

Project ID. 3557 N Dixie Hwy

Engineer:

Client: Gary Grass

Date: 8/1/2020

Surface Water Management Calculations for 3557 N Dixie Hwy

STORMWATER RETENTION CALCULATIONS

LANDUSE BREAKDOWN

Table 1 summarizes the proposed landuse breakdown of the project

Table 1 - Site Landuse Breakdown

Description	Existing Site (Ac)	Proposed Site (Ac)
Total Site Area:	0.057	0.057
Roof Area:	0.000	0.032
Deck and Driveway Area (Pervious):	0.000	0.025

WATER QUALITY

Water quality requirements are defined based on the following criteria: the first inch of runoff over the entire site, or 2.5 inches times the percent impervious

2.5 inches times the percent impervious controls over the first inch of runoff over the entire site

2.5 inches times the percent impervious = 0.005 ac-ft (see water quality calculations attached)

SOIL STORAGE

Soil Storage (S) was calculated to be 0.0 inches over the entire site for the **Existing Conditions** (see soil storage calculations attached)

Soil Storage (S) was calculated to be 2.7 inches over the entire site for the **Proposed Conditions** (see soil storage calculations attached)

RUNOFF CALCULATIONS

$$Q=(P-0.2S)^4/(P+0.8S)$$

Design Frequency	Precipitation P (in)	Existing			Proposed			Δ Pre vs Post
		Soil Storage S (in)	Runoff Q (in)	Runoff Volume (Ac-ft)	Soil Storage S (in)	Runoff Q (in)	Runoff Volume (Ac-ft)	Runoff Volume (Ac-ft)
10y-1d	8	0	8	0.038	2.7	5.48	0.026	-0.012
25y-3d	14	0	14.00	0.067	2.7	11.21	0.053	-0.014
100y-3d	17	0	17	0.081	2.7	14.14	0.067	-0.014

Runoff in the proposed condition is less than the existing conditions. Exfiltration trench is proposed for storage purposes (for FFE)

EXFILTRATION TRENCH CALCULATIONS

Water Table Elevation: 2.0 FT NAVD

Average Finished Grade for Trench Purposes 7.0 FT NAVD

$$\text{Exfiltration Trench Length} = \text{Volume} / (K(H^2W + 2H^2Du - Du^2 + 2H^2Ds) + (1.39E-4W * Du))$$

L= 35 Ft - Length of trench required

V= 0.77 Acre-inch - Volume treated

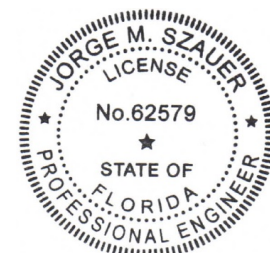
W= 4 Ft - Trench Width

K= 3.065E-04 CFS/FT^2-Ft. Head - Hydraulic Conductivity (See attached Soil Percolation Tests Report)

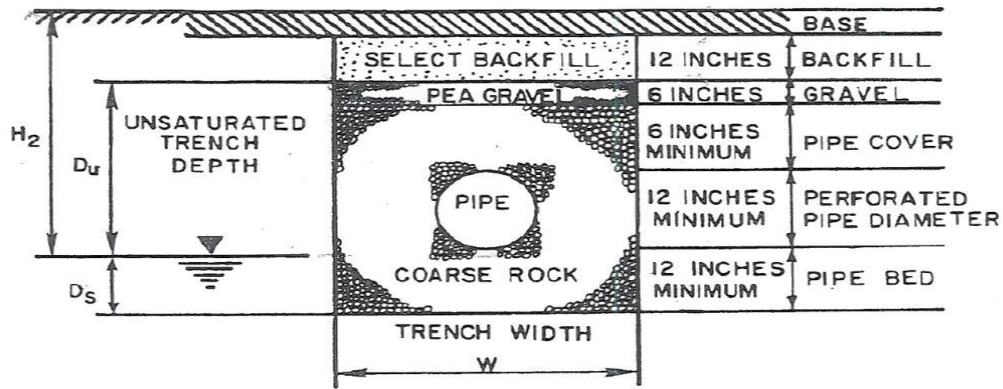
H2= 5.0 Ft - Depth to Water Table

Du= 4.0 Ft - Non-Saturated Trench Depth

Ds= 2.0 Ft - Saturated Trench Depth



SFWMD - Typical Exfiltration Trench Section



Length of Trench Required = 35 Ft (0.064 ac-ft)

