

Preliminary Hydrology Report

For

500 West Collins Avenue
Orange, California, 92867

November 7, 2022

Prepared For:

Brookfield Properties

2101 Rosecrans Avenue, Suite 6250
El Segundo, CA 90245

Prepared By:



KIER & WRIGHT
CIVIL ENGINEERS & SURVEYORS, INC.

163 Technology Drive, Suite 150
Irvine, CA, 92618
Phone 949.508.0202

Hydrologic Report
for
500 West Collins Avenue
Orange, California, 92867

Date: November 7, 2022

Project Manager: D. Garrett Readler, P.E.
RCE No. 76867

Job Number: A22199

Prepared By:



D. Garrett Readler, P.E.
Kier & Wright

11/07/22

Date

Contents

Contents	3
1. Introduction.....	4
1.1 Project Description.....	4
1.2 Report Objectives	4
1.3 Criteria, Procedure, and Methodology	4
2. Discussion/Calculations.....	5
2.1 Hydrology	5
2.2 Stormwater Quality	5
3. Conclusion.....	6
4. Attachments.....	7

1. Introduction

1.1 PROJECT DESCRIPTION

This report has been prepared to provide an analysis of drainage patterns and improvements related to the 500 W Collins development, which is located within the City of Orange, CA. The proposed project is a redevelopment of two existing buildings with onsite parking and outdoor storage. Once completed, this site will contain one new warehouse with truck docks, surrounded by site parking, landscape, and hardscape, with modular wetland systems for treatment and an underground pipe storage system for detention.

The site consists currently of two buildings, one smaller office building and one larger manufacturing/storage building. The site surface drains to the public right-of-way through on-site gutters and storm drain pipe that discharge to the public sidewalk on W Nicholas Avenue. The project proposes to surface drain all runoff to curb inlets where it will be treated prior to discharging into the public system.

1.2 REPORT OBJECTIVES

The objective of this report is to outline an orderly drainage system for the site in accordance with the Orange County Hydrology and Hydraulics Manual. Objectives of this report are as follows:

- Determine the developed, or proposed, site hydrologic conditions, including overland runoff rates expected from the 100-year storm event.
- Validate the design of the proposed underground storm drain conveyance systems and provide hydraulic calculations.
- Provide storm water quality treatment in accordance with MRP NPDES Permit dated November 19, 2015.

1.3 CRITERIA, PROCEDURE, AND METHODOLOGY

Calculations and design criteria contained within this report are consistent with the Orange County Hydrology requirements. The hydrology and storage calculations are per SCS runoff equations and are in accordance with County design criteria as performed in the Hydro Cad software.

2. Discussion/Calculations

2.1 HYDROLOGY

The site area of 6.035 acres is being treated by one modular wetland system .

Based on the NOAA Atlas 14 Point Precipitation Frequency Estimate, a mean precipitation depth of 3.76 inches was used for the 10-year storm, and 5.98 for the 100-year storm. Site hydrology was determined using HydroCAD software utilizing a Type 1 24-hour storm event. Time of concentration was determined using the WINTR-55 program. See Attachment 3 for results.

Using the inputs as described above, the expected 10-year and 100-year, 24-hour peak runoff rate for listed in the table below:

10-year	Site
Pre-Development (cfs)	26.10
Post-Development (cfs)	26.45

100-year	Site
Pre-Development (cfs)	44.11
Post-Development (cfs)	44.68

The existing peak flow leaving the site was 44.11 cfs. The proposed peak flow leaving the site is 44.68 cfs.

See Attachment 1 of this report for the proposed Hydrology Map and DMA areas and see Attachment 2 of this report for hydrologic calculations as contained within the HydroCAD results.

2.2 STORMWATER QUALITY

The storm water quality treatment was designed in accordance with the MRP NPDES Permit dated November 19, 2015. Two onsite modular wetland systems are proposed to meet treatment requirements. Sizing calculations are contained within Attachment 3 of this report.

