

STORMWATER MANAGEMENT REPORT

FOR

Culvers Restaurant

**2000 N. State Road 7,
Margate, FL 33063**

January 22nd, 2019

Justin Thompson, P.E.

Florida License No. 84595

Bowman Consulting Group, LTD.

Board of Professional Engineers –

Certificate of Authorization No. 30462

PROJECT #010594-01-001

13450 W Sunrise Blvd, Suite 320
Sunrise, FL 33323
954.314.8480

Table of Contents

Introduction.....	1
Project Information.....	1
Site Conditions.....	1
Land Use Calculations.....	2
Soil Storage and Runoff Calculations.....	3
Stage Storage.....	5
Methodology.....	7
Dry Pre-treatment.....	8
Pre Vs. Post.....	9
Conclusion.....	11
Appendix A.....	12
Appendix B.....	13

Justin Thompson, P.E.
Florida License No. 84595
Bowman Consulting Group, LTD.
Board of Professional Engineers –
Certificate of Authorization No. 30462

Introduction

Project Information

The project consists of one (1) lot located on the Southwest corner of W. Copans Road and NW 55th Avenue in the municipal boundaries of the City of Margate, FL. The lot folio number is 4842-30-05-0020, located in the jurisdiction of the City of Margate and is currently zoned Transit Oriented Corridor (TOC-G). The lot contains 3.60 acres in total, of which approximately 1.96 acres is developed as a convenience store with a gas station. The remaining 1.64 acres proposes the construction of a four thousand four hundred forty-three (4,443) square foot restaurant and a four thousand (4,000) square foot general retail. The parcel to the west will be incorporated into the design and calculations to treat this area as one large system. This is to provide adequate water quality treatment and attenuation for both parcels. To distinguish between the parcels the Wawa Site will be referred to as the “West Site” and the proposed Culver’s Site will be referred to as the “East Site”. The required storage volume to provide the 5 year – 1 hour level of service for the parking lot area will be stored in an underground detention system.

Site Conditions

Existing Conditions

The existing 1.96-acre west site is currently a gas station/convenience store with two (2) existing driveways providing access to both State Road 7 and Copans Road, there is currently cross access driveways providing access between the west site and the east site. The site is approximately eighty-four percent (84%) impervious and sixteen percent (16%) pervious. The existing 1.68-acre site is currently vacant with a driveway connecting the property to the west to NW 55th Avenue. The site is approximately ninety one percent (91%) pervious and nine percent (9%) impervious. There is currently (1) existing driveway along NW 55th Avenue, which is a two-way North Bound (NB) arterial. Both parcels combined generates a Runoff Curve Number (RCN) of 91.

Proposed Conditions

The proposed improvements include the construction of a four thousand four hundred forty-three (4,443) square foot restaurant and a four thousand (4,000) square foot general retail. The existing accessway from NW 55th Avenue to the property on the west side will be demolished and

incorporated into the proposed construction. Under proposed conditions, the site will be seventy-three (73%) percent impervious and twenty-seven (27%) percent pervious grass and open space. With these improved conditions the two parcels will generate a new RCN of 94.

Water Table

Due to tailwater conditions, the control elevation and groundwater table elevation have been set at 8.00 ft, NAVD88, as discussed with Broward County during preliminary meetings in July and August of 2018. This is above the 7.0 elevation in the published water table map and above the 6.5 elevation of the Broward County future groundwater conditions map. The Cocomar Water Control District maintains the canal system at 7.00 ft, NAVD88 during wet season and 8.00 ft, NAVD88 during the dry season.

Exfiltration Rates

The proposed storm water improvements associated with this project will incorporate the use of exfiltration trenches. Geotechnical borings were performed and tests based on constant head exfiltration test was used to estimate the “K” value. Based on the field data, a “K” value of 12.5×10^{-4} cfs/sqft-ft and 4.33×10^{-4} cfs/sqft-ft of head was used in the design of the exfiltration trenches for this project. Please refer to attached geotechnical report.

Flood Elevations

The FEMA FIRM map 12011C0165H indicates the site to be in a 0.2% Flood Hazard. FEMA panel number 12011C0165H has been enclosed for reference.

Land Use Calculations

Existing Conditions

Area Description	Square Feet	Acreage
Building	12,996	0.30
Sidewalk / Paving	64,853	1.49
Grass / Open Area	79,662	1.83
Total Area	157,511	3.62

Proposed Conditions

Area Description	Square Feet	Acreage
Building	21,439	0.49
Sidewalk / Paving	102,593	2.36
Grass / Open Area	33,479	0.77
Total Area	157,511	3.62

Soil Storage and Runoff Calculations:**Existing Conditions**

The existing soils are comprised of Pompano Fine Sand and Margate Fine Sand; therefore, flatwoods soils will be used. According to the SFWMD Manual, Page F-1, the depth to water table is 1.0' corresponding to developed available storage of 0.45".

$$\% \text{Impervious} = \frac{1.79}{3.62}$$

$$\% \text{Impervious} = 0.49$$

$$S = S_{\text{Comp}}(1 - \% \text{Impervious})$$

$$S = 0.45"(1 - 0.49)$$

$$\therefore S = \mathbf{0.2295}$$

$$CN = \frac{1000}{S + 10}$$

$$CN = \frac{1000}{(0.2295 + 10)}$$

$$\therefore CN = \mathbf{97.7565}$$

Proposed Conditions

The existing soils are comprised of Pompano fine sand and Margate fine sand; therefore, flatwoods soils will be used. According to the SFWMD Manual, Page F-1, the depth to water table is 1.0' corresponding to developed available storage of 0.45".

$$\% \text{Impervious} = \frac{2.85}{3.62}$$

$$\% \text{Impervious} = 0.79$$

$$S = S_{\text{Comp}}(1 - \% \text{Impervious})$$

$$S = 0.45"(1 - 0.79)$$

$$\therefore S = \mathbf{0.0945}"$$

$$CN = \frac{1000}{S + 10}$$

$$CN = \frac{1000}{(0.0945 + 10)}$$

$$\therefore CN = \mathbf{99.0638}$$

Dry Retention Area – Stage Storage Tabulation

Existing

	West Site	East Site	
WSEL	Surface (ac-ft)	Surface (ac-ft)	Total Volume (ac-ft)
8.00	0	0	0.00
9.00	0	0.02	0.02
10.00	0.22	0.08	0.30
11.00	0.94	0.51	1.45
12.00	2.19	1.69	3.88
12.50	3.02	3.34	6.36

Proposed

	West Site		East Site			
WSEL	Surface (ac-ft)	Trench (ac-ft)	Surface (ac-ft)	Trench (ac-ft)	Vault (ac-ft)	Total Volume (ac-ft)
8.00	0	0	0	0	0	0.00
9.00	0	0.15	0	0.48	0.60	1.23
10.00	0.22	0.31	0	0.95	0.60	2.08
11.00	0.94	0.31	1.02	0.95	0.60	3.82
12.00	2.19	0.31	1.35	0.95	0.60	5.20
12.50	3.02	0.31	1.84	0.95	0.60	6.72

METHODOLOGY

Water Quality

Per South Florida Water Management District design criteria for commercial properties, water quality treatment is required for wet detention areas. The wet detention volume shall be provided for the first inch of runoff from the developed project, or the total runoff of 2.5 inches times the percentage of imperviousness, whichever is greater. The required water quality volume of 0.57 ac-ft will be met in the proposed exfiltration trench and concrete vault on site which provides 2.51 ac-ft. of storage combined.

