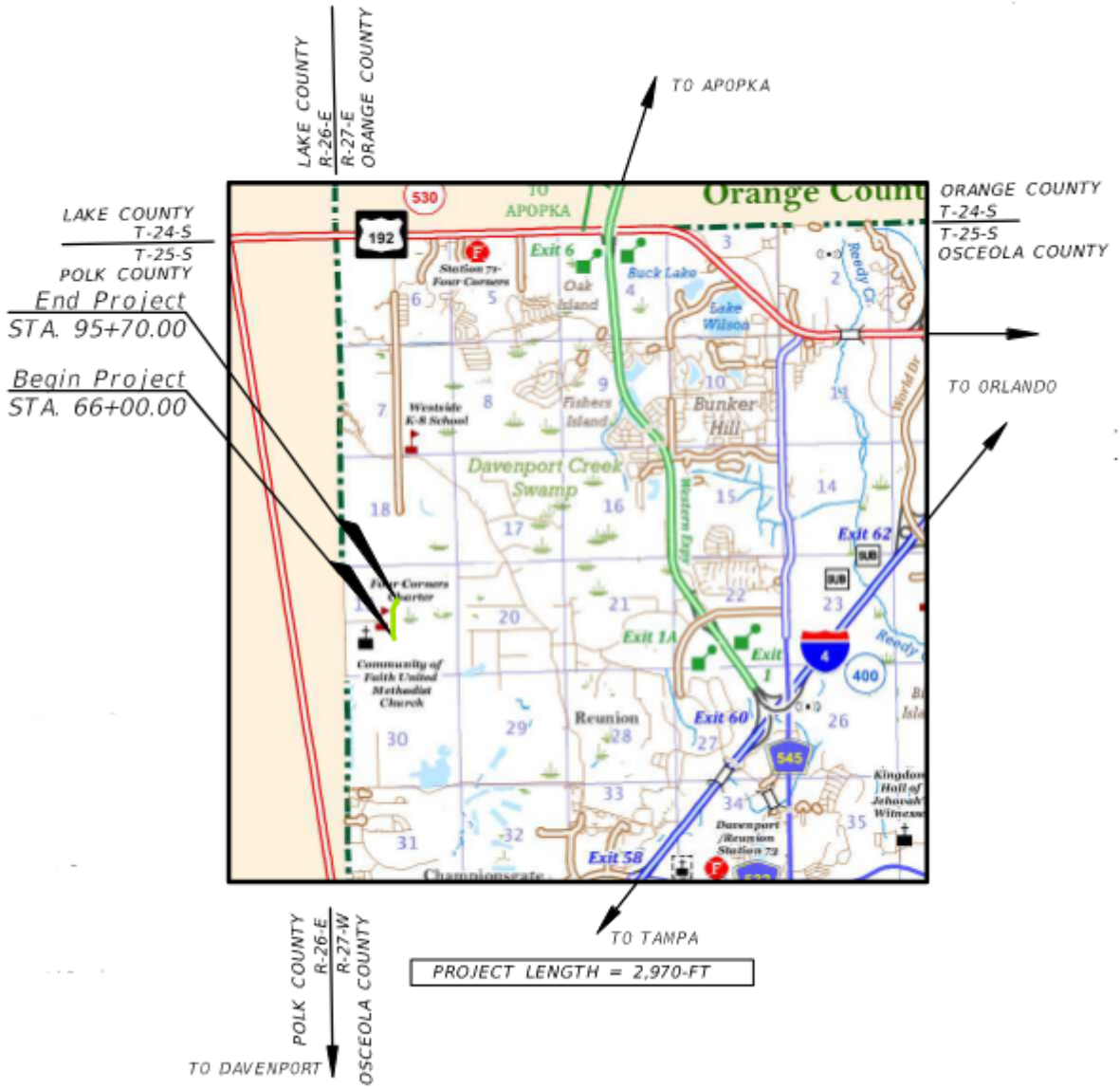
HAMILTON
ENGINEERING & SURVEYING, INC.

