Globe Engineering, Inc.

CIVIL ENGINEERING   **LAND PLANNING**   **CONSTRUCTION MANAGEMENT**

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FBPE registry # 8604

STORM DRAINAGE CALCULATIONS FOR
Belmont Park Estate

NE corner of Pompano Park Place & SW 4th Avenue

Pompano Beach, FL

Revised 05/01/2023

Martin Pilote, State of Florida, Professional Engineer, License No. 55992

This item has been digitally signed and sealed by Martin Pilote, PE on the date indicated here.

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Date: 2023.05.04 15:28:55 -04'00'

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Revised July 22, 2022

**Storm Drainage Summary for
Belmont Park Estates
NE corner of Pompano Park Place & SW 4th Avenue
Pompano Beach, FL**

INTRODUCTION
We are proposing a new multi-family project on previously developed property located at the NE corner of Pompano Park Place & SW 4th Avenue, Pompano Beach, Florida.
The current property consists of vacant land. The total project area is 0.936 acre.

EXISTING SURFACE WATER MANAGEMENT SYSTEM
The existing site is vacant land. The existing site grades are shown on the survey.
The current groundwater elevation from Broward County is 2.50 ft NAVD.
The future groundwater elevation from Broward County is 3.00 ft NAVD.
The future groundwater elevation is used in the drainage calculations.

One percolation test was performed in accordance with SFWMD procedures, which provide an average hydraulic conductivity as shown in the attached Exfiltration Trench calculations. Please refer to the attached Geotechnical Report (perc tests and soil borings).

PROPOSED SURFACE WATER MANAGEMENT SYSTEM
The proposed drainage improvements for the site consist of a series of inlets with exfiltration trench that connect to dry retention areas, swales, and R-Tanks under the parking lot.

Water quality treatment is provided within the exfiltration trench. Please refer to the attached Exfiltration Trench calculations.

Since the post-development stages are higher than the pre-development stages for the 100-year/72-hour and 25-year/72 hours storm events, the project is required to retain the post-development runoff on-site for the 25-year/72 hours storm event.

LAND USE AND SOIL STORAGE
Refer to the attached drainage calculations for the existing and proposed Land Use and soil storage for the entire site.

FLOOD PLAIN
The 2014 FEMA flood zone is X for the most of the parcel, except for a small portion on the west side that is within FEMA flood zone AH7

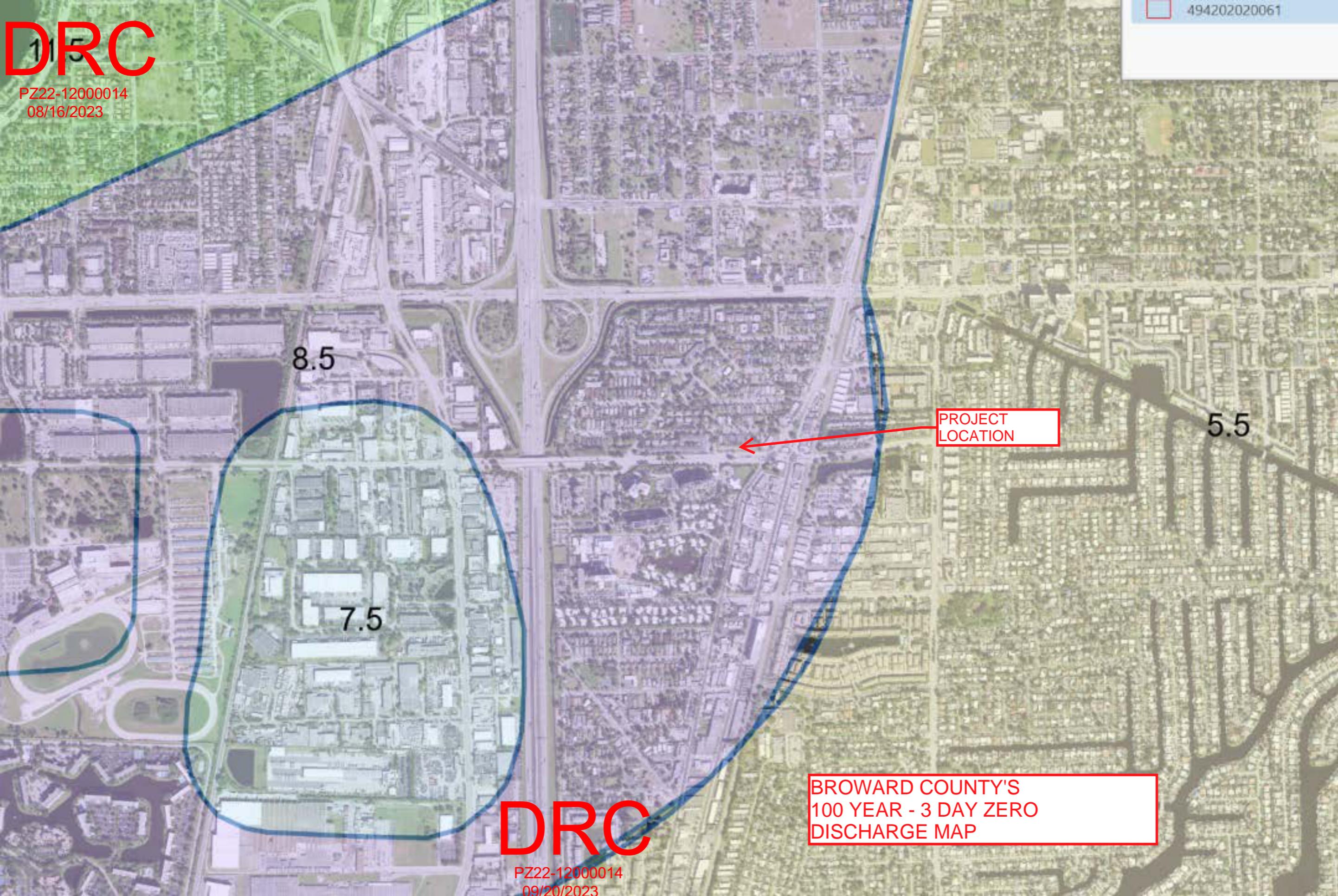For this site, the Broward County 100 year – 3 day zero discharge map is 8.50 ft