3. Conclusion







The overall hydrology and hydraulics are consistent with City of Irvine and County of Orange guidelines for the 100-year, 24-hour storm event. Treatment criteria is being met by the inclusion of two modular wetland systems onsite. All calculations supporting the design of proposed storm drain conveyance and stormwater treatment facilities are contained within the Attachments of this report.

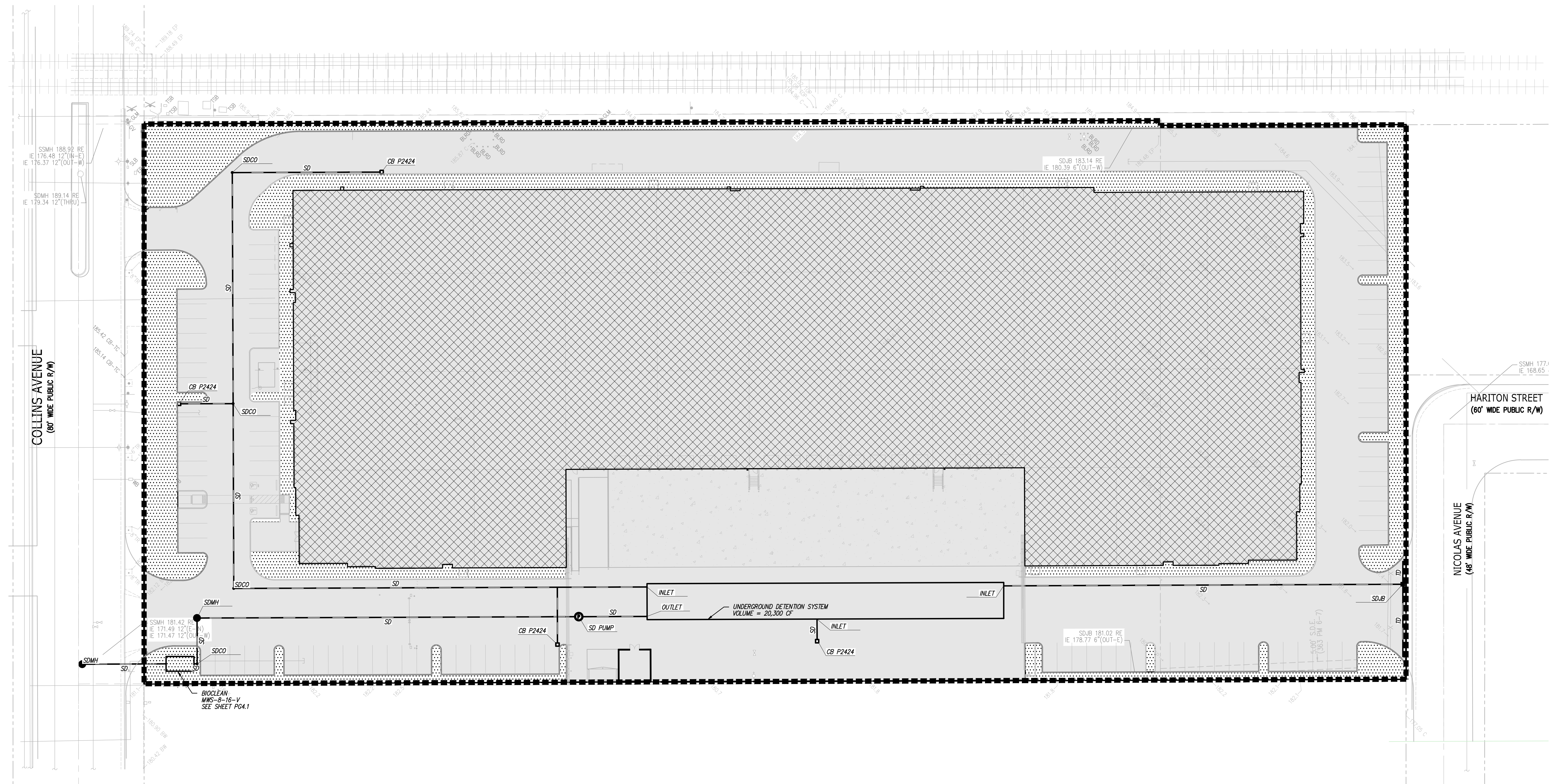
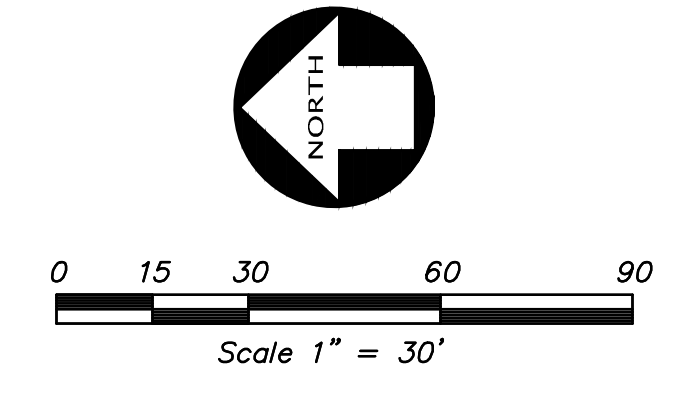
4. Attachments

