

PROPOSED DRAINAGE CALCULATIONS

Design Criteria:

Estimated Seasonal High Water Level: 5.00 NAVD

Proposed Acreages

Lake Areas (A_L):	0 sf	or	0.000 ac
Roof Areas (A_R):	3,715 sf	or	0.085 ac
Paved Areas (A_P):	36,056 sf	or	0.828 ac
Green Areas (A_G):	12,602 sf	or	0.289 ac
Total (A_T):	52,373 sf	or	1.202 ac

Compute Required Water Quality Volume:

- 1) Provide at least 1 inch over the developed project:

$$\begin{aligned} V_{PRE} &= 1 \text{ inch} \times A_T \times 1 \text{ ft} / 12 \text{ inches} \\ &= 1 \times 1.202 / 12 \\ &= 0.10 \text{ ac-ft or } 1.20 \text{ ac-in} \end{aligned}$$

- 2) Provide 2.5" over % impervious area:

- a) Site Area for water quality pervious/impervious calculation:

$$\begin{aligned} A_S &= A_T - (A_L + A_R) \\ &= 1.202 - (0 + 0.085) \\ &= 1.12 \text{ ac of site area for water quality pervious/impervious} \end{aligned}$$

- b) Impervious area for water quality pervious/impervious calculation:

$$\begin{aligned} A_{IMP} &= A_S - A_G \\ &= 1.117 - 0.289 \\ &= 0.83 \text{ ac of impervious area for water quality pervious/impervious} \end{aligned}$$

- c) Percent of impervious for water quality calculation:

$$\begin{aligned} &= A_{IMP} / A_S \times 100\% \\ &= 0.828 / 1.117 \times 100\% \\ &= 74.1\% \text{ impervious} \end{aligned}$$

- d) For 2.5" times the percent impervious:

$$\begin{aligned} &= 2.5" \times \% \text{ impervious area} \\ &= 2.5 \times 0.741 \\ &= 1.85 \text{ inches to be treated} \end{aligned}$$

- e) Compute volume required volume for quality detention

$$\begin{aligned} V_{PRE} &= \text{inches to be treated} \times (A_T - A_L) \\ &= 1.85 \times (1.202 - 0) \times 1 \text{ foot} / 12 \text{ inches} \\ &= 0.19 \text{ ac-ft or } \boxed{2.22 \text{ ac-in}} \end{aligned}$$

2) Since the 2.22 ac-in is greater than the 1.20 ac-in computed for the first inch of runoff the volume of 2.22 ac-in controls.

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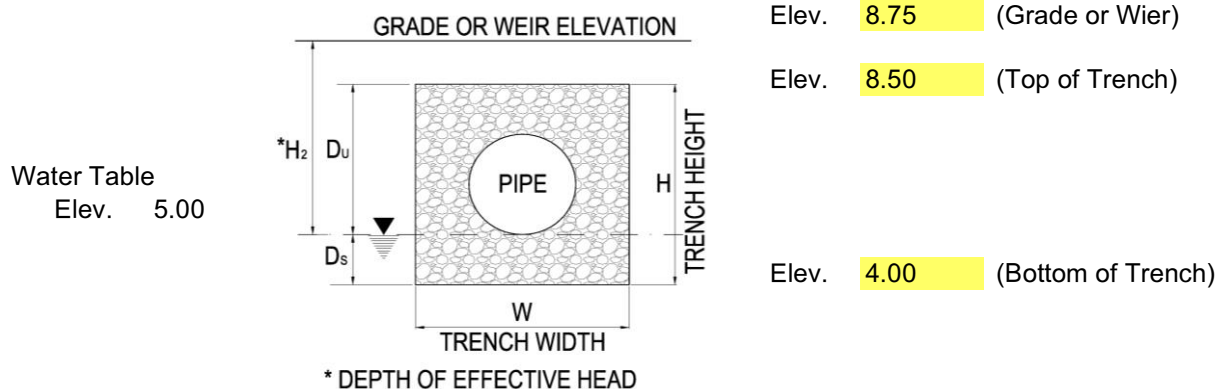
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Exfiltration Trench Calculations