- **1 in. x Site**

$$\left(1 \text{ in.} \times 3.62 \text{ ac.} \div 12 \frac{\text{in}}{\text{ft}}\right) = 0.30 \text{ ac.-ft}$$

∴ 0.30 ac.-ft. Required Water Quality

- **2.5 in. x (% Impervious)**

- Site Area for Water Quality Calculations

$$= (\text{Total Site} - \text{Roof Area})$$

$$= (3.62 \text{ ac} - 0.49 \text{ ac})$$

$$= 3.13 \text{ ac}$$

- Impervious Area for Water Quality Calculations

$$= (\text{Site Area for Water Quality} - \text{Pervious})$$

$$= (3.13 \text{ ac} - 0.77 \text{ ac})$$

$$= 2.36 \text{ ac}$$

- Percentage of Impervious for Water Quality Calculations

$$= (\text{Impervious Area for WQ} / \text{Site Area for WQ}) \times 100\%$$

$$= (2.36 \text{ ac.} \div 3.13 \text{ ac}) \times 100\% = 75\%$$

$$= (2.5 \text{ in.} \times 0.75) = 1.88 \text{ inches to be treated}$$

$$\begin{aligned} & \circ \text{ Inches to Be Treated} \times \text{Total Site Area} = \text{Treatment Volume} \\ & = (1.88 \text{ in.} \times 3.62 \text{ ac.}) = 6.81 \text{ ac.-in.} \\ & = \left(6.81 \text{ ac.-in.} \div 12 \frac{\text{in}}{\text{ft}} \right) = 0.57 \text{ ac.-ft} \end{aligned}$$

$\therefore$ 0.57 ac.-ft. Required Water Quality

- 0.57 ac.-ft. > 0.30 ac.-ft.

0.57 ac.-ft ← Controls

Water Quality Treatment Required = 0.57 ac-ft

Water Quality Treatment Provided = 0.95 ac-ft

Dry Pre-treatment

Per South Florida Water Management District design criteria, dry pre-treatment is required for 0.5 inches times the entire project area. The required dry pre-treatment volume of 0.15 ac-ft will be met within the proposed exfiltration trench system onsite and a Concrete Vault. The proposed exfiltration system provides a total storage volume of 2.51 ac-ft. The 0.15 ac-ft requirement will be provided in the exfiltration trench. Please see the *Stage Storage Tabulation* below:

$$= (0.5'' \times 3.62\text{-acres} / 12 = 0.15 \text{ ac-ft})$$

Dry Pre-Treatment Required = 0.15 ac-ft

Dry Pre-Treatment Provided = 0.95 ac-ft

Pre vs. Post Analysis

A Pre vs. Post analysis has been performed to model the existing condition and compare it to the proposed condition. Please see Appendix B for the Stage Storage tabulations and Cascade Model outputs. Cascade Models account for the difference as follows:

SFWMD Rainfall Used for Modeling Purposes

Storm Event	Rainfall (Inches)
5-year, 1-hour	3.28
10-year, 1-day	8
25-year, 3-day	14
100-year, 3-day	18.5

Maximum Stage

Storm Event	Pre (NAVD)	Post (NAVD)
5-year – 1-hour	10.21'	8.62'
10-year - 1-day	11.11'	9.90'
25-year - 3-day	11.45'	10.67'
100-year – 3day	12.33'	12.10'

Discharge Rate

Storm Event	Pre (cfs)	Post (cfs)
5-year – 1-hour	(1) 0.34	(1) 0.17
10-year - 1-day	(1) 0.41	(1) 0.32
25-year - 3-day	(1) 0.43	(1) 0.38
100-year – 3-day	-	-

**100 - year – 3day Event has been modeled as a zero discharge condition.*

CONCLUSION

In summary, the addition of 240 L.F. of exfiltration trench and a 34,541 square foot concrete vault will provide adequate storm water management to construct the proposed Culvers Restaurant and General Retail. Dry pre-treatment volume is being met within the 0.95 ac-ft of storage volume in the exfiltration trench. Water quality volume is being met by providing 0.95 ac-ft of storage volume in the exfiltration trench. The required storage volume to provide the 5 year – 1 hour level of service for the parking lot area will be stored in an underground detention system which will improve the existing flooding issue on the Wawa Parcel. In addition, the 100-year water surface elevation has also been demonstrated that it is below the proposed finished floor elevation of 13.00'

Appendix A

EXFILTRATION TRENCH DESIGN CALCULATIONS

for

Culver's Restaurant
2000 N. State Road 7,
Margate, FL

RUNOFF

Area	=	15751.1	sf
CN	=	99.06	
S	=	(1000/CN)-10	
S	=	0.094892	
P	=	3.28	in
Runoff	=	$\frac{(P-0.2S)^2}{(P+0.8S)}$	
Runoff	=	3.17	in
	=	41594	cf

RETENTION PROVIDED

Exfiltration

K_1	=	0.001250	cfs/sq ft - ft head
K_2	=	0.000433	cfs/sq ft - ft head
K_3	=	0.000433	cfs/sq ft - ft head

(From Geotechnical Report from Ardaman & Associates, Inc., dated June 6, 2018)

Kavg	=	0.000705	cfs/sq ft - ft head
------	---	----------	---------------------

L	=	$\frac{V}{(K * (2 * H_2 * D_U - D_U^2 + 2 * H_2 * D_S)) + ((1.39 \times 10^{-4}) * (W * D_U))}$
---	---	---

V	=	$L * (K * (H_2 * W + 2 * H_2 * D_U - D_U^2 + 2 * H_2 * D_S)) + ((1.39 \times 10^{-4}) * (W * D_U))$
---	---	---