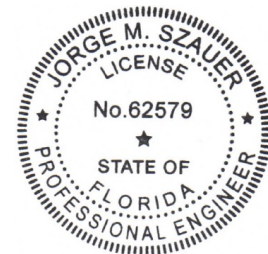
Length of Trench Provided = 35 Ft (0.064 ac-ft)

STAGE STORAGE

Stage (ft NGVD)	Existing			Proposed			
	Impervious (ac-ft)	Pervious (Ac-ft)	Total (Ac-ft)	Impervious (Ac-ft)	Pervious (ac-ft)	Exfiltration Trench (Ac-ft)	Total (Ac-ft)
6.00	0.00	0.00	0.00	0.00	0.00	0.77	0.77
6.50	0.01	0.00	0.01	0.00	0.00	0.77	0.77
7.00	0.04	0.00	0.04	0.00	0.01	0.77	0.78
7.50	0.07	0.00	0.07	0.00	0.02	0.77	0.79
8.00	0.10	0.00	0.10	0.00	0.03	0.77	0.80

Peak Stage 10y - 1d	6.97	6.30
Peak Stage 25y - 3d	7.47	6.30
Peak Stage 100y - 3d	7.72	6.68

Proposed FFE is 7.0, above 100y-3d peak elevation - OK



Water Quality Calculation

*2.5" * % Impervious vs. 1" over site*

3557 N Dixie

Date:

28-Jul-20

Input data in boxes below:

Total Area:	0.06	acre
Lake & WL:	0.00	"
Roof:	0.03	"
Pervious Area:	0.03	"

2.5 Inch * % Impervious:

$$\text{Vol} = 2.5 / 12 * (\text{Total} - \text{lakes}) * (\text{Total} - \text{roof} - \text{lake} - \text{pervious}) / (\text{Total} - \text{roof} - \text{lake})$$

$$\% \text{ Impervious} = (\text{Total} - \text{roof} - \text{lake} - \text{pervious}) / (\text{Total} - \text{roof} - \text{lake})$$

$$\text{Treatment Vol} = 2.5" / 12 * (\text{Total} - \text{lake}) * (\% \text{ Impervious})$$

% Impervious = 0.00%
Treatment Vol = 0.00 ac-ft

OR:

1" Over Entire Site:

Total Area: 0.057 acre

Treatment Vol = 0.00 ac-ft

The required water quality volume is based on: 1 inch over the entire site

The required water quality volume is: 0 acre-ft

Comments:

Soil Type: Flatwoods (2)

Soil Storage Calculation

Project: **3557 N Dixie**

Date: **28-Jul-20**

DWT	S (inches)
0	0
1	0.6
2	2.5
3	5.4
4	9

User Enter Data is Shown in Blue & Bold Font

SHGWT (Seasonal high groundwater table elevation): **2** ft NGVD
Total Impervious area (see note below): **0.032** acres

Pervious Area Description	Pervious Area Acreage (acres)	Low Elevation of Ground Surface (ft NGVD)	High Elevation of Ground Surface (ft NGVD)	Calculated Avg. Ground Surface Elevation (ft NGVD)	Calculated Depth to Groundwater (ft)	Calculated Uncompacted Soil Storage per SFWMD (inches)	Calculated Uncompacted Soil Storage per SFWMD (ac-ft)	Is Soil Compacted (enter Y or N)	Adjusted Soil Storage based on 75% Factor (ac-ft)	Note
Parking	0.007	6.0	7.0	6.50	4.50	9.000	0.006	Y	0.004	Compacted Soil
Patio	0.009	6.3	7.0	6.65	4.65	9.000	0.006	Y	0.005	Compacted Soil
Walkway	0.006	7.0	7.0	7.00	5.00	9.000	0.004	y	0.003	Compacted Soil
				0.00	0.00	0.000	0.000	Y	0.000	
				0.00	0.00	0.000	0.000	Y	0.000	
				0.00	0.00	0.000	0.000	Y	0.000	
				0.00	0.00	0.000	0.000	Y	0.000	
				0.00	0.00	0.000	0.000	Y	0.000	
				0.00	0.00	0.000	0.000	Y	0.000	
				0.00	0.00	0.000	0.000	Y	0.000	
Total	0.022	<- total pervious area							0.012	<- ac-ft (Total)

Calculated Composite Soil Storage: **2.728 inches** **CN = 1000/(S+10) = 78.6**

Note: The composite soil storage calculated above is based on the total ac-ft of soil storage divided over the entire site area including pervious and impervious area. If the user desires to calculate the composite soil storage over only the pervious area, then the impervious area should be entered as zero above.