NUTRIENT ANALYSIS REPORT
FOR
WESTSIDE BOULEVARD EXTENSION
STA 66+00 – STA 95+70

90% DRAINAGE DESIGN REPORT
OSCEOLA COUNTY, FLORIDA



FEBRUARY 9TH, 2023
HAMILTON PROJECT NO. 53509.0017

Signature Sheet for:

NUTRIENT ANALYSIS
FOR
WESTSIDE BOULEVARD EXTENSION
OSCEOLA COUNTY, FLORIDA

This item has been digitally signed and sealed by David A. Reid, PE on the date adjacent to the seal.

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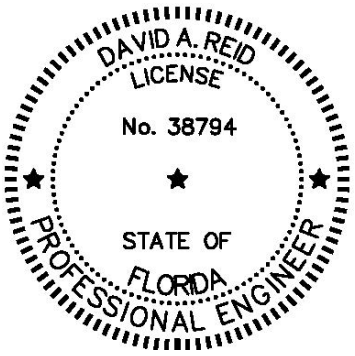

Dave Reid P.E. Florida License No. 38794

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Appendix

1.0 Purpose

The purpose of this report is to provide South Florida Water Management District (SFWMD) with nutrient loading calculations which demonstrate the project post development discharge of total nitrogen and phosphorus does not exceed the pre-development conditions.

2.0 Project Description

This report is in support of a request to construct a stormwater treatment system to serve a portion of a new four (4) lane divided urban road called Westside Boulevard.

This site is located in a portion of Section 19, Township 25 South, Range 27 East in Osceola County, Florida. The proposed improvements begin at the end of the southeast development called Tract X owned by Lennar LLC and the end of the southwest development called Eden Gardens owned by EGR East LLC and ends at the beginning of the Northwest residential development called Soleil at Westside owned by Mattamy Homes. The south and north developments that our proposed road is tying into are currently being designed and modified therefore coordination with the property owners is still ongoing. The location map is included in Appendix A. The project's horizontal datum is the Florida State Plane East zone (NAD 1983) and the vertical datum is NAVD88.

The following calculations were prepared in accordance with Environmental Research & Design, Inc.'s "Evaluation of Current Stormwater Design Criteria within the State of Florida" prepared for Florida Department of Environmental Protection from June 2007.

3.0 Pre-Development Conditions

1. **Total Drainage Area (Post-Basin 1):** 9.73 acres

2. **Ground Cover:** Undeveloped – Dry Prairie (TN=2.025 TP=0.184) (FDEP FLUCCS 3100: Herbaceous (Dry Prairie)

3. **Hydrologic Soil Group:** Type A and A/D

4. **Impervious Area:** 0% Impervious, 0% Directly Connected Impervious Area (DCIA)

4.0 Post-Development Conditions

1. **Total Drainage Area (Post-Basin 1):** 9.73 acres
   Preserved Wetland Area (Post-Basin 1): 0 acres
   Wet Detention Area: 0.56 acres
   Westside Blvd Road Area: 9.17 acres

2. **Ground Cover:** Westside Boulevard road areas will be covered with lawns in good condition.

3. **Hydrologic Soil Group:** Soils will be Type A.

4. **Impervious/DCIA Area:**
   Westside Boulevard areas will be 50% impervious, 75% of which will be DCIA.
   Impervious Area = 50 % of Westside Boulevard Area
   Impervious Area = 50 % x 9.17 acres = 4.59 acres
   DCIA Area = 75% of Impervious Area = 75% x 4.59 acres = 3.44 acres
   DCIA % = 3.44 acres / 9.73 acres = **35% of developed area**

5. **Composite Non-DCIA Curve Number:**
   Curve number for Flatwoods, 4' depth to water table and compacted = 60

Areas of lawns = Road Area – Impervious Area = 9.17 acres – 4.59 acres = 4.59 acres
Impervious area which is not DCIA = 4.59 acres – 3.44 acres = 1.15 acres
Using a curve number of 98 for impervious areas
Non-DCIA Curve Number = **67.6**

6. **Permanent Pool Volume:**
Normal Water Level = 117.25
Permanent Pool Volume at Normal Water Level = **19.30 ac-ft**

