

# Preliminary Hydrology Report

## **Starlight Cinemas Phase III- CEQA**

12111 Valley View Street  
Garden Grove, CA 93535

Prepared For:

## **Valley View Cinema Center, LLC**

315 Rees Street  
Playa Del Rey, CA 92845  
Daniel Akarakian  
310-702-5190

Prepared By:



18400 Von Karman Avenue, Suite 600  
Irvine, CA 92612  
Ali Khamsi, P.E.  
(949) 252-1022

October 9, 2020

---

## Table of Contents

<u>Sections</u>	<u>Page</u>
Project Description .....	3
Site Condition Assessment .....	3
Stormwater Design Volume Calculations .....	4
Stormwater Quality Control Measures .....	4
Hydromodification Requirements .....	5
Strom Drain Sizing .....	5

### Exhibits

- Exhibit 1 – Vicinity Map
- Exhibit 2 – Existing Conditions
- Exhibit 3 – Proposed Conditions

### Attachments

- Attachment A – Hydrology/ Hydraulics Calculations
- Attachment B – BMP Details

## **Project Description**

This project consists of the expansion of the existing Starlight Cinema, located at 1211 Valley View Street in the city of Garden Grove. The site is located southwest of the Chapman Avenue and Valley View Street Intersection. The project site is bounded by commercial properties to the north and east and residential areas to the south and west. A vicinity map is provided in Exhibit 1.

The 2.15 acre parcel is the third phase of redevelopment in the West Grove Shopping Center. Proposed work for this phase includes tenant improvements to the existing bowling alley, construction of new restaurant space, and reconfiguration of the parking lot including revised pedestrian and vehicular paths of travel.

## **Site Condition Assessment**

The project site is currently a developed shopping center almost entirely made up of impervious surface. The site slopes to the south and the east. The site is located within the Santa Ana Watershed.

### *Existing Hydrology*

The existing site is 2.15 acres which consists of 99% impervious area. Runoff predominantly leaves the site via sheet flow. The northern part of the site sheet flows to Valley View Street and continues south along the roadway before reaching a catch basin that discharges to a concrete channel that flows to Bolsa Chica Channel. The southern portion of the site sheet flows to a valley gutter where it discharges to the alley and continues west to a trench drain located in a residential area. Refer to Exhibit 2 for existing conditions map.

Per Geotechnical Investigation prepared by Terracon Consultants, Inc., dated June 5, 2017, the subsurface soils of the site consisted of predominantly very soft to medium stiff lean clay with variable amounts of sand to the maximum depth of 51.5 feet. Groundwater was encountered between the depths of 5 and 7 feet.

### *Proposed Hydrology*

The post development drainage is similar to the pre development drainage. There are two drainage management areas (DMAs) and runoff flows in the southern and eastern direction in both the pre and post condition. Runoff in the existing condition sheet flows to the road, however in developed condition, flow is collected and conveyed through storm drain to a modular wetland system before discharging through a parkway drain. DMA 1 is along Valley View street and will discharge to the street before entering a catch basin south of the site along Valley View Street. DMA 2 discharges to the alley where it flows along the alley gutter west before entering a trench drain near the adjacent community. Hydrology Calculations can be found in Appendix A.

## **Stormwater Design Volume Calculations**

The stormwater quality design volumes (DVC), uses the 2 year 1 hour rainfall intensity determined by exhibits found in the Orange County Technical Guidance Document (TGD). Calculations for the design flow rate for each drainage management area (DMA) was calculated using the North Orange County modified rational method provided in the TGD. Refer to Exhibit 4 for map. The summary of the calculations is shown in the following Table 1:

<b>Table 1: Peak Flow and DCV Summary Table</b>					
<b>Area ID</b>	<b>Drainage Area (ac)</b>	<b>Impervious Area</b>	<b>DCV (cf)</b>	<b>85<sup>th</sup> % Storm Peak Flow (cfs)</b>	<b>50 Year Peak Flow Rate (cfs)</b>
DMA-1	1.19	1.02	2730	0.23	1.17
DMA-2	0.96	0.86	2286	0.19	0.98

## **Stormwater Quality Control Measures**

Low Impact Development (LID) Best Management Practices (BMPs) are required to reduce pollutants in stormwater discharges. LID BMPs for this project are treating the full design capture volume (DCV).

To meet North Orange County WQMP requirements the project proposes to implement the following in each DMA:

- BioClean Modular Wetland to treat stormwater runoff. The unit is sized based on the treatment flow calculated per Orange County modified rational method in Worksheet D of the Technical Guidance Document (TGD). Refer to the project specific P-WQMP for further calculations.
- The mitigated flow will be discharged via a pump system out onto Valley View Street for DMA-1 and the southern Alley for DMA-2. The mitigated flow will discharge through a parkway drain at a low velocity.
- The internal bypass system is sized for the 50 year peak flow rate, and will also discharge to Valley View Street for DMA-1 and the southern Alley for DMA-2.

Table 2 below displays the permanent, structural BMP device to be used onsite:

Table 2: Stormwater Quality Control Measures				
Area ID	Proposed System	Manufacturer ID Number	Treatment Flow Rate (cfs)	Bypass Flow Rate (cfs)
DMA-1	BioClean Modular Wetland	MWS-L-8-12-5'-4.5"V	0.25	1.28
DMA-2	BioClean Modular Wetland	MWS-L-8-8-7'-4"V	0.21	1.08

## Hydromodification Requirements

Post development runoff volume for the 2-year, 24 hour storm does not exceed that of the pre-development condition by more than 5%; therefore HCOCs do not exist. Due to the addition of pervious planters and the use of storm drain systems to collect runoff, time of concentration has increased and runoff volume has decreased from pre to post conditions. Calculations are provided in Attachment A.

