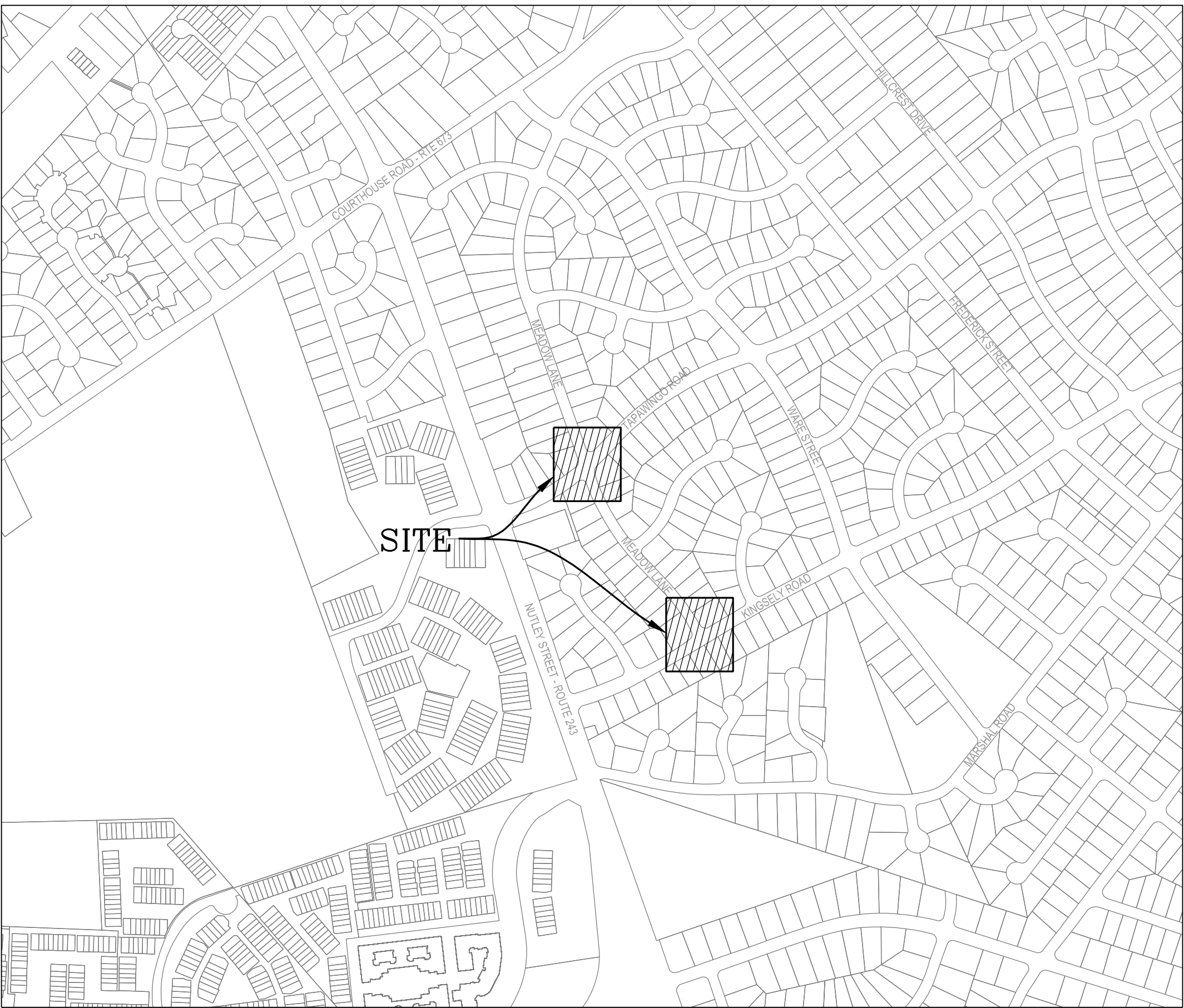


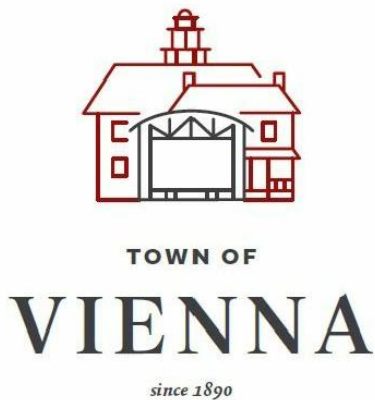
TOWN OF VIENNA
DEPARTMENT OF PUBLIC WORKS
FAIRFAX COUNTY, VIRGINIA

TAPAWINGO ROAD & KINGSLEY ROAD
ROAD IMPROVEMENT PLAN
100% DESIGN CONSTRUCTION DRAWINGS



VICINITY MAP
SCALE : 1" = 500'

OWNER/DEVELOPER:



TOWN OF VIENNA
DEPARTMENT OF PUBLIC WORKS
127 CENTER ST. S.
VIENNA, VA 22180

SHEET INDEX	
1.	COVER SHEET
2.	NOTES AND DETAILS
3.	NOTES AND DETAILS
4.	EXISTING CONDITIONS AND DEMOLITION PLAN
5.	EXISTING CONDITIONS AND DEMOLITION PLAN
6.	SITE PLAN
7.	SITE PLAN
8.	DRAINAGE DIVIDES
9.	BMP COMPUTATIONS & DETAILS
10.	BMP COMPUTATIONS & DETAILS
11.	BMP COMPUTATIONS & DETAILS
12.	BMP PLAN AND DETAILS
13.	BMP PLAN AND DETAILS
14.	BMP NOTES AND DETAILS
15.	STORM PROFILES
16.	STORM COMPUTATIONS
17.	EROSION & SEDIMENT CONTROL PH I & PH II
18.	EROSION & SEDIMENT CONTROL PH I & PH II
19.	EROSION & SEDIMENT CONTROL NARRATIVE & DETAILS
20.	PAVEMENT IMPROVEMENT PLAN
20A.	PAVEMENT IMPROVEMENT PLAN
21.	BIO-RETENTION LANDSCAPE PLAN

NOTICE REQUIRED

CONTRACTORS SHALL NOTIFY OPERATORS WHO MAINTAIN UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION OR BLASTING AT LEAST TWO WORKING DAYS, BUT NOT MORE THAN TEN WORKING DAYS PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION.

CONTACT "MISS UTILITY" AT
1-800-552-7001
FOR THESE UTILITIES

VIRGINIA ELECTRIC & POWER CO.
A.T. & T. CO.
COLUMBIA GAS TRANSMISSION CO.
FAIRFAX CO. SAN. SEWER DIV.
TRANSCO GAS PIPELINE CO.
COLUMBIA GAS OF VIRGINIA
CONTINENTAL TELEPHONE OF VIRGINIA

COLONIAL PIPELINE CO.
FAIRFAX CO. WATER AUTHORITY
WASHINGTON GAS LIGHT CO.
PRINCE WILLIAM ELEC. CO-OP.
PLANTATION PIPELINE CO.
C & P TELEPHONE CO.

CONTACT THESE UTILITIES

TRI-COUNTY ELEC. CO-OP 1-777-2151
FALLS CHURCH WATER SER. 1-241-5078

LOUDOUN WATER 571-291-7880
FAIRFAX CITY WATER SER. 385-7916

EMERGENCY DIAL 911
POLICE – FIRE – RESCUE
777-1021 777-2222

PLAN DATE	03-19-2021 10-29-2021 02-17-2022
No.	
DATE	
DESCRIPTION	
REVISIONS	

Urban, Ltd.
7712 Lees Ferry Turnpike
Arlington, Virginia 22203
Tel. 703.642.8080
Fax. 703.642.8251
www.urban-llc.com

urban
Planners • Engineers • Landscape Architects • Land Surveyors

COVER SHEET

VIENNA ROAD IMPROVEMENTS
TAPAWINGO ROAD & KINGSLEY ROAD
TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA

SCALE: AS NOTED
C.I. N/A
DATE: MARCH 2021

SHEET
1
OF
21

FILE No.
PP-2156

CG-12

CG-12

TYPICAL DESIGN

**TYPE A
WITH BUFFER STRIP**

SECTION A-A

SECTION B-B

NOTES:

1. FOR GENERAL NOTES ON THE DETECTABLE WARNING SURFACE, SEE SHEET 1 OF 5.
2. THIS DESIGN TO BE USED FOR CONSTRUCTION THAT INCORPORATES WIDER SIDEWALK, LANDING (4' WID REQUIRED AT TOP OF CURB RAMP. MINIMUM CURB RAMP LENGTH 8 FEET FOR NEW CONSTRUCTION.
3. GUTTER PAN SHALL BE A MAXIMUM SLOPE OF 20:1 AT THE RAMP OPENING.
4. DIAGONAL PLACEMENT IS NOT PERMITTED.

**EXAMPLE INSTALLATION METHODS -
SEE PLANS FOR LAYOUT**

**TYPICAL PLACEMENT
AT INTERSECTION
WITHIN CROSSWALK**

**TYPICAL PLACEMENT
AT INTERSECTION
WITHIN BUFFER STRIP
(WITH CROSSWALK)**

SPECIFICATION REFERENCE	A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. <div style="text-align: center; font-weight: bold; font-size: 1.2em;">CG-12 DETECTABLE WARNING SURFACE</div> <div style="text-align: center; font-weight: bold;">TYPE A (PERPENDICULAR) APPLICATION</div> <div style="text-align: center; font-size: 0.8em;">VIRGINIA DEPARTMENT OF TRANSPORTATION</div>	<div style="text-align: center; font-weight: bold; font-size: 1.2em;">VDOT</div> <div style="text-align: center; font-size: 0.8em;">ROAD AND BRIDGE STANDARDS</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> REVISION DATE 04/19 </div> <div style="width: 45%;"> SHEET 2 OF 5 204.02 </div> </div>
----------------------------	--	---

CG-6

NOTES:

1. THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
2. CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.
3. COMBINATION CURB & GUTTER HAVING A RADIUS OF 300 FEET OR LESS (ALONG FACE OF CURB) SHALL BE PAID FOR AS RADIAL COMBINATION CURB & GUTTER.
4. FOR USE WITH STABILIZED OPEN-GRADED DRAINAGE LAYER, THE BOTTOM OF THE CURB & GUTTER SHALL BE CONSTRUCTED PARALLEL TO THE SLOPE OF SUBBASE COURSES AND TO THE DEPTH OF THE PAVEMENT.
5. ALLOWABLE CRITERIA FOR THE USE OF CG-6 IS BASED ON ROADWAY CLASSIFICATION AND DESIGN SPEED AS SHOWN IN APPENDIX A OF THE ROAD DESIGN MANUAL IN THE SECTION ON CG URBAN STANDARDS.

THIS AREA MAY BE CONCRETE AT THE OPTION OF THE CONTRACTOR

THE BOTTOM OF THE CURB AND GUTTER MAY BE CONSTRUCTED PARALLEL TO THE SLOPE OF SUBBASE COURSES PROVIDED A MINIMUM DEPTH OF 7" IS MAINTAINED.

* MODIFIED GUTTER WIDTH OF 18"