Attachment 1	Hydrology Map
Attachment 2	HydroCAD Analysis
Attachment 3	WINTR-55 Results
Attachment 4	Treatment Calculations

Attachment 1
Hydrology Map

LEGEND

-  TRIBUTARY AREA LIMITS
-  LANDSCAPE AREA
-  IMPERVIOUS ROOFTOP DRAINING TO BIO-SWALE
-  IMPERVIOUS PAVEMENT DRAINING TO BIO-SWALE
-  BIO-RETENTION TREATMENT AREA
-  CONCRETE AREA



NO.	REVISION	BY	DATE

KIER+WRIGHT
 163 Technology Drive
 Irvine, CA 92620
 Phone: (949) 508-0202
 www.kierwright.com

PRELIMINARY SWQCP
 OF
500 W. COLLINS AVE
 FOR
BROOKFIELD PROPERTIES
 ORANGE, CALIFORNIA

DATE	NOV. 2022
SCALE	AS SHOWN
DESIGNER	JAM
DRAWN BY	MRF
JOB NO.	A22199

Z:\2022\A22199\DWG\ENTITLEMENTS\PD PERMIT\A22199-PC-SWG.dwg 11-07-22 10:05:29 AM jmarahall

Attachment 2
HydroCAD Analysis

Summary for Subcatchment 1S: Pre-Development

Runoff = 26.10 cfs @ 12.00 hrs, Volume= 1.360 af, Depth> 2.70"

