED BY: J. K. SCHMID	SHEET 89 of 137
PROPOSAL #:			PROJECT # P504104

97157

GENERAL INFORMATION PLAN
COLLEGE PKWY. & COLLEGE MANOR DRIVE / JONES STATION ROAD
TAX MAP 32, 39, AND 40
ARND, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD

DWG No:

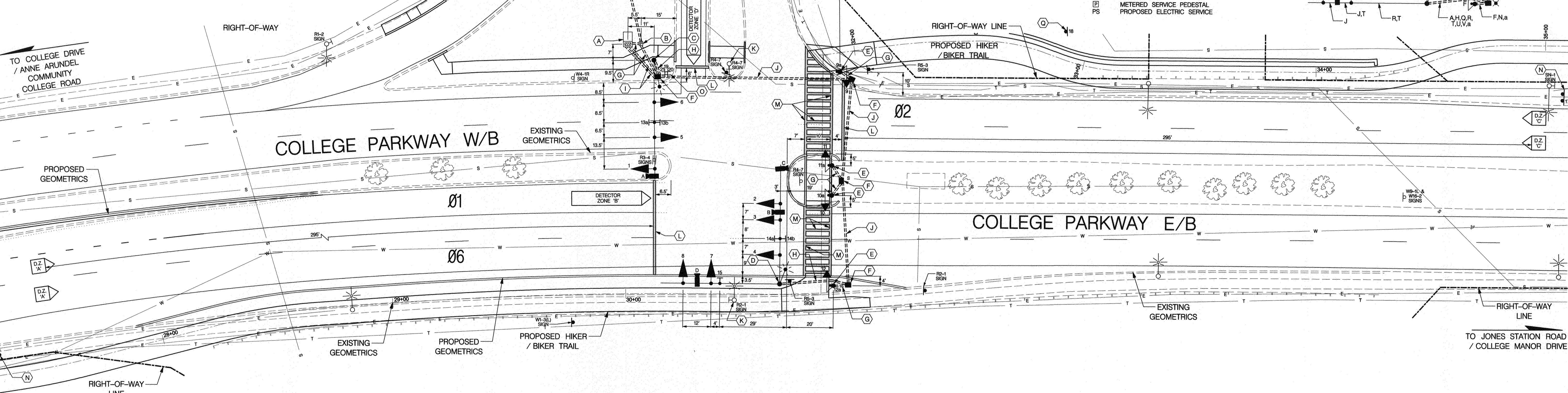
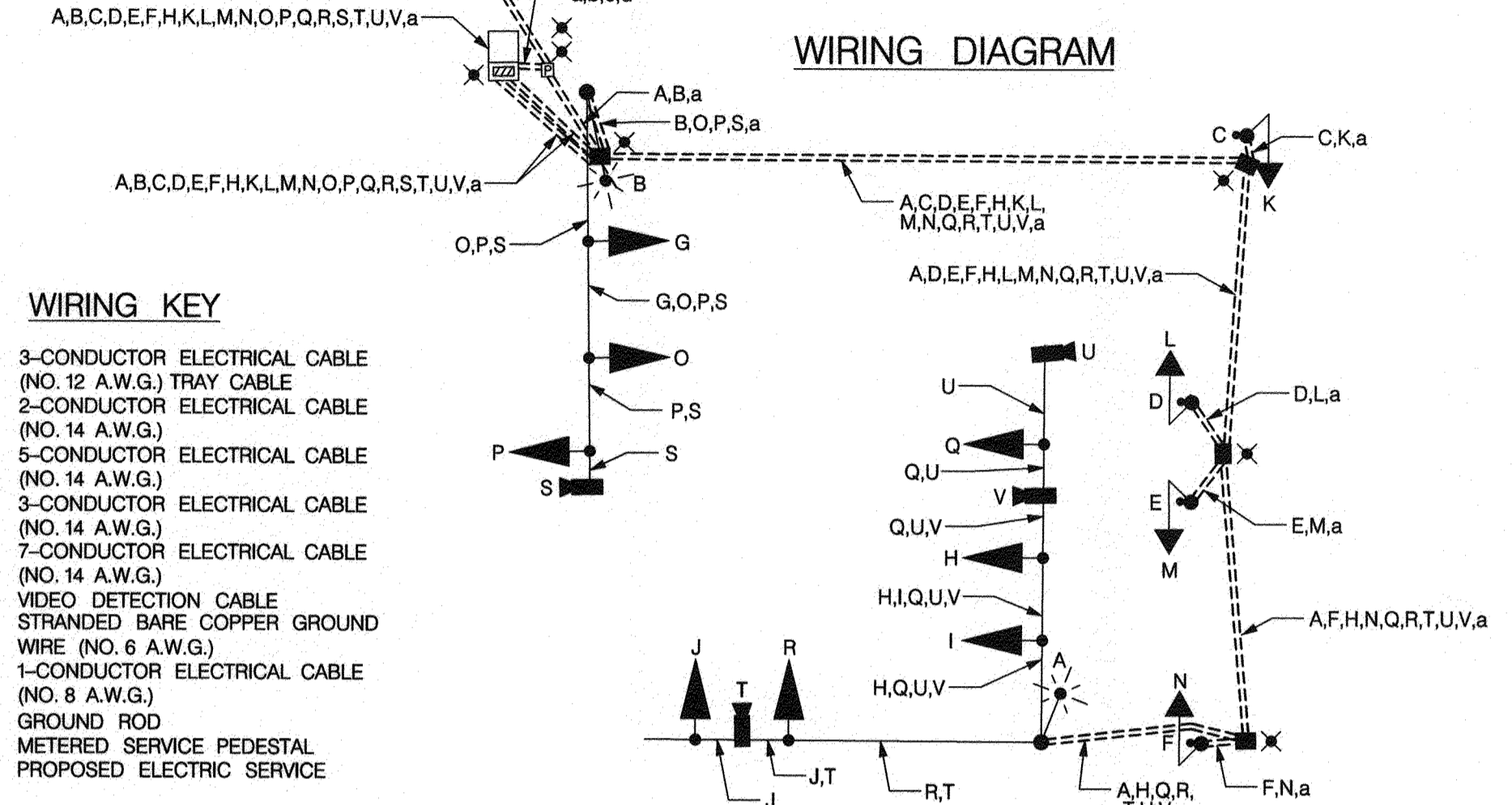
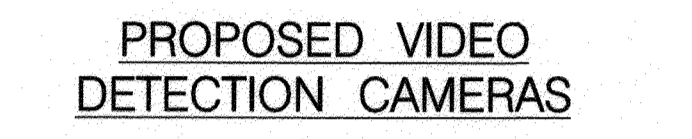
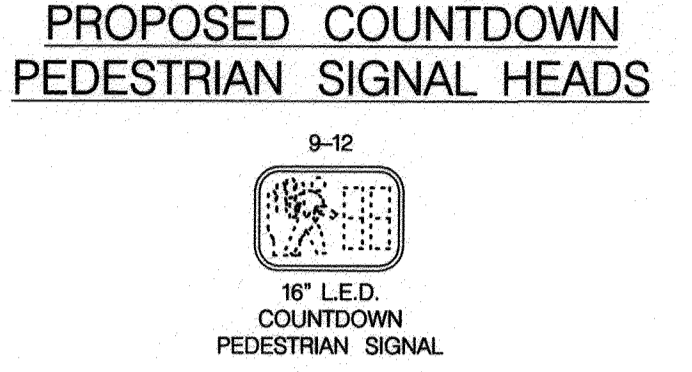