### Existing Vs. Proposed Imperviousness

The table below provides a comparison of the site pervious and impervious conditions prior to and following construction.

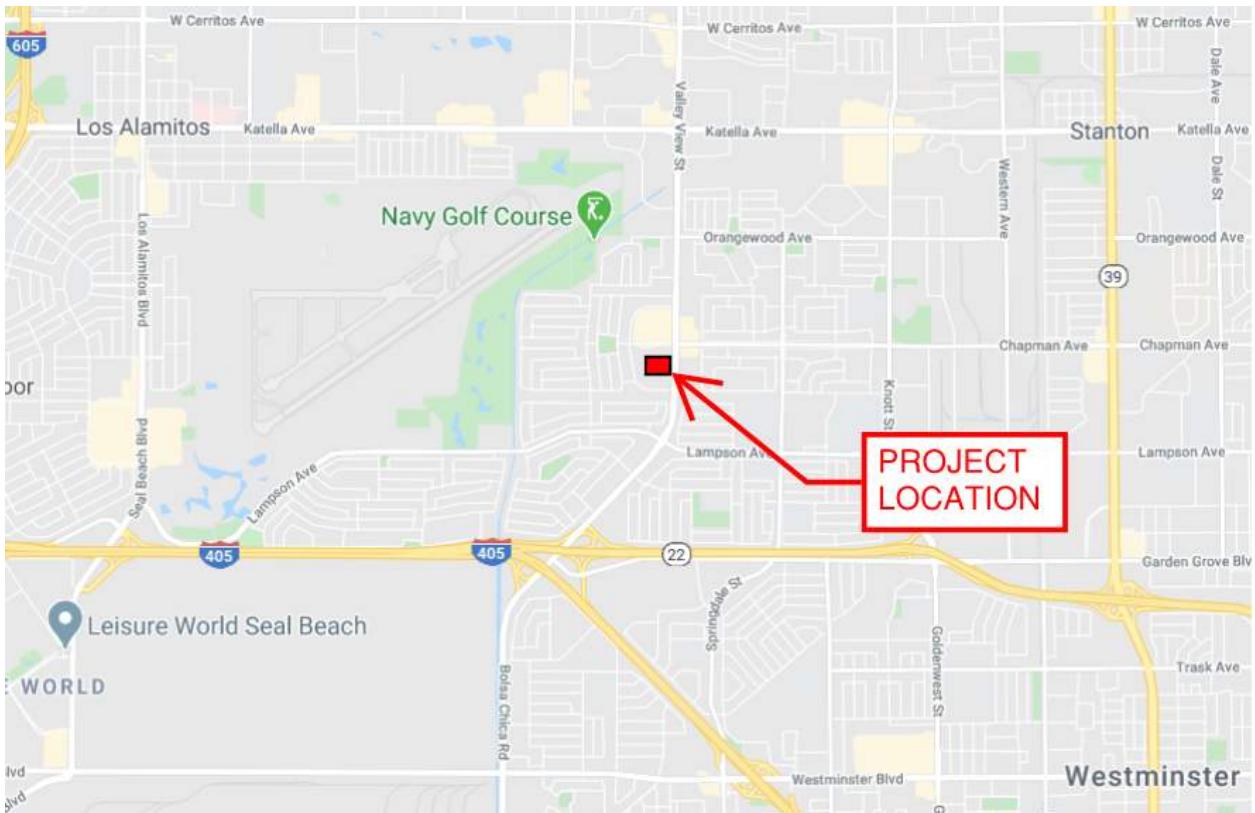
Table 3: Existing Area Impervious Vs. Pervious				
	Area (acres)	Pervious (acres)	Impervious (acres)	Impervious (%)
Existing	2.15	0.01	2.14	99%
Proposed	2.15	0.27	1.88	87%

The site map depicting site boundaries, drainage patterns and Storm Water Quality Control BMP's is provided in Exhibit 3 – Proposed Conditions.

## Storm Drain Sizing

The largest drainage area was used to establish the size of the pipe network. The 50-year peak flow from DMA-1 was used to calculate required pipe diameter of 8 inches. Flowmaster results can be found in Appendix A.

## Exhibit 1 – Vicinity Map



Site Address:

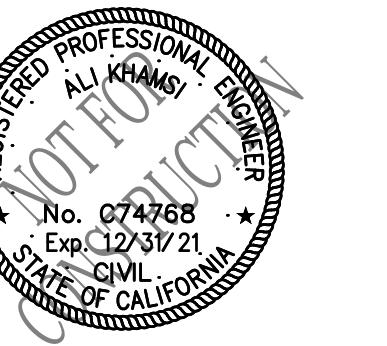
12111 Valley View Street  
Garden Grove CA, 93535