FINISHED FLOOR ELEVATION
The Finished Floor Elevation (FFE) will be 8.50 ft per the County's 100 year – 3 day zero discharge map.

DRC
PZ22-12000014
08/16/2023

494202020061

8.5

5.5

PROJECT
LOCATION

7.5

DRC

BROWARD COUNTY'S
100 YEAR - 3 DAY ZERO
DISCHARGE MAP

PZ22-12000014
09/20/2023

Belmont

POST DEVELOPMENT STORMWATER MANAGEMENT CALCULATIONS

LAND USE BREAKDOWN			GRADING PARAMETERS			
LAND USE BREAKDOWN	ACRES	PERCENT %	V/L	START ELEV	END ELEV	CHANGE
Building	0.130	13.9%	V	8.50	8.50	0.00
	0.000	0.0%	V	0.00	0.00	0.00
Pavement	0.326	34.8%	L	6.50	7.10	0.60
High Pavement	0.040	4.3%	L	6.50	7.52	1.02
Sidewalk	0.063	6.8%	L	6.40	8.42	2.02
Green	0.265	28.3%	L	7.00	8.40	1.40
DRA Side	0.085	9.1%	L	4.00	7.00	3.00
DRA Bottom	0.0267	2.9%	V	4.00	4.00	0.00
	0.000	0.0%	V	0.00	0.00	0.00
TOTAL	0.936	100.0%				

Exfiltration Trench

3.28" x site area allowed in trench (Vtotal):   3.07 ac-in.
Vtotal = Vwq + Vadd
Vwq (see calcs on following pages):   1.25 ac-in
%WQ: 0.5
%WQ x Vwq: 0.623 ac-in
Vadd max: 1.824 ac-in.
FS: 2

Exfiltration Trench

L_{max} = $FS(\%WQ)(Vwq)+Vadd)/[K \times (H_2W + 2H_2D_u - D_u^2 + 2H_2D_s) + (1.39 \times 10^{-4})WD_u]$

     =   293.50 feet

   L_{actual} =   400.00

Vwq =   1.25 ac-in.   (from above)

$Vadd_{actual}$ = $[L \times (K \times (H_2W + 2H_2D_u - D_u^2 + 2H_2D_s) + (1.39 \times 10^{-4})WDu)]/2 - FS(\%WQ \times Vwq)]$

     =   2.7   ac-in =   **0.226**   **ac-ft**

Vtotal actual   3.3   ac-in.   **0.278**   **ac-ft**

Vtotal in stage storage computation (ac-in) =   3.334   ac-in

          =   0.278   ac-ft

    V(ac-in)= $L \times [K \times (H2W + 2H_2D_u - D_u^2 + 2H_2D_s) + (1.39 \times 10^{-4})WD_u]$

       =   3.3   =   0.28   ac-ft   **5 yr-1 hr**

Max. Storage Credit: **0.25**   **ac-ft**

Exfiltration Trench Stage-Storage Calcs. *(Assuming Linear Progression)*	
Stage (ft)	Storage (ac-ft)
3	0.00
3.5	0.05
4	0.10
4.5	0.15
5	0.20
5.5	0.25