Pond 1

ELEV	DEPTH ft	AREA ft	AREA ac	VOL. cf	VOL. ac-ft
105.00	0.00	1938	0.04	0	0.00
106.00	1.00	3625	0.08	3625	0.08
107.00	2.00	5312	0.12	8937	0.21
108.00	3.00	6999	0.16	15936	0.37
109.00	4.00	8686	0.20	24622	0.57
110.00	5.00	10373	0.24	34995	0.80
111.00	6.00	12060	0.28	47055	1.08
112.00	7.00	13747	0.32	60803	1.40
113.00	8.00	15434	0.35	76237	1.75
114.00	9.00	17121	0.39	93358	2.14
115.00	10.00	18808	0.43	112166	2.57
116.00	11.00	20495	0.47	132661	3.05
117.00	12.00	22182	0.51	154844	3.55
117.25	12.25	22604	0.52	160495	3.68

7. **Wet Detention Residence Time:**
Annual C Value = **0.13**
(Zone 2, Appendix C – Calculated annual runoff coefficients for the designated meteorological zones as a function of curve number and DCIA from Evaluation of Current Stormwater Design Criteria within the State of Florida by ER&D, Inc. for FDEP)

Total Annual Rainfall = **50 inches**
(Zone 2, Appendix A – Expanded Views of Rainfall Isopleths by Region from Evaluation of Current Stormwater Design Criteria within the State of Florida by ER&D, Inc. for FDEP)

Total Annual Generated Runoff = C x Total Annual Rainfall x Total Drainage Area
Total Annual Generated Runoff = 0.13 x 50 inches x 9.73 acres = 5.27 ac-ft/year

Residence Time = Permanent Pool Volume / Total Annual Generated Runoff = **246 Days**

5.0 BMP Trains Analysis

The pre and post development conditions were analyzed using the newest version of BMP Trains Version 4.3.5. Based on the calculated values, determined above, the project information was inputted into the spreadsheet. Using a combination of the three (3) treatment methods of wet detention, surface discharge filter and grass swales. The surface discharge filtration media modeled in the BMP Trains is the Bold & Gold ® filtration media CTS24 that will be placed at the bank of Pond 1 with a perforated or slotted side-drain pipe. The grass swale modeled in BMP Trains simulates the grass spreader swale utilized to discharge from Pond 1 to Wetland 1. An exhibit showing the Bold & Gold ® CTS filtration media CTS can be found in Appendix B. The results of the model predicted that the post development loading for Nitrogen & Phosphorus does not result in a net increase of these nutrients and the proposed

system complies with current state water quality requirements for no net impact. The complete report generated from BMP Trains can be found in Appendix A.

6.0 FDEP Water Impairments

The project site is located within the Davenport Creek Basin (WBID:3170K), within the Kissimmee River group. According to FDEP's Statewide Comprehensive Verified List of Impaired Waters, the Davenport Creek Basin is not impaired by any nutrients. The Davenport Creek Basin is impaired with Fecal Coliform, which the proposed development will not be generating nor further impairing.

7.0 Summary of Results

The results from the BMP Trains model analysis can be found in the summary table below.

WATER SURFACE DISCHARGE	LOAD kg/year
Nitrogen	
Total Nitrogen Pre-Development Load	3.75 kg/year
Total Nitrogen Post-Development Load	22.64 kg/year
Provided Nitrogen Discharge Load	3.94 kg/year
Provided Nitrogen Load Removed	18.70 kg/year
Phosphorus	
Total Phosphorus Pre-Development Load	0.342 kg/year
Total Phosphorus Post-Development Load	2.979 kg/year
Provided Phosphorus Discharge Load	0.085 kg/year
Provided Phosphorus Load Removed	2.894 kg/year

Appendix A

BMP Trains 2020 Model

Complete Report (not including cost) Ver 4.3.5

Project: WestsideBlvdExt
Date: 2/9/2023 11:40:37 AM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	WestsideBoulevardExtension
Rainfall Zone	Florida Zone 2
Annual Mean Rainfall	50.00