COMBINATION 6" CURB AND GUTTER

SPECIFICATION
REFERENCE

105
502

VIRGINIA DEPARTMENT OF TRANSPORTATION

2016 ROAD & BRIDGE STANDARDS

VDOT

ROAD AND BRIDGE STANDARDS

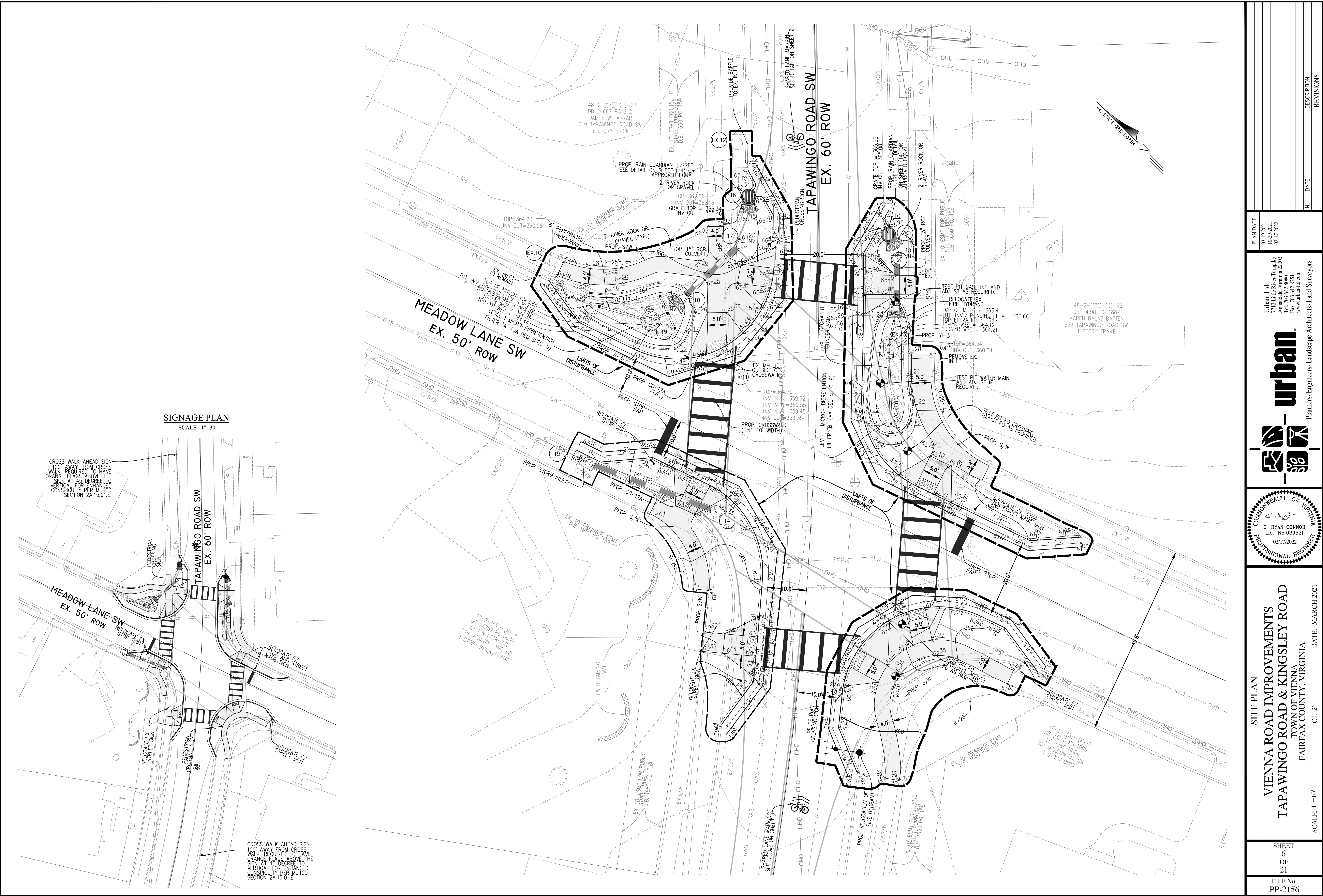
REVISION DATE

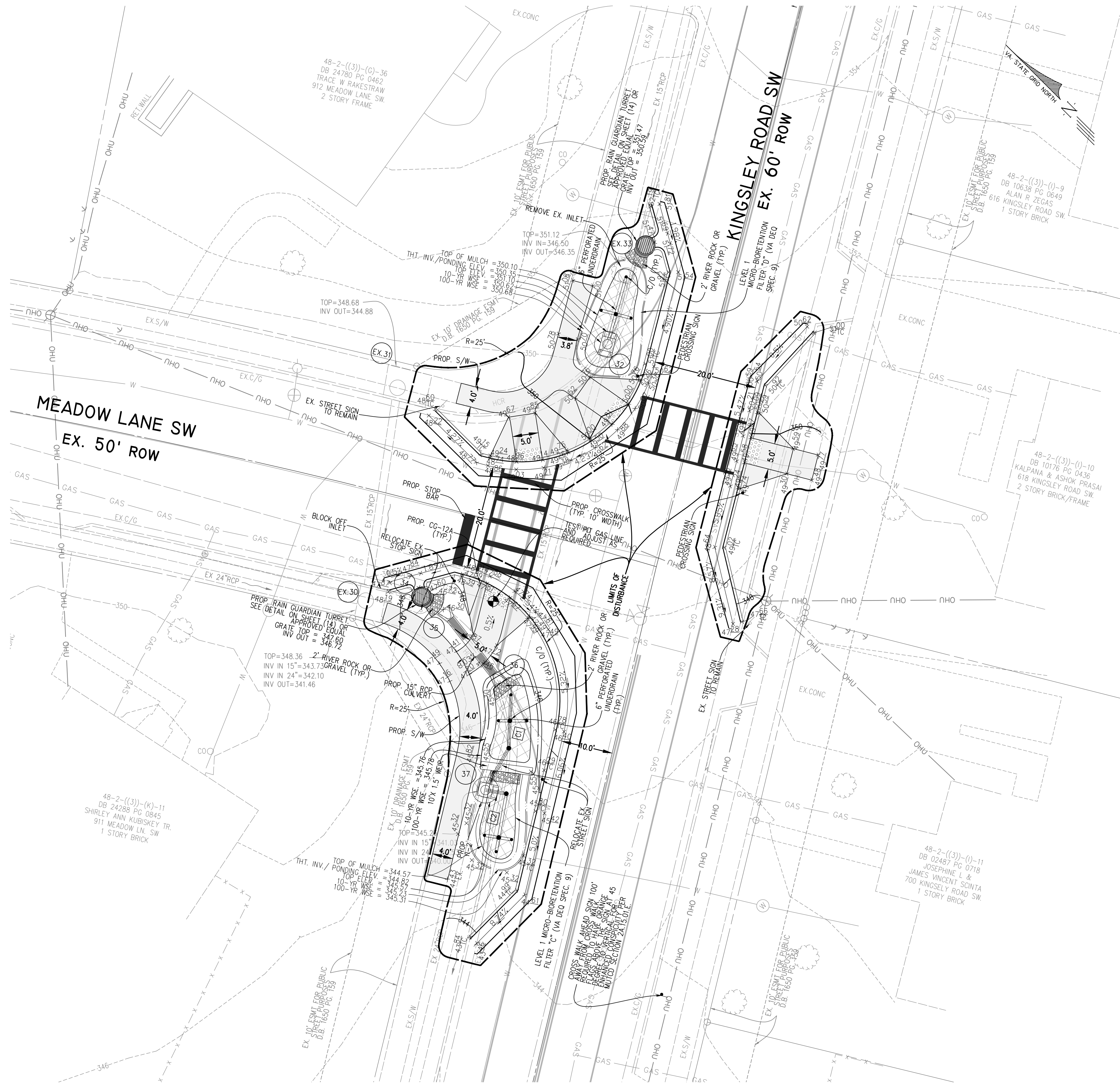
SHEET 1 OF 1

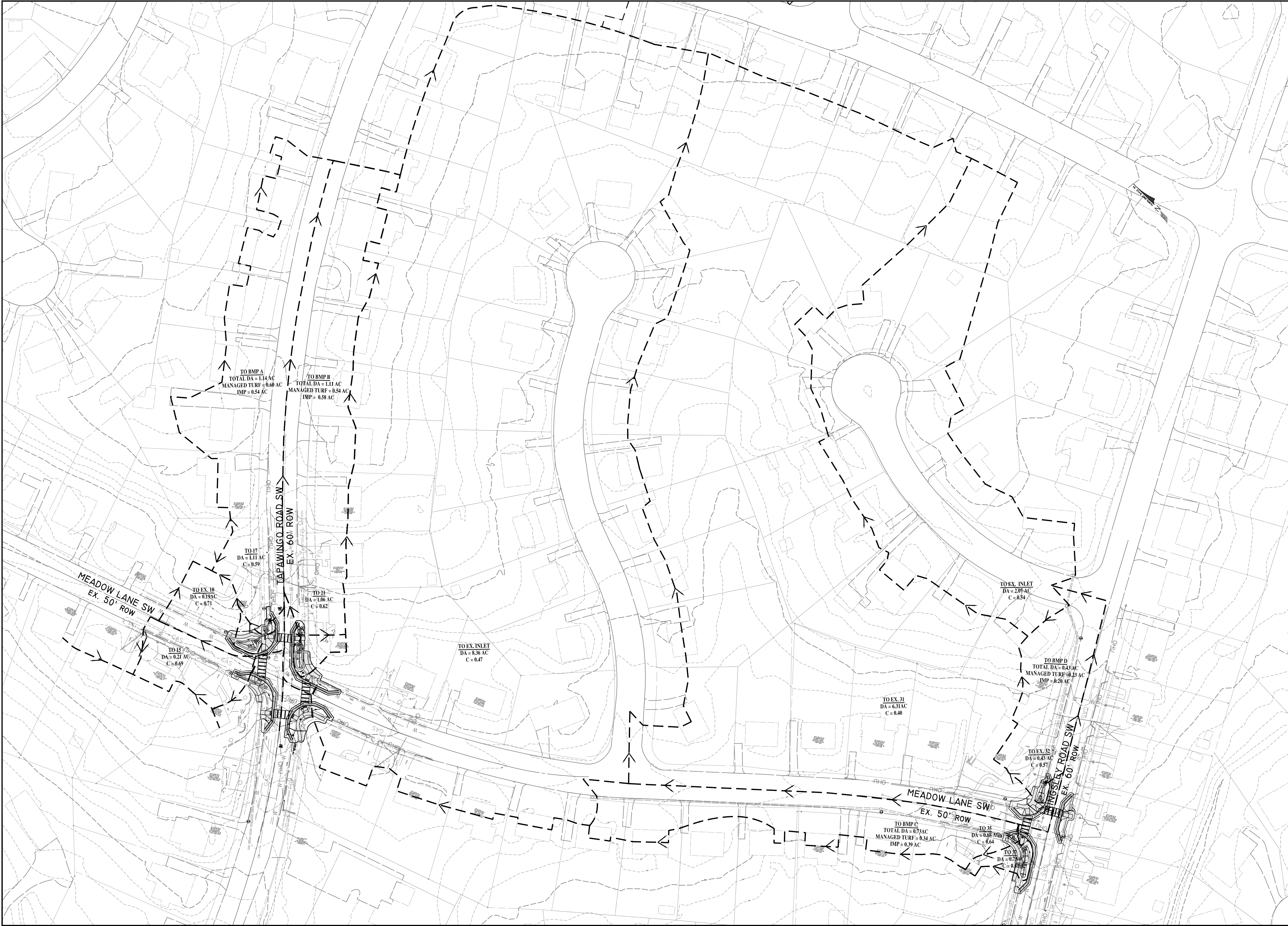
2010.03

EXISTING	DESCRIPTION	PROPOSED
	INDEX CONTOUR	
	INTERMEDIATE CONTOUR	
	EDGE OF PAVEMENT	
	CURB AND GUTTER	
	TRANSITION FROM SPILL TO CATCH CURB	
	HEADER CURB	
	PROPERTY LINE	
	DEPARTING PROPERTY LINE	
	LOT LINE	
	RIGHT-OF-WAY	
	CENTERLINE	
	FLOOD PLAIN	
	LIMIT OF DISTURBANCE	
	TREE LINE	
	FLOW LINE OF SWALE	
	STREAM	
	OVERLAND RELIEF PATHWAY	
	FENCE LINE	
	EASEMENT	
	WATER LINE	
	REUSE WATER MAIN	
	WATER VALVE	
	REDUCER	
	SANITARY SEWER	
	STORM SEWER	
	ELECTRIC SERVICE	
	TELEPHONE SERVICE	
	GAS LINE	
	IRRIGATION LINE	
	OVERHEAD WIRE	
	FIBER OPTIC LINE	
	UNKNOWN LINE	
	SPOT ELEVATION	
	UTILITY POLE	
	GUY WIRE	
	MAILBOX	
	SIGN	
	SANITARY SEWER IDENTIFIER	
	STORM DRAIN IDENTIFIER	
	EASEMENT IDENTIFIER	
	WATER METER	
	WATER VALVE	
	FIRE HYDRANT	
	COMMUNICATION VAULT (MANHOLE)	
	COMMUNICATION PEDESTAL	
	SPRINKLER HEAD	
	IRRIGATION CONTROL VALVE	
	END OF PAVING	
	PARKING INDICATOR	
	INDICATES THE NUMBER OF TYPICAL PARKING SPACES	
	STREET LIGHT	
	VEHICLES PER DAY (TRAFFIC COUNT)	
	TEST PIT REQUIRED	
	CRITICAL SLOPE	
	SLOPES TO BE STABILIZED PURSUANT TO VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK	
	HANDICAP RAMP	
	DENOTES LOCATION OF STANDARD RAMP CONSTRUCTION	
	DENOTES CLEAR SIGHT TRIANGLE	
	DECIDUOUS TREE	
	BENCHMARK	
	NEW ASPHALT	
	ASPHALT TRAIL	
	CONCRETE SIDEWALK	
	END WALLS	
	END SECTIONS	
	STOP SIGN	
	STREET SIGN	
	GEO	

[illegible]



[illegible]



PLAN DATE		03-19-2021	
		10-29-2021	
		02-17-2022	
Urban, Ltd.		7112 Lake View Turnpike	
Arlington, Virginia 22203		Tel. 703.642.8080	
Fax. 703.642.8251		www.urban-llc.com	
Planners - Engineers - Landscape Architects - Land Surveyors		No.	
DATE		DESCRIPTION	
REVISIONS			

COMMONWEALTH OF VIRGINIA
C. RYAN CONNOR
Lic. No. 039531
02/17/2022
PROFESSIONAL ENGINEER

BMP SITE REQUIREMENT COMPUTATIONS

ONSITE AREA ONLY (WITHIN PROPOSED DEVELOPMENT)

DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - Version 3.0

☐ 2011 BMP Standards and Specifications ☒ 2013 Draft BMP Standards and Specifications

Project Name: **TOV Tapawingo & Kingsley**
 Date: **10/29/2021**

CLEAR ALL

data input cells
 constant values
 calculation cells
 final results

Linear Development Project? ☐ No

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area (acres) → **0.29**

Maximum reduction required:	10%
The site's net increase in impervious cover (acres) is:	0
Post-Development TP Load Reduction for Site (lb/yr):	-0.06

Check:
 BMP Design Specifications List: 2013 Draft Stds & Specs
 Linear project? ☒ No
 Land cover areas entered correctly? ☒ Yes
 Total disturbed area entered? ☒ Yes

TP LOAD REDUCTION NOT REQUIRED

Pre-ReDevelopment Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed forest/open space					0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed				0.06	0.06
Impervious Cover (acres)				0.23	0.23
					0.29

Post-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land					0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed				0.13	0.13
Impervious Cover (acres)				0.16	0.16
Area Check	OK.	OK.	OK.	OK.	0.29

Constants

Annual Rainfall (inches)	43
Target Rainfall Event (inches)	1.00
Total Phosphorus (TP) EMC (mg/L)	0.26
Total Nitrogen (TN) EMC (mg/L)	1.86
Target TP Load (lb/acre/yr)	0.41
Pj (unitless correction factor)	0.90

Runoff Coefficients (Rv)

	A Soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

LAND COVER SUMMARY -- PRE-REDEVELOPMENT		
Land Cover Summary-Pre		
Pre-ReDevelopment	Listed	Adjusted ¹
Forest/Open Space Cover (acres)	0.00	0.00
Weighted Rv(forest)	0.00	0.00
% Forest	0%	0%
Managed Turf Cover (acres)	0.06	0.06
Weighted Rv(turf)	0.25	0.25
% Managed Turf	21%	21%
Impervious Cover (acres)	0.23	0.23
Rv(impervious)	0.95	0.95
% Impervious	79%	79%
Total Site Area (acres)	0.29	0.29
Site Rv	0.81	0.81

Treatment Volume and Nutrient Load		
Pre-ReDevelopment Treatment Volume (acre-ft)	0.0195	0.0195
Pre-ReDevelopment Treatment Volume (cubic feet)	848	848
Pre-ReDevelopment TP Load (lb/yr)	0.53	0.53
Pre-ReDevelopment TP Load per acre (lb/acre/yr)	1.84	1.84
Baseline TP Load (lb/yr) (0.41 lbs/acre/yr applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)		0.12

¹ Adjusted Land Cover Summary:
 Pre ReDevelopment land cover minus pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover.

Adjusted total acreage is consistent with Post-ReDevelopment acreage (minus acreage of new impervious cover).

Column I shows load reduction requirement for new impervious cover (based on new development load limit, 0.41 lbs/acre/year).

Post-Development Requirement for Site Area			
TP Load Reduction Required (lb/yr)	-0.06	**	TP LOAD REDUCTION NOT REQUIRED

REQUIREMENT FOR PROPOSED DEVELOPMENT

ONSITE (PROP. DEVELOPMENT) + OFFSITE (OFFSITE DA TO EACH BMPS)

DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - Version 3.0

☐ 2011 BMP Standards and Specifications ☒ 2013 Draft BMP Standards and Specifications

Project Name: **TOV Tapawingo & Kingsley**
 Date: **3/17/2021**

CLEAR ALL

data input cells
 constant values
 calculation cells
 final results

Linear Development Project? ☐ No

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area (acres) → **0.29**

Maximum reduction required:	10%
The site's net increase in impervious cover (acres) is:	0
Post-Development TP Load Reduction for Site (lb/yr):	0.40

Check:
 BMP Design Specifications List: 2013 Draft Stds & Specs
 Linear project? ☒ No
 Land cover areas entered correctly? ☒ Yes
 Total disturbed area entered? ☒ Yes

Pre-ReDevelopment Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed forest/open space					0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed				1.69	1.69
Impervious Cover (acres)				1.91	1.91
					3.60

Post-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land					0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed				1.76	1.76
Impervious Cover (acres)				1.84	1.84
Area Check	OK.	OK.	OK.	OK.	3.60

Constants

Annual Rainfall (inches)	43
Target Rainfall Event (inches)	1.00
Total Phosphorus (TP) EMC (mg/L)	0.26
Total Nitrogen (TN) EMC (mg/L)	1.86
Target TP Load (lb/acre/yr)	0.41
Pj (unitless correction factor)	0.90

Runoff Coefficients (Rv)

	A Soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

LAND COVER SUMMARY -- PRE-REDEVELOPMENT		
Land Cover Summary-Pre		
Pre-ReDevelopment	Listed	Adjusted ¹
Forest/Open Space Cover (acres)	0.00	0.00
Weighted Rv(forest)	0.00	0.00
% Forest	0%	0%
Managed Turf Cover (acres)	1.69	1.69
Weighted Rv(turf)	0.25	0.25
% Managed Turf	47%	47%
Impervious Cover (acres)	1.91	1.91
Rv(impervious)	0.95	0.95
% Impervious	53%	53%
Total Site Area (acres)	3.60	3.60
Site Rv	0.62	0.62

Treatment Volume and Nutrient Load		
Pre-ReDevelopment Treatment Volume (acre-ft)	0.1864	0.1864
Pre-ReDevelopment Treatment Volume (cubic feet)	8,120	8,120
Pre-ReDevelopment TP Load (lb/yr)	5.10	5.10
Pre-ReDevelopment TP Load per acre (lb/acre/yr)	1.42	1.42
Baseline TP Load (lb/yr) (0.41 lbs/acre/yr applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)		1.48



¹ Adjusted Land Cover Summary:
 Pre ReDevelopment land cover minus pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover.

Adjusted total acreage is consistent with Post-ReDevelopment acreage (minus acreage of new impervious cover).

Column I shows load reduction requirement for new impervious cover (based on new development load limit, 0.41 lbs/acre/year).

Post-Development Requirement for Site Area			
TP Load Reduction Required (lb/yr)	0.40		

THIS TP LOAD REDUCTION REQUIREMENT IS FOR THE BOTH ONSITE AND OFFSITE DRAINAGE AREA INCLUDING THE AREA TO EACH BMP DEVICES. HOWEVER, THE PROPOSED DEVELOPMENT DOES NOT REQUIRE THE TP LOAD REDUCTION.

PLAN DATE	03-19-2021 10-29-2021 02-17-2022	DESCRIPTION	REVISIONS
Urbans, Ltd. 7712 Amandale, Virginia 23003 Tel. 703.642.8080 Fax. 703.642.8251 www.urbans-llc.com			
 Planners • Engineers • Landscape Architects • Land Surveyors			
			
BMP COMPUTATION & DETAILS VIENNA ROAD IMPROVEMENTS TAPAWINGO ROAD & KINGSLEY ROAD TOWN OF VIENNA FAIRFAX COUNTY, VIRGINIA		DATE: MARCH 2021 C.I.: N/A SCALE: N/A	SHEET 9 OF 21 FILE No. PP-2156

Drainage Area A

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)				0.60	0.60	0.25
Impervious Cover (acres)				0.54	0.54	0.95
Total				1.14		

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
6. Bioretention (RR)													
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40	0.03 *	0.02*	0	41	61	102	25	0.00	0.06	0.04	0.03	
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80			0	0	0	0	50	0.00	0.00	0.00	0.00	

TOTAL IMPERVIOUS COVER TREATED (ac)

TOTAL MANAGED TURF AREA TREATED (ac)

TOTAL RUNOFF REDUCTION IN D.A. A (ft³)

TOTAL IMPERVIOUS COVER TREATED (ac)

TOTAL MANAGED TURF AREA TREATED (ac)

TOTAL RUNOFF REDUCTION IN D.A. A (ft³)

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)

1.51

2,407

--Select from dropdown lists--

0.02

0.03

41

AREA CHECK: OK.

AREA CHECK: OK.

1.51

0.04

1.48

Drainage Area B

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)				0.53	0.53	0.25
Impervious Cover (acres)				0.58	0.58	0.95
Total				1.11		

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
6. Bioretention (RR)													
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40	0.04 *	0.04 *	0	70	106	176	25	0.00	0.11	0.06	0.05	
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80			0	0	0	0	50	0.00	0.00	0.00	0.00	

TOTAL IMPERVIOUS COVER TREATED (ac)

TOTAL TURF AREA TREATED (ac)

TOTAL RUNOFF REDUCTION IN D.A. B (ft³)

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. B (lb/yr)

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr)

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr)

0.04

0.04

70

1.56

0.06

1.50

Drainage Area C

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)				0.34	0.34	0.25
Impervious Cover (acres)				0.39	0.39	0.95
Total				0.73		

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
6. Bioretention (RR)													
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40	0.03 *	0.03 *	0	56	84	139	25	0.00	0.09	0.05	0.04	
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80			0	0	0	0	50	0.00	0.00	0.00	0.00	

TOTAL IMPERVIOUS COVER TREATED (ac)

TOTAL MANAGED TURF AREA TREATED (ac)

TOTAL RUNOFF REDUCTION IN D.A. C (ft³)

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. C (lb/yr)

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. C (lb/yr)

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. C (lb/yr)

0.03

0.03

56

1.04

0.05

0.99

Drainage Area D

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)				0.23	0.23	0.25
Impervious Cover (acres)				0.20	0.20	0.95
Total				0.43		

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
6. Bioretention (RR)													
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40	0.03*	0.02*	0	41	62	103	25	0.00	0.06	0.04	0.03	
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80			0	0	0	0	50	0.00	0.00	0.00	0.00	

TOTAL IMPERVIOUS COVER TREATED (ac)

TOTAL MANAGED TURF AREA TREATED (ac)

TOTAL RUNOFF REDUCTION IN D.A. D (ft³)

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. D (lb/yr)

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. D (lb/yr)

TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. D (lb/yr)

0.02

0.03

41

0.56

0.04

0.53

Drainage Area Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres)	0.60	0.53	0.34	0.23	0.00	1.70
Impervious Cover (acres)	0.54	0.58	0.39	0.20	0.00	1.71
Total Area (acres)	1.14	1.11	0.73	0.43	0.00	3.41

Drainage Area Compliance Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Reduced (lb/yr)	0.04	0.06	0.05	0.04	0.00	0.18
TN Load Reduced (lb/yr)	0.29	0.51	0.40	0.30	0.00	1.49

TOTAL TP LOAD REDUCTION ACHIEVED

PLAN DATE
03-19-2021
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COMMONWEALTH OF VIRGINIA

C. RYAN CONNOR
Lic. No. 039531
02/17/2022
PROFESSIONAL ENGINEER

BMP COMPUTATIONS & DETAILS

VIENNA ROAD IMPROVEMENTS
TAPAWINGO ROAD & KINGSLEY ROAD
TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA

DATE: MARCH 2021
C.I. = 2'

SCALE: N/A

SHEET
10
OF
21

FILE No.
PP-2156

REVISIONS
No. DATE DESCRIPTION

BMP COMPUTATIONS

MICRO-BIORETENTION CALCULATIONS

VA DEQ Design Spec #9, Version 2.0

Spec Date March 1, 2013

Facility Name: A
Type of Facility: Level 1

A. SIZING CALCULATIONS

Variable	Value	Units	Description/Notes
Rd =	1.0	in	Per VA DEQ Specs, use 1.0 for water quality storm as a standard
RV _{MT} =	0.25	n/a	Managed Turf Land Cover Coefficient from VRRM Spreadsheet (typically 0.25)
RV _{IC} =	0.95	n/a	Impervious Surface Land Cover Coefficient from VRRM Spreadsheet (typically 0.95)
CA _{MT} =	0.60	ac	Managed Turf Drainage Area to facility from VRRM Spreadsheet*
CA _{IC} =	0.54	ac	Impervious Surface Drainage Area to facility from VRRM Spreadsheet*
CA =	1.14	ac	Total Drainage Area to facility
RV _{CA} =	0.58	n/a	Composite Land Cover Coefficient to facility
TV _{CA} =	2407	cf	Treatment Volume from drainage area to facility
V _{US} =	0	cf	Volume of runoff from upstream facility, if any, (see VRRM Spreadsheet Column E)
TV _{BMP} =	2407	cf	Total Treatment Volume to facility (Tv to be used in sizing calcs)

*If DA's to multiple facilities are combined on VRRM Spreadsheet, only include the area draining to this specific facility.

Porosity (per VA DEQ Design Spec #9 6.1.1):

Soil Media η =	0.25
Gravel η =	0.40
Surface Storage η =	1.00
Mulch η =	0.25

Bioretention Facility Layer Depths:

Soil Media =	18	inches
Gravel =	3	inches
Surface Storage =	3	inches
Mulch Storage =	2	inches

Design Storage Depth = 0.77 ft

Surface Area (SA) Required:

Type of Facility:	Level 1
V _{US} =	0 cf
Level 1: SA = (TV _{BMP} - volume reduced by upstream BMP) / Design Storage Depth	
Level 2: SA = ((1.25 x TV _{BMP}) - volume reduced by upstream BMP) / Design Storage Depth	
SA = (1 x 2407 - 0) / 0.77	
SA =	3139 sf

Area Provided (SA) = 131 SF
% of Area treated = 4.17%

B. DESIGN DATA

Variable	Value	Units	Notes
Facility Name:	A		
Type of Facility:	Level 1		
Surface Area =	131	sf	
Mulch Bed Elev =	363.65	ft	
Ponding Depth =	0.25	ft	6" max preferred
Max. Ponding Elev =	363.90	ft	
Top of Berm Elev =	364.46	ft	
Berm Width =	2.00	ft	
Inlet Elev =	363.90	ft	
Q10 =	3.57	cfs	
10-year Depth =	0.45	ft	from inlet comps
10-year WSEL =	364.35	ft	
10-year Freeboard =	0.11	ft	
Q100 =	4.77	cfs	
100-year Depth =	0.54	ft	from inlet / weir comps
100-year WSEL =	364.44	ft	

MICRO-BIORETENTION CALCULATIONS

VA DEQ Design Spec #9, Version 2.0

Spec Date March 1, 2013

Facility Name: B
Type of Facility: Level 1

A. SIZING CALCULATIONS

Variable	Value	Units	Description/Notes
Rd =	1.0	in	Per VA DEQ Specs, use 1.0 for water quality storm as a standard
RV _{MT} =	0.25	n/a	Managed Turf Land Cover Coefficient from VRRM Spreadsheet (typically 0.25)
RV _{IC} =	0.95	n/a	Impervious Surface Land Cover Coefficient from VRRM Spreadsheet (typically 0.95)
CA _{MT} =	0.53	ac	Managed Turf Drainage Area to facility from VRRM Spreadsheet*
CA _{IC} =	0.58	ac	Impervious Surface Drainage Area to facility from VRRM Spreadsheet*
CA =	1.11	ac	Total Drainage Area to facility
RV _{CA} =	0.62	n/a	Composite Land Cover Coefficient to facility
TV _{CA} =	2481	cf	Treatment Volume from drainage area to facility
V _{US} =	0	cf	Volume of runoff from upstream facility, if any, (see VRRM Spreadsheet Column E)
TV _{BMP} =	2481	cf	Total Treatment Volume to facility (Tv to be used in sizing calcs)

*If DA's to multiple facilities are combined on VRRM Spreadsheet, only include the area draining to this specific facility.