Trench Characteristics

L=	400	ft
W=	10	ft
K (CFS/ft²)=	3.02E-04	
H_2=	2.50	ft
D_u=	2.50	ft
D_s=	2.50	ft
Top of Trench Elev.=	5.50	ft-NAVD
Bottom of Trench Elev.=	0.50	ft-NAVD
Dry Retention Rim Elev.=	5.50	ft-NAVD

STAGE-STORAGE CALCULATIONS										
Assume Linear Progression for all Areas										
STAGE (ft-NAVD)	Volume of Storage (ac-ft)									
	Building	0	Pavement	Sidewalk	High Pavement	Green	DRA Side	DRA Bottom	R-tank	Exfil. Trench	TOTAL
3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.086
4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.10	0.171
4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.11	0.15	0.273
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.14	0.20	0.383
5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.18	0.25	0.500
6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.05	0.21	0.25	0.573
6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.07	0.21	0.25	0.619
7.00	0.00	0.00	0.07	0.01	0.00	0.00	0.13	0.08	0.21	0.25	0.750
7.50	0.00	0.00	0.23	0.02	0.02	0.02	0.17	0.09	0.21	0.25	1.017
8.00	0.00	0.00	0.39	0.04	0.04	0.09	0.21	0.11	0.21	0.25	1.348
8.50	0.00	0.00	0.55	0.07	0.06	0.21	0.26	0.12	0.21	0.25	1.733

Belmont
POST DEVELOPMENT STORMWATER MANAGEMENT CALCULATIONS

Project Location Hydraulic Details

Design Water Level=   3.00
Allowable Discharge* =   N/A   csm

Design Storm Rainfall Amounts

Storm	Rainfall (in.)		
Frequency	1 hr	24 hr	72 hr
3 year	x	x	
5 year	3.2	x	
10 year		9.00	13.00
25 year			16.00
100 year			20.00

Soil Storage Calculation

A. Total Pervious Area =   0.38   acres   =   40.3%

B. Depth to Water Table =   3.9   feet

C. From SFWMD Permit Information Manual, Vol. IV, Figure E-1, For 'flatwoods', the Cumulative Available Soil Storage is:

$$Sp = 6.59 \text{ inches}$$

D. Site Soil Storage (SSS) =   Sp x (Pervious Area/Total Area)
   =   2.65   inches

E. Curve No. (CN)=   1000 / (SSS +10)
   =   79

Water Quantity Calculations

A. Calculate the Runoff in Inches.

   Q=   (Rainfall - 0.2 x Soil Storage)^2 / (Rainfall + 0.8 x Soil Storage)

   $Q_{5yr-1hr}$=   1.34   inches
   $Q_{10yr-1day}$=   6.45   inches
   $Q_{25yr-3day}$=   13.20   inches
   $Q_{100yr-3day}$=   17.13   inches

B. Calculate the Runoff Volume

   V= Q x Project Area (1 ft / 12 in)

   $V_{5yr-1hr}$=   0.10   ac-ft
   $V_{10yr-1day}$=   0.50   ac-ft
   $V_{25yr-3day}$=   1.03   ac-ft
   $V_{100yr-3day}$=   1.34   ac-ft

C. Neglecting discharge and using the stage-storage chart and the calculated runoff volumes, the stages can be interpolated.

   $Stage_{5yr-1hr}$=   3.6   ft
   $Stage_{10yr-1day}$=   5.5   ft
   $Stage_{25yr-3day}$=   7.52   ft
   $Stage_{100yr-3day}$=   7.98   ft

Water Quality Calculations

A. Compute the first inch of runoff from the entire site.

1 inch x Total Area x (1 ft / 12 in)
= 0.08 ac-ft

B. Compute 2.5 inches times the percentage of imperviousness.

a. Site Area (SA), for water quality pervious/impervious calculations <u>only</u>

SA= Total Area - (roof + lake)
= 0.81 Acres

b. Impervious Area (IA), for water quality pervious/impervious calculations <u>only</u>

IA= Site Area(SA) - Pervious Area
= 0.43 Acres

c. Percentage of imperviousness for water quality

%imp= (IA / SA) x 100%
= 53.24 %

d. For 2.5 inches times percentage of imperviousness

= 2.5 inches x %imp
= 1.33 inches

e. Compute volume required for quality detention

= inches to be treated x (total - lake) x (1 ft / 12 in)
= 0.104 ac-ft **(CONTROLS)**

C. Since 2.5 inches times the percentage of impervious is greater than the first inch of runoff over the entire site, the volume to be treated is:

Volume to be treated = 0.104 ac-ft

The Water Quality Treatment is collected and stored in the exfiltration trench and dry retention
WATER QUALITY VOLUME MET AT ELEV. 3.63