## **Exhibit 2 – Existing Conditions**

## STARLIGHT CINEMAS

12111 VALLEY VIEW STREET  
GARDEN GROVE CA 92845

## CONSULTANTS:



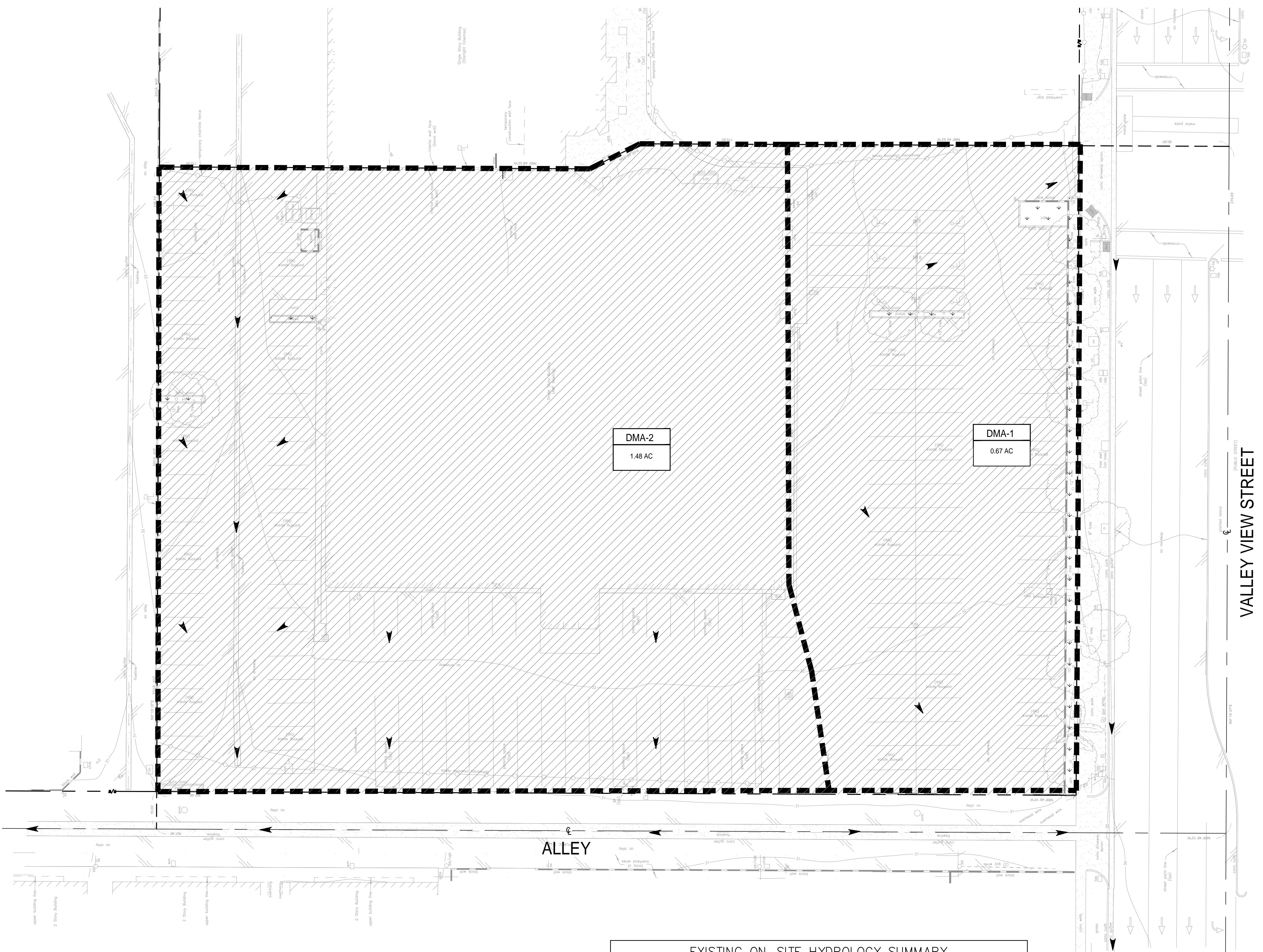
DATE ISSUED FOR:

Date: 03-19-2020  
Project Number: 1900064  
Drawn By: TN  
Checked By: RH  
Scale: AS SPECIFIED

## EXISTING HYDROLOGY EXHIBIT

SHEET:  
**EXHB 1**  
NOT FOR CONSTRUCTION

<b>LEGEND</b>
— PROPERTY LINE
- - - DRAINAGE AREA BOUNDARY (DMA)
▲ EXISTING FLOW DIRECTION
▨ EXISTING IMPERVIOUS AREA
▢ EXISTING PERVIOUS AREA



EXISTING ON-SITE HYDROLOGY SUMMARY								
TOTAL (FT <sup>2</sup> )	TOTAL (AC)	IMPERVIOUS (FT <sup>2</sup> )	IMPERVIOUS (AC)	IMPERVIOUS (%)	PERVIOUS (FT <sup>2</sup> )	PERVIOUS (AC)	PERVIOUS (%)	HCOC RUNOFF VOL (CF)
DMA-1	0.67	28812.68	0.66	98.50	251.63	0.01	1.50	4,611
DMA-2	1.48	64,467.65	1.48	99.88	74.67	0.00	0.12	10,299
	93,606.63	2.15	93,280.33	2.14	99.65	326.30	0.01	0.35
								14,909

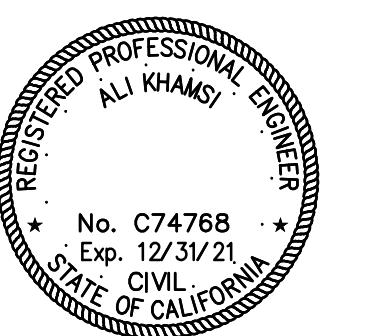
PLAN  
SCALE: 1" = 20'-0"  
0' 10' 20' 40'  
GRAPHIC SCALE