PHASE CHART

SIGNAL NUMBER	PHASES										F L A S H								
	01	02	03	04	05	06	07	08	09	10									
1	GA	YA	RA	RA															
2	GA	YA	RA	RA															
3	R	R	R	R															
4	R	R	R	R															
5	R	R	G	Y															
6	RA	RA	G	Y															
7	R	R	R	R															
8	R	R	R	R															
9	R	R	DW	DW															
10	R	R	DW	DW															
NON-CONFLICT PHASE											6	6	N / A	N / A					
CONFLICT PHASE											2,4	1,4		1,2,6	1,2,6	4			

CONSTRUCTION DETAILS

- INSTALL BASE MOUNTED CABINET AND CONTROLLER WITH ALL NECESSARY EQUIPMENT (NOTE: INSTALL 2-2 IN. AND 2-4 IN. SCHEDULE 80, RIGID PVC, 90 DEGREE CONDUIT BENDS)
- INSTALL 200 AMP METERED SERVICE PEDESTAL
- INSTALL 27 FT. MAST ARM POLE WITH A 50 FT. MAST ARM, VEHICLE SIGNAL HEADS, SIGN, VIDEO DETECTION CAMERA AND 10 FT. STREET LIGHTING ARM WITH LED LUMINAIRE (NOTE: INSTALL 2-3 IN. SCHEDULE 80, RIGID PVC, 90 DEGREE, CONDUIT BENDS)
- INSTALL 27 FT. MAST ARM POLE WITH TWIN 50 FT./50 FT. MAST ARMS, VEHICLE SIGNAL HEADS, SIGNS, VIDEO DETECTION CAMERAS AND 5 FT. STREET LIGHTING ARM WITH LED LUMINAIRE (NOTE: INSTALL 2-3 IN. SCHEDULE 80, RIGID PVC, 90 DEGREE, CONDUIT BENDS)
- INSTALL 10 FT. BREAKAWAY PEDESTAL POLE ON MODIFIED BASE WITH PEDESTRIAN SIGNAL HEAD, PUSHBUTTON AND SIGN (NOTE: INSTALL 1-2 IN. SCHEDULE 80, RIGID PVC, 90 DEGREE CONDUIT BEND, SEE STD MD-801-01-01 FOR FOUNDATION DETAIL)
- INSTALL ELECTRICAL HANDHOLE
- INSTALL 2 IN. SCHEDULE 80, RIGID PVC, ELECTRICAL CONDUIT - TRENCHED
- INSTALL 3 IN. SCHEDULE 80, RIGID PVC, ELECTRICAL CONDUIT - TRENCHED
- INSTALL 4 IN. SCHEDULE 80, RIGID PVC, ELECTRICAL CONDUIT - TRENCHED
- INSTALL 4 IN. SCHEDULE 80, RIGID PVC, ELECTRICAL CONDUIT - BORED
- REMOVE EXISTING STREET LIGHT. INSTALL ELECTRICAL HANDHOLE OVER EXISTING FOUNDATION. RELOCATE SIGN AS SHOWN ON SIGNING AND PAVEMENT MARKING PLAN.
- INSTALL 12 IN. SOLID WHITE, LEAD FREE PAVEMENT MARKING FOR STOP BAR LINE
- INSTALL 12 IN. SOLID WHITE, LEAD FREE PAVEMENT MARKING FOR CROSSWALK LINE
- INSTALL W3-3 SIGN ON TWO GALVANIZED U-CHANNEL POSTS APPROXIMATELY 400 FT. IN ADVANCE OF THE STOPBAR
- REMOVE EXISTING STOP AND STREET NAME SIGNS AND SUPPORT
- INSTALL 4 IN. SCHEDULE 80, RIGID PVC, ELECTRICAL CONDUIT - BORED (FOR ELECTRICAL SERVICE)
- INSTALL W-1-3(L) SIGN ON ONE GALVANIZED 4 IN. X 4 IN. WOOD SUPPORT
- INSTALL 4 IN. SCHEDULE 80 RIGID PVC ELECTRICAL CONDUIT - BORED (PROPOSED UNDERGROUND ELECTRICAL SERVICE BEND UP 1 FT. ABOVE GRADE AT UTILITY POLE WITH PULL ROPE FOR ELECTRICAL SERVICE)