K-Value:

Test Hole #	(cfs/ft ² /ft hd)
1	2.20E-04
2	
K _{AVG}	2.20E-04

Trench:



K =	2.20E-04	cfs/ft ² - ft head
H ₂ =	3.75	ft
W =	6.50	ft
D _u =	3.50	ft
D _s =	1.00	ft
H = D _u + D _s =	4.50	ft

1) Trench Length for Water Quality Requirements:

V = 2.22 ac-in or 0.19 ac-ft

$$L = \frac{V}{K(H_2W + 2H_2D_u - D_u^2 + 2H_2D_s) + (1.39 \times 10^{-4})WD_u}$$

L = 167.5 feet

2) Compute Maximum Length Trench:

$$V = 3.28 \text{ inches} \times 1.202 \text{ acres} = 3.94 \text{ ac-in or } 0.33 \text{ ac-ft}$$

L = 297.4 feet

3) Compute Provided Trench Volume:

$$L = 297 \text{ feet}$$

$$V = 0.01 \times (K(H_2W + 2H_2Du - Du^2) - 2H_2Du) + (1.00 \times 10^{-4} / V) Du$$

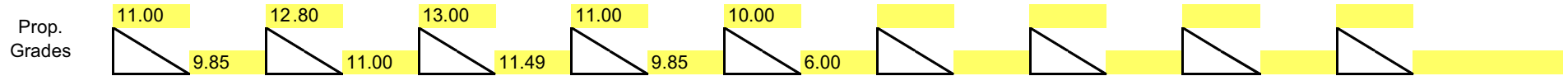
$V = 3.94$ ac-in or 0.35 ac-to

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STAGE STORAGE AREA CALCULATION



Stage	Pavement Area Low Area 0.350 0.000 (ac.-ft.)	Pavement Area High Area 0.342 0.000 (ac.-ft.)	Sidewalk Area Area 0.200 0.000 (ac.-ft.)	Landscape Area Area 0.249 0.000 (ac.-ft.)	Retention Area Area 0.040 0.002 (ac.-ft.)	Area 0.000 0.000 (ac.-ft.)	Area 0.000 0.000 (ac.-ft.)	Exfiltration Trench Area 0.000 0.000 (ac.-ft.)	Building Area 0.085 0.000 (ac.-ft.)	Total Site 1.202
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04
7.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.00	0.08
7.50	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.11	0.00	0.12
8.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.15	0.00	0.17
8.50	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.18	0.00	0.22
9.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.22	0.00	0.27
9.50	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.26	0.00	0.32
10.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.29	0.00	0.38
10.50	0.06	0.00	0.00	0.05	0.10	0.00	0.00	0.33	0.00	0.54
11.00	0.20	0.00	0.00	0.14	0.12	0.00	0.00	0.33	0.00	0.80
11.50	0.38	0.02	0.00	0.27	0.14	0.00	0.00	0.33	0.00	1.14
12.00	0.55	0.10	0.02	0.39	0.16	0.00	0.00	0.33	0.00	1.55
12.50	0.73	0.21	0.07	0.52	0.18	0.00	0.00	0.33	0.00	2.04
13.00	0.90	0.38	0.15	0.64	0.20	0.00	0.00	0.33	0.00	2.60

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PZ20-12000037

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Date: 3/3/2021
Project: Raceway - Atlantic
Project No: F150047

DESIGN CRITERIA

October Water Elevation 5.00
FEMA Elevation N/A

PROPOSED LAND USE SUMMARY

Areas:	Square Ft.	Acres	Percent
Lake	0	0.00	0.0%
Building	3,715	0.085	7.1%
Paved and Sidewalk	36,056	0.828	68.9%
Pervious	12,602	0.289	24.1%
Total Area:	52,373	1.202	100.0%