## **Exhibit 3 – Proposed Conditions**

## STARLIGHT CINEMAS

12111 VALLEY VIEW STREET  
GARDEN GROVE CA 92845

### CONSULTANTS:

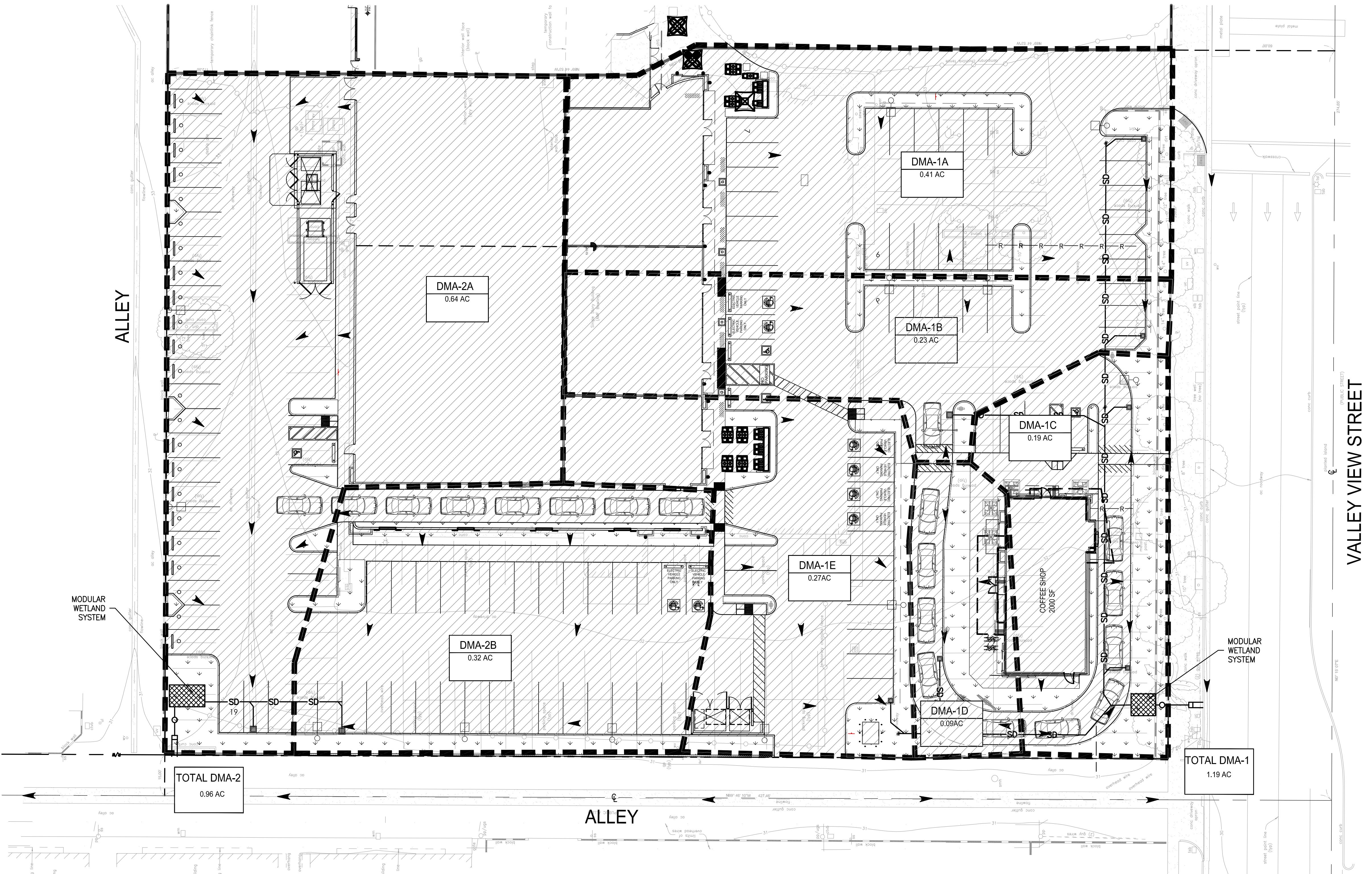


DATE  ISSUED FOR:

Date: 03-19-2020  
Project Number: 1900064  
Drawn By: TN  
Checked By: RH  
Scale: AS SPECIFIED

### PROPOSED HYDROLOGY EXHIBIT

SHEET:  
**EXHB 1**  
NOT FOR CONSTRUCTION



### PROPOSED ON-SITE HYDROLOGY SUMMARY

	TOTAL (FT <sup>2</sup> )	TOTAL (AC)	IMPERVIOUS (FT <sup>2</sup> )	IMPERVIOUS (AC)	IMPERVIOUS (%)	PERVIOUS (FT <sup>2</sup> )	PERVIOUS (AC)	PERVIOUS (%)	HCOC RUNOFF VOL (CF)
DMA-1	51836.40	1.19	44,264.45	1.02	85.39	7571.95	0.17	14.61	7,269
DMA-2	41817.60	0.96	37,590.52	0.86	88.75	4227.08	0.10	11.25	6,087
SITE	93654.00	2.15	81,854.97	1.88	87.40	11799.03	0.27	12.60	13,355