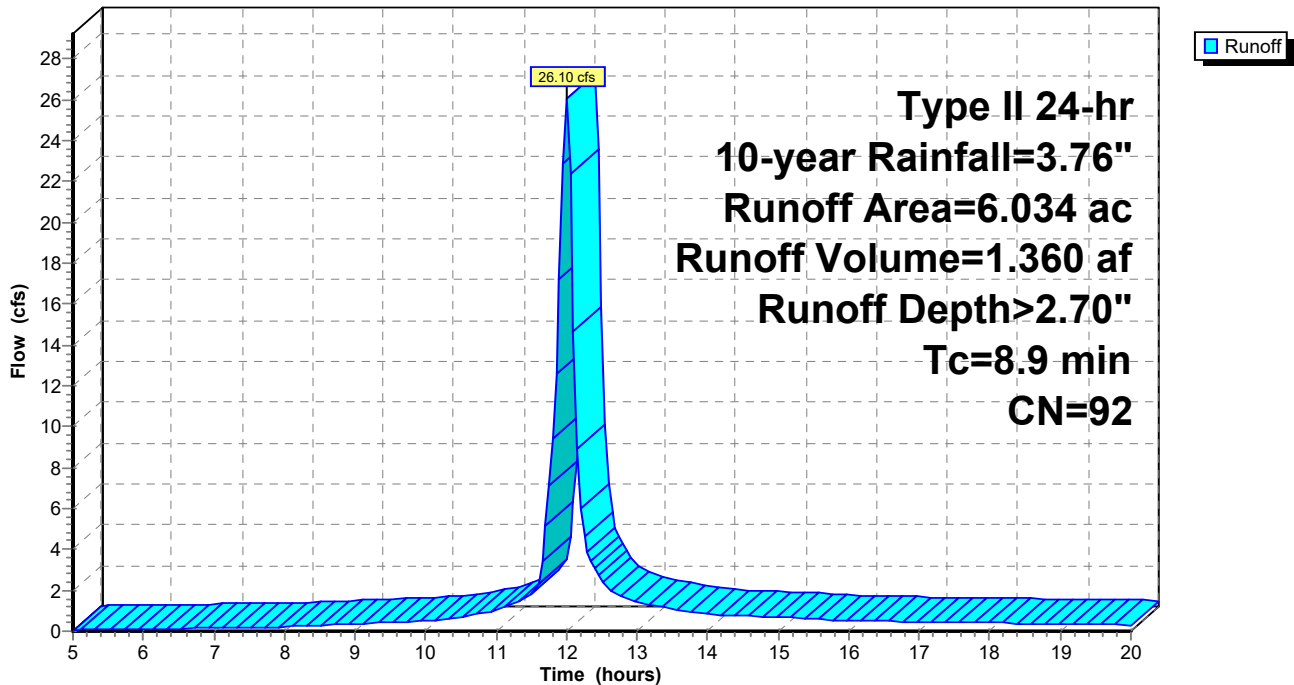
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-year Rainfall=3.76"

Area (ac)	CN	Description
4.552	98	Paved parking, HSG A
0.324	68	<50% Grass cover, Poor, HSG A
1.158	76	Gravel roads, HSG A
6.034	92	Weighted Average
1.482		24.56% Pervious Area
4.552		75.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9					Direct Entry,

Subcatchment 1S: Pre-Development

Hydrograph



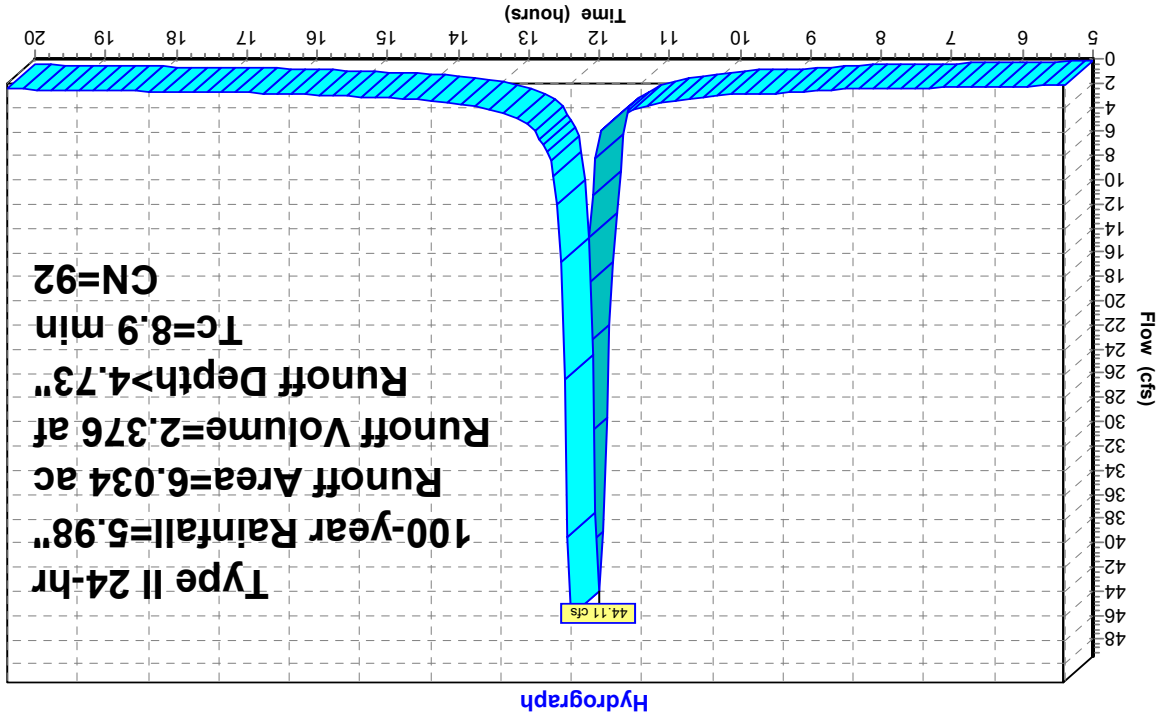
Summary for Subcatchment 1S: Pre-Development