V	=	0.95	ac-ft
	=	41594	cf
	=	11.46	ac-in
W	=	Trench Width	= 8 feet
K	=	Hydraulic Conductivity	= 0.000705 cfs/sq ft - ft head
H_2	=	Depth to Water Table	= 4.22 feet
D_U	=	Non-saturated trench depth	= 1.50 feet
D_S	=	Saturated Trench Depth	= 6.50 feet

Length of Trench Required, L	=	240	ft
------------------------------	---	-----	----

SUMMARY

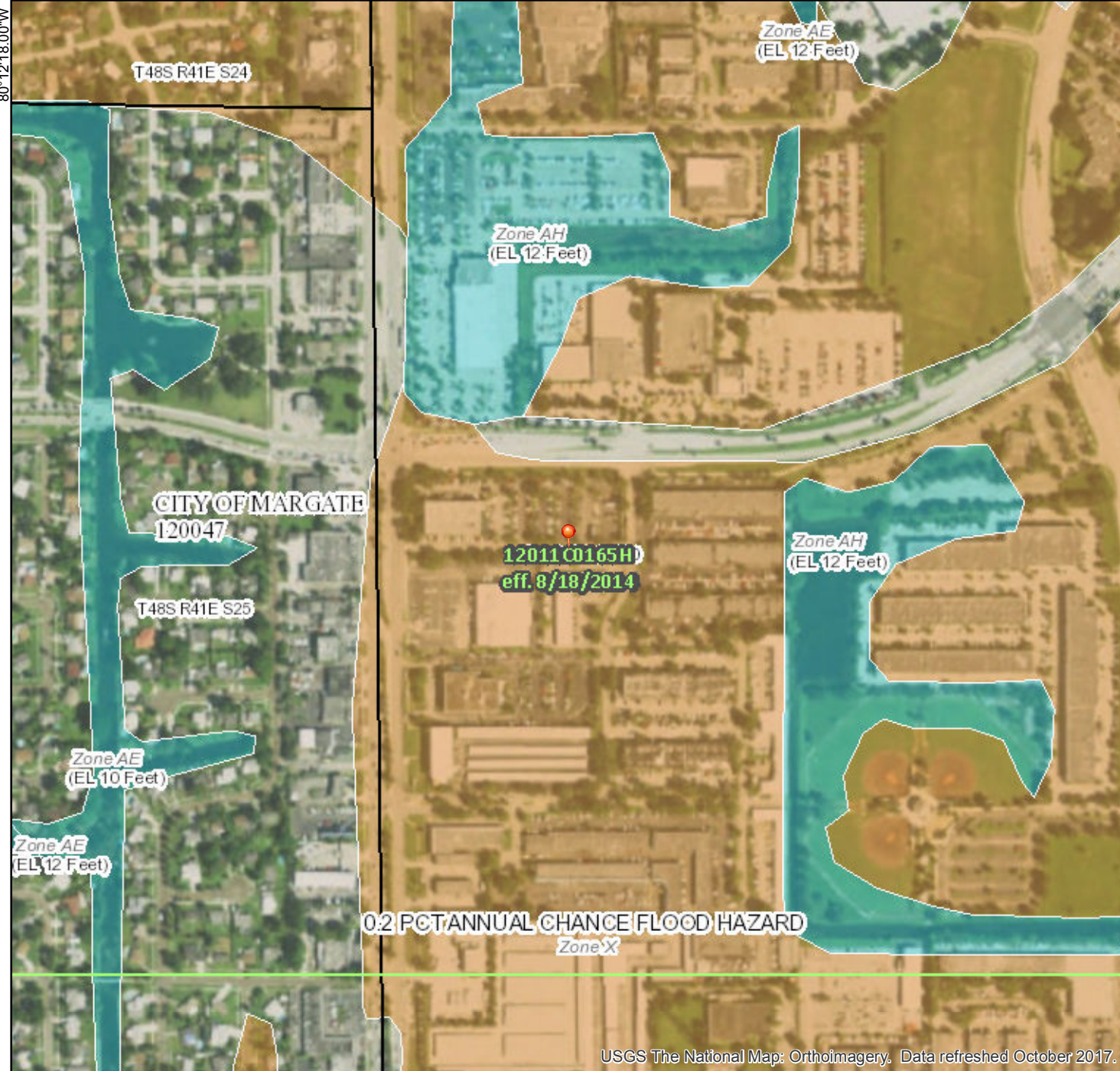
240 LF of exfiltration trench with more than 0.95 ac-ft of storage has been provided.
A safety factor of 2.0 is provided.

Appendix B

National Flood Hazard Layer FIRMette



26°15'29.33"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		513 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/6/2018 at 4:59:34 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

USGS The National Map: Orthoimagery. Data refreshed October 2017.

0 250 500 1,000 1,500 2,000 Feet 1:6,000

26°14'57.06"N

80°11'40.55"W

Soil Map—Broward County, Florida, East Part



Map Scale: 1:627 if printed on A landscape (11" x 8.5") sheet.

0 5 10 20 30 Meters

0 30 60 120 180 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

7/19/2018
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Broward County, Florida, East Part

Survey Area Data: Version 13, Oct 2, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 17, 2014—Feb 11, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Margate fine sand, occasionally ponded, 0 to 1 percent slopes	0.4	18.2%
29	Pompano fine sand, 0 to 2 percent slopes	1.7	81.8%
Totals for Area of Interest		2.1	100.0%

F. Water Storage

A. Ground Storage

1. One of the requirements for dry retention/detention flood protection areas is that each shall have a "mechanism" for returning the water level to control elevation. In such situations, the term "mechanism" is normally interpreted to mean something designed, fabricated, and installed in or on the site. As a result, almost every such project will have something - a V-notch weir, exfiltration trench, key/mosquito ditch, sump, etc. - to provide the required drawdown.

Such devices may not always be necessary. If it can be shown that the soil itself allows the water table to subside in an acceptable length of time, then no "artificial" mechanism need be installed. The burden of proof is on the applicant, and District staff will not approve, or recommend for approval, a dry system which does not provide such mechanisms, be they natural or fabricated.

2. The moisture storage capability (S) of the soil profile has been estimated by the United States Department of Agriculture – Natural Resource Conservation Service (USDA – NRCS; fka Soil Conservation Service [SCS]) for the soils found within the SFWMD boundaries. The total amount of water which can be stored in the soil profile expressed as a function of the depth to the water table* for these soils is:

SOIL STORAGE												
Depth to W.T.*	Coastal(1)				Flatwoods (2)				Depressional (3)			
	Uncomp. S (In.)	Uncomp. CN	Comp. S	Comp. CN	Uncomp. S (In.)	Uncomp. CN	Comp. S (In.)	Comp. CN	Uncomp. S (In.)	Uncomp. CN	Comp. S (In.)	Comp. CN
1	0.60	94	0.45	96	0.60	94	0.45	96	0.60	94	0.45	96
2	2.50	80	1.88	84	2.50	80	1.88	84	2.10	83	1.58	86
3	6.60	60	4.95	67	5.40	65	4.05	71	4.40	69	3.30	75
4	10.90	48	8.18	55	9.00	53	6.75	60	6.80	60	5.10	66

*Typically, the Seasonal High Water Table. Consult with District staff regarding site-specific situations and questions.

