

SURFACE WATER MANAGEMENT CALCULATIONS

AURA DELRAY

Delray Beach, FL

HSQ PROJECT No.: 190643

Prepared For:

Trinsic

Prepared By:



HSQ GROUP, INC.

Engineers • Planners • Surveyors

1001 Yamato Road, Suite 105

Boca Raton, Florida 33431

(561) 392-0221 Phone

Jay Huebner, P.E.

FL Reg # 54615

DATE: June 16, 2020

GIVEN:

A. LAND USE SUMMARY:

1.	Lake Area =	0.000 ac.
2.	Buildings =	2.140 ac.
3.	Pavement & Others =	5.490 ac.
4.	Green Areas =	4.610 ac.
5.	Total =	<u>12.240</u>
		12.24

B. OTHER:

1. The current zoning on the property is Residential

DESIGN CRITERIA:

A. WATER QUALITY CRITERIA:

1. If a wet detention system, then whichever is the greater of the following:
 - a. The first inch of runoff from the entire project site.
 - b. The amount of 2.5 inches times the percent impervious for the project site.
2. If a dry detention system, then 75% of the volume required for the wet detention system.
3. If a retention system, then 50% of the volume required.
4. If the property is zoned "Commercial", at least 0.5 inches of retention or dry detention pre-treatment will be required.
5. Any detention system shall be designed to discharge no more than 0.5 inches of the detained volume per day.

B. WATER QUANTITY CRITERIA:

1. DESIGN EVENTS AND RAINFALL AMOUNTS:

- a. Design Event for Water Quality - Site Drainage:

Frequency:	5 year
Duration:	1 Hour
Amount:	5.00 inches
- b. Design Event for Minimum Road Elevation:

Frequency:	5 year
Duration:	1 day
Amount:	8.00 inches
- c. Design Event for Minimum Discharge Elevation:

Frequency:	25 year
Duration:	3 day
Amount:	15.00 inches
- d. Design Event for Minimum Finish Floor Elevation:

Frequency:	100 year
Duration:	3 day
Amount:	18.00 inches

2. ADDITIONAL DESIGN INFORMATION:

- a. Design Water / Control Elevation: 7.00 NAVD
- b. Drainage Basin / Canal Number: E-4
- c. Design Storm Allowable Discharge: 1.00 cfs.
- d. Time of Concentration: 10 minutes

COMPUTATIONS:

A. WATER QUALITY COMPUTATIONS:

1. Compute the first inch of runoff from the entire developed project site:

$$= 1.00 \text{ inch} \times 12.240 \text{ acres} \times (1 \text{ foot} / 12 \text{ inches})$$

$$= \underline{1.020 \text{ ac-ft for the first inch of runoff}}$$
2. Compute 2.5 inches times the percent impervious for the developed project site:
 - a. Site area for water quality pervious / impervious calculations only:

$$= \text{Total Project} - (\text{Lake Area} + \text{Buildings})$$

$$= 12.240 \text{ acres} - (0.000 \text{ acres} + 2.140 \text{ acres})$$

$$= \underline{10.100 \text{ acres of site area for water quality calculations}}$$
 - b. Impervious area for water quality pervious / impervious calculations only:

$$= \text{Site area for water quality} - \text{Pervious area}$$

$$= 10.100 \text{ acres} - 4.610 \text{ acres}$$

$$= \underline{5.490 \text{ acres of impervious area for water quality calculations}}$$
 - c. Percentage of impervious area for water quality:

$$= \text{Impervious area for water quality} / \text{Site area for water quality} \times 100\%$$

$$= 5.490 \text{ acres} / 10.100 \text{ acres} \times 100\%$$

$$= \underline{54.36 \% \text{ Impervious}}$$
 - d. For 2.5 inches times the percentage of impervious area:

$$= 2.5 \text{ inches} \times 54.36 \%$$

$$= \underline{1.359 \text{ inches to be treated}}$$
 - e. Compute volume required for quality detention:

$$= \text{Inches to be treated} \times (\text{Total Site Area} - \text{Lake Area})$$

$$= 1.359 \text{ inches} \times (12.240 \text{ acres} - 0.000 \text{ acres}) \times (1 \text{ foot} / 12 \text{ inches})$$

$$= \underline{1.386 \text{ ac-ft required for detention storage}}$$
3. The first inch of runoff from the entire developed site = 1.020 ac-ft
 2.5 inches times the percentage of impervious area = 1.386 ac-ft