Runoff = 44.11 cfs @ 12.00 hrs, Volume = 2.376 af, Depth > 4.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span = 5.00-20.00 hrs, dt = 0.05 hrs
 Type II 24-hr 100-year Rainfall=5.98"

Area (ac)	CN	Description
4.552	98	Paved parking, HSG A
0.324	68	>50% Grass cover, Poor, HSG A
1.158	76	Gravel roads, HSG A
6.034	92	Weighted Average
1.482		24.56% Pervious Area
4.552		75.44% Impervious Area
Tc Length (feet)		Slope Velocity (ft/ft)
(min)		Capacity (cfs)
8.9		Direct Entry,

Subcatchment 1S: Pre-Development



Runoff

Attachment 3
WINTR-55 Results

Jake

A22199

Orange County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)

Pre-Develo							
SHEET	54	0.0064	0.011				0.024
SHALLOW	691	0.0058	0.025				0.124
					Time of Concentration		.148
							=====
Post-Devel							
SHEET	94	0.0075	0.011				0.036
SHALLOW	578	0.0055	0.025				0.106
					Time of Concentration		.142
							=====

Attachment 4
Treatment Calculations

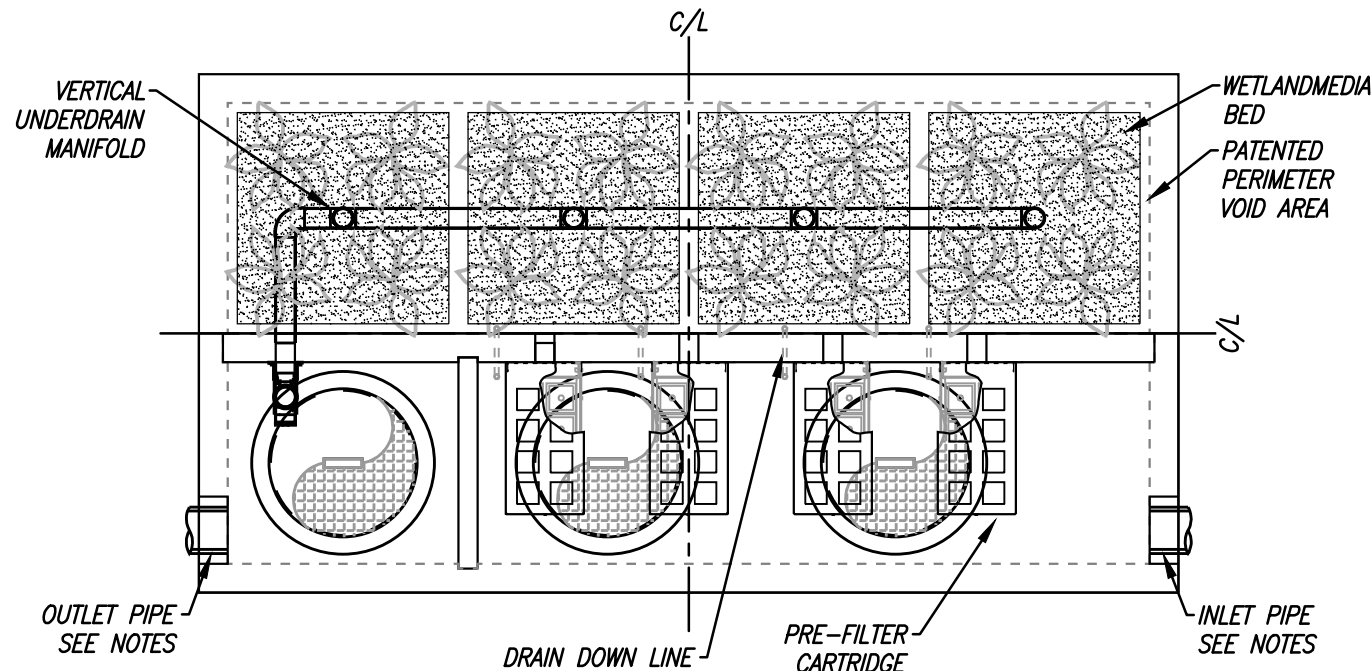
SITE SPECIFIC DATA			
PROJECT NUMBER	730626		
PROJECT NAME	500 WEST COLLINS		
PROJECT LOCATION	ORANGE, CA		
STRUCTURE ID	----		
TREATMENT REQUIRED			
VOLUME BASED (CF)	FLOW BASED (CFS)		
20,278	N/A		
TREATMENT HGL AVAILABLE (FT)	N/K		
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE	OFFLINE		
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	176.83	HDPE	8"
RETURN PIPE	179.93	PVC	6"
OUTLET PIPE	176.33	HDPE	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	182.00	182.00	182.00
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	2EA ϕ 30"	OPEN PLANTER	ϕ 30"
WETLANDMEDIA VOLUME (CY)	11.33		
ORIFICE SIZE (DIA. INCHES)	ϕ 1.56"		
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