(1) Sandy soils 0 - 40" thick with water tables dropping below 40" - St. Lucie series is representative

(2) Water tables 15" - 40" - Immokalee series is representative

(3) Water tables above ground - 15" - Riviera and Pompano series are representative

The compacted values represent the cumulative water storage values reduced by 25 percent to account for the reduction in void spaces due to the compaction which occurs incidental to earthwork operations. An example of the use of this information is:

Assume the following:

Average Finished Grade = 17.0 feet NGVD

Average Ground Water* Level = 14.0 feet NGVD

Percent of Project in Lakes = 15%

Percent of Project Impervious = 35%

Coastal Soil Type (compacted)

Project Name: Culvers Restaurant - Existing 5yr 1 Hr

Reviewer: JT

Project Number: 010594-01-001

Period Begin: Jun 18, 2018;0000 hr End: Jun 19, 2018;0800 hr Duration: 32 hr

Time Step: 0.0167 hr, Iterations: 10

Basin 1: Site

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 24 hr

Design Frequency: 5 year

1 Day Rainfall: 3.28 inches

Area: 3.62 acres

Ground Storage: 0.2295 inches

Time of Concentration: 0.17 hours

Initial Stage: 8 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
8.00	0.00
9.00	0.02
10.00	0.30
11.00	1.45
12.00	3.88
12.50	6.36

Offsite Receiving Body: NW 55th Avenue

Time (hr)	Stage (ft NGVD)
0.00	12.00
1000.00	12.00

Offsite Receiving Body: Offsite Storm System

Time (hr)	Stage (ft NGVD)
0.00	8.00
1000.00	8.00

Structure: 1

From Basin: Site

To Basin: Offsite Storm System

Structure Type: Gravity

Weir: Broad Crested, Crest Elev = 11.5 ft NGVD, Length = 3 ft, Weir Coef = 2.6

Bleeder: Circular, Invert Elev = 8 ft NGVD, Diameter = 0.25 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 1 ft, Manning's n = 0.015, Length = 24 ft

US Invert Elev = 8 ft NGVD, DS Invert Elev = 8 ft NGVD, no flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	8.00	8.00
1.00	0.03	0.00	0.00	0.00	8.00	8.00
2.00	0.07	0.01	0.00	0.00	8.01	8.00
3.01	0.11	0.05	0.02	0.00	8.12	8.00
3.99	0.15	0.08	0.06	0.00	8.21	8.00
4.99	0.20	0.13	0.10	0.01	8.32	8.00
6.00	0.27	0.19	0.14	0.02	8.49	8.00
7.00	0.35	0.25	0.19	0.04	8.74	8.00
8.00	0.45	0.31	0.22	0.05	9.00	8.00
9.00	0.56	0.39	0.23	0.07	9.04	8.00
10.00	0.70	0.49	0.23	0.09	9.10	8.00

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
11.01	0.88	0.73	0.25	0.11	9.21	8.00
12.01	2.16	7.34	0.33	0.13	10.03	8.00
12.99	2.51	0.97	0.34	0.16	10.18	8.00
13.99	2.68	0.55	0.34	0.19	10.21	8.00
15.00	2.79	0.36	0.34	0.22	10.21	8.00
16.00	2.89	0.36	0.34	0.24	10.21	8.00
17.00	2.95	0.21	0.34	0.27	10.20	8.00
18.00	3.00	0.21	0.34	0.30	10.20	8.00
19.00	3.06	0.21	0.34	0.33	10.19	8.00
20.01	3.12	0.21	0.34	0.36	10.18	8.00
20.99	3.16	0.14	0.34	0.38	10.16	8.00
21.99	3.20	0.14	0.34	0.41	10.15	8.00
23.00	3.24	0.14	0.34	0.44	10.14	8.00
24.00	3.28	0.14	0.33	0.47	10.12	8.00
25.00	3.28	0.00	0.33	0.50	10.10	8.00
26.00	3.28	0.00	0.33	0.52	10.08	8.00
27.00	3.28	0.00	0.33	0.55	10.05	8.00
28.01	3.28	0.00	0.33	0.58	10.03	8.00
29.01	3.28	0.00	0.32	0.60	10.01	8.00
29.99	3.28	0.00	0.32	0.63	9.93	8.00
31.00	3.28	0.00	0.31	0.66	9.84	8.00
32.00	3.28	0.00	0.30	0.68	9.75	8.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	0.34	16.02	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Site	10.21	16.02	8.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Site	0.91	0.00	0.68	0.00	0.23	0.00

Project Name: Culvers Restaurant - Existing 10yr 1 Day

Reviewer: JT

Project Number: 010594-01-001

Period Begin: Jun 18, 2018;0000 hr End: Jun 19, 2018;0800 hr Duration: 32 hr

Time Step: 0.0167 hr, Iterations: 10

Basin 1: Site

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 24 hr

Design Frequency: 10 year

1 Day Rainfall: 8 inches

Area: 3.62 acres

Ground Storage: 0.2295 inches

Time of Concentration: 0.17 hours

Initial Stage: 8 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
8.00	0.00
9.00	0.02
10.00	0.30
11.00	1.45
12.00	3.88
12.50	6.36

Offsite Receiving Body: NW 55th Avenue

Time (hr)	Stage (ft NGVD)
0.00	12.00
1000.00	12.00

Offsite Receiving Body: Offsite Storm System

Time (hr)	Stage (ft NGVD)
0.00	8.00
1000.00	8.00

Structure: 1

From Basin: Site

To Basin: Offsite Storm System

Structure Type: Gravity

Weir: Broad Crested, Crest Elev = 11.5 ft NGVD, Length = 3 ft, Weir Coef = 2.6

Bleeder: Circular, Invert Elev = 8 ft NGVD, Diameter = 0.25 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 1 ft, Manning's n = 0.015, Length = 24 ft