Porosity (per VA DEQ Design Spec #9 6.1.1):

Soil Media η =	0.25
Gravel η =	0.40
Surface Storage η =	1.00
Mulch η =	0.25

Bioretention Facility Layer Depths:

Soil Media =	18	inches
Gravel =	12	inches
Surface Storage =	3	inches
Mulch Storage =	3	inches

Design Storage Depth = 1.09 ft

Surface Area (SA) Required:

Type of Facility:	Level 1
V _{US} =	0 cf
Level 1: SA = (TV _{BMP} - volume reduced by upstream BMP) / Design Storage Depth	
Level 2: SA = ((1.25 x TV _{BMP}) - volume reduced by upstream BMP) / Design Storage Depth	
SA = (1 x 2481 - 0) / 1.09	
SA =	2281 sf

Area Provided (SA) = 163 SF
% of Area treated = 7.14%

B. DESIGN DATA

Variable	Value	Units	Notes
Facility Name:	B		
Type of Facility:	Level 1		
Surface Area =	163	sf	
Mulch Bed Elev =	363.41	ft	
Ponding Depth =	0.25	ft	6" max preferred
Max. Ponding Elev =	363.66	ft	
Top of Berm Elev =	364.22	ft	
Berm Width =	2.00	ft	
Inlet Elev =	363.66	ft	
Q10 =	3.69	cfs	
10-year Depth =	0.46	ft	from inlet comps
10-year WSEL =	364.12	ft	
10-year Freeboard =	0.10	ft	
Q100 =	4.93	cfs	
100-year Depth =	0.55	ft	from inlet / weir comps
100-year WSEL =	364.21	ft	

MICRO-BIORETENTION CALCULATIONS

VA DEQ Design Spec #9, Version 2.0

Spec Date March 1, 2013

Facility Name: C
Type of Facility: Level 1

A. SIZING CALCULATIONS

Variable	Value	Units	Description/Notes
Rd =	1.0	in	Per VA DEQ Specs, use 1.0 for water quality storm as a standard
RV _{MT} =	0.25	n/a	Managed Turf Land Cover Coefficient from VRRM Spreadsheet (typically 0.25)
RV _{IC} =	0.95	n/a	Impervious Surface Land Cover Coefficient from VRRM Spreadsheet (typically 0.95)
CA _{MT} =	0.34	ac	Managed Turf Drainage Area to facility from VRRM Spreadsheet*
CA _{IC} =	0.39	ac	Impervious Surface Drainage Area to facility from VRRM Spreadsheet*
CA =	0.73	ac	Total Drainage Area to facility
RV _{CA} =	0.62	n/a	Composite Land Cover Coefficient to facility
TV _{CA} =	1653	cf	Treatment Volume from drainage area to facility
V _{US} =	0	cf	Volume of runoff from upstream facility, if any, (see VRRM Spreadsheet Column E)
TV _{BMP} =	1653	cf	Total Treatment Volume to facility (Tv to be used in sizing calcs)

*If DA's to multiple facilities are combined on VRRM Spreadsheet, only include the area draining to this specific facility.

Porosity (per VA DEQ Design Spec #9 6.1.1):

Soil Media η =	0.25
Gravel η =	0.40
Surface Storage η =	1.00
Mulch η =	0.25

Bioretention Facility Layer Depths:

Soil Media =	18	inches
Gravel =	9	inches
Surface Storage =	3	inches
Mulch Storage =	3	inches

Design Storage Depth = 0.99 ft

Surface Area (SA) Required:

Type of Facility:	Level 1
V _{US} =	0 cf
Level 1: SA = (TV _{BMP} - volume reduced by upstream BMP) / Design Storage Depth	
Level 2: SA = ((1.25 x TV _{BMP}) - volume reduced by upstream BMP) / Design Storage Depth	
SA = (1 x 1653 - 0) / 0.99	
SA =	1666 sf

Area Provided (SA) = 139 SF
% of Area treated = 8.34%

B. DESIGN DATA

Variable	Value	Units	Notes
Facility Name:	C1		
Type of Facility:	Level 1		
Surface Area =	44	sf	
Mulch Bed Elev =	345.30	ft	
Ponding Depth =	0.25	ft	6" max preferred
Max. Ponding Elev =	345.55	ft	
Top of Berm Elev =	345.82	ft	
Berm Width =	1.50	ft	
Weir Elev =	345.55	ft	
Q10 =	2.49	cfs	
10-year Depth =	0.21	ft	from weir comps
10-year WSEL =	345.76	ft	
10-year Freeboard =	0.06	ft	
Q100 =	3.33	cfs	
100-year Depth =	0.23	ft	from weir comps
100-year WSEL =	345.78	ft	

Variable	Value	Units	Notes
Facility Name:	C2		
Type of Facility:	0.25		
Surface Area =	95	sf	
Mulch Bed Elev =	344.57	ft	
Ponding Depth =	0.25	ft	6" max preferred
Max. Ponding Elev =	344.82	ft	
Top of Berm Elev =	345.32	ft	
Berm Width =	2.00	ft	
Inlet Elev =	344.82	ft	
Q10 =	3.10	cfs	
10-year Depth =	0.41	ft	from inlet comps
10-year WSEL =	345.23	ft	
10-year Freeboard =	0.09	ft	
Q100 =	4.16	cfs	
100-year Depth =	0.49	ft	from inlet / weir comps
100-year WSEL =	345.31	ft	

MICRO-BIORETENTION CALCULATIONS

VA DEQ Design Spec #9, Version 2.0

Spec Date March 1, 2013

Facility Name: D
Type of Facility: Level 1

A. SIZING CALCULATIONS

Variable	Value	Units	Description/Notes
Rd =	1.0	in	Per VA DEQ Specs, use 1.0 for water quality storm as a standard
RV _{MT} =	0.25	n/a	Managed Turf Land Cover Coefficient from VRRM Spreadsheet (typically 0.25)
RV _{IC} =	0.95	n/a	Impervious Surface Land Cover Coefficient from VRRM Spreadsheet (typically 0.95)
CA _{MT} =	0.23	ac	Managed Turf Drainage Area to facility from VRRM Spreadsheet*
CA _{IC} =	0.20	ac	Impervious Surface Drainage Area to facility from VRRM Spreadsheet*
CA =	0.43	ac	Total Drainage Area to facility
RV _{CA} =	0.58	n/a	Composite Land Cover Coefficient to facility
TV _{CA} =	898	cf	Treatment Volume from drainage area to facility
V _{US} =	0	cf	Volume of runoff from upstream facility, if any, (see VRRM Spreadsheet Column E)
TV _{BMP} =	898	cf	Total Treatment Volume to facility (Tv to be used in sizing calcs)

*If DA's to multiple facilities are combined on VRRM Spreadsheet, only include the area draining to this specific facility.

Porosity (per VA DEQ Design Spec #9 6.1.1):

Soil Media η =	0.25
Gravel η =	0.40
Surface Storage η =	1.00
Mulch η =	0.25

Bioretention Facility Layer Depths:

Soil Media =	18	inches
Gravel =	3	inches
Surface Storage =	3	inches
Mulch Storage =	3	inches

Design Storage Depth = 0.79 ft

Surface Area (SA) Required:

Type of Facility:	Level 1
V _{US} =	0 cf
Level 1: SA = (TV _{BMP} - volume reduced by upstream BMP) / Design Storage Depth	
Level 2: SA = ((1.25 x TV _{BMP}) - volume reduced by upstream BMP) / Design Storage Depth	
SA = (1 x 898 - 0) / 0.79	
SA =	1141 sf


Area Provided (SA) = 131 SF
% of Area treated = 11.48%


B. DESIGN DATA

Variable	Value	Units	Notes
Facility Name:	D		
Type of Facility:	Level 1		
Surface Area =	163	sf	
Mulch Bed Elev =	350.10	ft	
Ponding Depth =	0.25	ft	6" max preferred
Max. Ponding Elev =	350.35	ft	
Top of Berm Elev =	350.70	ft	
Berm Width =	2.00	ft	
Inlet Elev =	350.35	ft	
Q10 =	1.66	cfs	
10-year Depth =	0.27	ft	from inlet comps
10-year WSEL =	350.62	ft	
10-year Freeboard =	0.08	ft	
Q100 =	2.23	cfs	
100-year Depth =	0.33	ft	from inlet / weir comps
100-year WSEL =	350.68	ft	

PLAN DATE
03-19-2021
10-29-2021
02-17-2022

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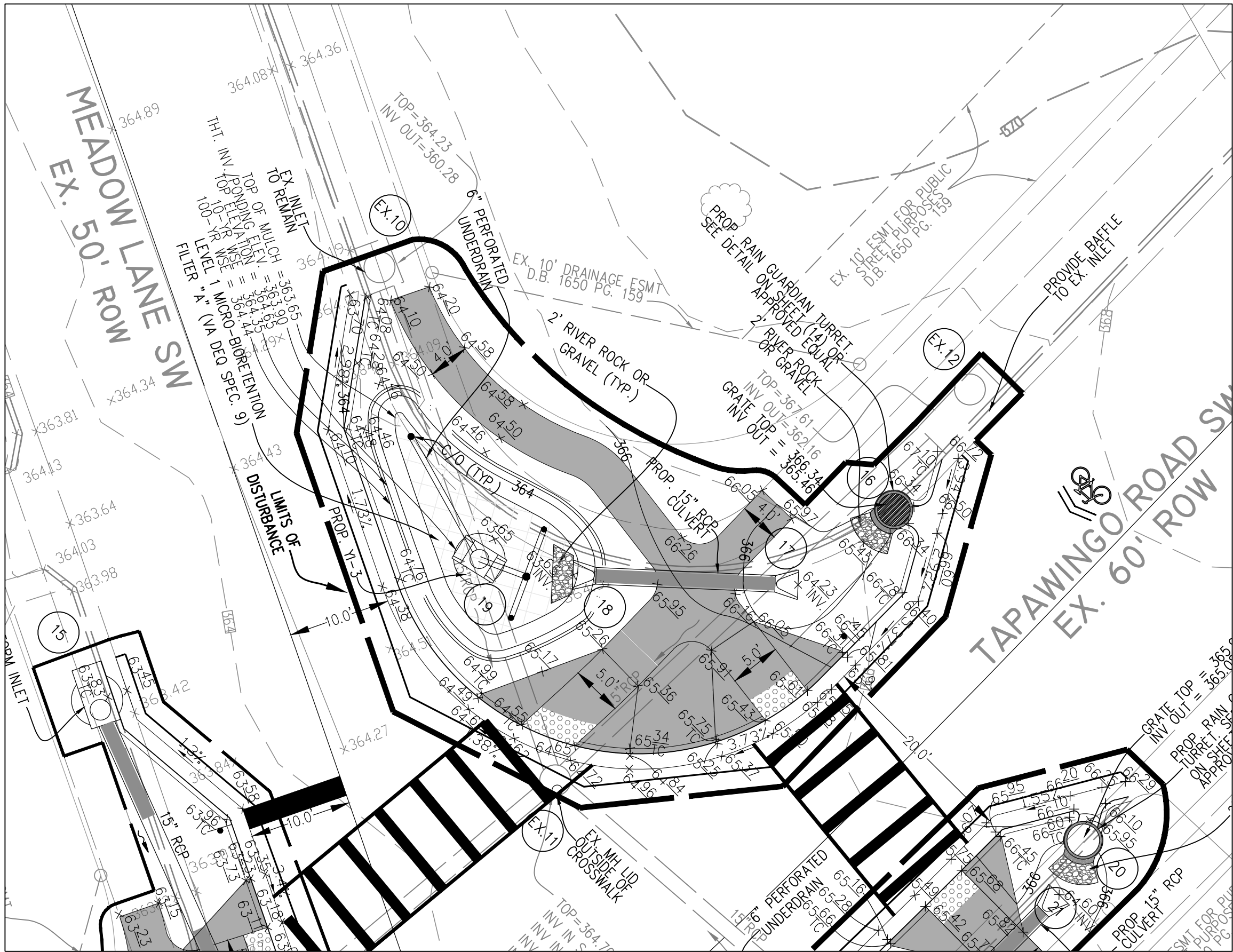

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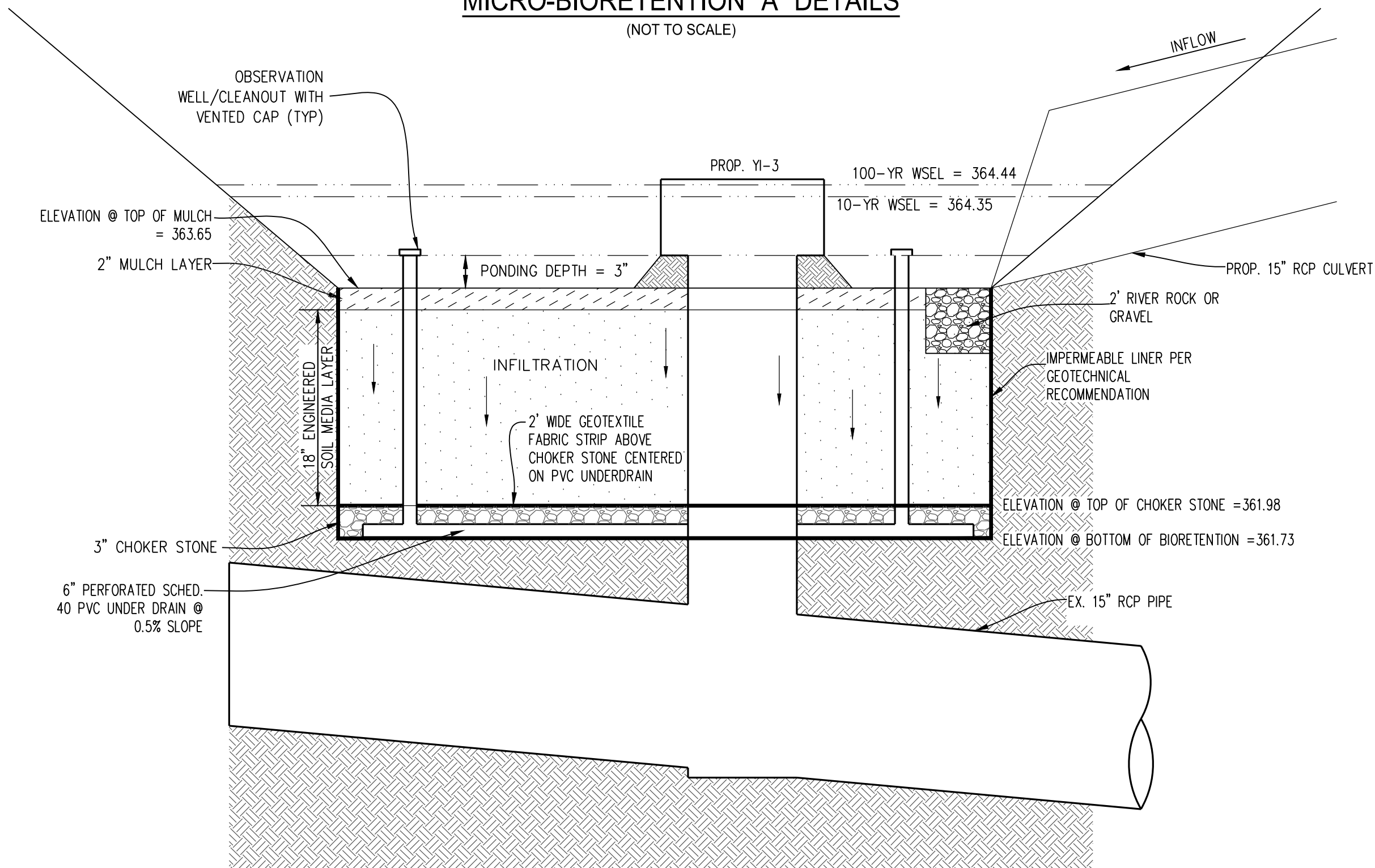
BMP COMPUTATIONS & DETAILS
VIENNA ROAD IMPROVEMENTS
TAPAWINGO ROAD & KINGSLEY ROAD
TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA
SCALE: N/A
C.I. = 2'
DATE: MARCH 2021

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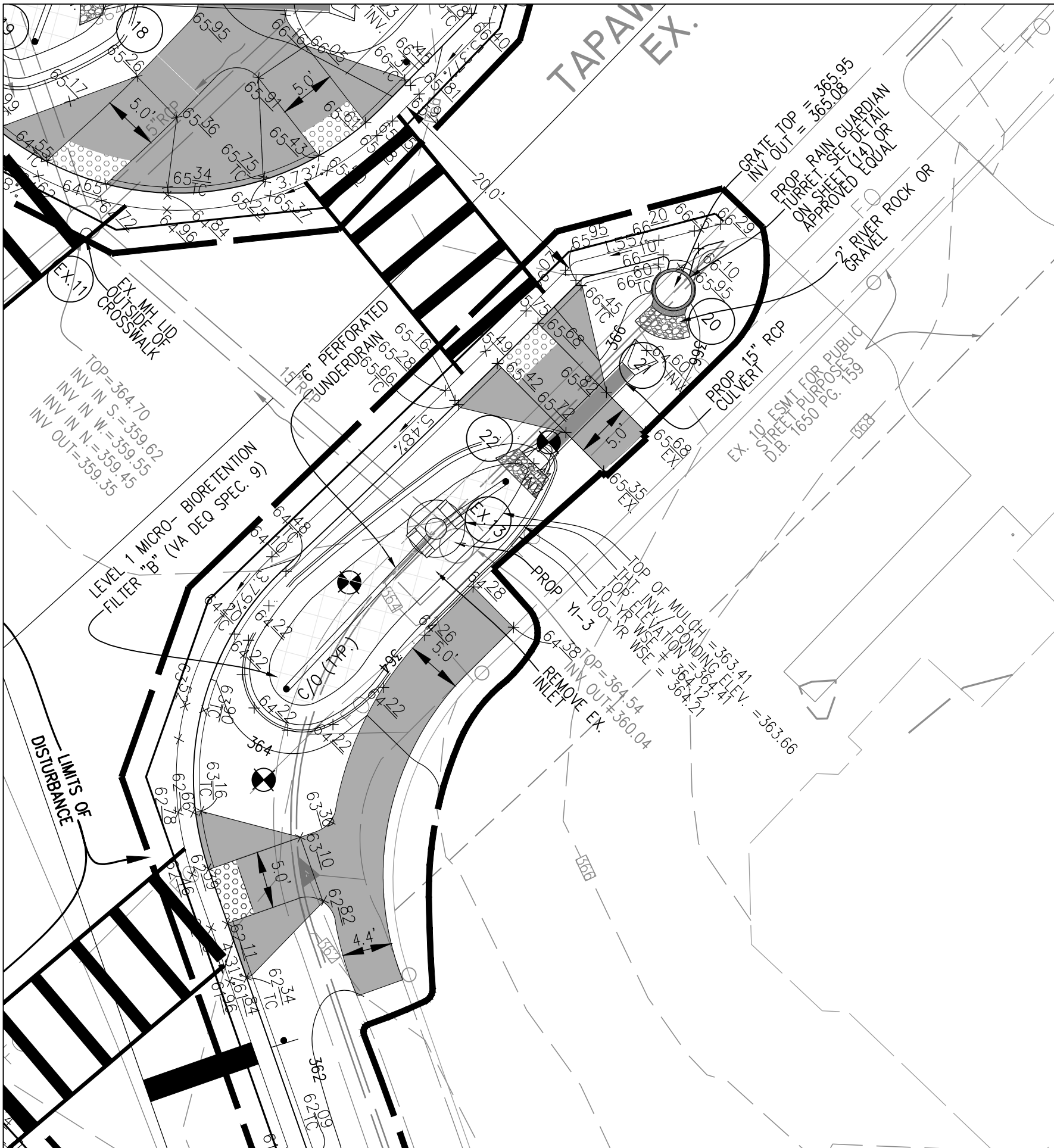
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(SCALE 1"=10')