GENERAL NOTES

- THE UTILITIES ON THE CONSTRUCTION PLAN ARE SCHEMATIC ONLY AND ARE NOT TO BE CONSIDERED COMPLETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY COMPANIES PRIOR TO CONSTRUCTION SO THAT ALL UTILITIES MAY BE LOCATED IN THE FIELD. THE CONTRACTOR SHALL LOCATE EXISTING UTILITIES A MINIMUM OF TWO (2) WEEKS IN ADVANCE OF CONSTRUCTION OPERATIONS IN THE VICINITY OF THE UTILITIES. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITIES AND OR AGENCIES AT LEAST FIVE (5) DAYS BEFORE STARTING WORK ON THESE PLANS. MISS UTILITY AND ANNE ARUNDEL COUNTY TRAFFIC ENGINEERING DIVISION 410-222-7331.
- ALL TRAFFIC SIGNAL FOUNDATIONS SHALL BE INSTALLED AT THE FINAL SIDEWALK OR CURB GRADE FOR CLOSED SECTIONS, HIGHEST ROADWAY PROFILE GRADE FOR OPEN SECTIONS, TO MEET CLEARANCE AS SPECIFIED IN MD 816.03, MD 818.01, MD 818.02, MD 818.04. THE CONTRACTOR SHALL VERIFY ULTIMATE GRADES PRIOR TO THE INSTALLATION OF ALL SIGNAL EQUIPMENT.
- THE LOCATION OF THE PROPOSED GEOMETRICS MUST BE CONFIRMED PRIOR TO THE INSTALLATION OF SIGNAL EQUIPMENT.
- CONDUIT SHALL BE INSTALLED PRIOR TO THE INSTALLATION OF PAVEMENT MARKINGS.
- CONSTRUCTION SHALL BE COMPLETED IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR CONSTRUCTION AND MATERIAL (MDOT SHA JULY 2020) AND THE ANNE ARUNDEL COUNTY STANDARD SPECIFICATIONS AND DETAILS, 2001, AND ALL AMENDMENTS TO EACH SPECIFICATION.
- ALL NEW SIGNAL HEADS SHALL BE SECURELY WRAPPED AND OR BAGGED BY THE CONTRACTOR PRIOR TO THE SIGNAL BEING PLACED IN SERVICE.
- ALL POLE, SIGNAL HEAD, AND DETECTOR LOCATIONS ARE TO BE MARKED IN THE FIELD AND APPROVED BY THE TRAFFIC ENGINEERING DIVISION PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL FURNISH THREE (3) COPIES OF THE AS-BUILT PLANS TO THE TRAFFIC ENGINEERING DIVISION.
- THE SIGNAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL PAVEMENT MARKINGS CALLED OUT TO BE INSTALLED ON THE PLAN.
- ADEQUATE CLEARANCE MUST BE MAINTAINED BETWEEN SIGNAL EQUIPMENT AND AERIAL UTILITY LINES.
- FOR ADDITIONAL SIGNING AND PAVEMENT MARKINGS, SEE SIGNING AND PAVEMENT MARKING PLAN.
- W3-3 SIGN ASSEMBLIES SHALL BE REMOVED BETWEEN 90 AND 120 DAYS AFTER INSTALLATION.
- ALL TRAIL STRIPING AND SIGNING SHALL BE RETROREFLECTORIZED.

Professional Certification: I, James Kyle Schmid, certify that these documents were prepared by or approved by me and that I am a duly licensed Professional Engineer under the laws of the State of Maryland License # 42413 Expiration Date 6-6-2022

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Suite B
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APPROVED: [Signature] DATE: 5/6/21
APPROVED: [Signature] DATE: 4/15/21
APPROVAL: [Signature] DATE: 4/21/21

CHIEF ENGINEER
PROJECT MANAGER
ASSISTANT CHIEF ENGINEER

CHIEF, RIGHT OF WAY SERVICES

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

97158

TRAFFIC SIGNAL PLAN
COLLEGE PARKWAY & JONES STATION ROAD
TAX MAP 32, 36, AND 40
ARND, MD 2P CODE 2102 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD

DWG NO: DD13C

SCALE: 1" = 20'
DRAWN BY: A. M. ROSEN
CHECKED BY: J. K. SCHMID
SHEET 90 OF 137
PROJECT #: P504104
PROPOSAL #:

PROJECT DESCRIPTION

THIS PROJECT INVOLVES THE INSTALLATION OF A NEW TRAFFIC CONTROL SIGNAL AT THE INTERSECTION OF COLLEGE PARKWAY AND JONES STATION ROAD IN ANNE ARUNDEL COUNTY. THE WORK IS NECESSITATED BY THE CONSTRUCTION OF A NEW TRAIL ACROSS JONES STATION ROAD. COLLEGE PARKWAY IS ASSUMED TO RUN IN AN EAST-WEST DIRECTION.

INTERSECTION OPERATION

THE INTERSECTION WILL OPERATE IN A NEMA FOUR-PHASE, FULLY-ACTUATED MODE WITH AN EXCLUSIVE LEFT TURN PHASE FOR THE EASTBOUND APPROACH OF COLLEGE PARKWAY AND AN ALTERNATE PEDESTRIAN PHASE TO CROSS THE EAST LEG OF COLLEGE PARKWAY.