The volume of 1.386 ac-ft controls
4. If the project is zoned "Commercial" or if the project were discharging directly to a sensitive receiving body and is more than 40% impervious, 0.5 inches of dry detention pre-treatment must be provided:

$$= 0.5 \text{ inches} \times (\text{Total Site Area} - \text{Lake Area})$$

$$= 0.5 \text{ inches} \times (12.240 \text{ acres} - 0.000 \text{ acres}) \times (1 \text{ foot} / 12 \text{ inches})$$

$$= \underline{0.510 \text{ ac-ft required for pre-treatment}}$$

5. Compute credit for using one of the following systems:

- a. Wet detention volume to be provided:
 = Total required detention - Pre-treatment
 = 1.386 ac-ft - 0.510 ac-ft
 = **0.876 ac-ft of volume required for wet detention**
- b. Dry detention volume to be provided (75% of the total required detention volume):
 = Total required detention volume X 75%
 = 1.386 ac-ft X 75%
 = **1.040 ac-ft of volume required for dry detention**
- c. Dry retention volume to be provided (50% of the total required detention volume):
 = Total required detention volume X 50%
 = 1.386 ac-ft X 50%
 = **0.693 ac-ft of volume required for dry retention**

B. SUMMARY OF WATER QUALITY COMPUTATIONS:

Item:	Description:	Quantity:
A.1	First inch of runoff from entire project site =	1.020 ac-ft
A.2	2.5 inches times percent impervious =	1.386 ac-ft
A.3	Volume to be treated =	1.386 ac-ft
A.4	Pre-treatment required for commercial site =	0.510 ac-ft
A.5.a	Wet detention volume required =	0.876 ac-ft
A.5.b	Dry detention volume required =	1.040 ac-ft
A.5.c	Dry retention volume required =	0.693 ac-ft
A.5.d	Exfiltration trench volume required =	1.386 ac-ft

C. STAGE ELEVATION INFORMATION:

Item:	Description:	S type	Area ac.	Low ft.	High ft.	I %	C %	Total Area %
1	park area	V	0.160	9.50	10.00	0	50	1.31
2	park area bank	L	0.040	9.50	11.00	0	50	0.33
3	Dry Detention Area	V	0.300	8.00	8.00	0	50	2.45
4	Dry Detention Bank	L	0.370	8.00	11.00	0	50	3.02
5	n / a	V						0.00
6	n / a	L						0.00
7	n / a	L						0.00
8	sidewalks/ driveways patio	L	0.600	11.75	12.50	100	100	4.90
9	Common Green Areas	L	3.740	11.00	13.00	0	50	30.56
10	Pavement & Others	L	4.890	11.50	13.00	100	100	39.95
11	Building Coverage Areas	V	2.140	13.50	13.50	100	100	17.48
Total:			12.240	8.00	13.50	62.34	81.17	100.0

* Abbreviations: S = Storage; (V = Vertical Storage & L = Linear Storage)
 I = Impervious
 C = Compaction; (Use the following compaction factors: 0%, 50%, 100%)

D. SCS CURVE NUMBER AND SOIL STORAGE CALCULATIONS:

1. Soil Moisture Storage Table:

Existing Soil Type: 2 **FLATWOODS**

Depth to Water Table ft.	Cumulative Water Storage (Pre.-Dev.) in.	Compacted Water Storage (Post 50%) in.	Compacted Water Storage (Post 100%) in.
1	0.76	0.67	0.57
2	2.50	2.19	1.88
3	5.40	4.73	4.05
4	9.00	7.88	6.75