PLAN  
SCALE: 1" = 20'-0"  
0' 10' 20' 40'  
GRAPHIC SCALE

## **Attachment A – Hydrology/ Hydraulics Calculations**

## HCOC Calculation

PRE-DEVELOPED CONDITION						
DMA	AREA (AC)	IMPERVIOUS (AC)	IMPERVIOUS RATIO	C	2-YEAR, 24 HR RAINFALL (in)	Runoff Volume (CF)
1	0.67	0.66	0.99	0.89	2.13	4611
2	1.48	1.48	1.00	0.9	2.13	10299
						<b>TOTAL</b> 14909

POST-DEVELOPED CONDITION						
DMA	AREA (AC)	IMPERVIOUS (AC)	IMPERVIOUS RATIO	C	2-YEAR, 24 HR RAINFALL (in)	Runoff Volume (CF)
1	1.19	1.02	0.86	0.79	2.13	7269
2	0.96	0.86	0.90	0.82	2.13	6087
						<b>TOTAL</b> 13355

<b>V2 (post/pre)</b>	<b>0.90</b>
--------------------------	-------------

### **Hydromodification Control Design Not Required**

Post development runoff volume for the 2-year, 24 hour storm does not exceed that of the pre-development condition by more than 5%; therefore HCOCs do not exist. Due to the addition of pervious planters and the use of storm drain systems to collect runoff, time of concentration has increased, and runoff volume has decreased from pre

### **Formulas**

$$V = C \cdot d \cdot A \cdot 43560 \cdot \frac{1}{12}$$

LID DESIGN SUMMARY						
DMA	AREA (AC)	IMPERVIOUS (AC)	C	24 Hour, 85th Percentile Rainfall (in)	QDESIGN (CFS)	DCV (CF)
1	1.19	1.02	0.79	0.8	0.2	2730
2	0.96	0.86	0.82	0.8	0.24	2286
		TOTAL		0.44	5016	

**Formulas**

$V = C \cdot d \cdot A \cdot 43560 \cdot 1/12$   
 C from TGD worksheet D

## Circular Pipe (Pipe Sizing.fm8)

Label	Friction Method	Roughness Coefficient	Channel Slope (ft/ft)	Normal Depth (in)	Diameter (in)
Circular Pipe - 1	Manning Formula	0.010	0.006	6.3	8.0
Discharge (cfs)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Hydraulic Radius (in)	Critical Depth (in)	Percent Full (%)
1.17	0.3	1.5	2.4	6.2	78.7
Critical Slope (ft/ft)	Velocity (ft/s)	Velocity Head (ft)	Maximum Discharge (cfs)	Discharge Full (cfs)	Flow Type
0.006	3.97	0.25	1.31	1.22	Subcritical