CONTROLLER REQUIREMENTS

A NEW EIGHT-PHASE, FULLY-ACTUATED CONTROLLER HOUSED IN A BASE MOUNTED CABINET WILL BE USED.

APS PEDESTRIAN SIGNAL NOTES

- PUSHBUTTONS ARE TO BE LOCATED SO THEY CAN BE ACTIVATED BY A PERSON IN A WHEELCHAIR REACHING LESS THAN 18" FROM A 60" X 60" LEVEL LANDING AREA WITH A CROSS SLOPE OF LESS THAN OR EQUAL TO 2%.
- THE 10' SEPARATION BETWEEN PUSHBUTTONS IS TO BE MEASURED FROM THE FACE OF THE PUSHBUTTON TO THE FACE OF THE PUSHBUTTON, NOT CENTER TO CENTER OF POLE.
- PUSHBUTTON ARROWS ARE TO BE PARALLEL TO THE CROSSING FOR WHICH THEY ARE INTENDED.
- LOCATION OF ACCESSIBLE PEDESTRIAN SIGNAL PUSHBUTTONS MUST MEET LOCATION REQUIREMENTS OF MUTCD SEC. 4E.08 + 4E.10 AND FIG. 4E-3 + 4E-4 AND THE NCHRP PUBLICATION, "ACCESSIBLE PEDESTRIAN SIGNALS: GUIDE TO BEST PRACTICE". IF NOT MET, THE CONTRACTOR IS TO STOP WORK ON PUSHBUTTON LOCATION UNTIL A DESIGN WAIVER IS OBTAINED AND APPROVED BY ANNE ARUNDEL COUNTY TRAFFIC ENGINEERING.
- ALL APS CENTRAL CONTROL UNITS SHALL BE DELIVERED TO ANNE ARUNDEL COUNTY TRAFFIC ENGINEERING FOR PROGRAMMING AND TESTING PRIOR TO INSTALLATION.

APS NOTES

TO CROSS COLLEGE PARKWAY FROM ROAD EDGE:

- WHEN PEDESTRIAN LOCATES AND PRESSES PUSHBUTTON FOR AN EXTENDED TIME, THE PUSHBUTTON UNIT WILL ANNOUNCE, "WAIT TO CROSS COLLEGE PARKWAY AT JONES STATION, SECOND PUSHBUTTON IN MEDIAN, WAIT."
- WHEN WALK PHASE BEGINS, THE MESSAGE WILL BE A RAPID TICK, WHICH WILL LAST FOR THE DURATION OF THE WALK

TO CROSS COLLEGE PARKWAY FROM MEDIAN:

- WHEN PEDESTRIAN LOCATES AND PRESSES PUSHBUTTON FOR AN EXTENDED TIME, THE PUSHBUTTON UNIT WILL ANNOUNCE, "WAIT TO CROSS COLLEGE PARKWAY AT JONES STATION, WAIT."
- WHEN WALK PHASE BEGINS, THE MESSAGE WILL BE A RAPID TICK, WHICH WILL LAST FOR THE DURATION OF THE WALK

EQUIPMENT LIST "A"

A. EQUIPMENT TO BE FURNISHED BY THE COUNTY AND INSTALLED BY THE CONTRACTOR

QUANTITY	DESCRIPTION
NONE	

EQUIPMENT LIST "B"

B. EQUIPMENT TO BE FURNISHED AND /OR INSTALLED BY CONTRACTOR. ALL EQUIPMENT SHALL HAVE CATALOG CUTS SUBMITTED AND APPROVED BY ANNE ARUNDEL COUNTY PRIOR TO INSTALLATION.