2. Available Soil Storage Calculation:

Item:	Description:	Elev. ft.	S in.	Area acres	Stored ac-in
1	park area	9.75	4.09	0.160	0.65
2	park area bank	10.25	5.51	0.040	0.22
3	Dry Detention Area	8.00	0.67	0.300	0.20
4	Dry Detention Bank	9.50	3.46	0.370	1.28
5	n / a	0.00	0.00	0.000	0.00
6	n / a	0.00	0.00	0.000	0.00
7	n / a	0.00	0.00	0.000	0.00
8	sidewalks/ driveways patio	12.13	6.75	0.000	0.00
9	Common Green Areas	12.00	7.88	3.740	29.45
10	Pavement & Others	12.25	6.75	0.000	0.00
11	Building Coverage Areas	13.50	6.75	0.000	0.00
Total:		11.45	41.85	4.610	31.81

* Abbreviations: S = Soil Storage

P = Pervious

3. Moisture Storage Calculation (S):

= Available soil storage / Total Site Area

= 31.81 ac-in / 12.240 acres

= **2.60 inches**

4. SCS Curve Number Calculation (CN):

= 1000 / (S + 10)

= 1000 / (2.599 + 10)

= **79**

E. SURFACE STORAGE CALCULATIONS:

1. Stage vs. Storage Calculations:

Stage ft.	Item:	STORAGE (ac-ft)										T ac-ft	Total ac-ft
		1 ac-ft	2 ac-ft	3 ac-ft	4 ac-ft	5 ac-ft	6 ac-ft	7 ac-ft	8 ac-ft	9 ac-ft	10 ac-ft		
7.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.50		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50
8.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.99
8.50		0.00	0.00	0.15	0.02	0.00	0.00	0.00	0.00	0.00	0.00	1.49	1.66
9.00		0.00	0.00	0.30	0.06	0.00	0.00	0.00	0.00	0.00	0.00	1.99	2.35
9.50		0.00	0.00	0.45	0.14	0.00	0.00	0.00	0.00	0.00	0.00	2.48	3.07
10.00		0.08	0.00	0.60	0.25	0.00	0.00	0.00	0.00	0.00	0.00	2.48	3.41
10.50		0.16	0.01	0.75	0.39	0.00	0.00	0.00	0.00	0.00	0.00	2.48	3.79
11.00		0.24	0.03	0.90	0.56	0.00	0.00	0.00	0.00	0.00	0.00	2.48	4.21
11.50		0.32	0.05	1.05	0.74	0.00	0.00	0.00	0.00	0.23	0.00	2.48	4.88
12.00		0.40	0.07	1.20	0.93	0.00	0.00	0.00	0.03	0.94	0.41	2.48	6.45
12.50		0.48	0.09	1.35	1.11	0.00	0.00	0.00	0.23	2.10	1.63	2.48	9.47
13.00		0.56	0.11	1.50	1.30	0.00	0.00	0.00	0.53	3.74	3.67	2.48	13.88
13.50		0.64	0.13	1.65	1.48	0.00	0.00	0.00	0.83	5.61	6.11	2.48	18.93
14.00		0.72	0.15	1.80	1.67	0.00	0.00	0.00	1.13	7.48	8.56	2.48	23.98
14.50		0.80	0.17	1.95	1.85	0.00	0.00	0.00	1.43	9.35	11.00	2.48	29.03
15.00		0.88	0.19	2.10	2.04	0.00	0.00	0.00	1.73	11.22	13.45	2.48	34.08
15.50		0.96	0.21	2.25	2.22	0.00	0.00	0.00	2.03	13.09	15.89	2.48	39.13
16.00		1.04	0.23	2.40	2.41	0.00	0.00	0.00	2.33	14.96	18.34	2.48	44.18
16.50		1.12	0.25	2.55	2.59	0.00	0.00	0.00	2.63	16.83	20.78	2.48	49.23