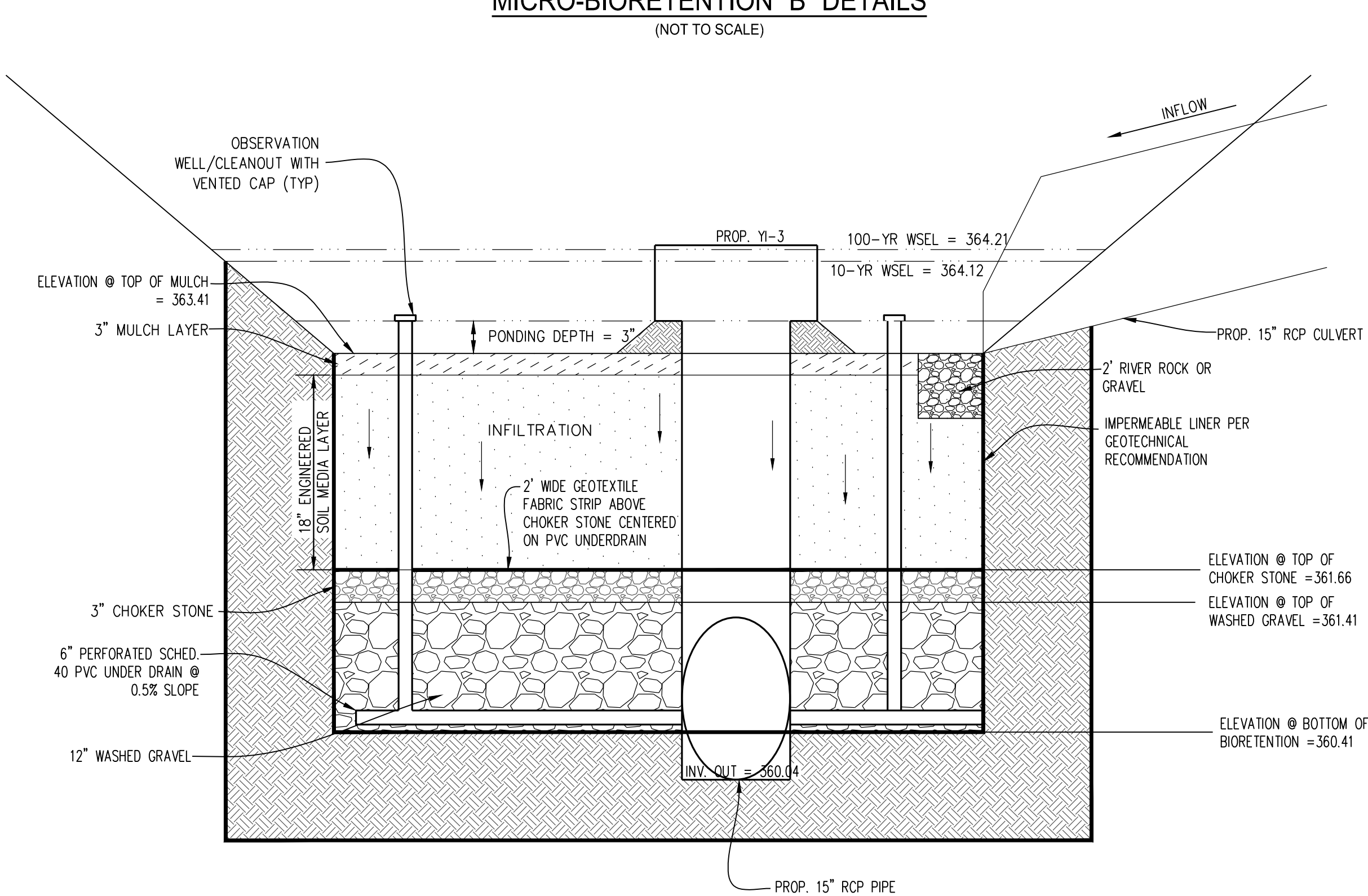
MICRO-BIORETENTION "A" DETAILS
(NOT TO SCALE)



MICRO-BIORETENTION "B" PLAN
(SCALE 1"=10')



MICRO-BIORETENTION "B" DETAILS
(NOT TO SCALE)



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No.		DATE		DESCRIPTION		REVISIONS	
1		03-19-2021		Initial Design			
2		10-29-2021		Final Design			
3		02-17-2022		Construction Documents			

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02/17/2022
PROFESSIONAL ENGINEER

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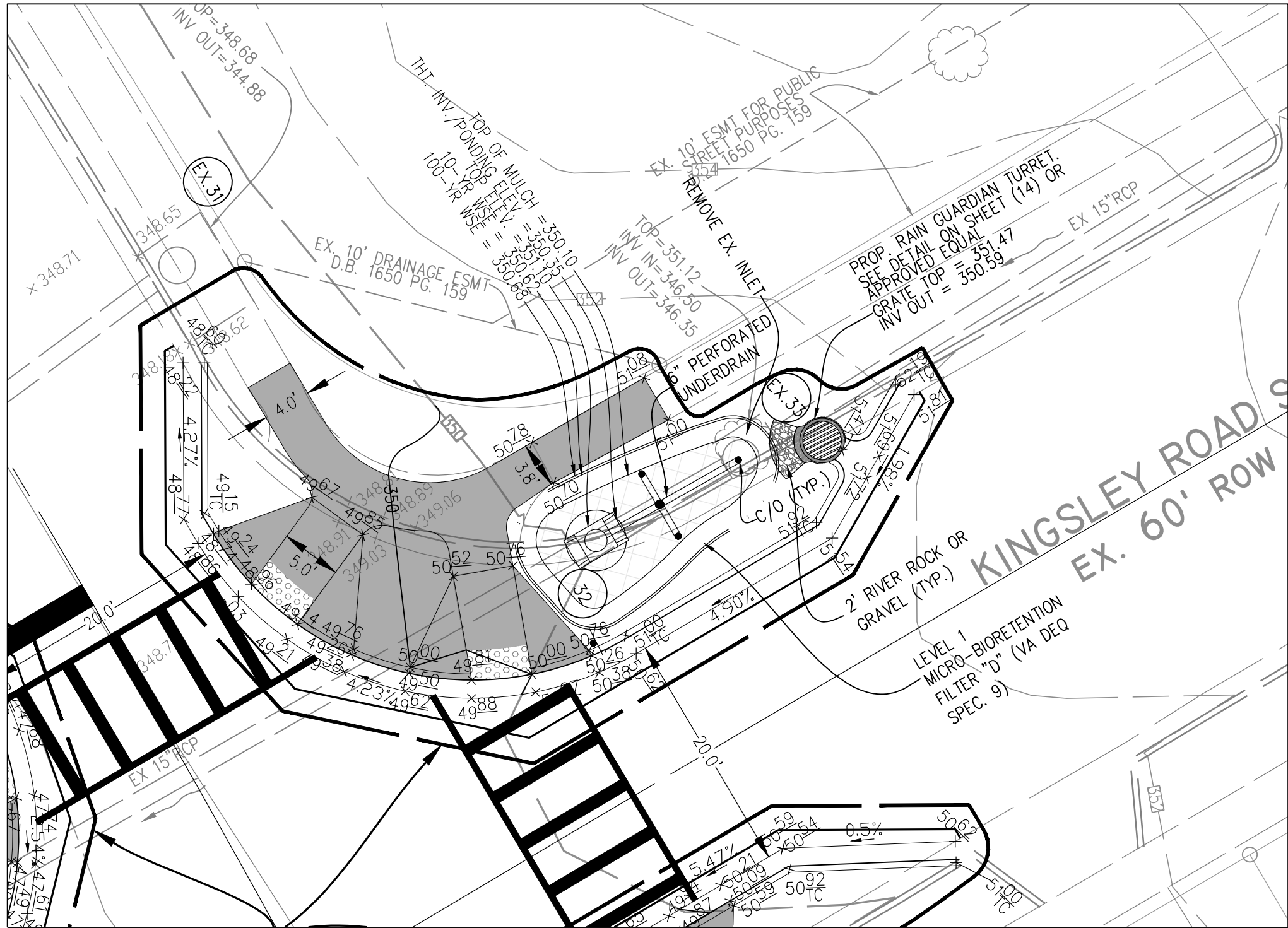
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TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA

SCALE: AS SHOWN C.I. = 2' DATE: MARCH 2021

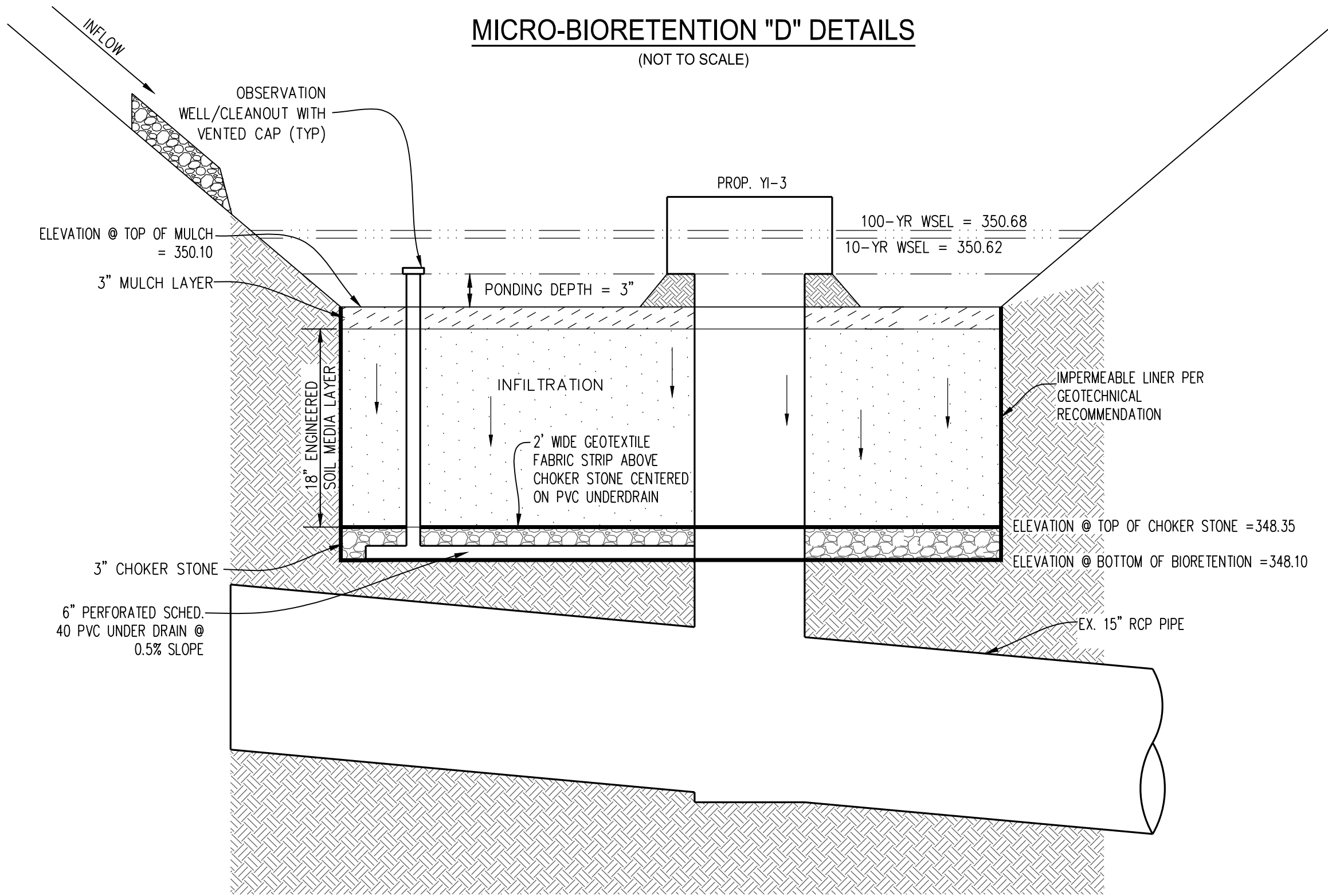
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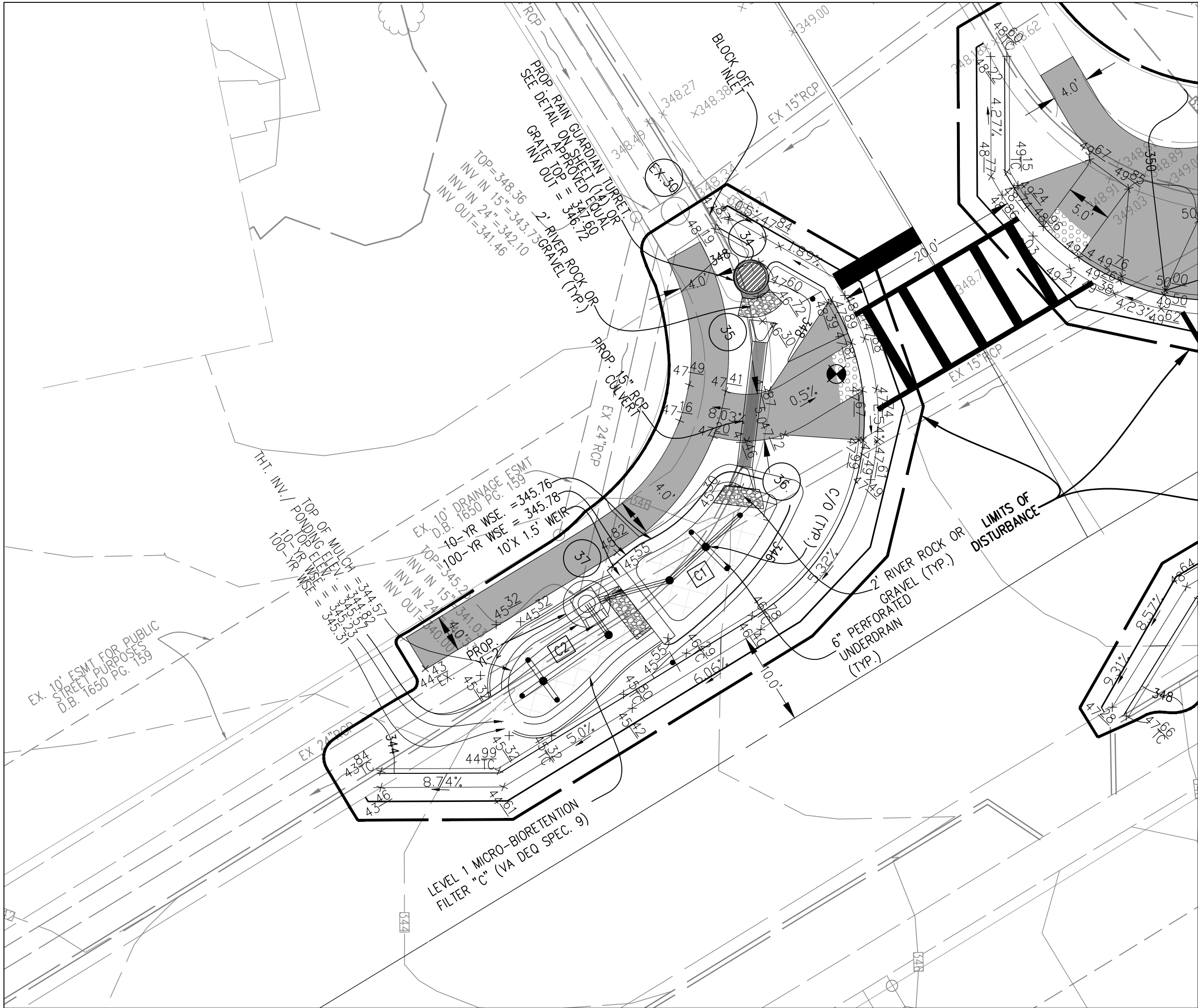
MICRO-BIORETENTION "D" PLAN
(SCALE 1"=10')



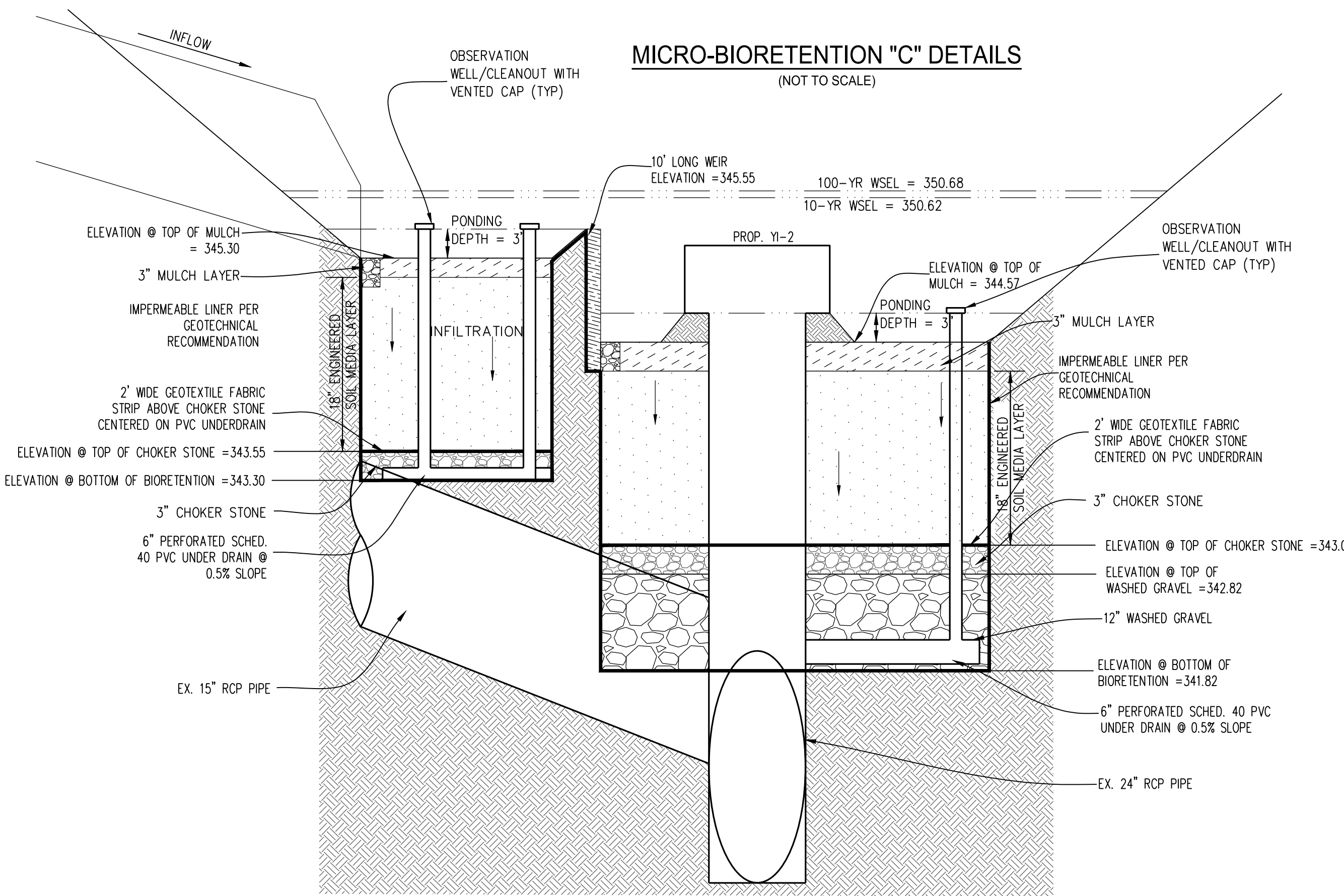
MICRO-BIORETENTION "D" DETAILS
(NOT TO SCALE)



MICRO-BIORETENTION "C" PLAN
(SCALE 1"=10')



MICRO-BIORETENTION "C" DETAILS
(NOT TO SCALE)