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Site Storage Calculation

Project Name: *3557 N Dixie Existing*

Date: *29-Jul-20*

User: *enter*

Minimum Stage: *6.000* feet, NGVD
Incremental Stage: *0.500* feet



Area Number	1	2	3	4	5	Total Area	
Area Description	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>		
Area (acres)	<i>0.057</i>					0.057 ac	
Area (ft^2)	2.48E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
Low Elv.	<i>6.300</i>	<i>7.000</i>	<i>9.000</i>	<i>5.000</i>	<i>5.000</i>		
High Elv.	<i>6.300</i>	<i>9.000</i>	<i>10.000</i>	<i>5.000</i>	<i>7.500</i>		
Stage (ft, NGVD)	Storage (ac-ft)	Storage (ac-ft)	Storage (ac-ft)	Storage (ac-ft)	Storage (ac-ft)	Stage (ft, NGVD)	Total Storage (ac-ft)
6.000	0.00	0.00	0.00	0.00	0.00	6.00	0.00
6.500	0.01	0.00	0.00	0.00	0.00	6.50	0.01
7.000	0.04	0.00	0.00	0.00	0.00	7.00	0.04
7.500	0.07	0.00	0.00	0.00	0.00	7.50	0.07
8.000	0.10	0.00	0.00	0.00	0.00	8.00	0.10
8.500	0.13	0.00	0.00	0.00	0.00	8.50	0.13
9.000	0.15	0.00	0.00	0.00	0.00	9.00	0.15
9.500	0.18	0.00	0.00	0.00	0.00	9.50	0.18
10.000	0.21	0.00	0.00	0.00	0.00	10.00	0.21
10.500	0.24	0.00	0.00	0.00	0.00	10.50	0.24
11.000	0.27	0.00	0.00	0.00	0.00	11.00	0.27
11.500	0.30	0.00	0.00	0.00	0.00	11.50	0.30
12.000	0.32	0.00	0.00	0.00	0.00	12.00	0.32
12.500	0.35	0.00	0.00	0.00	0.00	12.50	0.35
13.000	0.38	0.00	0.00	0.00	0.00	13.00	0.38
13.500	0.41	0.00	0.00	0.00	0.00	13.50	0.41

SCS Runoff Equation:

3557 N Dixie Existing

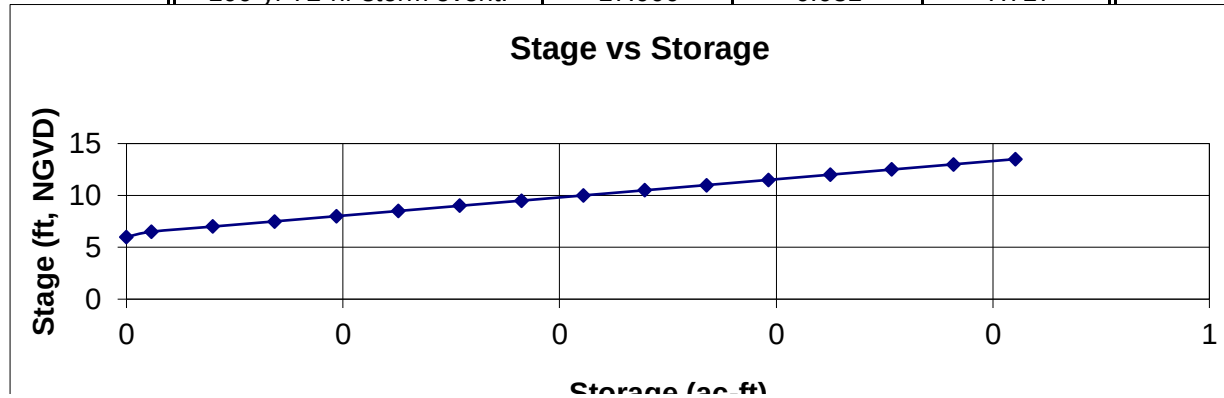
Rainfall & Basin Information:

Total Site Area (including buildings):	0.06	acres
Composite Soil Storage:	0.00	inches
10-yr 24-hr storm event:	8.00	inches
10-yr 72-hr storm event:	10.90	inches
25-yr 24-hr storm event:	10.30	inches
25-yr 72-hr storm event:	14.00	inches
100-yr 72-hr storm event:	17.00	inches