## **Attachment B – BMP Details**

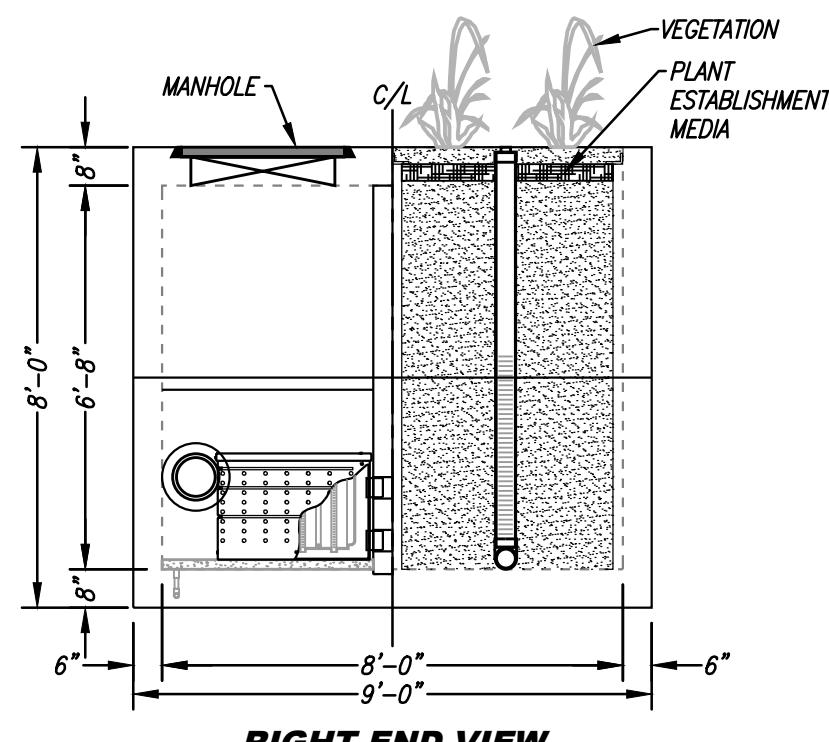
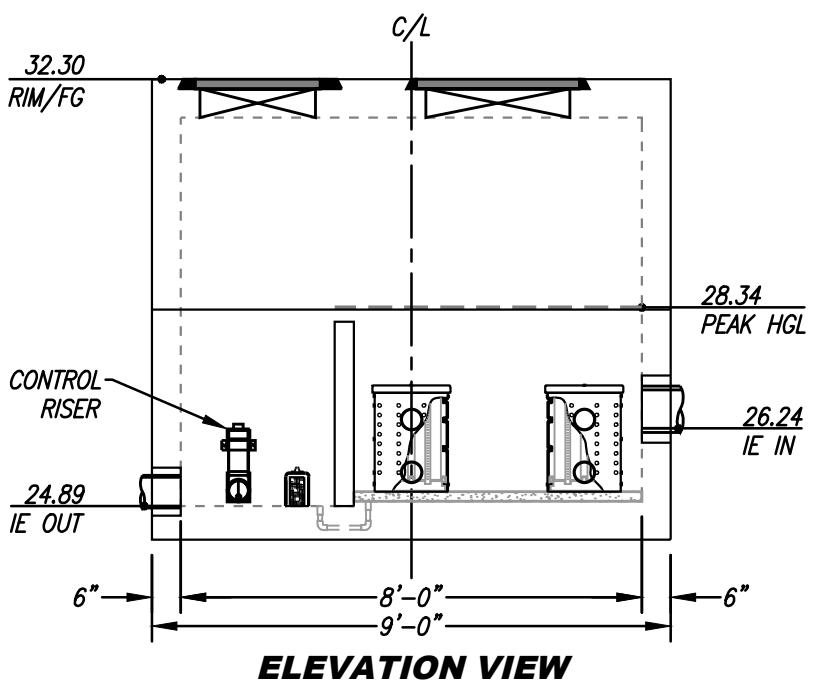
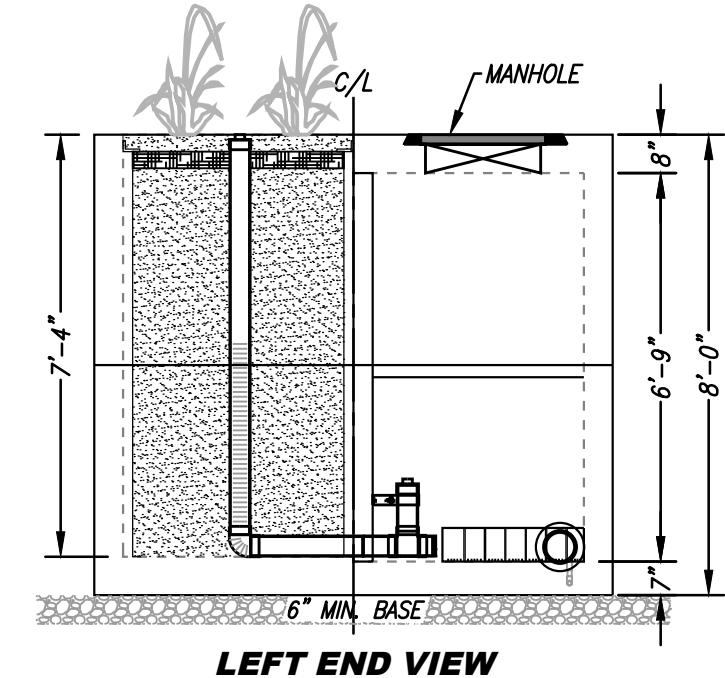
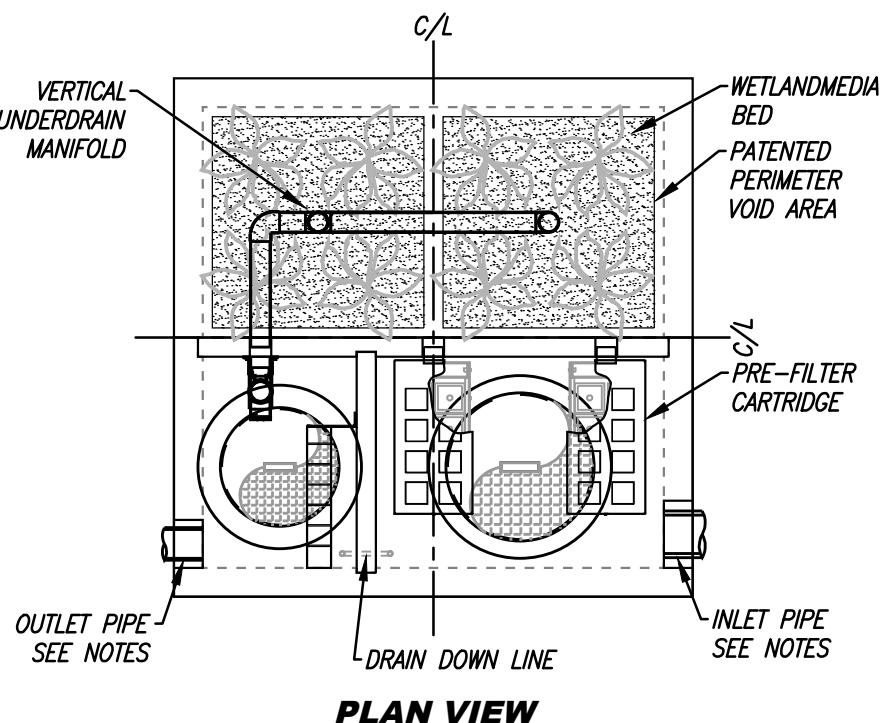
SITE SPECIFIC DATA			
PROJECT NUMBER	10749		
PROJECT NAME	STARLIGHT CINEMAS PHASE III		
PROJECT LOCATION	GARDEN GROVE, CA		
STRUCTURE ID	DMA 1		
TREATMENT REQUIRED			
VOLUME BASED (CF)	FLOW BASED (CFS)		
N/A	0.220		
TREATMENT HGL AVAILABLE (FT)	N/K		
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE	1.14		
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	26.24	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	24.89	PVC	6"
PRETREATMENT	BIOFILTRATION	DISCHARGE	
RIM ELEVATION	32.30	32.30	32.30
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	Ø30"	OPEN PLANTER	Ø24"
WETLANDMEDIA VOLUME (CY)	7.43		
ORIFICE SIZE (DIA. INCHES)	Ø2.14"		
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