PLAN DATE		REVISIONS	
DATE	DESCRIPTION	DATE	DESCRIPTION
03-19-2021			
10-29-2021			
02-17-2022			

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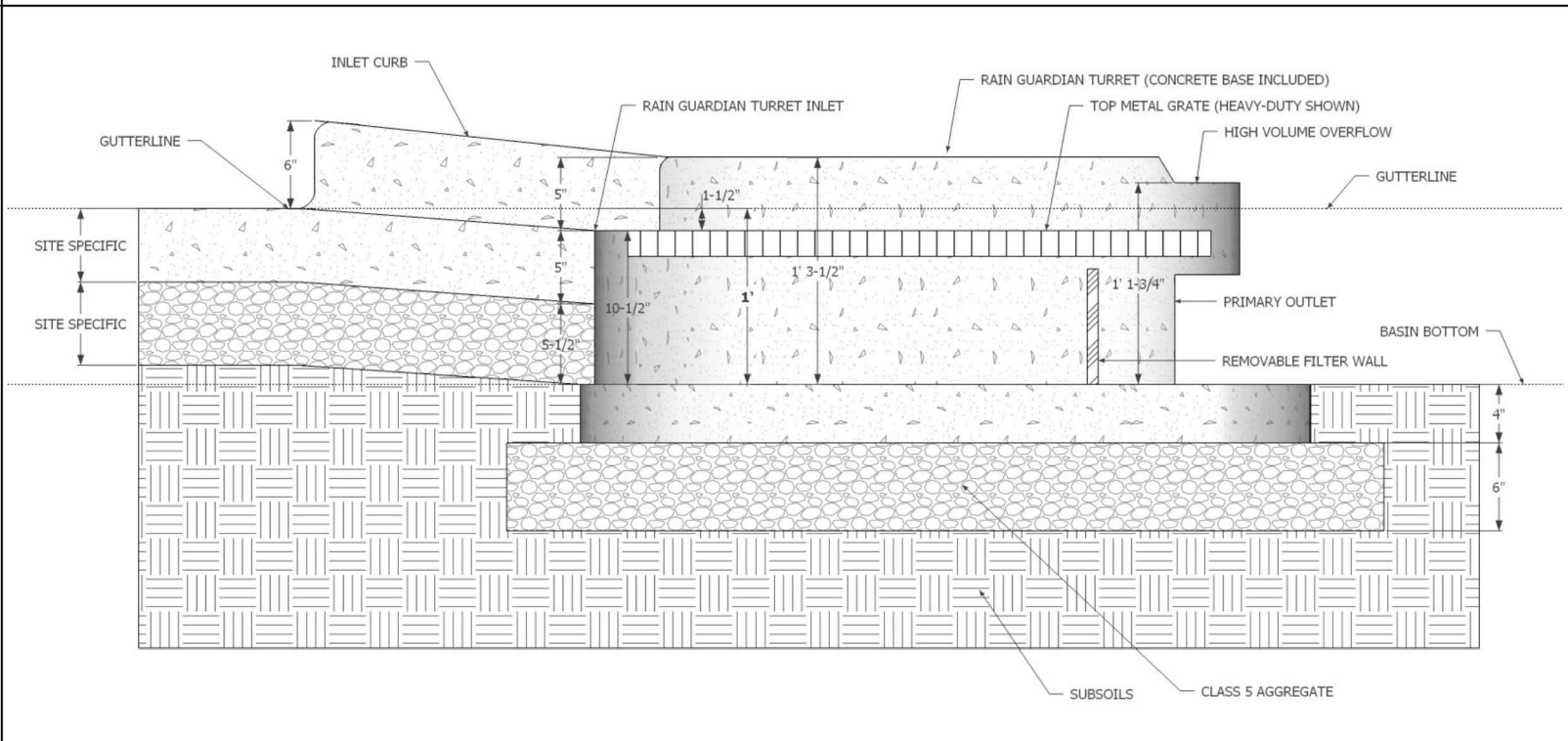
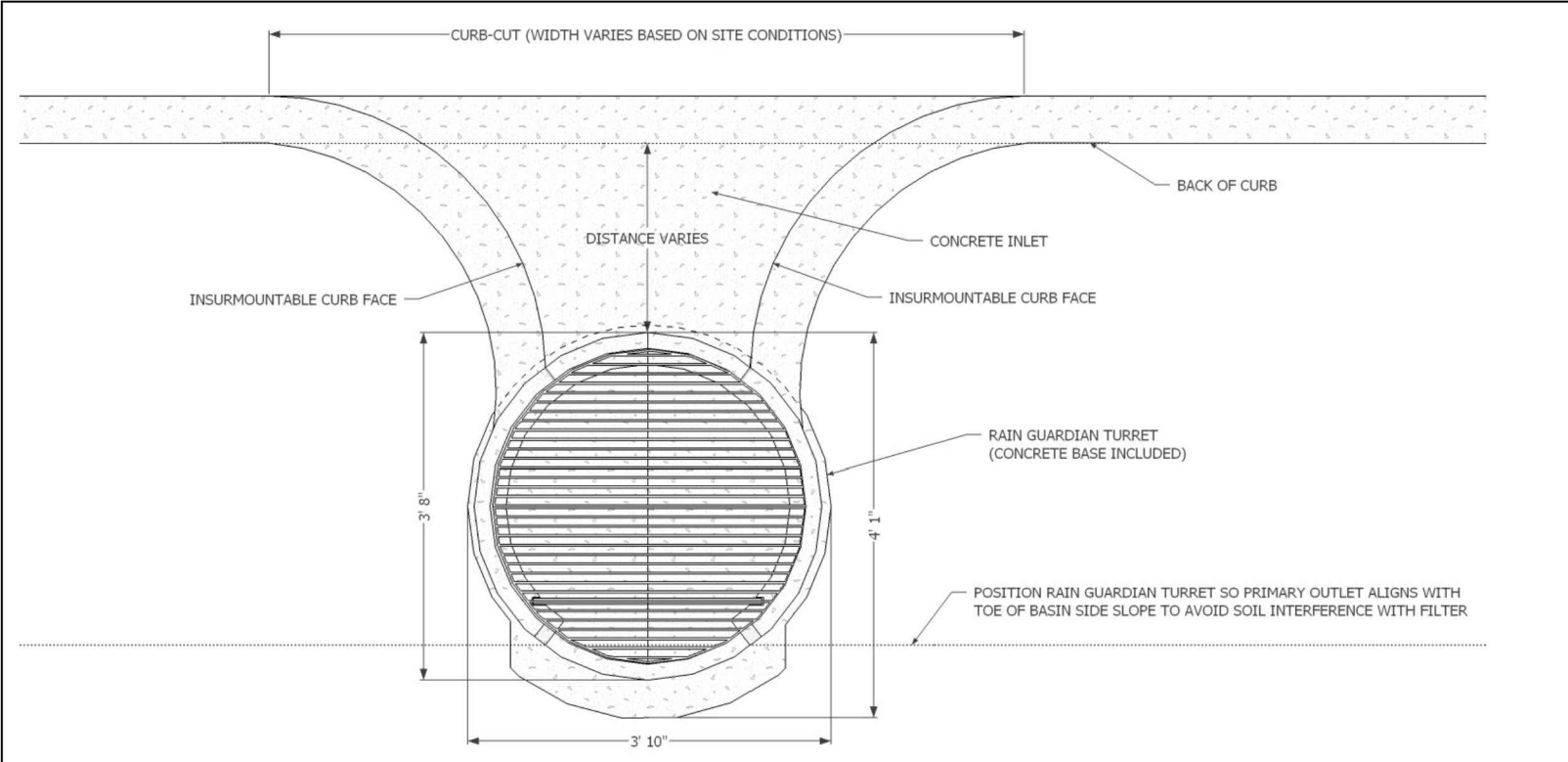
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SCALE: AS SHOWN
C.I. = 2'
DATE: MARCH 2021

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BMP PRETREATMENT DETAILS



**RAIN GUARDIAN TURRET
PRETREATMENT CHAMBER
BIORETENTION PONDING DEPTH: 1'
TYPICAL DETAIL**

PLAN VIEW NOTES

1. INLET WIDTH AND DISTANCE BETWEEN BACK OF CURB AND RAIN GUARDIAN TURRET MAY VARY WITH SITE CONDITIONS.
2. CONCRETE BASE EXTENDS BEYOND THE FILTER WALL OF THE RAIN GUARDIAN TURRET TO SERVE AS A SPLASH DISSIPATOR.

INSTALLED VIEWS



CROSS-SECTION VIEW NOTES

1. THE TOP OF THE CLASS 5 BASE (COMPACTED TO 95% STANDARD PROCTOR) IS PRECISELY 1' 4" BELOW THE GUTTERLINE ELEVATION.

SPECIFICATIONS

1. STEEL REINFORCED, COLD JOINT SECURED MONOLITHIC CONCRETE STRUCTURE (1,030 LBS). CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS. CONCRETE AIR ENTRAINMENT (4% TO 8% BY VOLUME). MANUFACTURED AND DESIGNED TO ASTM C886.
2. THREE-POINT PICK USING RECESSED LIFTING POCKETS WITH A STANDARD HOOK.
3. TWO-PIECE LIGHT-DUTY GALVANIZED GRATE (34.5 LBS/PIECE) FOR 541 LB CONCENTRATED LOAD OR 309 LB/SQ FT UNIFORM LOAD.
4. TWO-PIECE HEAVY-DUTY GALVANIZED GRATE (77.5 LBS/PIECE) FOR 2,456 LB CONCENTRATED LOAD OR 1,404 LB/SQ FT UNIFORM LOAD.

INSTALLATION NOTES

1. INSTALL THE CLASS 5 BASE (COMPACTED TO 95% STANDARD PROCTOR). THE DISTANCE FROM THE BACK OF THE CURB MAY VARY BASED ON SITE CONDITIONS, BUT CONSIDERATIONS SHOULD INCLUDE SLOPE OF THE INLET AND BASIN SIDE SLOPES ADJACENT TO THE RAIN GUARDIAN TURRET. POSITION RAIN GUARDIAN TURRET SO PRIMARY OUTLET ALIGNS WITH TOE OF BASIN SIDE SLOPE TO AVOID SOIL INTERFERENCE WITH REMOVABLE FILTER WALL. EXCAVATE 1' 10" BELOW THE GUTTERLINE ELEVATION (I.E. THE BIORETENTION OVERFLOW ELEVATION) TO ACCOMMODATE THE 1' PONDING DEPTH, 6" CLASS 5 AGGREGATE, AND 4" RAIN GUARDIAN TURRET BASE (INCLUDED). THEREFORE, THE TOP OF THE CLASS 5 COMPACTED BASE IS PRECISELY 1' 4" BELOW THE GUTTERLINE ELEVATION. THE TOP OF THE RAIN GUARDIAN TURRET METAL GRATE WILL BE 10-1/2" ABOVE THE TOP OF THE CONCRETE BASE AND 1-1/2" BELOW THE GUTTERLINE ELEVATION TO ACCOMMODATE A SLOPED INLET FROM THE GUTTER TO THE RAIN GUARDIAN TURRET.

2. THE RAIN GUARDIAN TURRET SHOULD BE SET ON THE PREPARED CLASS 5 BASE.
3. INSTALL FRAMING FOR INLET BETWEEN RAIN GUARDIAN TURRET AND BACK OF CURB. TOP ELEVATIONS OF THE FRAMING SHOULD MATCH THE TOP OF THE CURB ON THE STREET SIDE AND THE TOP OF THE RAIN GUARDIAN TURRET ON THE BIORETENTION SIDE.

4. USE EXPANSION JOINT MATERIAL BETWEEN RAIN GUARDIAN TURRET AND BIORETENTION INLET.
5. SIDE CURBS OF THE POURED INLET MUST HAVE AN INSURMOUNTABLE PROFILE TO PREVENT WATER FLOW FROM OVERTOPPING THE DOWNSTREAM SIDE OF THE INLET.

6. REMOVABLE FILTER WALL SHOULD BE INSTALLED WITH FILTER FABRIC FACING THE RAIN GUARDIAN TURRET INLET.

MANUFACTURED BY:



CONCRETE PRODUCTS

REVISION HISTORY

REV	BY	DATE	DESCRIPTION
A	MDH	12/1/15	TURRET—1'

SCALE	VARIABLE
U.S. PATENT	8,501,016



Anoka Conservation District
1318 McKay Dr. NE, Suite 300
Ham Lake, MN 55304
763-434-2030

BIORETENTION FILTER NOTES:

1. THE CONTRACTOR SHALL COMPLY WITH ALL BMP SPECIFICATIONS OUTLINED IN THE VIRGINIA DEQ STORMWATER DESIGN SPECIFICATION NO. 9, DRAFT VERSION 2.0, PUBLISHED JANUARY 1, 2013.
2. THE CONTRACTOR SHALL FOLLOW THE BMP CONSTRUCTION SEQUENCE SPECIFIED IN VA DEQ SPEC. NO. 9, DRAFT VERSION 2.0, SECTION 8 (PAGES 37–39).
3. A SOIL SCIENTIST CERTIFICATION SHALL BE PROVIDED BY CONTRACTOR WHICH CERTIFIES TO THE CONTENT AND PERFORMANCE OF THE SOIL MEDIA PER VA DEQ SPEC. NO. 9, DRAFT VERSION 2.0, SECTION 6.6 (PAGES 24–29).
4. UPON INSTALLATION, A SOIL SCIENTIST CERTIFICATION SHALL BE PROVIDED BY THE CONTRACTOR WHICH CERTIFIES TO THE COMPACTION AND OTHER INSTALLATION FACTORS THAT AFFECT THE SOIL MEDIA PERFORMANCE AS OUTLINED IN VA DEQ SPEC. NO. 9, DRAFT VERSION 2.0.
5. TO ENSURE PROPER FUNCTIONALITY AND EXTEND THE LONGEVITY OF THE BMP DEVICES, THE BMP DEVICES SHALL BE REGULARLY MAINTAINED PER THE MAINTENANCE SCHEDULES LISTED BELOW. THE OWNER SHALL BE RESPONSIBLE FOR ALL MAINTENANCE ACTIVITIES.
6. THE BIORETENTION MATERIAL SPECIFICATIONS (TABLE 9.7) BELOW SHALL BE USED FOR INFORMATION ONLY FOR THE MATERIALS TO BE UTILIZED IN THE CONSTRUCTION OF THE BIORETENTION FILTER. THE CONTRACTOR SHALL ACTUALLY INSTALL ONLY THE MATERIALS CALLED OUT ON THIS PLAN (WHERE PROVIDED) OR OTHERWISE AS INDICATED IN THE VA DEQ SPEC. NO. 9. THE CONTRACTOR SHALL ALSO PROCURE ALL BMP MATERIALS FROM A CERTIFIED MANUFACTURER. SEE PLANTING PLAN FOR PLANTING MATERIALS.

BIORETENTION MATERIAL SPECIFICATIONS

VA DEQ SPEC. 9, DRAFT VERSION 2.0, JANUARY 1, 2013

Table 9.7. Bioretention Material Specifications

Material	Specification	Notes
Filter Media Composition	Filter Media to contain: <ul style="list-style-type: none">• 80% - 90% sand• 10%-20% soil fines• 0%-5% organic matter Available P between L+ and M per DCR 2005 Nutrient Management Criteria.	The volume of filter media based on 110% of the plan volume, to account for settling or compaction.
Filter Media Testing		The media should be certified by the supplier.
Mulch Layer	Use aged, shredded hardwood bark mulch or stable coarse compost.	Lay a 2 to 3 inch layer on the surface of the filter bed.
Alternative Surface Cover	Use river stone or pea gravel, coir and jute matting, or turf cover.	Lay a 2 to 3 inch layer of to suppress weed growth.
Top Soil For Turf Cover	Loamy sand or sandy loam texture, with less than 5% clay content, pH corrected to between 6 and 7, and an organic matter content of at least 2%.	3 inch surface depth.
Geotextile/Liner	Use a non-woven geotextile fabric with a flow rate of ≥ 110 gal./min./sq. ft. (e.g., Geotex 351 or equivalent).	Apply only to the sides and directly above the underdrain. For hotspots and certain karst sites only, use an appropriate liner on bottom.
Choking Layer	Lay a 2 to 4 inch layer of sand over a 2 inch layer of choker stone (typically #8 or #89 washed gravel), which is laid over the underdrain stone.	
Stone Jacket for Underdrain and/or Storage Layer	1 inch stone should be double-washed and clean and free of all fines (e.g., VDOT #57 stone).	12 inches for the underdrain; 12 to 18 inches for the stone storage layer, if needed.
Underdrains, Cleanouts, and Observation Wells	Use 6 inch rigid schedule 40 PVC pipe (or equivalent corrugated HDPE for micro-bioretention), with 3/8-inch perforations at 6 inches on center; position each underdrain on a 1% or 2% slope located nor more than 20 feet from the next pipe.	Lay the perforated pipe under the length of the bioretention cell, and install non-perforated pipe as needed to connect with the storm drain system. Install T's and Y's as needed, depending on the underdrain configuration. Extend cleanout pipes to the surface with vented caps at the Ts and Ys.
Plant Materials	Plant one tree per 250 square feet (15 feet on-center, minimum 1 inch caliper). Shrubs a minimum of 30 inches high planted a minimum of 10 feet on-center. Plant ground cover plugs at 12 to 18 inches on-center. Plant container-grown plants at 18 to 24 inches on-center, depending on the initial plant size and how large it will grow.	Establish plant materials as specified in the landscaping plan and the recommended plant list. In general, plant spacing must be sufficient to ensure the plant material achieves 80% cover in the proposed planting areas within a 5-year period. If seed mixes are used, they should be from a qualified supplier, should be appropriate for stormwater basin applications, and should consist of native species (unless the seeding is to establish maintained turf).

MAINTENANCE ACTIVITIES AND SCHEDULE

BIORETENTION FILTER (VA DEQ SPEC. 9, DRAFT VERSION 2.0, JANUARY 1, 2013)

Table 9.8. Suggested Annual Maintenance Activities for Bioretention

Maintenance Tasks	Frequency
• Mowing of grass filter strips and bioretention turf cover.	At least 4 times a year.
• Spot weeding, erosion repair, trash removal, and mulch raking.	Twice during growing season.
• Add reinforcement planting to maintain desired the vegetation density.	As needed.
• Remove invasive plants using recommended control methods.	
• Stabilize the contributing drainage area to prevent erosion.	
• Spring inspection and cleanup.	Annually.
• Supplement mulch to maintain a 3 inch layer.	
• Prune trees and shrubs.	
• Remove sediment in pre-treatment cells and inflow points.	Once every 2 to 3 years.
• Replace the mulch layer.	Every 3 years.

BMP NARRATIVE

FOR THE WATER QUALITY COMPUTATIONS VRRM REDEVELOPMENT COMPLIANCE SPREADSHEET VERSION 3.0 IS UTILIZED. ONSITE TOTAL TP LOAD REDUCTION REQUIREMENT IS CALCULATED UTILIZING THE ONSITE DRAINAGE AREA. THE TOTAL TP LOAD REDUCTION ACHIEVED IS COMPUTED UTILIZING THE ONSITE AND OFFSITE DRAINAGE AREA TO EACH PROPOSED BMP DEVICES (MICRO-BIORETENTION) AS SHOWN ON SHEET 9 & 10.

DUE TO THE NATURE OF THIS PROJECT, THERE IS NO REDEVELOPMENT REQUIREMENT FOR POLLUTANT REMOVAL. THE TOTAL IMPERVIOUS AREA ON THE SITE AFTER REDEVELOPMENT WILL BE LESS THAN THE IMPERVIOUS AREA ON THE SITE BEFORE REDEVELOPMENT. THEREFORE, A SMALL WATER QUALITY EXCESS OF 0.06 LB/YR IS ACHIEVED BEFORE ACCOUNTING FOR THE WATER QUALITY PROVIDED BY THE PROPOSED BMP DEVICES (SEE SHEET 9). THIS IS INDICATED BY THE POLLUTANT REMOVAL REQUIREMENT SHOWN ON THIS SHEET BEING NEGATIVE.

A TOTAL OF 0.18 LB/YR OF PHOSPHORUS IS REMOVAL IS ACHIEVED BY THE INSTALLATION OF BMP DEVICES (AS SHOWN IN SHEET 10). TAKING INTO ACCOUNT THE NEGATIVE REQUIREMENT FOR THE SITE, THIS SITE PROVIDES A TOTAL WATER QUALITY EXCESS OF 0.24 LB/YR.

