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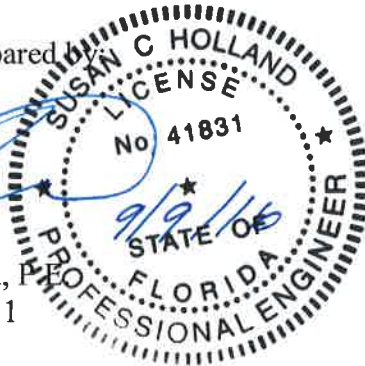

September 9, 2016

**Preliminary Drainage Calculations for
Margate Sports Field, Covered Play Structure and Restroom Building**

The current site is an undeveloped open area. This site will be developed to have covered sports fields, walkways, a concession building and a restroom building. A drainage system will be designed to collect stormwater from the buildings, the roof structure over the play fields and the walkways. The stormwater will be treated for water quality through with the use of exfiltration trenches. The stormwater will then be discharged to the adjacent canal through a control structure, located at the south end of the site.

Attached are preliminary drainage calculations for the project. The finished floor elevation for the concession building and the restroom building has been set at the 100 year – 3 day stage, without offsite discharge to the canal. The control structure will discharge water, over a weir, once the exfiltration system has reached capacity. Calculations for the discharge will be presented as the project progresses.

Calculations prepared by:



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License No. 41831

Margate, FL

Prepared by Susan C Holland, P.E.

Post-Development

Lic. No. 41831

HEI Project 16-32

Preliminary Calculations

Elevations are referenced to NAVD 1988

General Information

Total Project Area =	1.53 Acres	
Paved/Covered Area =	1.05 Acres	
Building Area =	0.03 Acres	
Lake Area =	0.00 Acres	
Recreation Area =	0.00 Acres	
Pervious Area =	0.45 Acres	
Total Impervious Area =	1.08 Acres	(70.6%)
Total Pervious Area (TPA) =	0.45 Acres	(29.4%)
Proposed Min. Floor Elevation =	13.50 '	
Proposed Min. Crown of Road =	NA	
Proposed Average Finished Grade =	11.00 '	
Lake Control Stage =	0.00 '	
Flood Criteria (Dade County only) =	0.00 '	
October Water Table =	6.50 '	
(Wet season water table)		
Credit (Dade County only) =	0.00 "	
Discharge Off-site =		

Storm Event Information

Retention for water quality

2.50 "

Finished Floor Elevation

100 year 3 day event = 17.67 "

100 Year 1 day event = 13.00 "

Perimeter Grade Elevation

25 year 1 day event = 10.00 "

25 year 3 day event = 13.59 "

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Exfiltration Trench Data

Trench Length = 206.00 '
Trench Width = 8.00 '
Trench Depth = 4.00 '
Pipe Diameter = 2.00 '
K = 0.000305

Exfiltration Trench Length

storm event = 2.50 "

H2 (depth to water table) = 2.50 '

Du (non-saturated trench depth) = 2.50 '

Ds (saturated trench depth) = 1.50 '

C Factor

Pervious = 0.6
Impervious = 0.9
Weighted C Factor = **0.81**

$$\frac{(0.45) \times (0.60) + (1.08) \times (0.90)}{1.53} = \mathbf{0.81}$$

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SCS Curve Number

Elevations are referenced to NAVD 1988

Design Water Table Elevation = 6.5 '
Average Finished Grade = 11.00
Average Depth Water Table = 4.50

Compacted Water Storage - (CWS) = 8.18 "
(Flatwoods soil - interpolated)

Ground Storage Under Pervious Area
(CWS/12 in/ft) x (TMPA) = 0.31 AC-FT

Soil Storage (S) = 2.41 "

SCS Curve Number (CN) = 80.61

Cumulative Soil Moisture Storage

S.F.W.M.D Vol. IV,
pg C-III-3, figure C-III-1

DWT=Depth to Water Table
NAS=Natural Available Storage
DAS=Developed Available Storage

DWT	NAS	DAS
1.0 '	0.69 "	0.45 "
2.0 '	2.50 "	1.88 "
3.0 '	6.60 "	4.95 "
4.0 '	10.90 "	8.18 "