#### INSTALLATION NOTES

- 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.
- 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.
- 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.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
- VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
- 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

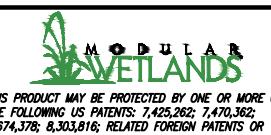
- MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



#### INTERNAL BYPASS DISCLOSURE:

THE DESIGN AND CAPACITY OF THE PEAK CONVEYANCE METHOD TO BE REVIEWED AND APPROVED BY THE ENGINEER OF RECORD. HGL(S) AT PEAK FLOW SHALL BE ASSESSED TO ENSURE NO UPSTREAM FLOODING. PEAK HGL AND BYPASS CAPACITY SHOWN ON DRAWING ARE USED FOR GUIDANCE ONLY.

TREATMENT FLOW (CFS)	0.220
OPERATING HEAD (FT)	3.2
PRETREATMENT LOADING RATE (GPM/SF)	1.9
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0



THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,376; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

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-8-8-7'-4"-V**  
STORMWATER BIOFILTRATION SYSTEM  
STANDARD DETAIL

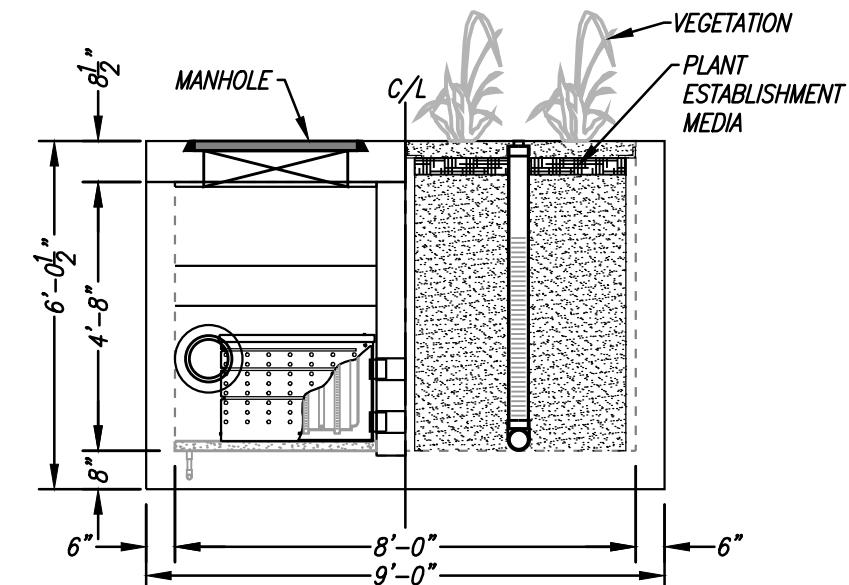
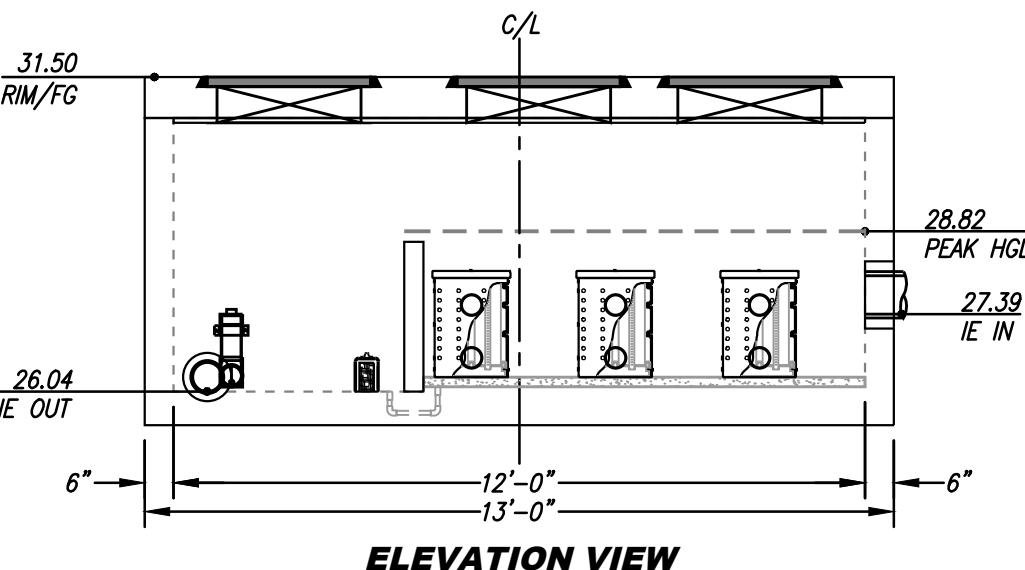
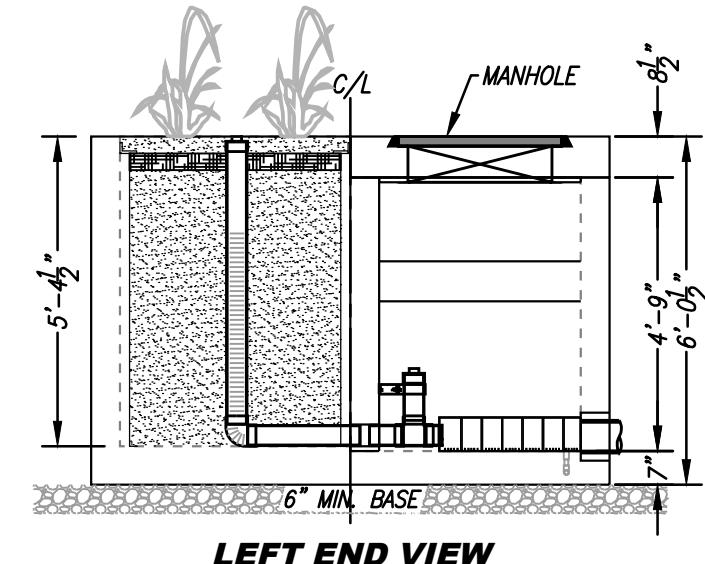
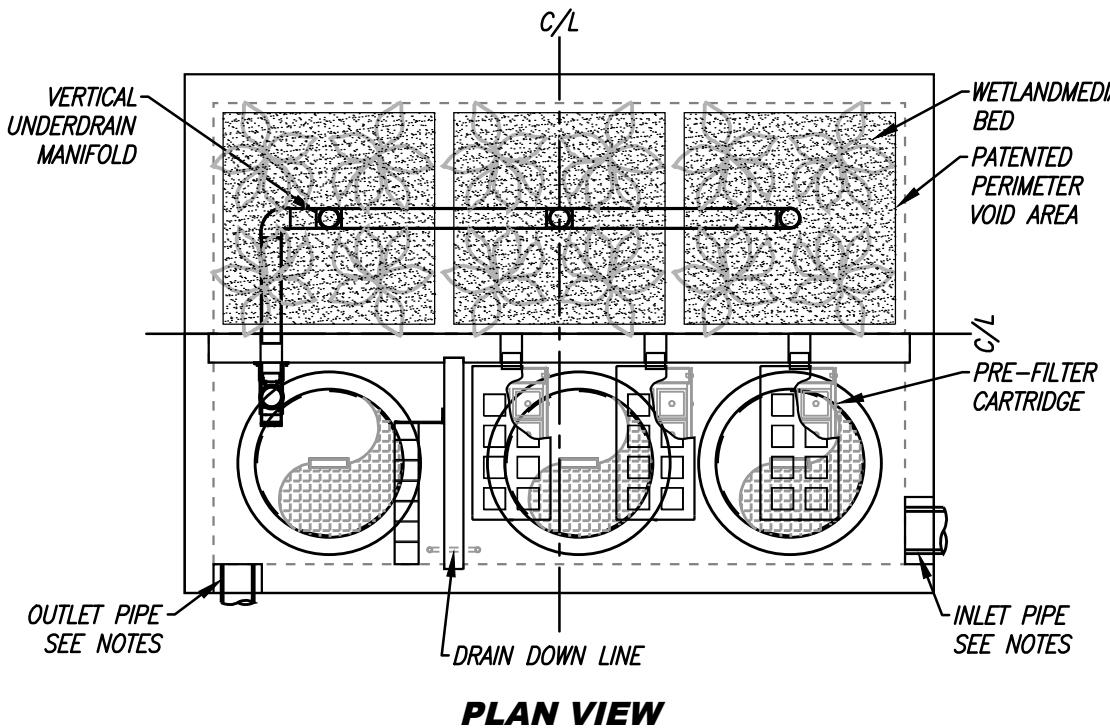
SITE SPECIFIC DATA		
PROJECT NUMBER		10749
PROJECT NAME		STARLIGHT CINEMAS PHASE III
PROJECT LOCATION		GARDEN GROVE, CA
STRUCTURE ID		DMA 2
TREATMENT REQUIRED		
VOLUME BASED (CF)	FLOW BASED (CFS)	
N/A	0.260	