US Invert Elev = 8 ft NGVD, DS Invert Elev = 8 ft NGVD, no flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	8.00	8.00
1.00	0.08	0.05	0.00	0.00	8.03	8.00
2.00	0.16	0.15	0.10	0.00	8.29	8.00
3.01	0.26	0.25	0.17	0.01	8.62	8.00
3.99	0.36	0.33	0.22	0.03	8.98	8.00
4.99	0.50	0.46	0.23	0.05	9.05	8.00
6.00	0.66	0.59	0.24	0.07	9.14	8.00
7.00	0.86	0.72	0.25	0.09	9.26	8.00
8.00	1.10	0.84	0.27	0.11	9.42	8.00
9.00	1.37	1.02	0.29	0.13	9.62	8.00
10.00	1.71	1.26	0.31	0.16	9.87	8.00

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
11.01	2.16	1.86	0.33	0.18	10.06	8.00
12.01	5.26	18.11	0.37	0.21	10.64	8.00
12.99	6.13	2.37	0.40	0.25	11.02	8.00
13.99	6.54	1.36	0.40	0.28	11.06	8.00
15.00	6.80	0.88	0.41	0.31	11.08	8.00
16.00	7.04	0.87	0.41	0.35	11.10	8.00
17.00	7.18	0.53	0.41	0.38	11.10	8.00
18.00	7.33	0.52	0.41	0.41	11.11	8.00
19.00	7.47	0.52	0.41	0.45	11.11	8.00
20.01	7.62	0.52	0.41	0.48	11.11	8.00
20.99	7.71	0.35	0.41	0.51	11.11	8.00
21.99	7.81	0.35	0.41	0.55	11.11	8.00
23.00	7.90	0.35	0.41	0.58	11.11	8.00
24.00	8.00	0.35	0.41	0.62	11.11	8.00
25.00	8.00	0.00	0.41	0.65	11.10	8.00
26.00	8.00	0.00	0.41	0.68	11.08	8.00
27.00	8.00	0.00	0.41	0.72	11.07	8.00
28.01	8.00	0.00	0.40	0.75	11.05	8.00
29.01	8.00	0.00	0.40	0.78	11.04	8.00
29.99	8.00	0.00	0.40	0.82	11.03	8.00
31.00	8.00	0.00	0.40	0.85	11.01	8.00
32.00	8.00	0.00	0.40	0.88	11.00	8.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	0.41	20.19	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Site	11.11	20.19	8.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Site	2.33	0.00	0.89	0.00	1.45	0.00

Project Name: Culvers Restaurant - Existing 25yr 3 Day

Reviewer: JT

Project Number: 010594-01-001

Period Begin: Jun 18, 2018;0000 hr End: Jun 21, 2018;0900 hr Duration: 81 hr

Time Step: 0.0167 hr, Iterations: 10

Basin 1: Site

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 25 year

3 Day Rainfall: 14 inches

Area: 3.62 acres

Ground Storage: 0.2295 inches

Time of Concentration: 0.17 hours

Initial Stage: 8 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
8.00	0.00
9.00	0.02
10.00	0.30
11.00	1.45
12.00	3.88
12.50	6.36

Offsite Receiving Body: NW 55th Avenue

Time (hr)	Stage (ft NGVD)
0.00	12.00
1000.00	12.00

Offsite Receiving Body: Offsitte Storm System

Time (hr)	Stage (ft NGVD)
0.00	8.00
1000.00	8.00

Structure: 1

From Basin: Site

To Basin: Offsitte Storm System

Structure Type: Gravity

Weir: Broad Crested, Crest Elev = 11.5 ft NGVD, Length = 3 ft, Weir Coef = 2.6

Bleeder: Circular, Invert Elev = 8 ft NGVD, Diameter = 0.25 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 1 ft, Manning's n = 0.015, Length = 24 ft

US Invert Elev = 8 ft NGVD, DS Invert Elev = 8 ft NGVD, no flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	8.00	8.00
1.00	0.06	0.02	0.00	0.00	8.01	8.00
2.00	0.13	0.09	0.05	0.00	8.18	8.00
3.01	0.19	0.14	0.11	0.01	8.32	8.00
3.99	0.25	0.16	0.13	0.02	8.44	8.00
4.99	0.31	0.18	0.15	0.03	8.55	8.00
6.00	0.38	0.19	0.17	0.04	8.64	8.00
7.00	0.44	0.20	0.18	0.06	8.71	8.00
8.00	0.50	0.20	0.19	0.07	8.77	8.00
9.00	0.56	0.21	0.20	0.09	8.82	8.00
10.00	0.63	0.21	0.20	0.11	8.85	8.00

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
11.01	0.69	0.21	0.21	0.12	8.88	8.00
12.01	0.75	0.21	0.21	0.14	8.91	8.00
12.99	0.81	0.22	0.21	0.16	8.93	8.00
13.99	0.88	0.22	0.21	0.17	8.95	8.00
15.00	0.94	0.22	0.22	0.19	8.96	8.00
16.00	1.00	0.22	0.22	0.21	8.97	8.00
17.00	1.07	0.22	0.22	0.23	8.98	8.00
18.00	1.13	0.22	0.22	0.25	8.99	8.00
19.00	1.19	0.22	0.22	0.26	9.00	8.00
20.01	1.25	0.22	0.22	0.28	9.00	8.00
20.99	1.32	0.22	0.22	0.30	9.00	8.00
21.99	1.38	0.22	0.22	0.32	9.00	8.00
23.00	1.44	0.22	0.22	0.34	9.00	8.00
24.00	1.50	0.22	0.22	0.36	9.00	8.00
25.00	1.60	0.33	0.22	0.37	9.03	8.00
26.00	1.69	0.33	0.23	0.39	9.06	8.00
27.00	1.78	0.33	0.23	0.41	9.09	8.00
28.01	1.87	0.33	0.24	0.43	9.12	8.00
29.01	1.96	0.33	0.24	0.45	9.14	8.00
29.99	2.05	0.33	0.24	0.47	9.17	8.00
31.00	2.14	0.33	0.24	0.49	9.20	8.00
32.00	2.24	0.33	0.25	0.51	9.22	8.00
33.00	2.33	0.33	0.25	0.53	9.24	8.00
34.00	2.42	0.33	0.25	0.55	9.27	8.00
35.00	2.51	0.33	0.26	0.57	9.29	8.00
36.01	2.60	0.33	0.26	0.60	9.31	8.00
37.01	2.69	0.33	0.26	0.62	9.33	8.00
37.99	2.78	0.33	0.26	0.64	9.36	8.00
38.99	2.87	0.33	0.26	0.66	9.38	8.00
40.00	2.97	0.33	0.27	0.68	9.40	8.00
41.00	3.06	0.33	0.27	0.70	9.41	8.00
42.00	3.15	0.33	0.27	0.73	9.43	8.00
43.00	3.24	0.33	0.27	0.75	9.45	8.00
44.00	3.33	0.33	0.27	0.77	9.47	8.00
45.01	3.42	0.33	0.28	0.79	9.49	8.00
45.99	3.51	0.33	0.28	0.82	9.50	8.00
46.99	3.61	0.33	0.28	0.84	9.52	8.00
48.00	3.70	0.33	0.28	0.86	9.53	8.00
49.00	3.80	0.37	0.28	0.89	9.56	8.00
50.00	3.90	0.37	0.29	0.91	9.59	8.00
51.00	4.03	0.45	0.29	0.93	9.63	8.00
52.00	4.16	0.52	0.30	0.96	9.68	8.00
53.01	4.34	0.67	0.30	0.98	9.78	8.00
54.01	4.56	0.82	0.32	1.01	9.91	8.00
54.99	4.81	0.97	0.33	1.03	10.02	8.00
56.00	5.11	1.12	0.33	1.06	10.07	8.00
57.00	5.46	1.34	0.34	1.09	10.14	8.00
58.00	5.89	1.64	0.34	1.12	10.22	8.00
59.00	6.47	2.38	0.35	1.15	10.34	8.00
60.00	10.46	23.85	0.40	1.18	11.05	8.00
61.01	11.60	3.02	0.42	1.21	11.29	8.00
62.01	12.13	1.73	0.42	1.25	11.35	8.00
62.99	12.45	1.14	0.43	1.28	11.38	8.00
63.99	12.76	1.13	0.43	1.32	11.41	8.00
65.00	12.95	0.68	0.43	1.35	11.42	8.00
66.00	13.13	0.68	0.43	1.39	11.43	8.00
67.00	13.32	0.68	0.43	1.42	11.43	8.00
68.00	13.51	0.67	0.43	1.46	11.44	8.00
69.00	13.63	0.45	0.43	1.49	11.44	8.00
70.01	13.75	0.45	0.43	1.53	11.44	8.00
70.99	13.88	0.45	0.43	1.56	11.45	8.00
71.99	14.00	0.45	0.43	1.60	11.45	8.00
73.00	14.00	0.00	0.43	1.64	11.43	8.00
74.00	14.00	0.00	0.43	1.67	11.42	8.00
75.00	14.00	0.00	0.43	1.71	11.40	8.00
76.00	14.00	0.00	0.43	1.74	11.39	8.00
77.00	14.00	0.00	0.43	1.78	11.38	8.00
78.01	14.00	0.00	0.43	1.81	11.36	8.00
79.01	14.00	0.00	0.42	1.85	11.35	8.00