Zero-Discharge Runoff Volume & Interpolated Stages:

$$\text{Runoff (inches)} = (P - 0.2S)^2 / (P + 0.8S)$$

Design Storms (from above)	Runoff (in)	Runoff (ac-ft)	Stage (ft)
10-yr 24-hr storm event:	8.000	0.038	6.967
10-yr 72-hr storm event:	10.900	0.052	7.208
25-yr 24-hr storm event:	10.300	0.049	7.158
25-yr 72-hr storm event:	14.000	0.067	7.467
100-yr 72-hr storm event:	17.000	0.081	7.717



Exfiltration Trench Calculation
Reference: SFWMD Vol. IV

8/3/2020

3557 N Dixie

Case 1:

$$\text{Length} = \text{Volume} / (K(H_2 \cdot W + 2 \cdot H_2 \cdot Du - Du^2 + 2 \cdot H_2 \cdot Ds) + (1.39E-4 \cdot W \cdot Du))$$

This formula takes into consideration a safety factor of 2 and a 50% credit for retention system.

Variable Definitions:

Ds =	Saturated Depth of Trench (ft)
Du =	Unsaturated Depth (ft)
H ₂ =	Depth from Land Surface to Water Table (ft)
W =	Trench Width (ft)
Volume =	Required Wet Detention Volume (ac-in)
Length =	Calculated Trench Length (ft)
K =	Hydraulic Conductivity (ft/sec)

Note: (a) This equation (**Case 1**) is a special case. Validity criteria: (1) $Ds < Du$. (2) $W < 2 \cdot (Ds + Du)$
(b) Minimum pipe diameter is 12 inches, minimum trench width (W) is 3 ft.

Input:

Ds =	2	ft	<u>Validity Check:</u>	
Du =	4	ft	(1) $Ds < Du$?	Yes
H ₂ =	5	ft	(2) $W < 2 \cdot (Ds + Du)$?	Yes
W =	4	ft	(3) $W > 3$?	Yes
Volume =	0.77	ac-in		
K =	3.07E-04	cfs/ft ² (i.e. ft/sec)		

Case 1: Calculated Trench Length = 35 ft

Case 2:

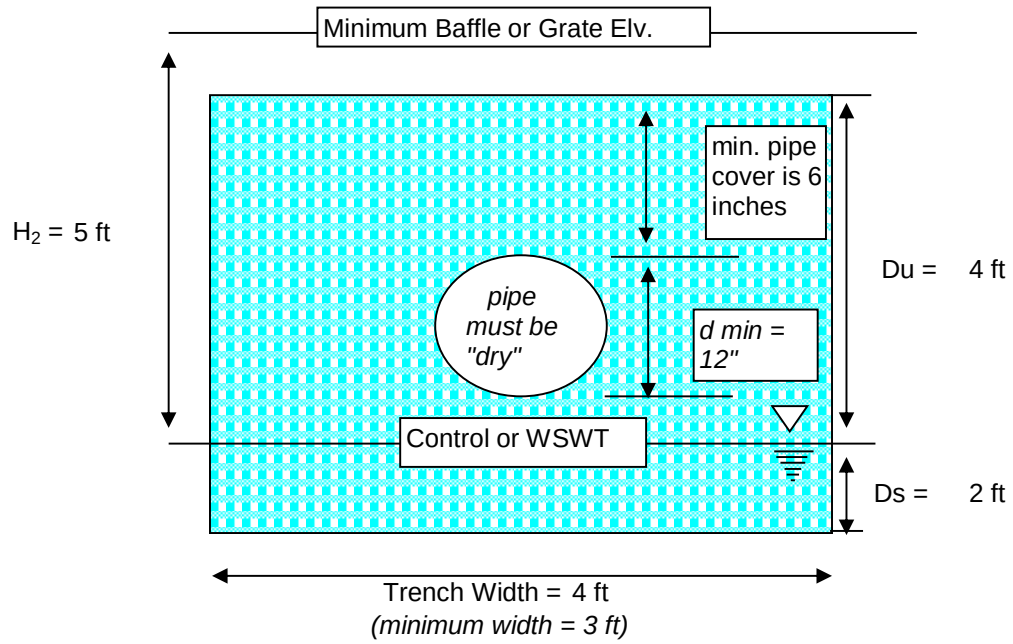
$$\text{Length} = \text{Volume} / (K(2 \cdot H_2 \cdot Du - Du^2 + 2 \cdot H_2 \cdot Ds) + (1.39E-4 \cdot W \cdot Du))$$

This formula takes into consideration a safety factor of 2 and a 50% credit for retention system.
This formula is valid if $W > 2(Ds + Du)$ and $Ds > Du$.