QUANTITY	DESCRIPTION
LS	MAINTENANCE OF TRAFFIC
4 CY	TEST PIT EXCAVATION
4 EA	THIRD PARTY CONCRETE TESTING
1 EA	27 FT. MAST ARM POLE WITH TWIN 50 /50 FT. MAST ARMS
1 EA	27 FT. MAST ARM POLE WITH 50 FT. MAST ARM
55 LF	2 IN. SCHEDULE 80 RIGID ELECTRICAL PVC CONDUIT - TRENCHED
25 LF	3 IN. SCHEDULE 80 RIGID ELECTRICAL PVC CONDUIT - TRENCHED
25 LF	4 IN. SCHEDULE 80 RIGID ELECTRICAL PVC CONDUIT - TRENCHED
485 LF	4 IN. SCHEDULE 80 RIGID ELECTRICAL PVC CONDUIT - BORED
9 CY	CONCRETE FOR SIGNAL FOUNDATION
255 LF	NO. 6 AWG STRANDED BARE COPPER WIRE
6 EA	ELECTRICAL HANDHOLE
7 EA	GROUND ROD 3 / 4 IN. DIAMETER X 10 FT. LENGTH
20 LF	ELECTRICAL CABLE 1-CONDUCTOR (NO. 8 A.W.G.)
265 LF	ELECTRICAL CABLE 3-CONDUCTOR (NO. 12 A.W.G.) TRAY CABLE
670 LF	ELECTRICAL CABLE 2-CONDUCTOR (NO. 14 A.W.G.)
695 LF	ELECTRICAL CABLE 3-CONDUCTOR (NO. 14 A.W.G.)
45 LF	ELECTRICAL CABLE 5-CONDUCTOR (NO. 14 A.W.G.)
1075 LF	ELECTRICAL CABLE 7-CONDUCTOR (NO. 14 A.W.G.)
1 EA	"EAGLE" EIGHT-PHASE NTCP CONTROLLER AND CABINET WITH ALL NECESSARY EQUIPMENT
6 EA	12 IN., 1-WAY, 3-SECTION (R,Y,G) "CHAPEL HILL" POLYCARBONATE SIGNAL HEAD WITH "DIALIGHT" L.E.D. INDICATIONS, BLACKFACE DOORS AND TUNNEL VISORS - MAST ARM MOUNT
2 EA	12 IN., 1-WAY, 3-SECTION (R,A,Y,G,A) "CHAPEL HILL" POLYCARBONATE SIGNAL HEAD WITH "DIALIGHT" L.E.D. INDICATIONS, BLACKFACE DOORS AND TUNNEL VISORS - MAST ARM MOUNT
4 EA	"TRAFICON FLIR" VIDEO DETECTION CAMERA WITH THERMAL SENSOR AND CABLE
2 EA	"TRAFICON" VIDEO DETECTION INTERFACE EQUIPMENT (VP MODULE)
1 EA	"TRAFICON" VIDEO DETECTION PIM CARD
1 EA	5 FT. LIGHTING ARM WITH RX2 LED LUMINAIRE
1 EA	10 FT. LIGHTING ARM WITH RX2 LED LUMINAIRE
2 EA	D-3(1) DUAL FACE SIGN (VAR. X 16") "JONES STATION ROAD" - MAST ARM MOUNT
1 EA	D-3(1) SINGLE FACE SIGN (VAR. X 16") "COLLEGE PARKWAY" - MAST ARM MOUNT
2 EA	W3-3 SIGN (48" X 48") AND W16-14(1) SIGN (30" X 30") AND FLAGS - GROUND MOUNT
1 EA	W1-3(L) SIGN (18" X 18") - GROUND MOUNT
110 LF	GALVANIZED U-CHANNEL SUPPORT FOR GROUND MOUNTED SIGN
30 LF	WOOD SIGN SUPPORTS 4 INCH X 4 INCH
260 LF	12 IN. WHITE, LEAD FREE, HEAT APPLIED THERMOPLASTIC PAVEMENT MARKING
85 LF	4 IN. WHITE, LEAD FREE, HEAT APPLIED THERMOPLASTIC PAVEMENT MARKING
420 LF	4 IN. YELLOW, LEAD FREE, HEAT APPLIED THERMOPLASTIC PAVEMENT MARKING
505 LF	REMOVE EXISTING PAVEMENT MARKING LINE
3 EA	RELOCATE EXISTING GROUND MOUNTED SIGN
2 EA	RELOCATE EXISTING POLE MOUNTED SIGN
4 EA	16 IN. COUNTDOWN PEDESTRIAN SIGNAL HEAD - POLE MOUNT
1 EA	REMOVE AND DISPOSE OF GROUND MOUNTED SIGN AND SUPPORTS
1 EA	METERED SERVICE PEDESTAL
1 EA	CLARY UPS BATTERY BACKUP SYSTEM
4 EA	POLARA BULLDOG PEDESTRIAN PUSHBUTTON WITH RAISED ARROW AND SIGN
4 EA	BREAKAWAY PEDESTAL POLE
1 EA	POLARA CCU