STAGE\STORAGE AREA CALCULATION

Stage	Site Stage-Storage (previous page)	Additional Underground Storage (StormTech) (ac.-ft.)	Total Storage Area (ac.-ft.)
5.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00
6.00	0.00	0.00	0.00
6.50	0.04	0.00	0.04
7.00	0.08	0.00	0.08
7.50	0.12	0.00	0.12
8.00	0.17	0.00	0.17
8.50	0.22	0.00	0.22
9.00	0.27	0.62	0.88
9.50	0.32	0.62	0.94
10.00	0.38	0.62	1.00
10.50	0.54	0.62	1.16
11.00	0.80	0.62	1.41
11.50	1.14	0.62	1.76
12.00	1.55	0.62	2.16
12.50	2.04	0.62	2.65
13.00	2.60	0.62	3.22

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PZ20-12000037
7/07/2021

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PZ20-12000037
9/15/2021

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PZ20-12000037
4/7/21

Soil Storage

Land Use Summary:

	Acres	Percent
Lake Areas (A_L):	0.000	0.0%
Roof Areas (A_R):	0.085	7.1%
Paved Areas (A_P):	0.828	68.9%
Green Areas (A_G):	0.289	24.0%
Total (A_T):	1.202	100.0%

Compacted Soil Storage per
SFWMD Vol. IV Page C-III-1

Depth to Water Table (feet)	Water Storage (inches)
1	0.45
2	1.88
3	4.95
4	8.18

Average Pervious Grade (Elev.): 9.80
Depth to Water Table: 4.80 ft
Soil Storage at Average Depth (S_S): 8.18 inches

Weighted S value:

$$= S_S \times \% \text{ Pervious}$$

$$= 8.18 \times 0.24$$

$$= \boxed{1.96 \text{ inches}}$$

Rainfalls

From Figure C-I-6, 100-Year Storm = 14.50 inches

$$100\text{-Year 3-Day Storm} = 14.50 \text{ inches} \times 1.359 = \boxed{19.71 \text{ inches}}$$

From Figure C-I-5, 25-Year Storm = 11.40 inches

$$25\text{-Year 3-Day Storm} = 11.40 \text{ inches} \times 1.359 = \boxed{15.49 \text{ inches}}$$

From Figure C-I-4, 10-Year Storm = 9.00 inches

Results from Flood Routings

$$\begin{aligned} \text{Runoff (Q)} &= (P - 0.2S)^2 / (P + 0.8S) \\ &= (19.71 - (0.2 \times 1.96))^2 / (19.71 + (0.8 \times 1.96)) \\ &= 17.54 \text{ inches of total runoff} \end{aligned}$$

$$\begin{aligned} \text{Runoff Volume} &= Q \times \text{Project Area} \\ &= 17.54 \times 1.202 = 21.08 \text{ acre-inches} = 1.76 \text{ acre-ft.} \end{aligned}$$

Maximum Stage for 100-Year 3-Day Storm (no discharge) = **11.50** NGVD

$$\begin{aligned} \text{Runoff (Q)} &= (P - 0.2S)^2 / (P + 0.8S) \\ &= (- (0.2 \times))^2 / (+ (0.8 \times)) \\ &= 13.36 \text{ inches of total runoff} \end{aligned}$$

$$\begin{aligned} \text{Runoff Volume} &= Q \times \text{Project Area} \\ &= 13.36 \times 1.202 = 16.06 \text{ acre-inches} = 1.34 \text{ acre-ft.} \end{aligned}$$

Maximum Stage for 25-Year 3-Day Storm (no discharge) = **10.85** NGVD

$$\begin{aligned} \text{Runoff (Q)} &= (P - 0.2S)^2 / (P + 0.8S) \\ &= (9 - (0.2 \times 1.96))^2 / (9 + (0.8 \times 1.96)) \\ &= 7.01 \text{ inches of total runoff} \end{aligned}$$

$$\begin{aligned} \text{Runoff Volume} &= Q \times \text{Project Area} \\ &= 7.01 \times 1.202 = 8.42 \text{ acre-inches} = 0.70 \text{ acre-ft.} \end{aligned}$$

Maximum Stage for 10-Year 1-Day Storm (no discharge) = **8.86** NGVD