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
79.99	14.00	0.00	0.42	1.88	11.33	8.00
80.99	14.00	0.00	0.42	1.92	11.32	8.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	0.43	72.01	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Site	11.45	72.01	8.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Site	4.14	0.00	1.92	0.00	2.22	0.00

Project Name: Culvers Restaurant - Existing 100yr 3 Day

Reviewer: JT

Project Number: 010594-01-001

Period Begin: Jun 18, 2018;0000 hr End: Jun 21, 2018;0900 hr Duration: 81 hr

Time Step: 0.0167 hr, Iterations: 10

Basin 1: Site

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 100 year

3 Day Rainfall: 18.5001 inches

Area: 3.62 acres

Ground Storage: 0.2295 inches

Time of Concentration: 0.17 hours

Initial Stage: 8 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
8.00	0.00
9.00	0.02
10.00	0.30
11.00	1.45
12.00	3.88
12.50	6.36

Offsite Receiving Body: NW 55th Avenue

Time (hr)	Stage (ft NGVD)
0.00	12.00
1000.00	12.00

Offsite Receiving Body: Offsite Storm System

Time (hr)	Stage (ft NGVD)
0.00	8.00
1000.00	8.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
-------	-----------	-----------	-----------	-----------

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Site	12.33	73.30	8.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Site	5.50	0.00	0.00	0.00	5.50	0.00

Project Name: Culvers Restaurant - Proposed 5yr 1 hour

Reviewer: JT

Project Number: 010594-01-001

Period Begin: Jun 18, 2018;0000 hr End: Jun 19, 2018;0800 hr Duration: 32 hr

Time Step: 0.0167 hr, Iterations: 10

Basin 1: Site

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 24 hr

Design Frequency: 10 year

1 Day Rainfall: 3.28 inches

Area: 3.6 acres

Ground Storage: 0.1395 inches

Time of Concentration: 0.17 hours

Initial Stage: 8 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
8.00	0.00
9.00	1.23
10.00	2.08
11.00	3.82
12.00	5.20
12.50	6.72

Offsite Receiving Body: Offsite1

Time (hr)	Stage (ft NGVD)
0.00	12.22
1000.00	12.22

Offsite Receiving Body: Offsite2

Time (hr)	Stage (ft NGVD)
0.00	8.00
1000.00	8.00

Structure: 1

From Basin: Site

To Basin: Offsite2

Structure Type: Gravity

Weir: Broad Crested, Crest Elev = 11.5 ft NGVD, Length = 3 ft, Weir Coef = 2.6

Bleeder: Circular, Invert Elev = 8 ft NGVD, Diameter = 0.25 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 1 ft, Manning's n = 0.015, Length = 24 ft

US Invert Elev = 8 ft NGVD, DS Invert Elev = 8 ft NGVD, no flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	8.00	8.00
1.00	0.03	0.00	0.00	0.00	8.00	8.00
2.00	0.07	0.04	0.00	0.00	8.00	8.00
3.01	0.11	0.08	0.00	0.00	8.01	8.00
3.99	0.15	0.11	0.00	0.00	8.01	8.00
4.99	0.20	0.17	0.00	0.00	8.02	8.00
6.00	0.27	0.22	0.00	0.00	8.04	8.00
7.00	0.35	0.28	0.00	0.00	8.05	8.00
8.00	0.45	0.33	0.01	0.00	8.07	8.00
9.00	0.56	0.41	0.02	0.00	8.10	8.00
10.00	0.70	0.51	0.03	0.00	8.13	8.00