INSTALLATION NOTES

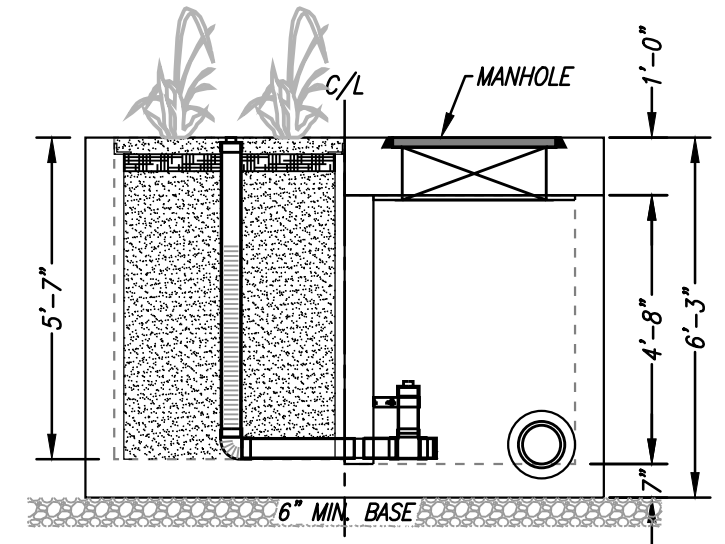
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