EQUIPMENT PURCHASE INFORMATION

"CHAPEL HILL" TRAFFIC SIGNAL HEADS	TRAFFIC PARTS, TEXAS CONTACT MS. JONI FEXER 1-800-345-6329
L.E.D.'S AND PEDESTRIAN COUNTDOWN SIGNALS	J.O. HERBERT COMPANY OF MIDLOTHIAN, VA CONTACT MR. JACK HERBERT (804)763-6480
TRAFICON EQUIPMENT	CONTROL TECHNOLOGIES CONTACT MR. JIM LAMPE (703) 595-2980
EAGLE EQUIPMENT	MOBOTREX CONTACT MR. WILLIAM LAMIE (804) 893-8413
PHILIPS HADCO RX2 LEDGINE LED	BGE OUTDOOR LIGHTING CONTACT MR. NICK COSTA (410)470-8413

ANNE ARUNDEL COUNTY CONTACTS

DESIGN CONTACT	MR. BO ZHOU, P.E., PTOE (410) 222 7331
CONSTRUCTION CONTACT	MR. ERIC WINKELMEYER (410) 222-1940

EQUIPMENT LIST "C"

C. EXISTING EQUIPMENT TO BE REMOVED BY THE CONTRACTOR AND DELIVERED TO THE ANNE ARUNDEL COUNTY TRAFFIC MAINTENANCE SHOP LOCATED AT 409 BROADNECK RD., ANNAPOLIS MD 21401. THE CONTRACTOR SHALL NOTIFY MR. ERIC WINKELMEYER AT (410) 222-1940 AT LEAST THREE DAYS IN ADVANCE OF DELIVERY.

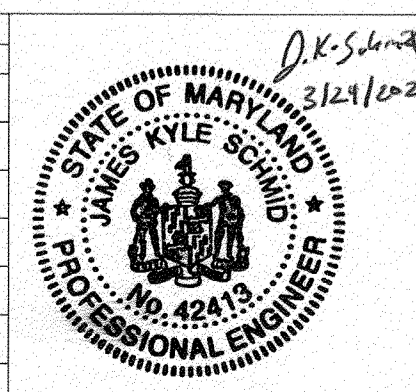
QUANTITY	DESCRIPTION
NONE	

ALL SIGNAL EQUIPMENT TO BE REMOVED AND NOT RETURNED TO THE COUNTY SHALL BECOME THE PROPERTY OF THE CONTRACTOR.

DWG NO: DD13D

Professional Certification: I, James Kyle Schmid, certify that these documents were prepared by or approved by me and that I am a duly licensed Professional Engineer under the laws of the State of Maryland License # 42413 Expiration Date 6-6-2022

#	REVISIONS DESCRIPTION	APPROVED BY	DATE



TRAFFIC CONCEPTS, INC.
7525 Connelley Drive
Suite B
Hanover, MD 21076
(410) 760-2911
FAX: (410) 760-2915
EMAIL: TRAFFIC@TRAFFIC-CONCEPTS.COM

ANNE ARUNDEL COUNTY

DEPARTMENT OF PUBLIC WORKS

APPROVED	DATE	APPROVED	DATE	SCALE:	NONE
<i>[Signature]</i>	5/16/21	<i>[Signature]</i>	4/15/21	DRAWN BY:	A. M. ROSEN
CHIEF ENGINEER		PROJECT MANAGER		CHECKED BY:	J. K. SCHMID
APPROVAL	DATE	APPROVED	DATE	SHEET	91 of 137
<i>[Signature]</i>	4/21/21	<i>[Signature]</i>	4/16/21	PROJECT #:	P504104
ASSISTANT CHIEF ENGINEER		CHIEF, RIGHT OF WAY SERVICES		PROPOSAL #:	

97159
GENERAL INFORMATION PLAN
COLLEGE PARKWAY &
JONES STATION ROAD
TAX MAP 32.30 AND 40
ARUNDEL, MD ZIP CODE 21012 3RD DISTRICT
ANNE ARUNDEL COUNTY, MD