* Abbreviations: T = Exfiltration Trench

F. MINIMUM BUILDING FINISH FLOOR ELEVATION CALCULATIONS (ZERO DISCHARGE):

1. The rainfall amount for the 100-Year, 3-Day storm event:

$$= \underline{18.00 \text{ in.}}$$

2. Compute inches of runoff, Q:

$$= (P - (0.2 S)) ^ 2 / (P + (0.8 X S))$$

$$= (\quad 18.00 \text{ in.} - (0.2 \times \quad 2.60 \text{ in.})) ^ 2 / (18.00 \text{ in.} + (0.8 \times \quad 2.60 \text{ in.}))$$

$$= \underline{15.22 \text{ inches of runoff}}$$

3. Compute volume of runoff:

$$= (\text{Inches of Runoff}) \times (\text{Project Area})$$

$$= 15.22 \text{ inches} \times 12.240 \text{ acres} \times (1 \text{ foot} / 12 \text{ inches})$$

$$= \underline{15.52 \text{ ac-ft of storage required (zero discharge)}}$$

4. From the stage vs storage curve, 15.52 ac-ft corresponds to elevation

13.16 NAVD

Building minimum finish floor is at 13.50 NAVD.

G. MINIMUM DISCHARGE ELEVATION CALCULATIONS (ZERO DISCHARGE):

1. The rainfall amount for the 25-Year, 3-Day storm event:
= **15.00 in.**
2. Compute inches of runoff, Q:
= $(P - (0.2 S))^2 / (P + (0.8 X S))$
= $(15.00 \text{ in.} - (0.2 \times 2.60 \text{ in.}))^2 / (15.00 \text{ in.} + (0.8 \times 2.60 \text{ in.}))$
= **12.28 inches of runoff**
3. Compute volume of runoff:
= (Inches of Runoff) X (Project Area)
= 12.28 inches X 12.240 acres X (1 foot / 12 inches)
= **12.52 ac-ft of storage required (zero discharge)**
4. From the stage vs storage curve, **12.52** ac-ft corresponds to elevation **12.85** NAVD

THE PERIMETER BERM IS 12.65 NAVD
Routing elevation is 12.52

H. MINIMUM ROAD CROWN ELEVATION CALCULATIONS (ZERO DISCHARGE):

1. The rainfall amount for the 5-Year, 1-Day storm event:
= **8.00 in.**
2. Compute inches of runoff, Q:
= $(P - (0.2 S))^2 / (P + (0.8 X S))$
= $(8.00 \text{ in.} - (0.2 \times 2.60 \text{ in.}))^2 / (8.00 \text{ in.} + (0.8 \times 2.60 \text{ in.}))$
= **5.55 inches of runoff**
3. Compute volume of runoff:
= (Inches of Runoff) X (Project Area)
= 5.55 inches X 12.240 acres X (1 foot / 12 inches)
= **5.66 ac-ft of storage required (zero discharge)**
4. From the stage vs storage curve, **5.66** ac-ft corresponds to elevation **11.75** NAVD