PLAN DATE
03-09-2021
10-29-2021
02-17-2022

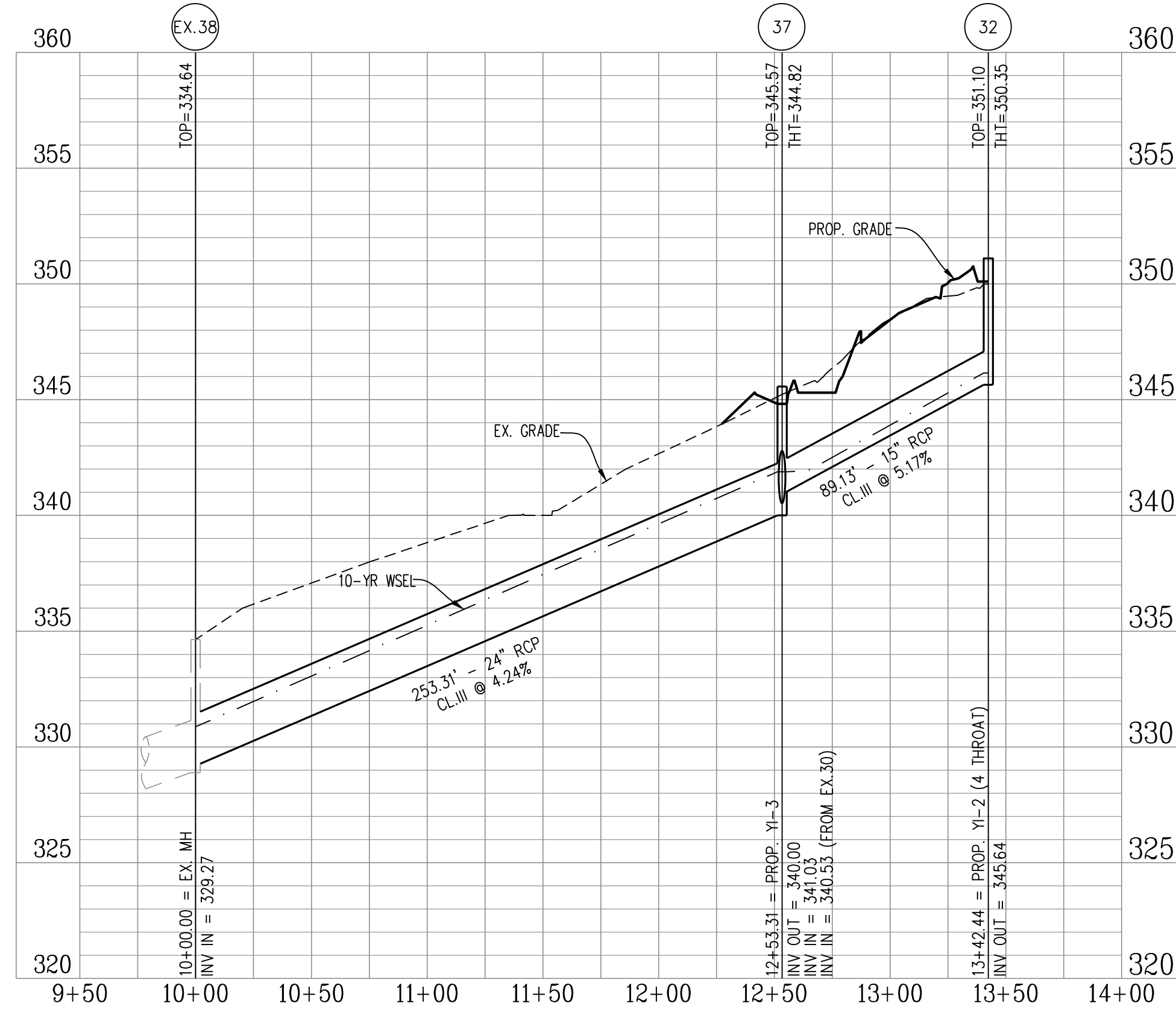
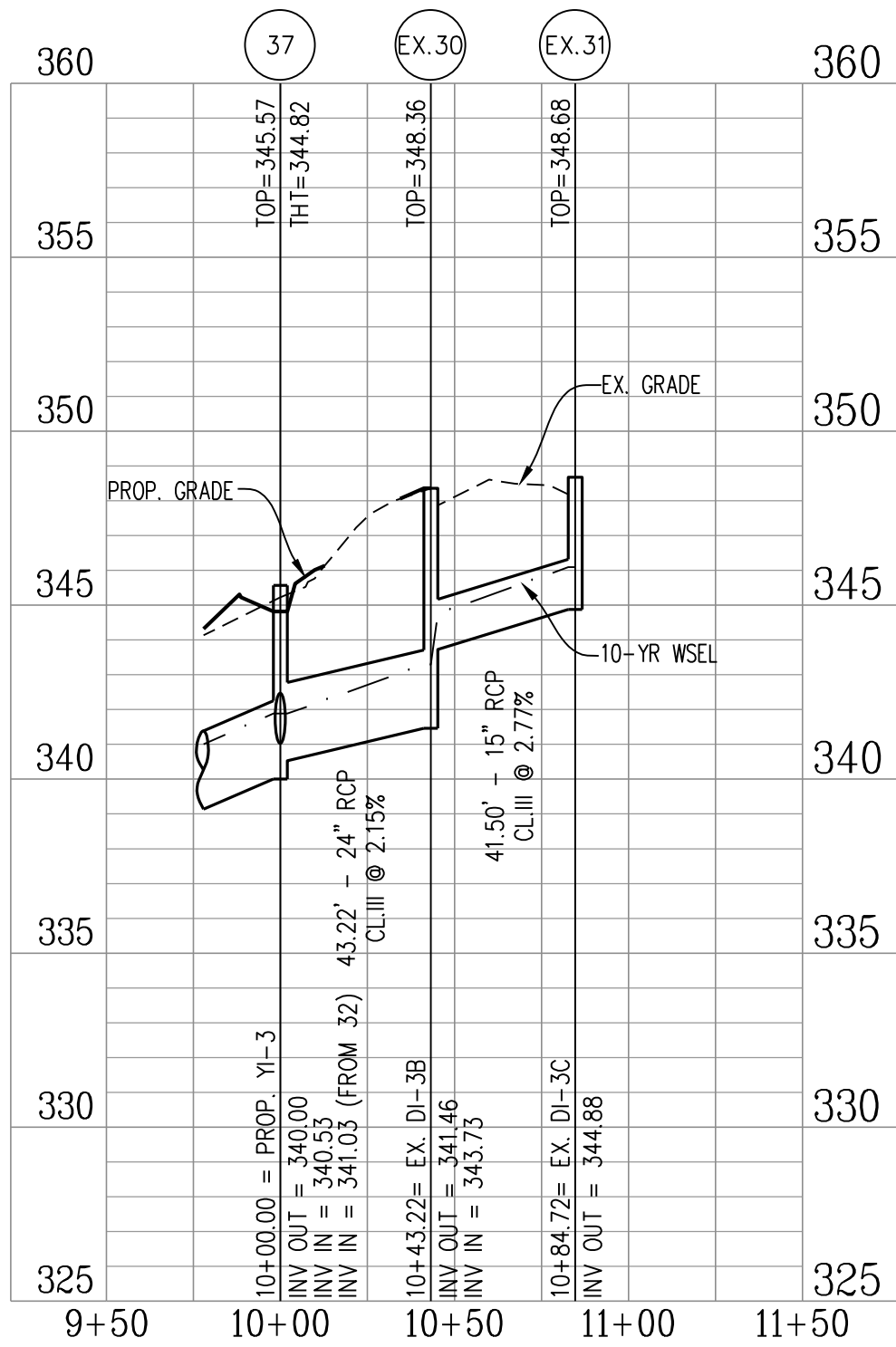
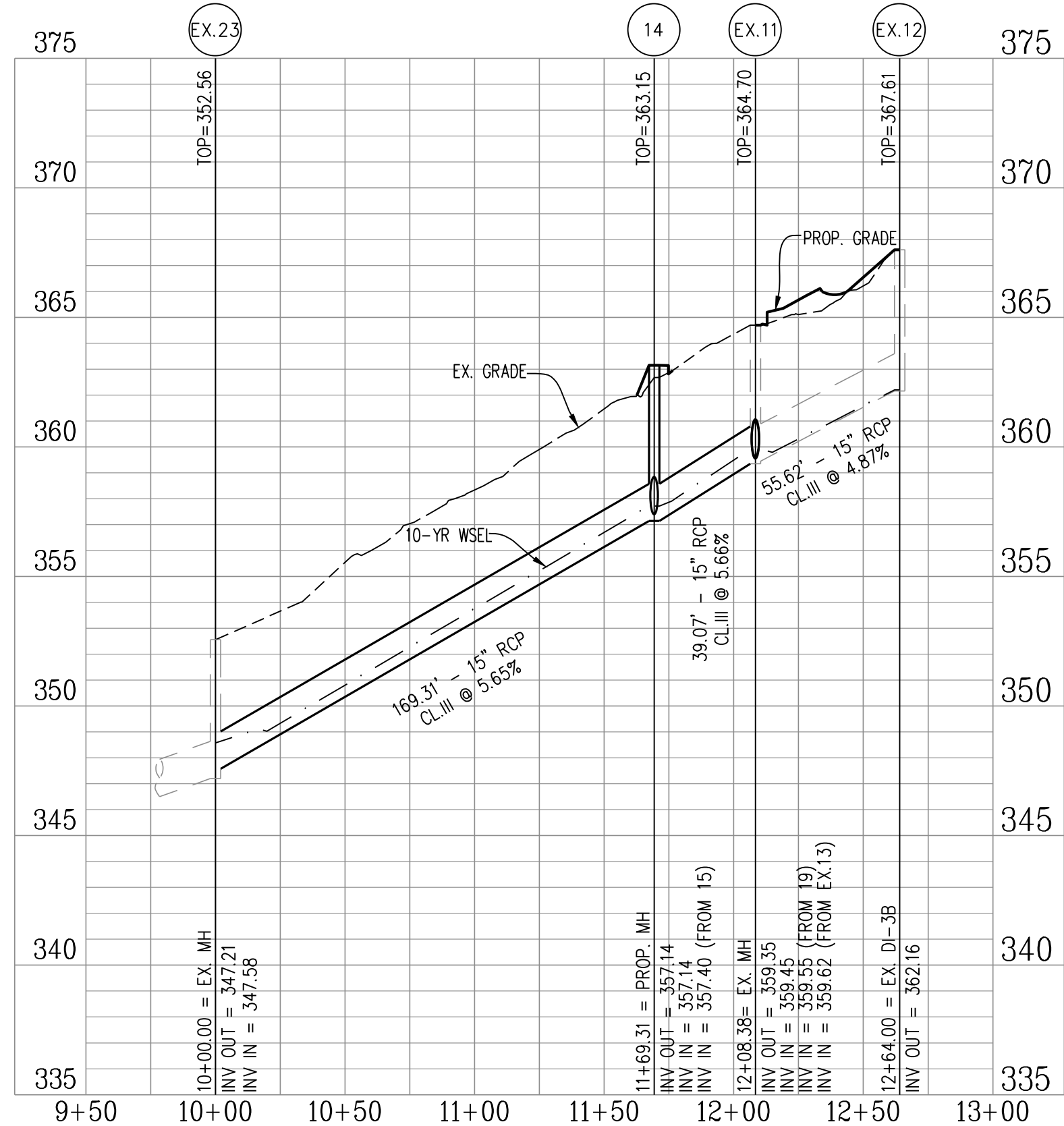
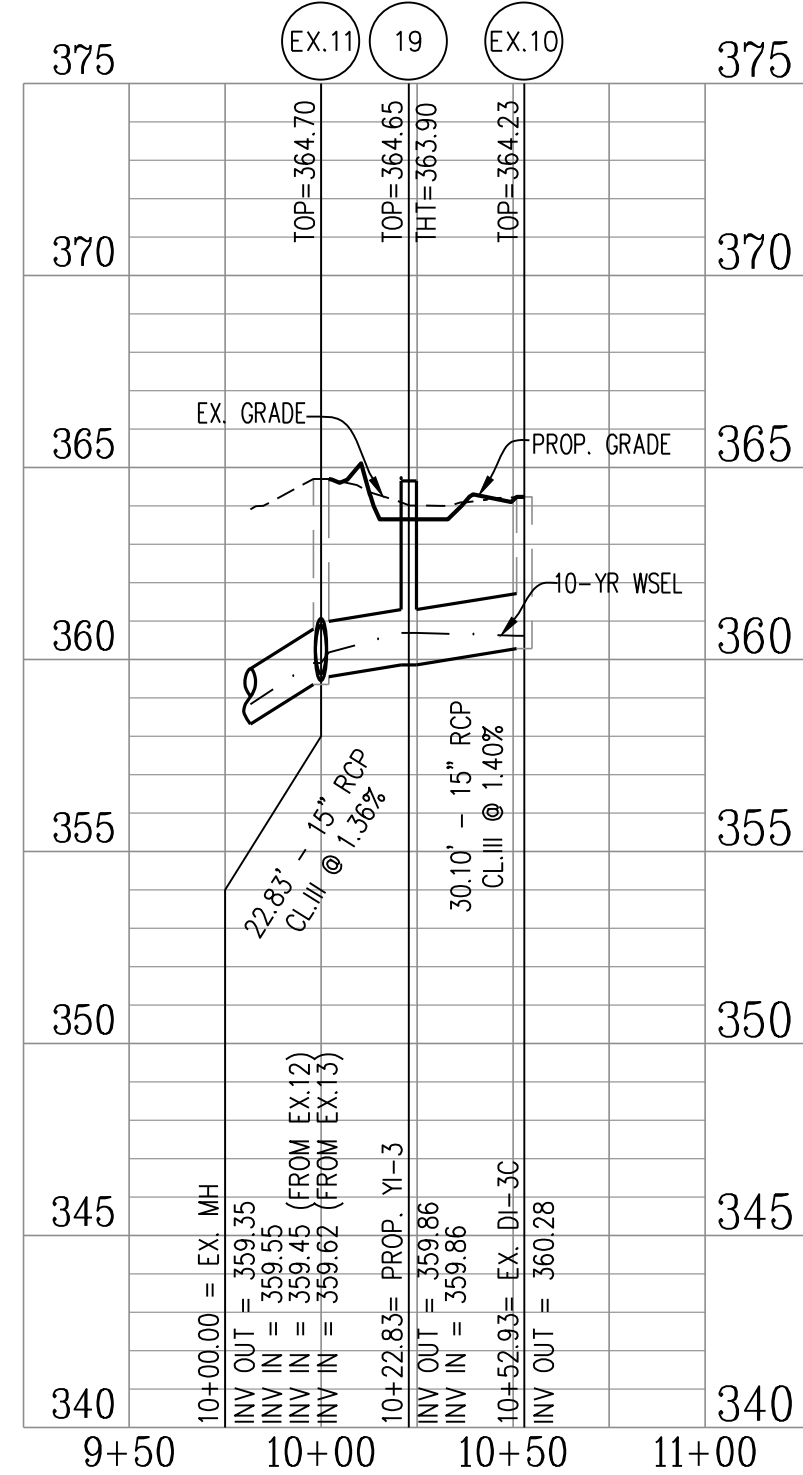
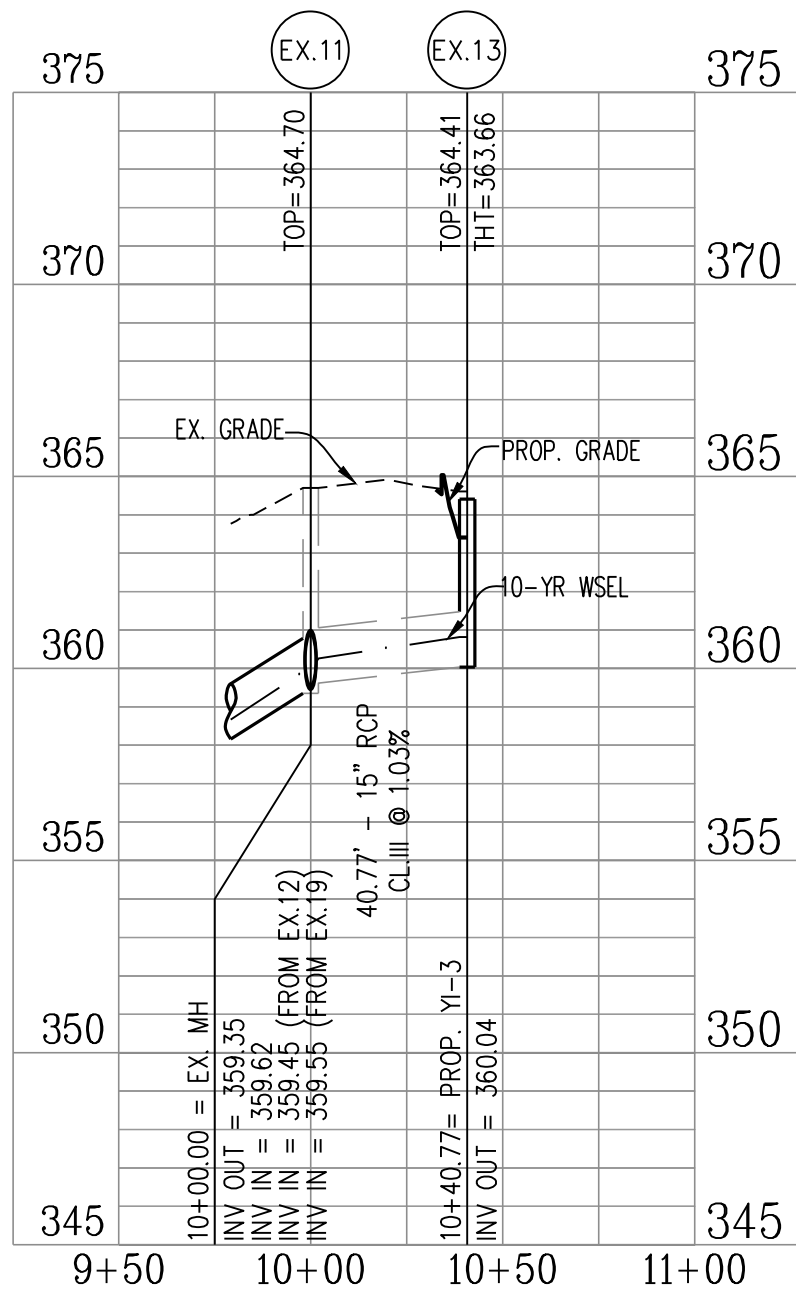
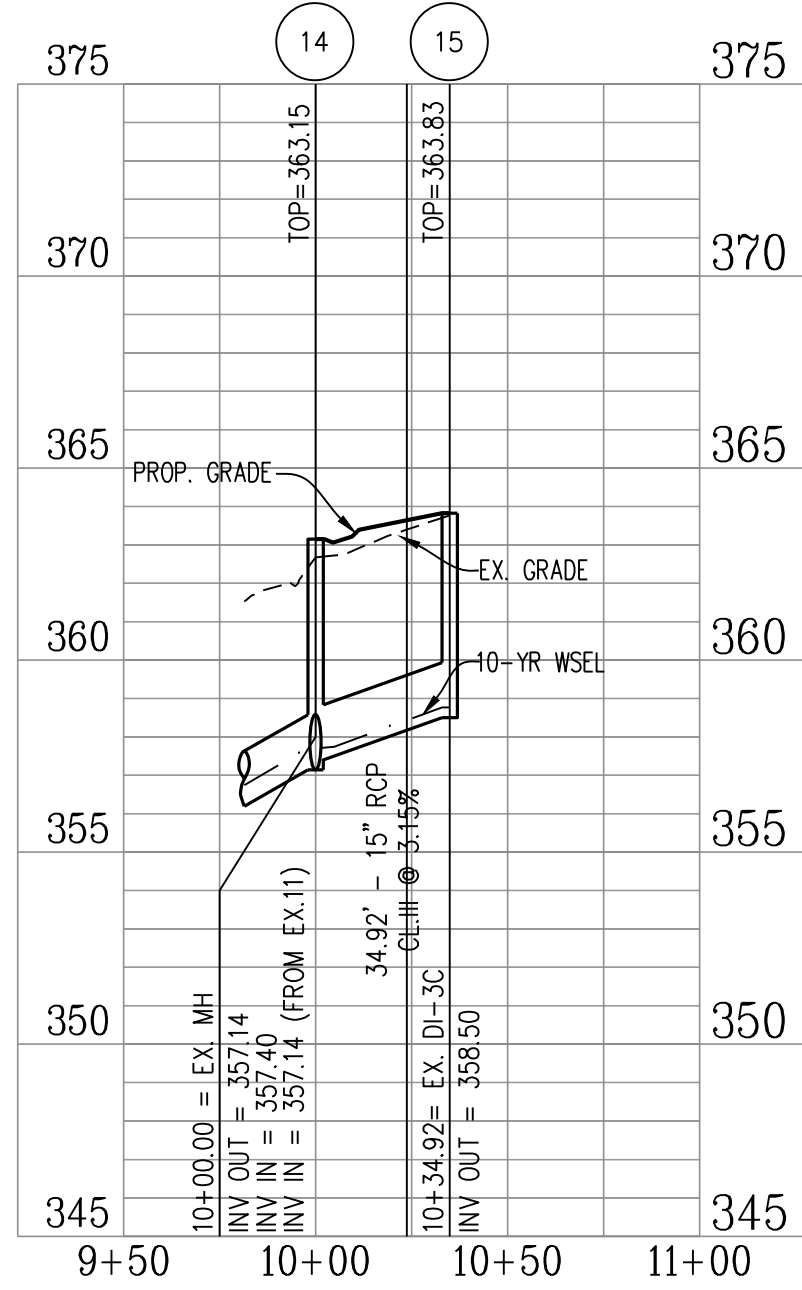
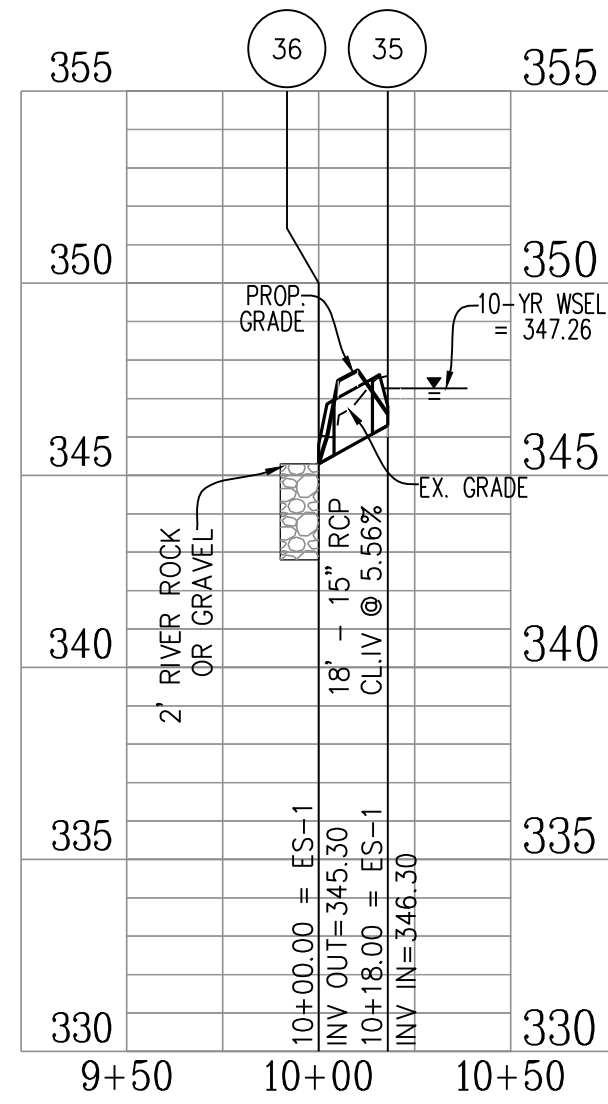
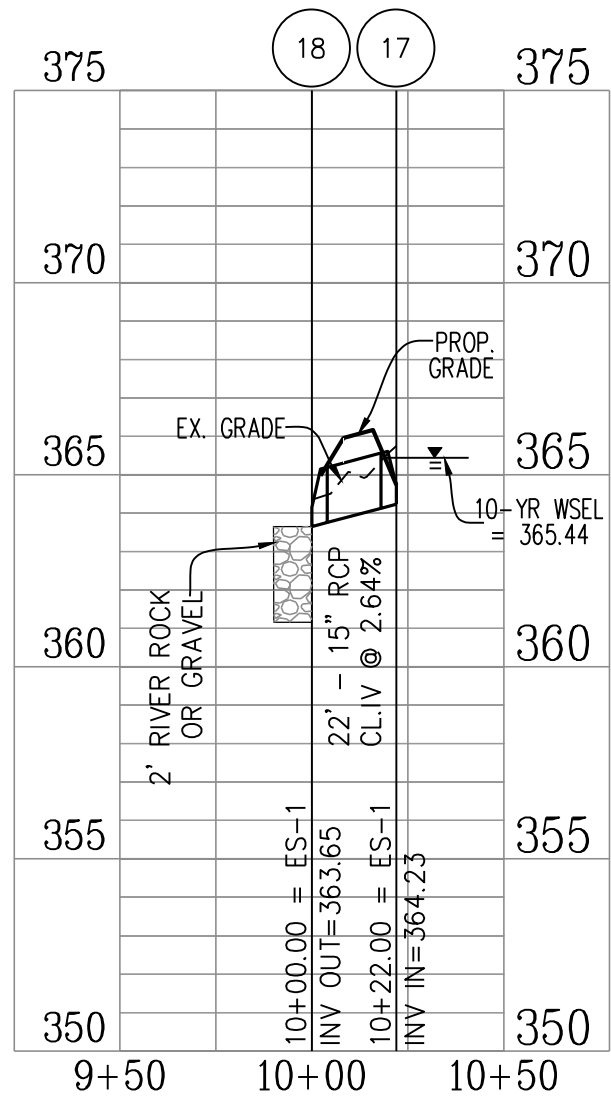
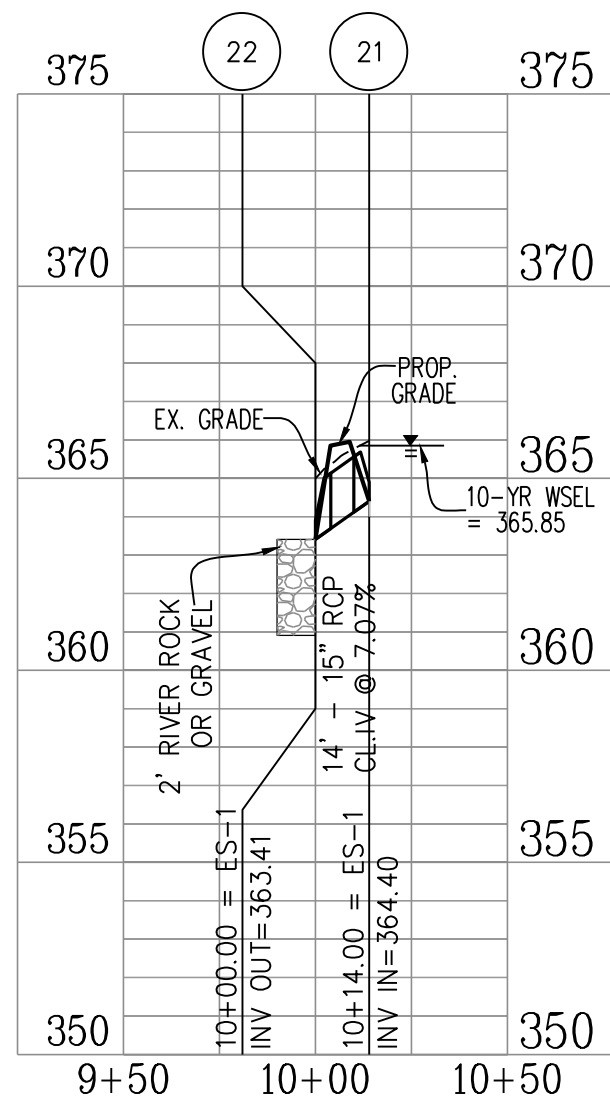
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BMP NOTES & DETAILS
VIENNA ROAD IMPROVEMENTS
TAPAWINGO ROAD & KINGSLEY ROAD
TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA
SCALE: AS SHOWN
C.I. = 2'
DATE: MARCH 2021