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
11.01	0.88	0.75	0.04	0.01	8.17	8.00
12.01	2.16	7.36	0.12	0.01	8.39	8.00
12.99	2.51	0.96	0.15	0.02	8.54	8.00
13.99	2.68	0.55	0.16	0.04	8.58	8.00
15.00	2.79	0.36	0.16	0.05	8.60	8.00
16.00	2.89	0.36	0.16	0.06	8.61	8.00
17.00	2.95	0.21	0.17	0.08	8.61	8.00
18.00	3.00	0.21	0.17	0.09	8.62	8.00
19.00	3.06	0.21	0.17	0.10	8.62	8.00
20.01	3.12	0.21	0.17	0.12	8.62	8.00
20.99	3.16	0.14	0.17	0.13	8.62	8.00
21.99	3.20	0.14	0.17	0.15	8.62	8.00
23.00	3.24	0.14	0.17	0.16	8.62	8.00
24.00	3.28	0.14	0.17	0.17	8.62	8.00
25.00	3.28	0.00	0.16	0.19	8.61	8.00
26.00	3.28	0.00	0.16	0.20	8.60	8.00
27.00	3.28	0.00	0.16	0.21	8.59	8.00
28.01	3.28	0.00	0.16	0.23	8.58	8.00
29.01	3.28	0.00	0.16	0.24	8.56	8.00
29.99	3.28	0.00	0.15	0.25	8.55	8.00
31.00	3.28	0.00	0.15	0.27	8.54	8.00
32.00	3.28	0.00	0.15	0.28	8.53	8.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	0.17	20.17	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Site	8.62	20.17	8.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Site	0.94	0.00	0.28	0.00	0.66	0.00

Project Name: Culvers Restaurant - Proposed 10yr 1 Day

Reviewer: JT

Project Number: 010594-01-001

Period Begin: Jun 18, 2018;0000 hr End: Jun 19, 2018;0800 hr Duration: 32 hr

Time Step: 0.0167 hr, Iterations: 10

Basin 1: Site

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 24 hr

Design Frequency: 10 year

1 Day Rainfall: 8 inches

Area: 3.6 acres

Ground Storage: 0.1395 inches

Time of Concentration: 0.17 hours

Initial Stage: 8 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
8.00	0.00
9.00	1.23
10.00	2.08
11.00	3.82
12.00	5.20
12.50	6.72

Offsite Receiving Body: Offsite1

Time (hr)	Stage (ft NGVD)
0.00	12.22
1000.00	12.22

Offsite Receiving Body: Offsite2

Time (hr)	Stage (ft NGVD)
0.00	8.00
1000.00	8.00

Structure: 1

From Basin: Site

To Basin: Offsite2

Structure Type: Gravity

Weir: Broad Crested, Crest Elev = 11.5 ft NGVD, Length = 3 ft, Weir Coef = 2.6

Bleeder: Circular, Invert Elev = 8 ft NGVD, Diameter = 0.25 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 1 ft, Manning's n = 0.015, Length = 24 ft

US Invert Elev = 8 ft NGVD, DS Invert Elev = 8 ft NGVD, no flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	8.00	8.00
1.00	0.08	0.11	0.00	0.00	8.00	8.00
2.00	0.16	0.21	0.00	0.00	8.01	8.00
3.01	0.26	0.29	0.00	0.00	8.03	8.00
3.99	0.36	0.36	0.00	0.00	8.05	8.00
4.99	0.50	0.49	0.01	0.00	8.08	8.00
6.00	0.66	0.61	0.02	0.00	8.12	8.00
7.00	0.86	0.73	0.04	0.00	8.16	8.00
8.00	1.10	0.86	0.06	0.01	8.21	8.00
9.00	1.37	1.03	0.09	0.02	8.27	8.00
10.00	1.71	1.27	0.11	0.02	8.34	8.00

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
11.01	2.16	1.86	0.13	0.03	8.44	8.00
12.01	5.26	18.04	0.22	0.05	9.00	8.00
12.99	6.13	2.36	0.28	0.07	9.54	8.00
13.99	6.54	1.35	0.29	0.09	9.67	8.00
15.00	6.80	0.88	0.30	0.12	9.74	8.00
16.00	7.04	0.87	0.31	0.14	9.80	8.00
17.00	7.18	0.52	0.31	0.17	9.82	8.00
18.00	7.33	0.52	0.31	0.19	9.84	8.00
19.00	7.47	0.52	0.31	0.22	9.87	8.00
20.01	7.62	0.52	0.31	0.25	9.89	8.00
20.99	7.71	0.35	0.31	0.27	9.89	8.00
21.99	7.81	0.35	0.31	0.30	9.89	8.00
23.00	7.90	0.35	0.31	0.32	9.90	8.00
24.00	8.00	0.35	0.32	0.35	9.90	8.00
25.00	8.00	0.00	0.31	0.37	9.88	8.00
26.00	8.00	0.00	0.31	0.40	9.85	8.00
27.00	8.00	0.00	0.31	0.43	9.82	8.00
28.01	8.00	0.00	0.30	0.45	9.79	8.00
29.01	8.00	0.00	0.30	0.48	9.76	8.00
29.99	8.00	0.00	0.30	0.50	9.73	8.00
31.00	8.00	0.00	0.30	0.53	9.70	8.00
32.00	8.00	0.00	0.29	0.55	9.67	8.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	0.32	24.01	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Site	9.90	24.01	8.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Site	2.35	0.00	0.55	0.00	1.80	0.00

Project Name: Culvers Restaurant - Proposed 25yr 3 Day

Reviewer: JT

Project Number: 010594-01-001

Period Begin: Jun 18, 2018;0000 hr End: Jun 21, 2018;0900 hr Duration: 81 hr

Time Step: 0.0167 hr, Iterations: 10

Basin 1: Site

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 25 year

3 Day Rainfall: 14 inches

Area: 3.6 acres

Ground Storage: 0.1395 inches

Time of Concentration: 0.17 hours

Initial Stage: 8 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
8.00	0.00
9.00	1.23
10.00	2.08
11.00	3.82
12.00	5.20
12.50	6.72

Offsite Receiving Body: Offsite1

Time (hr)	Stage (ft NGVD)
0.00	12.22
1000.00	12.22

Offsite Receiving Body: Offsite2

Time (hr)	Stage (ft NGVD)
0.00	8.00
1000.00	8.00

Structure: 1

From Basin: Site

To Basin: Offsite2

Structure Type: Gravity

Weir: Broad Crested, Crest Elev = 11.5 ft NGVD, Length = 3 ft, Weir Coef = 2.6

Bleeder: Circular, Invert Elev = 8 ft NGVD, Diameter = 0.25 ft

Default Coefs: Weir Coef = 0.6, Orifice Coef = 0.6

Pipe: Diameter = 1 ft, Manning's n = 0.015, Length = 24 ft

US Invert Elev = 8 ft NGVD, DS Invert Elev = 8 ft NGVD, no flap gate

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
0.00	0.00	0.00	0.00	0.00	8.00	8.00
1.00	0.06	0.06	0.00	0.00	8.00	8.00
2.00	0.13	0.14	0.00	0.00	8.01	8.00
3.01	0.19	0.17	0.00	0.00	8.02	8.00
3.99	0.25	0.19	0.00	0.00	8.03	8.00
4.99	0.31	0.20	0.00	0.00	8.04	8.00
6.00	0.38	0.21	0.01	0.00	8.06	8.00
7.00	0.44	0.21	0.01	0.00	8.07	8.00
8.00	0.50	0.22	0.01	0.00	8.08	8.00
9.00	0.56	0.22	0.02	0.00	8.10	8.00
10.00	0.63	0.22	0.02	0.00	8.11	8.00