Note: (a) This equation (**case 2**) is a special case. Validity criteria: (1) $Ds > Du$. (2) $W > 2 \cdot (Ds + Du)$
(b) Minimum pipe diameter is 12 inches, minimum trench width (W) is 3 ft.

Case 2: Calculated Trench Length = 49 ft Validity Check:
(1) $Ds > Du$? criterion NOT met

3557 N Dixie



(2) $W > 2 * (Ds+Du)$? criterion NOT met
(3) $W > 3$? Yes

[Click here for Directions:](#)

Site Storage Calculation

Project Name: *3557 N Dixie Proposed*

Date: *29-Jul-20*

User: *enter*

Minimum Stage: *6.000* feet, NGVD
Incremental Stage: *0.500* feet



Area Number	1		2	3	4	5	Total Area
Area Description	<i>Parking</i>	<i>Patio</i>	<i>Walkway</i>		<i>Exf Trench</i>		
Area (acres)	<i>0.007</i>	<i>0.009</i>	<i>0.006</i>				0.022 ac
Area (ft^2)	3.05E+02	3.92E+02	2.61E+02	0.00E+00	0.00E+00	0.00E+00	
Low Elv.	<i>6.000</i>	<i>6.300</i>	<i>7.000</i>				
High Elv.	<i>7.000</i>	<i>7.000</i>	<i>7.000</i>				
Stage (ft, NGVD)	Storage (ac-ft)	Storage (ac-ft)	Storage (ac-ft)	Storage (ac-ft)	Storage (ac-ft)	Storage (ac-ft)	Stage (ft, NGVD)
6.000	0.00	0.00	0.00	0.00	0.06		6.00
6.500	0.00	0.00	0.00	0.00	0.06		6.50
7.000	0.00	0.00	0.00	0.00	0.06	0.00	7.00
7.500	0.01	0.01	0.00	0.00	0.06	0.00	7.50
8.000	0.01	0.01	0.01	0.00	0.06	0.00	8.00
8.500	0.01	0.02	0.01	0.00	0.06	0.00	8.50
9.000	0.02	0.02	0.01	0.00	0.06	0.00	9.00
9.500	0.02	0.03	0.02	0.00	0.06	0.00	9.50
10.000	0.02	0.03	0.02	0.00	0.06	0.00	10.00
10.500	0.03	0.03	0.02	0.00	0.06	0.00	10.50
11.000	0.03	0.04	0.02	0.00	0.06	0.00	11.00
11.500	0.04	0.04	0.03	0.00	0.06	0.00	11.50
12.000	0.04	0.05	0.03	0.00	0.06	0.00	12.00
12.500	0.04	0.05	0.03	0.00	0.06	0.00	12.50
13.000	0.05	0.06	0.04	0.00	0.06	0.00	13.00
13.500	0.05	0.06	0.04	0.00	0.06	0.00	13.50

SCS Runoff Equation:

3557 N Dixie Proposed

Rainfall & Basin Information:

Total Site Area (including buildings):	0.06	acres
Composite Soil Storage:	2.70	inches
10-yr 24-hr storm event:	8.00	inches
10-yr 72-hr storm event:	0.00	inches
25-yr 24-hr storm event:	0.00	inches
25-yr 72-hr storm event:	14.00	inches
100-yr 72-hr storm event:	17.00	inches

Total Storage
0.06
0.07
0.07
0.08
0.09
0.10
0.11
0.13
0.14
0.15
0.16
0.17
0.18
0.19
0.20
0.21

Zero-Discharge Runoff Volume & Interpolated Stages:

Runoff (inches) = (P-0.2S)^2 / (P + 0.8*S)

Design Storms (from above)	Runoff (in)	Runoff (ac-ft)	Stage (ft)
10-yr 24-hr storm event:	5.478	0.026	#N/A
10-yr 72-hr storm event:	0.135	0.001	#N/A
25-yr 24-hr storm event:	0.135	0.001	#N/A
25-yr 72-hr storm event:	11.211	0.053	#N/A
100-yr 72-hr storm event:	14.140	0.067	6.684