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Elevations are referenced to NAVD 1988

Stage / Storage

Area of Developed Site Grading = 1.50 Acres

Stage	1.50 AC		Total
	Surface Stor.	Trench	
	Linear Stor.	Storage	
	Elev. 11'-12.75'		
6.50 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
1.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
2.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
3.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
4.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
5.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
6.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
7.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
8.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
9.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
10.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
11.00 '	0.00 AC-FT	0.22 AC-FT	0.22 AC-FT
12.00 '	0.75 AC-FT	0.22 AC-FT	0.97 AC-FT
12.50 '	1.13 AC-FT	0.22 AC-FT	1.35 AC-FT
13.00 '	1.69 AC-FT	0.22 AC-FT	1.91 AC-FT

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Retention / Detention Requirements for Water Quality

First 1" of runoff

$$\text{Volume} = 1" \times 1\text{ft}/12" \times 1.53 \text{ Acres} = 0.13 \text{ AC-FT}$$

Total project area - roof area = 1.53 acres - 0.03 acres = 1.50 acres
1.50 acres - 0.45 acres (pervious area) = 1.05 acres
1.05 acres / 1.50 acres X 100% = 70% impervious
2.5" X 0.70 = 1.75" to be treated
1.75" X 1.53 acres = 2.68 acre-inches (0.22 acre-feet)

**Water quality provided in
exfiltration trench system for 2.68 acre-inches.**

Exfilt Trench Lenght

Margate Sports Field

9/6/2016

Margate, FL
Post Development

Exfiltration Trench Length

C Pervious = 0.60

C Impervious = 0.90

Weighted C Factor = 0.81

storm event = 2.50

Trench width = 8.00

H2 (depth to water table) = 2.50

Du (non-saturated trench depth) = 2.50

Ds (saturated trench depth) = 1.50

Total volume to be exfiltrated = 2.68 AC-IN (0.22 AC-FT)

$$L = \frac{1.82}{0.000305 \times [(2.5 \times 8) + (2 \times 2.5 \times 2.5) - (2.5)^2 + (2 \times 2.5 \times 1.5)] + [(0.000139 \times 8 \times 2.5]}$$

$$L = 204.99'$$

206 LF of exfiltration trench provided.

Absolute Civil Engineering Solutions, LLC

ENGINEERING TESTING-ENGINEERING INSPECTION SERVICES-GEOTECHNICAL-ENVIRONMENTAL SERVICES

USUAL OPEN HOLE CONSTANT HEAD PERCOLATION TEST

DATE:	7/20/2016		
CLIENT:	Craven Thompson and Associates		
PROJECT:	Margate Sports Park		
PROJECT LOCATION:	1701 Banks Road, Margate, FL 33063		
TEST #	P-1		
LOCATION OF TEST:	As Shown on Boring Location Map		
DIA. OF AUGER:	8 INCHES	DIA. OF PERFORATED CASING:	6 INCHES

TOTAL TIME (minutes)	ELAPSED TIME (minutes)	GALLONS PER MINUTE (GPM)
1	1	9.00
2	1	9.00
3	1	9.00
4	1	8.00
5	1	7.00
6	1	7.00
7	1	7.00
8	1	7.00
9	1	7.00
10	1	7.00

DEPTH OF HOLE: 15 FT PERCOLATION RATE: 7.00 G.P.M.

WATER TABLE BELOW GROUND SURFACE: 2.33 Ft

K-VALUE: 3.05E-04 cfs/ft^2 per ft of head

NOTE 1: The percolation rate was maintained for more than ten (10) minutes.

SUBSURFACE INVESTIGATION

From 0'-0" to 0'-2"	Topsoil
From 0'-2" to 0'-6"	Black Medium Sand with Some Roots
From 0'-6" to 4'-8"	Brown Medium Silica Sand Mixed with Light Brown Silica Sand
From 4'-8" to 11'-7"	Brown Medium Silica Sand
From 11'-7" to 15'-0"	Gray Medium Sandy Coral Rocks



Wayne Webb, P.E.
Project Manager

State of Florida
Registered Professional Engineer: 56701

7/22/16