TREATMENT HGL AVAILABLE (FT)		N/K
PEAK BYPASS REQUIRED (CFS) - IF APPLICABLE		1.34
PIPE DATA	I.E.	MATERIAL
INLET PIPE 1	27.39	PVC
INLET PIPE 2	N/A	N/A
OUTLET PIPE	26.04	PVC
	PRETREATMENT	BIOFILTRATION
RIM ELEVATION	31.50	31.50
SURFACE LOAD	PEDESTRIAN	N/A
FRAME & COVER	2EA Ø30"	OPEN PLANTER
WETLANDMEDIA VOLUME (CY)	8.18	
ORIFICE SIZE (DIA. INCHES)	Ø2.47"	
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.		

#### INSTALLATION NOTES

- 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.
- 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.
- 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.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
- VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
- 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

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



#### INTERNAL BYPASS DISCLOSURE:

THE DESIGN AND CAPACITY OF THE PEAK CONVEYANCE METHOD TO BE REVIEWED AND APPROVED BY THE ENGINEER OF RECORD. HGL(S) AT PEAK FLOW SHALL BE ASSESSED TO ENSURE NO UPSTREAM FLOODING. PEAK HGL AND BYPASS CAPACITY SHOWN ON DRAWING ARE USED FOR GUIDANCE ONLY.

TREATMENT FLOW (CFS)	0.260
OPERATING HEAD (FT)	2.6
PRETREATMENT LOADING RATE (GPM/SF)	1.5
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0



MODULAR  
WETLANDS

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,376; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

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-8-12-5'-4.5"-V**  
**STORMWATER BIOFILTRATION SYSTEM**  
**STANDARD DETAIL**