THE ROAD CROWN ELEVATIONS IS 11.50 NAVD
Routing elevation is 11.19

I. WATER QUALITY - SITE DRAINAGE CALCULATIONS:

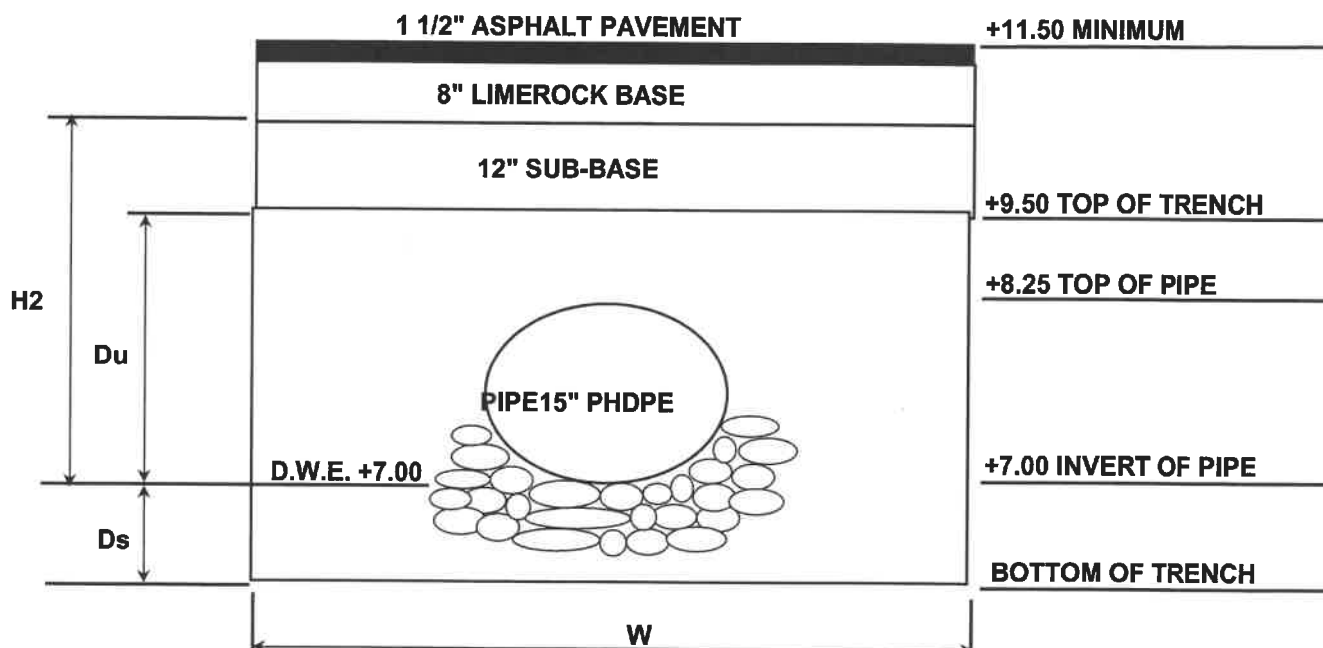
1. The rainfall amount for the 5-Year, 1-Hour storm event:
= **5.00 in.**
2. Compute inches of runoff, Q:
= $(P - (0.2 S))^2 / (P + (0.8 X S))$
= $(5.00 \text{ in.} - (0.2 \times 2.60 \text{ in.}))^2 / (5.00 \text{ in.} + (0.8 \times 2.60 \text{ in.}))$
= **2.84 inches of runoff**
3. Compute volume of runoff:
= (Inches of Runoff) X (Project Area)
= 2.84 inches X 12.240 acres X (1 foot / 12 inches)
= **2.89 ac-ft of storage required (zero discharge)**

Provided in EXFILTRATION TRENCH

J. EXFILTRATION TRENCH CALCULATIONS:

1. Design Formula:
$$L = (FS ((\%WQ \cdot V1) + V2)) / (K((H2 \cdot W) + (2 \cdot H2 \cdot Du) - (Du^2) + (2 \cdot H2 \cdot Ds)) + (1.39 \times 10^{-4} \cdot W \cdot Du))$$
2. Design Information:

V1 = Exfiltrated Volume (Pre-treatment):	16.63 ac-in
V2 = Exfiltrated Volume (Additional Storage):	21.61 ac-in
W = Trench Width:	8.00 ft.
K = Hydraulic Conductivity:	1.72E-04 cfs/sq-ft per ft head
H2 = Depth of Water Table:	4.50 ft.
Du = Non-Saturated Trench Depth:	2.50 ft.
Ds = Saturated Trench Depth:	2.00 ft.
3. Exfiltration Trench Required: **5,146 ft.**
4. Exfiltration Trench Provided: **4,010 ft.**
5. Exfiltration Trench Storage Provided: **29.80 ac-in** or **2.48 ac-ft**



Project Name: Aura Delray

Reviewer: Jay Huebner

Project Number: 190643

Period Begin: Sep 18, 2019;0000 hr End: Sep 21, 2019;0800 hr Duration: 80 hr

Time Step: 0.2 hr, Iterations: 10

Basin 1: Aura Delray

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 3day

Design Frequency: 25 year

1 Day Rainfall: 11 inches

Area: 12.24 acres

Ground Storage: 2.6 inches

Time of Concentration: 0.5 hours

Initial Stage: 7 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
7.00	0.00
7.50	0.50
8.00	0.99
8.50	1.66
9.00	2.35
9.50	3.07
10.00	3.41
10.50	3.79
11.00	4.21
11.50	4.88
12.00	6.45
12.50	9.47
13.00	13.88
13.50	18.93