Pre-Condition Landuse Information

Landuse	Undeveloped - Dry Prairie: TN=2.025 TP=0.184
Area (acres)	9.73
Rational Coefficient (0-1)	0.04
Non DCIA Curve Number	63.00
DCIA Percent (0-100)	0.00
Nitrogen EMC (mg/l)	2.025
Phosphorus EMC (mg/l)	0.184
Runoff Volume (ac-ft/yr)	1.508
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	3.766
Phosphorus Loading (kg/yr)	0.342

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200
Area (acres)	9.73
Rational Coefficient (0-1)	0.32
Non DCIA Curve Number	67.60
DCIA Percent (0-100)	35.00
Wet Pond Area (ac)	0.56
Nitrogen EMC (mg/l)	1.520
Phosphorus EMC (mg/l)	0.200
Runoff Volume (ac-ft/yr)	12.081
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000

Nitrogen Loading (kg/yr)	22.643
Phosphorus Loading (kg/yr)	2.979

Catchment Number: 1 Name: WestsideBoulevardExtension

Project: WestsideBlvdExt
Date: 2/9/2023

Multiple BMP in Series Design Parameters

BMP in Series Number: 1
BMP Type: Wet Detention

Permanent Pool Volume (ac-ft)	3.680
Permanent Pool Volume (ac-ft) for 31 days residence	1.026
Annual Residence Time (days)	111
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

BMP in Series Number: 2
BMP Type: Filtration

Treatment Depth (in)	1.500
Hydraulic Capture Efficiency (%)	93
Media Type	B&G CTS24
Media N Reduction (%)	75
Media P Reduction (%)	95

BMP in Series Number: 3
BMP Type: Swale

Swale Top Width for Flood Conditions - **W** (ft)	8.000
Swale Bottom Width - **B** (ft)	0.100
Swale Length - **L** (ft)	90.000
Average Impervious Length (ft)	8.000
Average Impervious Width (ft)	8.000
Average Pervious Width (ft)	8.000
Swale Slope (foot drop/foot length) - **S**	0.010
Mannings N	0.050
Soil Infiltration Rate (in/hr)	3.300
Side Slope of Swale horizontal/vertical - **Z**	0.250
Average Height of Swale Block - **H**	0.000
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	0.003
Number of Swale Blocks	

BMP in Series Number: 4
BMP Type: None

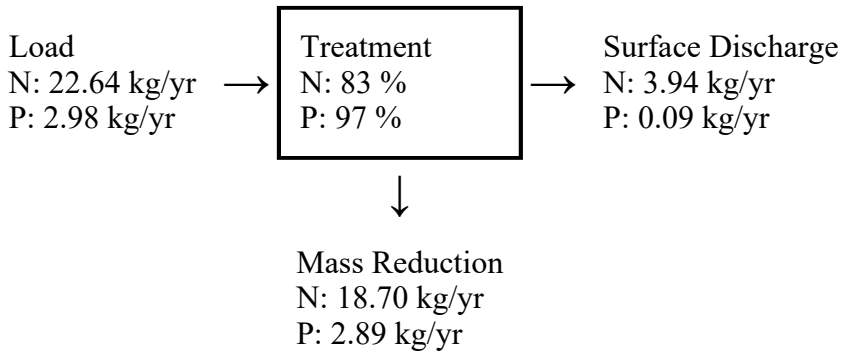
Watershed Characteristics

Catchment Area (acres)	9.73
Contributing Area (acres)	9.170
Non-DCIA Curve Number	67.60
DCIA Percent	35.00
Rainfall Zone	Florida Zone 2
Rainfall (in)	50.00