SHEET
14
OF
21

FILE No.
PP-2156



STORM PROFILES

VIENNA ROAD IMPROVEMENTS
TAPAWINGO ROAD & KINGSLEY ROAD
TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA

SHEET
15
OF
21

FILE No.
PP-2156

DATE: MARCH 2021

SCALE: 1" = 50'

C.I. N/A

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02/17/2022
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PLAN DATE
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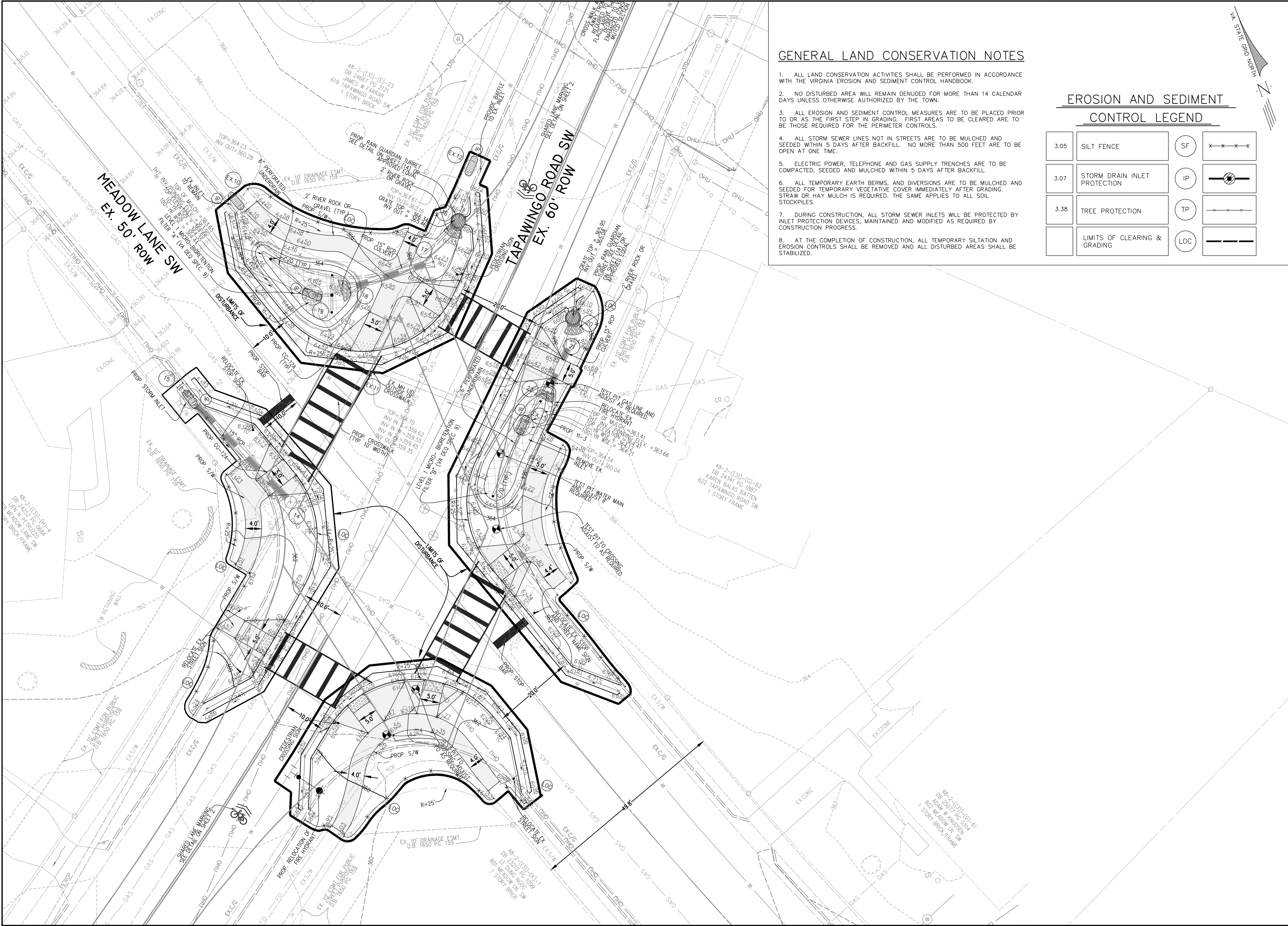
REVISIONS
No. DATE DESCRIPTION

Pipe	CULVERT DESCRIPTION				HYDROLOGIC CALCULATIONS										Total Flow Q (cfs)	Flow per Barrel Q/N (cfs)	HEADWATER CALCULATIONS										ELEVATION HEADWATER CONTROL	VELOCITY OUT
	Material-Shape-Size-Entrance																INLET CONTROL					OUTLET CONTROL						
																	HWI/D (2)	HWI (3)	FALL (3)	CL _{HI} (4)	HW _O (5)	D _c (6)	H _c (6)	k _e (7)	H (7)	EL _{JO} (8)		
N	INVO	INVIN	Type	D (in)	C	T _c	I	A	EL _i	EL _o	S	L _o																
17-18	1-15" RCP	1	363.65	364.23	RCP	15	0.59	10	5.45	1.11	364.23	363.65	2.64%	22.00	3.57	3.57	0.97	1.21	1.79	365.44	0.53	0.76	0.76	0.50	0.58	364.99	365.44	7.29
21-22	1-15" RCP	1	363.41	364.40	RCP	15	0.62	10	5.45	1.06	364.40	363.41	7.07%	14.00	3.58	3.58	1.00	1.25	2.24	366.65	0.44	0.76	0.76	0.50	0.99	365.16	365.65	9.17
35-36	1-15" RCP	1	345.30	346.30	RCP	15	0.64	10	5.45	0.68	346.30	345.30	5.56%	18.00	2.37	2.37	0.77	0.96	1.96	347.26	0.35	0.62	0.62	0.50	1.00	346.92	347.35	8.27

LineID	DrainageArea	RunoffCoeff	IncrCxA	TotalCxA	Inlet Time	Tc	Rainfall Intensity	KnownQ	Runoff Q	InvertUp	InvertDn	Length	Slope	Diameter	Capacity	Actual Flow Velocity	Full Flow Vel
	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(%)	(in)	(cfs)	(ft/s)	(ft/s)
14-EX.23	0	0	0	1.56	5	123.9	1.34	0	2.1	357.14	347.58	169.31	5.65	15	16.62	2.89	13.54
EX.11-14	0	0	0	1.47	0	123.8	1.34	0	1.98	359.35	357.14	39.07	5.66	15	16.64	3.65	13.56
EX.12-EX.11	0	0	0	0	10	10	0	0.01	0.01	362.16	359.45	55.62	4.87	15	15.44	0.47	12.58
19-EX.11	1.13	0.58	0.66	0.79	10	10.8	5.29	0	4.18	359.86	359.55	22.83	1.36	15	8.15	5.77	6.64
EX.10-19	0.19	0.71	0.13	0.13	10	10	5.45	0	0.74	360.28	359.86	30.1	1.4	15	8.26	1.82	6.73
EX.13-EX.11	1.11	0.61	0.68	0.68	10	10	5.45	0	3.69	360.04	359.62	40.77	1.03	15	7.1	5.23	5.79
15-14	0.21	0.69	0.14	0.14	10	10	5.45	0	0.79	358.5	357.4	34.92	3.15	15	12.42	2.95	10.12
37-EX.38	0.75	0.61	0.46	3.23	5	17.5	4.3	0	37.4	340	329.27	253.31	4.24	24	50.43	12.95	16.05
32-37	0.43	0.57	0.25	0.25	5	10.7	5.32	0	7.39	345.64	341.03	89.13	5.17	15	15.91	7.15	12.96
EX.30-37	0	0	0	2.52	0	17.5	4.31	0	28.32	341.46	340.53	43.22	2.15	24	35.94	10.69	11.44
EX.31-EX.30	6.31	0.4	2.52	2.52	15	15	4.62	0	11.65	344.88	343.73	41.5	2.77	15	11.65	10.2	9.49

InletID	Outlet WSE	Do	Qo	Lo	Sfo	Vo	Qi	Vi	Hi	Angle	MinorLoss	Final H	HGLJunct	Inlet WSE	Rim Elev
	(ft)	(in)	(cfs)	(ft)	(%)	(ft)	(cfs)	(ft/s)	(ft)	(Deg)		(ft)	(ft)	(ft)	(ft)
14	348.58	15.00	2.10	169.31	0.00	0.22	0.00	3.79	0.22	-40.09	n/a	0.58	357.72	357.72	363.15
EX.11	357.72	15.00	1.98	39.07	0.00	0.22	0.00	3.72	0.22	0.39	n/a	0.56	359.91	359.91	364.70
EX.12	359.91	15.00	0.01	55.62	0.00	0.01	0.01	0.91	0.01	-3.61	n/a	0.04	362.20	362.20	367.61
19	360.18	15.00	4.18	22.83	0.00	0.37	3.57	4.85	0.37	-69.00	n/a	0.83	360.69	360.69	364.65
EX-10	360.69	15.00	0.74	30.10	0.00	0.12	0.74	2.78	0.12	0.04	n/a	0.34	360.62	360.62	364.23
EX-13	360.26	15.00	3.69	40.77	0.00	0.33	3.69	4.63	0.33	80.42	n/a	0.78	360.82	360.82	364.41
15	357.73	15.00	0.79	34.92	0.00	0.12	0.79	2.83	0.12	-74.50	n/a	0.35	358.85	358.85	363.83
37	330.87	24.00	37.40	253.31	0.00	2.25	3.10	12.02	2.25	-31.32	2.54	1.94	341.94	341.94	345.57
32	341.94	15.00	7.39	89.13	0.00	0.67	1.66	6.55	0.67	-1.63	n/a	1.08	346.72	346.72	351.10
EX.30	341.94	24.00	28.32	43.22	0.00	1.37	0.00	9.39	1.37	-45.44	1.92	1.83	343.29	343.29	348.36
EX.31	344.76	15.00	11.65	41.50	0.00	1.43	11.65	9.58	1.43	10.17	n/a	1.21	346.09	346.09	348.68

Inlet ID	Inlet Type	Length	DrainageArea	C	CA	I	Q incr.	QCarryover	QCaptured	QBypass	GutterSlope	CrossSlope, Sx	T (Grade) Spread	T (Sump) Spread	W	Sw	d	E	h	10yr WSEL
		(ft)	(ac)	(C)		(in/hr)	(cfs)	(cfs)	(cfs)	(cfs)	(ft/ft)	(ft/ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft)	(%)	(in)	
14	MH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	357.72
EX.11	MH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	359.91
EX.12	Curb	8.5	0	0	0	0	0.01	0	0.01	0	0	0.06	0.35	0	1.5	0.083	0.2	100	5.5	367.31
19	Y1-3	4	1.13	0.58	0.66	5.45	3.57	0	3.57	0	Sag	0.00	0	0	0.083	0.45	100	6	364.35	
EX.10	DI-3C	4	0.19	0.71	0.13	5.45	0.74	0	0.74	0	Sag	0.05	0	2.48	1.5	0.083	0.34	100	5.5	364.07
EX.13	Y1-3	4	1.11	0.61	0.68	5.45	3.69	0	3.69	0	Sag	0.00	0	0	0	0.083	0.46	100	6	364.12
15	DI-3C	6	0.21	0.69	0.14	5.45	0.79	0	0.79	0	Sag	0.08	0	1.50	1.5	0.083	0.29	100	5.5	363.62
37	Y1-3	4	0.75	0.61	0.46	6.77	3.1	0	3.1	0	Sag	0.03	0	0	0	0	0.41	100	6	345.23
32	Y1-2	4	0.43	0.57	0.25	6.77	1.66	0	1.66	0	Sag	0.02	0	0	0	0	0.27	100	6	350.62
EX.30	DI-3C	6	0	0	0	0	0	17.45	17.45	0	Sag	0.05	0	0	1.5	0.083	0.3	100	5.5	348.16
EX.31	DI-3C	8.5	6.31	0.4	2.52	4.62	11.65	0	11.65	0	Sag	0.03	0	19.64	1.5	0.083	0.84	100	5.5	349.02



GENERAL LAND CONSERVATION NOTES

1. ALL LAND CONSERVATION ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.
2. NO DISTURBED AREA WILL REMAIN DENUDE FOR MORE THAN 14 CALENDAR DAYS UNLESS OTHERWISE AUTHORIZED BY THE TOWN.
3. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN GRADING. FIRST AREAS TO BE CLEARED ARE TO BE THOSE REQUIRED FOR THE PERIMETER CONTROLS.
4. ALL STORM SEWER LINES NOT IN STREETS ARE TO BE MULCHED AND SEEDED WITHIN 5 DAYS AFTER BACKFILL. NO MORE THAN 500 FEET ARE TO BE OPEN AT ONE TIME.
5. ELECTRIC POWER, TELEPHONE AND GAS SUPPLY TRENCHES ARE TO BE COMPACTED, SEEDED AND MULCHED WITHIN 5 DAYS AFTER BACKFILL.
6. ALL TEMPORARY EARTH BERMS, AND DIVERSIONS ARE TO BE MULCHED AND SEEDED FOR TEMPORARY VEGETATIVE COVER IMMEDIATELY AFTER GRADING. STRAW OR HAY MULCH IS REQUIRED. THE SAME APPLIES TO ALL SOIL STOCKPILES.
7. DURING CONSTRUCTION, ALL STORM SEWER INLETS WILL BE PROTECTED BY INLET PROTECTION DEVICES, MAINTAINED AND MODIFIED AS REQUIRED BY CONSTRUCTION PROGRESS.
8. AT THE COMPLETION OF CONSTRUCTION, ALL TEMPORARY SILTATION AND EROSION CONTROLS SHALL BE REMOVED AND ALL DISTURBED AREAS SHALL BE STABILIZED.