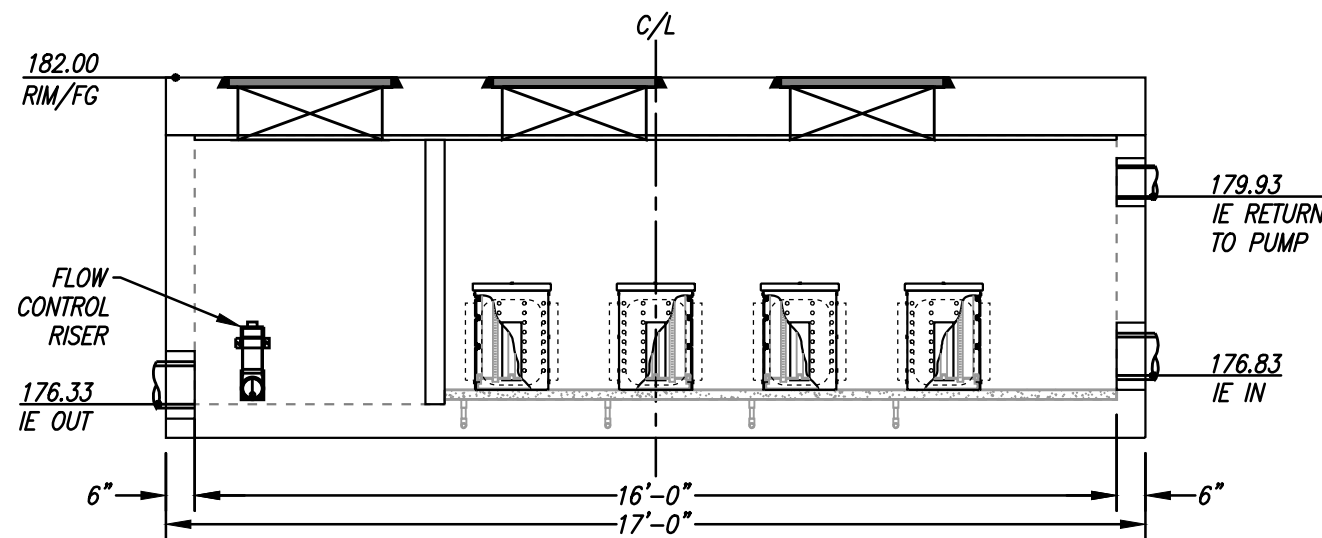
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



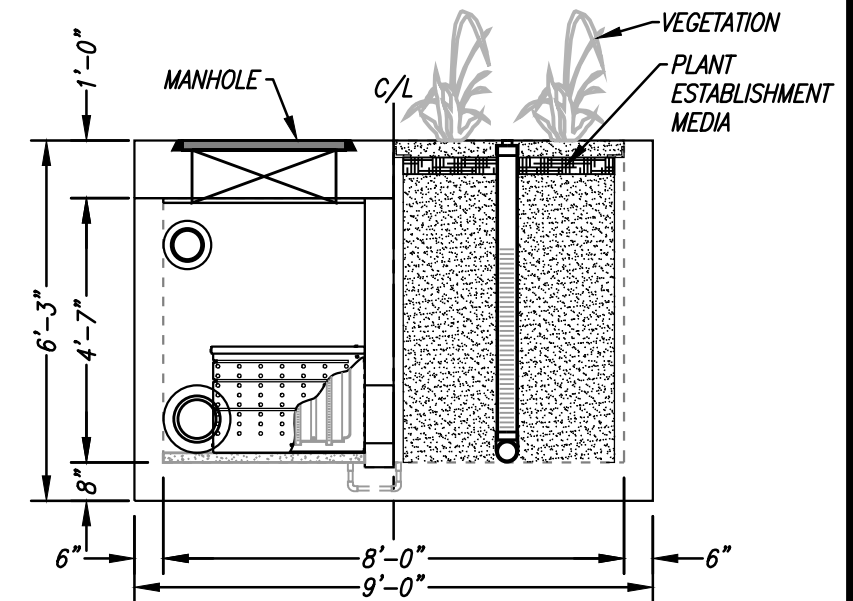
PLAN VIEW



LEFT END VIEW

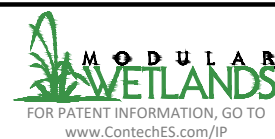


ELEVATION VIEW



RIGHT END VIEW

REQUIRED TREATMENT VOLUME (CF)	20,278
DRAINDOWN DURATION (HOURS)	46
MAX DISCHARGE RATE PER MWS UNIT(GPM)	55.41
OPERATING HEAD (FT)	3.6
WETLANDMEDIA INFILTRATION RATE (IN/HR)	26
WETLANDMEDIA LOADING RATE (GPM/SF)	OR 0.26



PROPRIETARY AND CONFIDENTIAL:
THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE SOLE PROPERTY OF FORTERRA AND ITS COMPANIES. THIS DOCUMENT, NOR ANY PART THEREOF, MAY BE USED, REPRODUCED OR MODIFIED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF FORTERRA.



MWS-L-8-16-5'-7\"/>

11/1/22/MAT/WHOLEERY