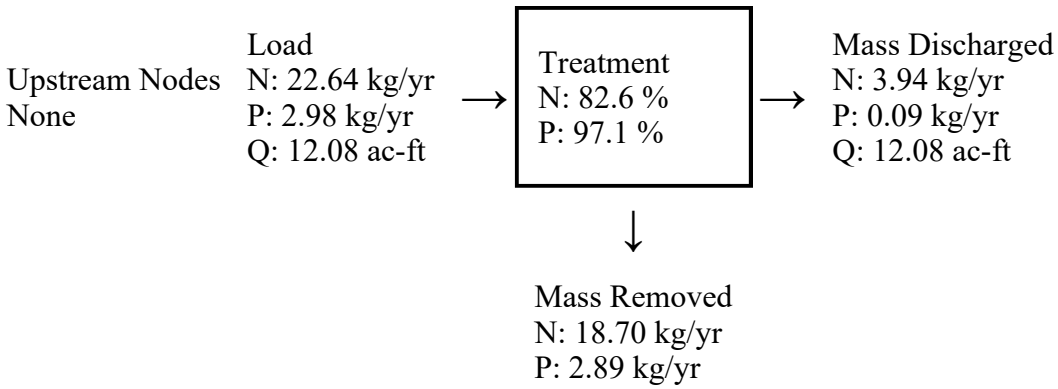
Surface Water Discharge

Required TN Treatment Efficiency (%)	83
Provided TN Treatment Efficiency (%)	83
Required TP Treatment Efficiency (%)	89
Provided TP Treatment Efficiency (%)	97

Load for Multiple BMP in Series



Load Diagram for Multiple BMP (As Used In Routing)



Summary Treatment Report Version: 4.3.5

Project: WestsideBlvdExt

Analysis Type: Net Improvement
BMP Types:
Catchment 1 - (WestsideBoulevardExtension) Multiple BMP
Based on % removal values to the nearest percent

Date:2/9/2023

Routing Summary
Catchment 1 Routed to Outlet

Total nitrogen target removal met? **Yes**
Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge		
Total N pre load	3.77 kg/yr	
Total N post load	22.64 kg/yr	
Target N load reduction	83 %	
Target N discharge load	3.77 kg/yr	
Percent N load reduction	83 %	
Provided N discharge load	3.94 kg/yr	8.69 lb/yr
Provided N load removed	18.7 kg/yr	41.24 lb/yr