EROSION AND SEDIMENT CONTROL LEGEND

3.05	SILT FENCE	SF	XXXXX
3.07	STORM DRAIN INLET PROTECTION	IP	[Symbol]
3.38	TREE PROTECTION	TP	[Symbol]
	LIMITS OF CLEARING & GRADING	LOC	[Symbol]

PLAN DATE
03-19-2021
10-29-2021
02-17-2022

DESCRIPTION
REVISIONS

No.

DATE

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EROSION AND SEDIMENT CONTROL PH I & PH II
VIENNA ROAD IMPROVEMENTS
TAPAWINGO ROAD & KINGSLEY ROAD
TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA
SCALE: 1"=10'
DATE: MARCH 2021

SHEET
17
OF
21
FILE No.
PP-2156

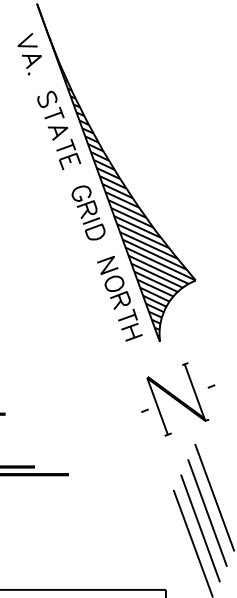


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EROSION AND SEDIMENT CONTROL LEGEND

3.05	SILT FENCE	SF	XXXXX
3.07	STORM DRAIN INLET PROTECTION	IP	IP
3.38	TREE PROTECTION	TP	TP
	LIMITS OF CLEARING & GRADING	LOC	LOC



EROSION AND SEDIMENT CONTROL PH I & PH II
VIENNA ROAD IMPROVEMENTS
TAPAWINGO ROAD & KINGSLEY ROAD
TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA

SCALE: 1"=10'
DATE: MARCH 2021

FILE No.
PP-2156

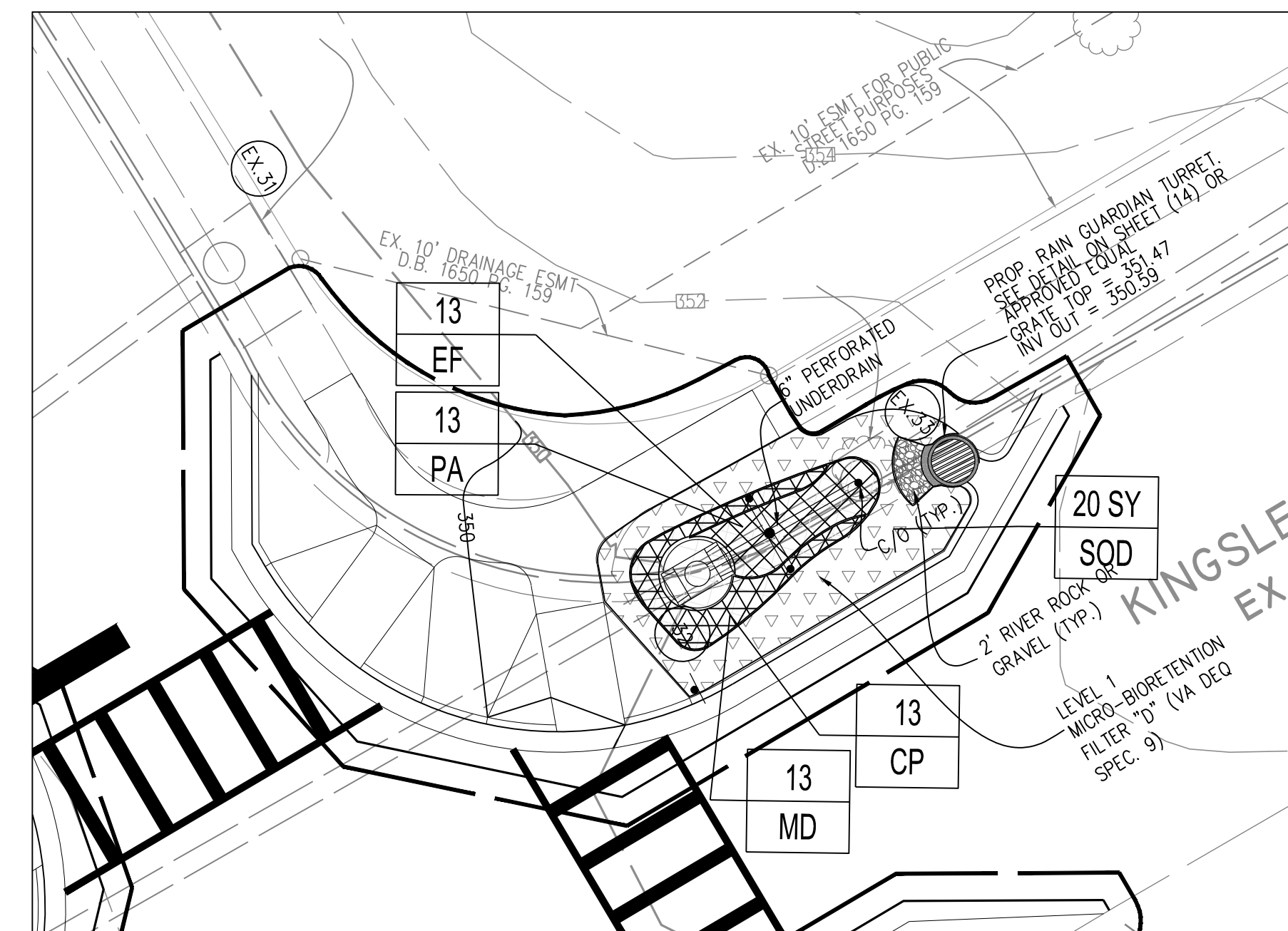
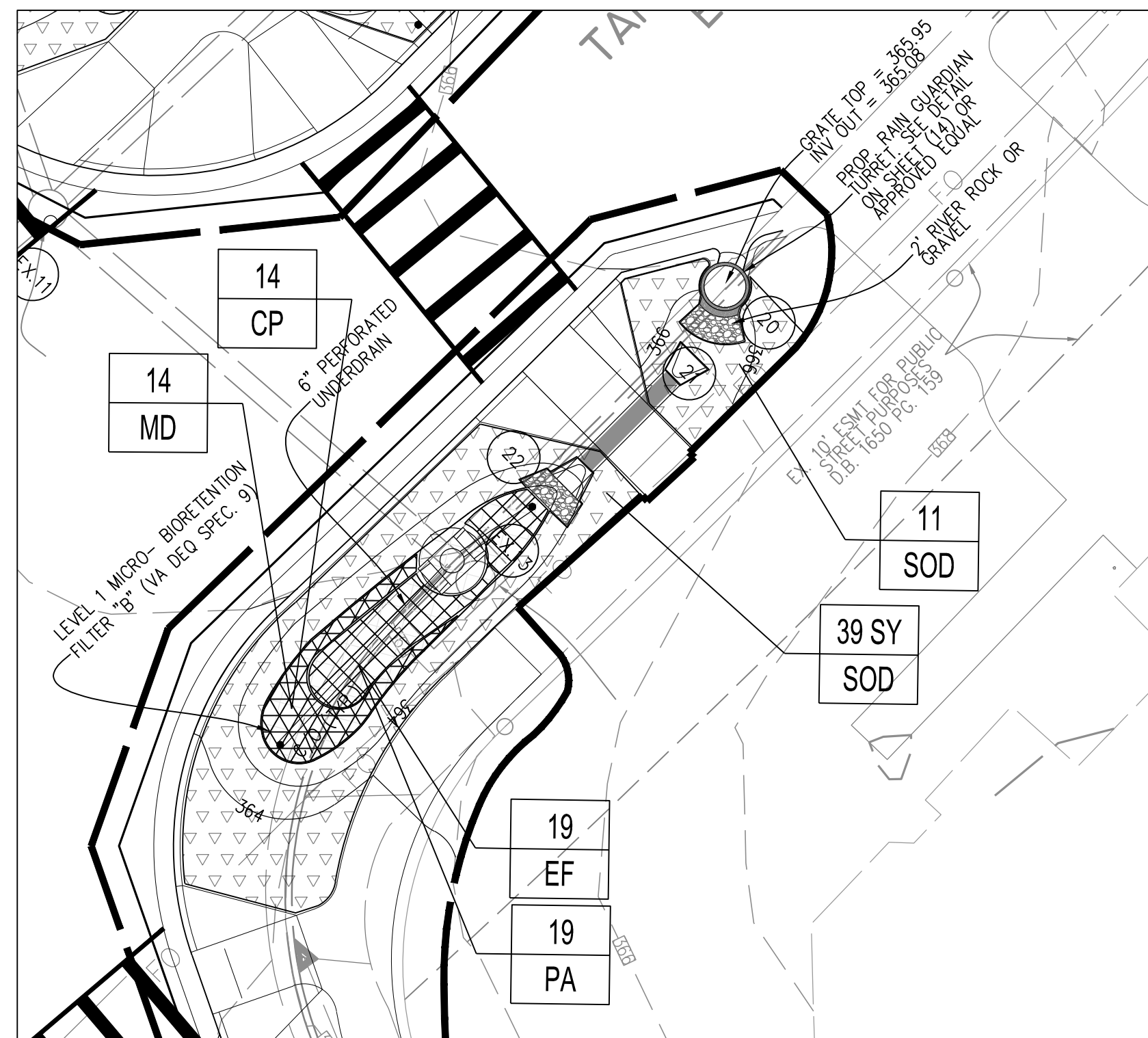
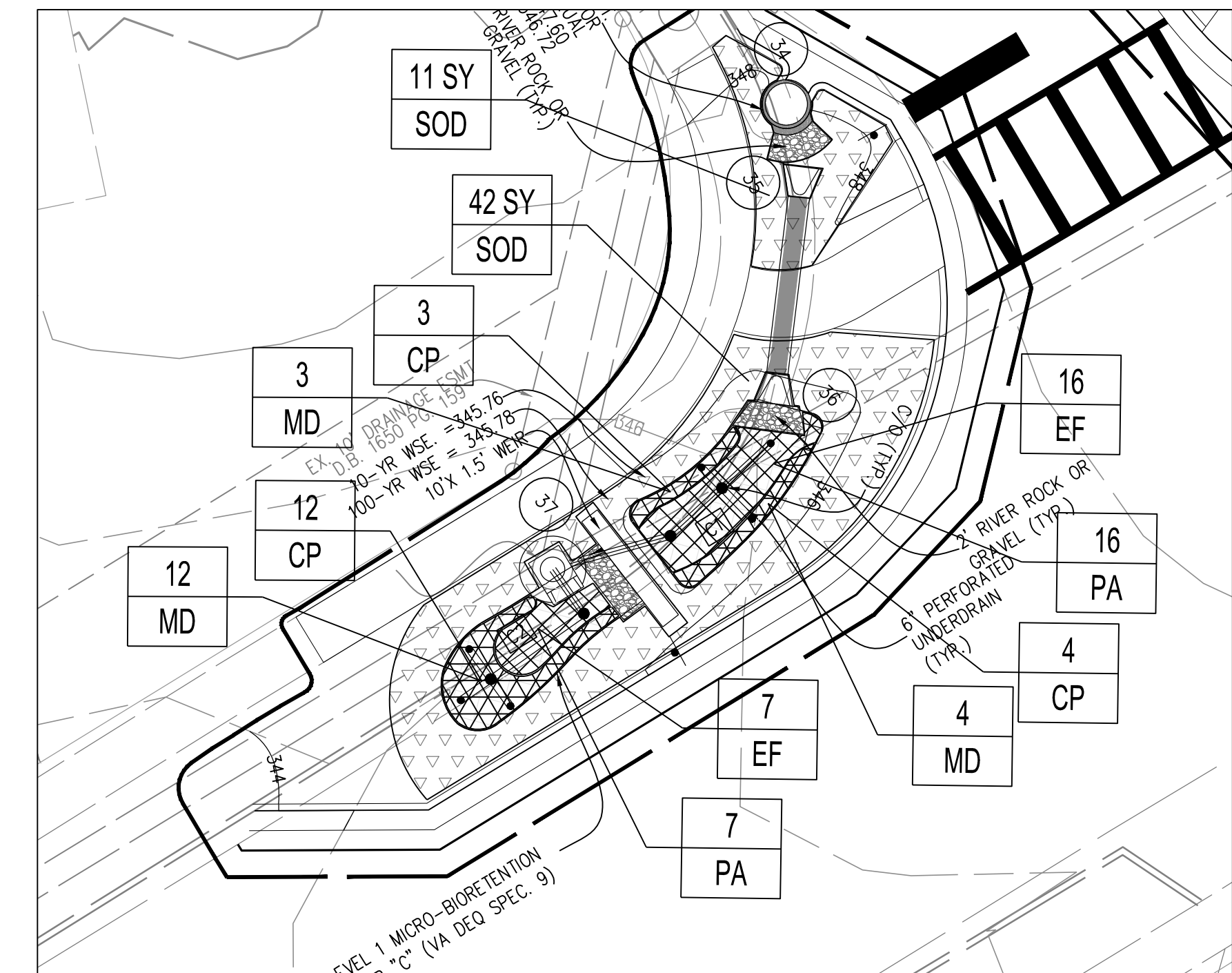
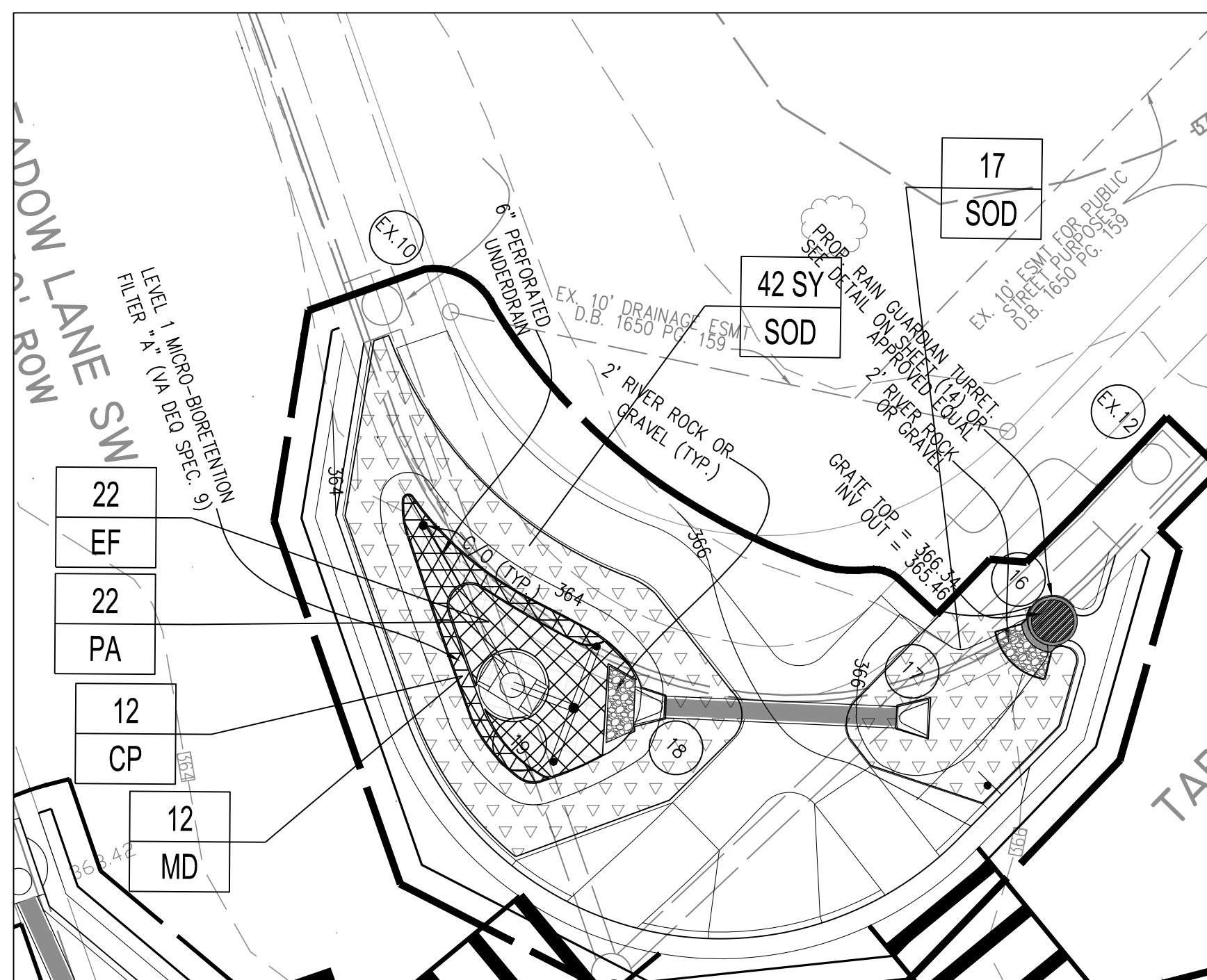
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COMMONWEALTH OF VIRGINIA
C. RYAN CONNOR
Lic. No. 039631
02/17/2022
PROFESSIONAL ENGINEER


PLAN DATE
03-19-2021
10-29-2021
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REVISIONS
No. DATE DESCRIPTION



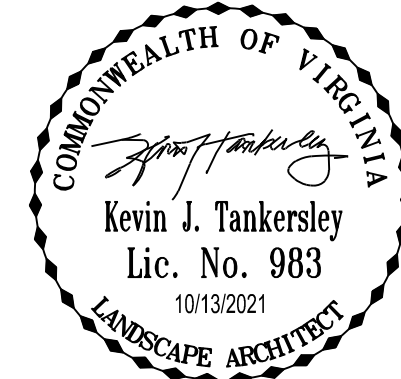
LEGEND

 PERENNIALS

 SOD

BIORETENTION AREA PLANT LIST						
BIORETENTION PLANTING TEMPLATE: HERBACEOUS MEADOW						
Qty.	Key	Botanical Name	Common Name	Size	Type	Remarks
		<u>Perennials</u>				Plant perennials in random pattern, intersperse with each other in area shown on plan
58	CP	Carex pensylvanica	Pennsylvania Sedge	2 qt.	Cont.	18" o.c.; Mature height 0.5-1'
77	EF	Eupatorium dubium 'Baby Joe'	Baby Joe Dwarf Joe Pye Weed	2 qt.	Cont.	Purple-pink flowers; 18" o.c.; Mature height 2-3'
58	MD	Momarda didyma 'Fireball'	Fireball Bee Balm	2 qt.	Cont.	Red flowers, spring; 18" o.c.; Mature height 1-2'
77	PA	Panicum virgatum 'Cape Breeze'	Cape Breeze Switchgrass	2 qt.	Cont.	18" o.c.; Mature height 2-3'
		<u>Sod</u>				
182 SY	SOD	Grass Sod	Tall Fescue/Kentucky Blue Grass Blend			

Note: Dwarf cultivars have been chosen to minimize height and avoid visibility issues at the intersections

[illegible]

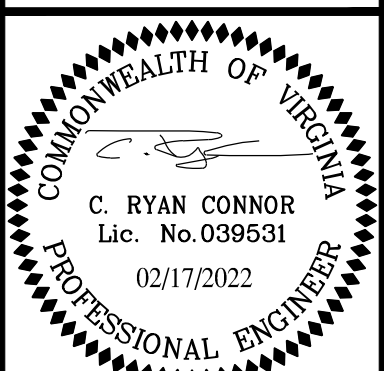
PLAN DATE
03-19-2021
10-29-2021
02-17-2022

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BIO-RETENTION LANDSCAPE PLAN

VIENNA ROAD IMPROVEMENTS

TAPAWINGO ROAD & KINGSLEY ROAD

TOWN OF VIENNA
FAIRFAX COUNTY, VIRGINIA

E. AS SHOWN C1 - 2" DATE: MARCH 2014

SCALE: AS SHOWN C.I. = 2' DATE: MARCH 2021

SHEET
21
OF
21

FILE No.
PP-2156