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
11.01	0.69	0.22	0.03	0.01	8.13	8.00
12.01	0.75	0.22	0.03	0.01	8.14	8.00
12.99	0.81	0.22	0.04	0.01	8.15	8.00
13.99	0.88	0.22	0.04	0.02	8.16	8.00
15.00	0.94	0.22	0.05	0.02	8.18	8.00
16.00	1.00	0.22	0.05	0.02	8.19	8.00
17.00	1.07	0.22	0.06	0.03	8.20	8.00
18.00	1.13	0.22	0.06	0.03	8.21	8.00
19.00	1.19	0.22	0.07	0.04	8.22	8.00
20.01	1.25	0.23	0.07	0.04	8.23	8.00
20.99	1.32	0.23	0.08	0.05	8.24	8.00
21.99	1.38	0.23	0.08	0.06	8.25	8.00
23.00	1.44	0.23	0.09	0.06	8.26	8.00
24.00	1.50	0.23	0.09	0.07	8.27	8.00
25.00	1.60	0.33	0.09	0.08	8.28	8.00
26.00	1.69	0.33	0.10	0.09	8.30	8.00
27.00	1.78	0.33	0.10	0.09	8.32	8.00
28.01	1.87	0.33	0.11	0.10	8.33	8.00
29.01	1.96	0.33	0.11	0.11	8.35	8.00
29.99	2.05	0.33	0.11	0.12	8.36	8.00
31.00	2.14	0.33	0.12	0.13	8.37	8.00
32.00	2.24	0.33	0.12	0.14	8.39	8.00
33.00	2.33	0.33	0.12	0.15	8.40	8.00
34.00	2.42	0.33	0.13	0.16	8.42	8.00
35.00	2.51	0.33	0.13	0.17	8.43	8.00
36.01	2.60	0.33	0.13	0.18	8.44	8.00
37.01	2.69	0.33	0.14	0.19	8.46	8.00
37.99	2.78	0.33	0.14	0.21	8.47	8.00
38.99	2.87	0.33	0.14	0.22	8.48	8.00
40.00	2.97	0.33	0.14	0.23	8.49	8.00
41.00	3.06	0.33	0.15	0.24	8.51	8.00
42.00	3.15	0.33	0.15	0.25	8.52	8.00
43.00	3.24	0.33	0.15	0.27	8.53	8.00
44.00	3.33	0.33	0.15	0.28	8.54	8.00
45.01	3.42	0.33	0.16	0.29	8.56	8.00
45.99	3.51	0.33	0.16	0.30	8.57	8.00
46.99	3.61	0.33	0.16	0.32	8.58	8.00
48.00	3.70	0.33	0.16	0.33	8.59	8.00
49.00	3.80	0.37	0.16	0.34	8.60	8.00
50.00	3.90	0.37	0.17	0.36	8.62	8.00
51.00	4.03	0.45	0.17	0.37	8.64	8.00
52.00	4.16	0.52	0.17	0.38	8.66	8.00
53.01	4.34	0.67	0.18	0.40	8.69	8.00
54.01	4.56	0.82	0.18	0.41	8.72	8.00
54.99	4.81	0.97	0.19	0.43	8.77	8.00
56.00	5.11	1.12	0.20	0.45	8.83	8.00
57.00	5.46	1.34	0.21	0.46	8.90	8.00
58.00	5.89	1.64	0.22	0.48	8.99	8.00
59.00	6.47	2.37	0.24	0.50	9.15	8.00
60.00	10.46	23.73	0.33	0.52	10.09	8.00
61.01	11.60	3.00	0.36	0.55	10.44	8.00
62.01	12.13	1.72	0.37	0.58	10.52	8.00
62.99	12.45	1.13	0.37	0.61	10.56	8.00
63.99	12.76	1.12	0.37	0.64	10.60	8.00
65.00	12.95	0.67	0.37	0.67	10.62	8.00
66.00	13.13	0.67	0.37	0.70	10.63	8.00
67.00	13.32	0.67	0.38	0.73	10.64	8.00
68.00	13.51	0.67	0.38	0.76	10.66	8.00
69.00	13.63	0.45	0.38	0.80	10.66	8.00
70.01	13.75	0.45	0.38	0.83	10.67	8.00
70.99	13.88	0.45	0.38	0.86	10.67	8.00
71.99	14.00	0.45	0.38	0.89	10.67	8.00
73.00	14.00	0.00	0.38	0.92	10.66	8.00
74.00	14.00	0.00	0.38	0.95	10.64	8.00
75.00	14.00	0.00	0.37	0.98	10.62	8.00
76.00	14.00	0.00	0.37	1.01	10.61	8.00
77.00	14.00	0.00	0.37	1.04	10.59	8.00
78.01	14.00	0.00	0.37	1.07	10.57	8.00
79.01	14.00	0.00	0.37	1.11	10.55	8.00

Time (hr)	Cumulative Rainfall (in)	Instant Runoff (cfs)	Current Discharge (cfs)	Cumulative Discharge (acre-ft)	Head Water Stage (ft NGVD)	Tail Water Stage (ft NGVD)
79.99	14.00	0.00	0.37	1.14	10.54	8.00
80.99	14.00	0.00	0.37	1.17	10.52	8.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	0.38	72.03	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Site	10.67	72.03	8.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Site	4.15	0.00	1.17	0.00	2.98	0.00

Project Name: Culvers Restaurant - Proposed 100yr 3 Day

Reviewer: JT

Project Number: 010594-01-001

Period Begin: Jun 18, 2018;0000 hr End: Jun 21, 2018;0900 hr Duration: 81 hr

Time Step: 0.0167 hr, Iterations: 10

Basin 1: Site

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 100 year

3 Day Rainfall: 18.5001 inches

Area: 3.6 acres

Ground Storage: 0.1395 inches

Time of Concentration: 0.17 hours

Initial Stage: 8 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
8.00	0.00
9.00	1.23
10.00	2.08
11.00	3.82
12.00	5.20
12.50	6.72

Offsite Receiving Body: Offsite1

Time (hr)	Stage (ft NGVD)
0.00	12.22
1000.00	12.22

Offsite Receiving Body: Offsite2

Time (hr)	Stage (ft NGVD)
0.00	8.00
1000.00	8.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
-------	-----------	-----------	-----------	-----------

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Site	12.10	73.38	8.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Site	5.50	0.00	0.00	0.00	5.50	0.00