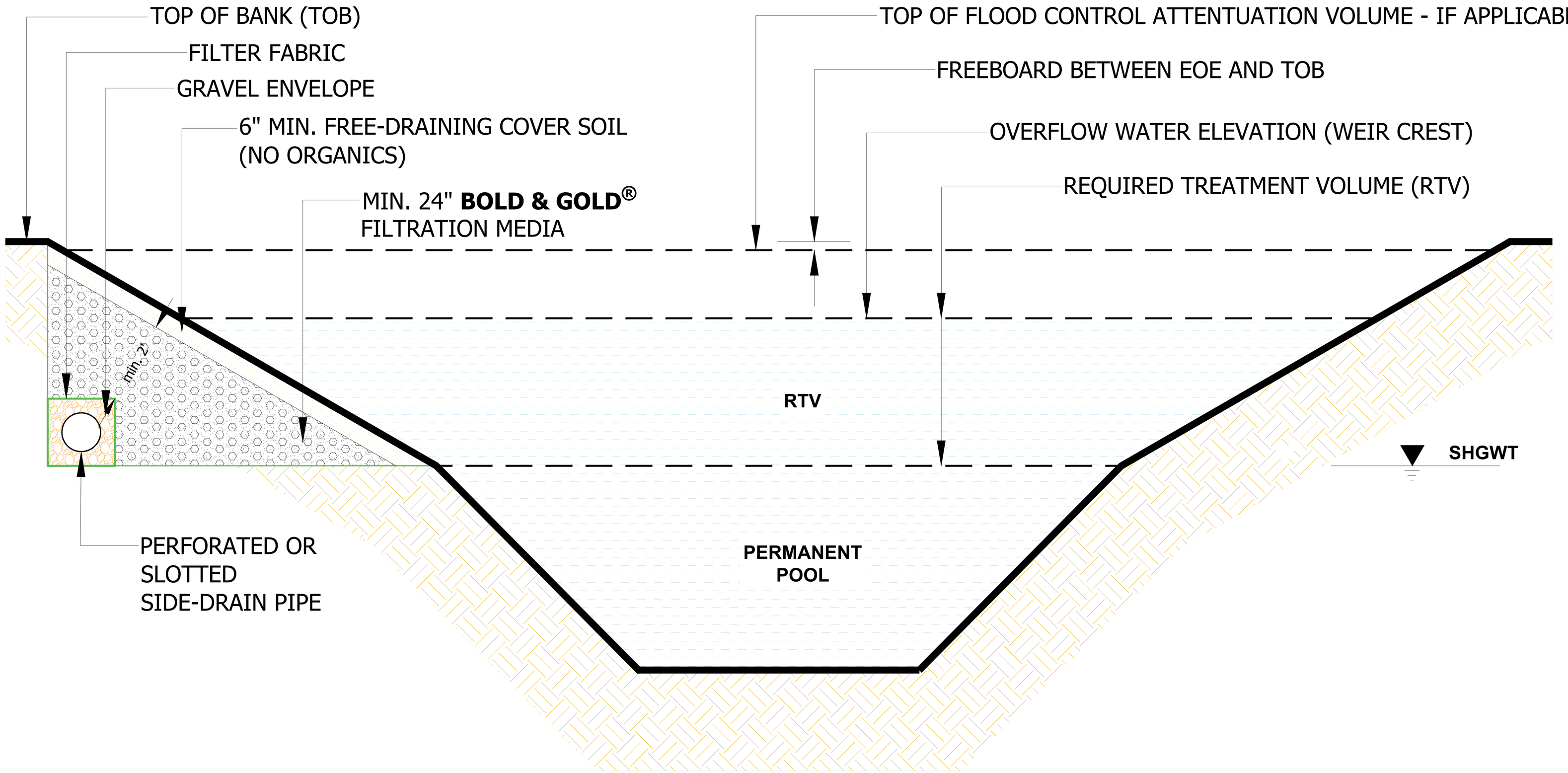
Phosphorus

Surface Water Discharge		
Total P pre load	.342 kg/yr	
Total P post load	2.979 kg/yr	
Target P load reduction	89 %	
Target P discharge load	.342 kg/yr	
Percent P load reduction	97 %	
Provided P discharge load	.085 kg/yr	.19 lb/yr
Provided P load removed	2.894 kg/yr	6.381 lb/yr

Appendix B

BOLD & GOLD CTS FILTRATION MEDIA

SHGWT = SEASONAL HIGH GROUNDWATER TABLE



BOLD & GOLD® CTS FILTRATION MEDIA USED AS A FILTER MEDIA AT THE BANK OF A POND

THIS IS A GENERIC CADD DETAIL SHOWING THE REFERENCED SECTION OF THE SIDE-BANK FILTER MEDIA SYSTEM. THE DIMENSIONS AND FIT ARE NOT APPLICABLE TO THE SPECIFIC PROJECT, BUT TO PROVIDE GENERIC SECTION DETAILS TO THE DESIGN ENGINEER. IT IS NOT A SUBSTITUTE FOR PROFESSIONAL JUDGEMENT, AS THE DESIGN ENGINEER IS RESPONSIBLE TO COMPLY FULLY WITH APPLICABLE LAWS AND REGULATIONS GUIDING THE DESIGN AND INSTALLATION OF SIDE-BANK FILTER MEDIA SYSTEMS. ENVIRONMENTAL CONSERVATION SOLUTIONS, LLC. DOES NOT BEAR ANY LIABILITY IN THE USE OF THE GENERIC DETAILS. ENGINEER OF RECORD TO REVIEW, APPROVE AND ENDORSE FINAL SITE SPECIFIC DESIGN.

TITLE:
Section Details for Detention Side-drain Filtration System with Bold & Gold® Media

DRAWN: **IGA**
CHECKED: **IGA**
DATE: **09/11/2019**
PROJECT #: **ECS/--/yy#####**

REV	DRW	CHK	DESCRIPTIONS

PROJECT NAME:
XYZ

PROJECT LOCATION:
Street Address
City, State, Zip Code

BOLD & GOLD®
Bold & Gold® Filtration Media
(*Biosorption Activated Media* - BAM)

Environmental Conservation Solutions, LLC.
2346 Vulcan Road
Apopka, FL 32703

Scale: NTS

SHEET **01**

B&G_Wet Pond with Side-drain Filtration System.dwg
9/11/2019
Iklengogo