Offsite Receiving Body: Offsitel

Time (hr)	Stage (ft NGVD)
0.00	7.00
100.00	7.00

Structure: 1

From Basin: Aura Delray

To Basin: Offsitel

Structure Type: Gravity

Weir: Sharp Crested, Crest Elev = 13 ft NGVD, Length = 5 ft

Bleeder: Inv-Tri, Invert Elev = 7 ft NGVD, Height = 0.5 ft

Width = 0.5 ft

Default Coefs: Weir Coef = 2.5, Orifice Coef = 0.6

Pipe: Diameter = 2 ft, Manning's n = 0.012, Length = 100 ft

US Invert Elev = 4 ft NGVD, DS Invert Elev = 4 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	7.00	7.00
1.00	0.07	0.00	0.00	0.00	7.00	7.00
2.00	0.13	0.00	0.00	0.00	7.00	7.00
3.00	0.20	0.00	0.00	0.00	7.00	7.00
4.00	0.27	0.00	0.00	0.00	7.00	7.00
5.00	0.33	0.00	0.00	0.00	7.00	7.00
6.00	0.40	0.00	0.00	0.00	7.00	7.00
7.00	0.47	0.00	0.00	0.00	7.00	7.00
8.00	0.54	0.00	0.00	0.00	7.00	7.00

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)
9.00	0.60	0.03	0.00	0.00	7.00	7.00
10.00	0.67	0.07	0.00	0.00	7.01	7.00
11.00	0.74	0.10	0.00	0.00	7.01	7.00
12.00	0.80	0.14	0.00	0.00	7.02	7.00
13.00	0.87	0.17	0.00	0.00	7.04	7.00
14.00	0.94	0.20	0.00	0.00	7.05	7.00
15.00	1.00	0.23	0.00	0.00	7.07	7.00
16.00	1.07	0.25	0.00	0.00	7.09	7.00
17.00	1.14	0.27	0.00	0.00	7.11	7.00
18.00	1.20	0.30	0.01	0.00	7.13	7.00
19.00	1.27	0.32	0.01	0.00	7.16	7.00
20.00	1.34	0.34	0.02	0.00	7.18	7.00
21.00	1.41	0.36	0.03	0.01	7.21	7.00
22.00	1.47	0.37	0.03	0.01	7.24	7.00
23.00	1.54	0.39	0.05	0.01	7.27	7.00
24.00	1.61	0.41	0.06	0.02	7.29	7.00
25.00	1.70	0.60	0.08	0.02	7.33	7.00
26.00	1.80	0.65	0.11	0.03	7.38	7.00
27.00	1.90	0.68	0.14	0.04	7.42	7.00
28.00	2.00	0.70	0.18	0.05	7.46	7.00
29.00	2.09	0.73	0.25	0.07	7.51	7.00
30.00	2.19	0.75	0.28	0.09	7.55	7.00
31.00	2.29	0.77	0.30	0.12	7.59	7.00
32.00	2.39	0.79	0.32	0.14	7.62	7.00
33.00	2.48	0.80	0.34	0.17	7.66	7.00
34.00	2.58	0.82	0.36	0.20	7.70	7.00
35.00	2.68	0.84	0.38	0.23	7.74	7.00
36.00	2.78	0.85	0.40	0.26	7.78	7.00
37.00	2.88	0.87	0.42	0.30	7.82	7.00
38.00	2.97	0.88	0.43	0.33	7.85	7.00
39.00	3.07	0.89	0.45	0.37	7.89	7.00
40.00	3.17	0.90	0.46	0.41	7.93	7.00
41.00	3.27	0.91	0.48	0.45	7.97	7.00
42.00	3.36	0.92	0.49	0.49	8.00	7.00
43.00	3.46	0.93	0.50	0.53	8.03	7.00
44.00	3.56	0.94	0.51	0.57	8.06	7.00
45.00	3.66	0.95	0.52	0.61	8.08	7.00
46.00	3.75	0.96	0.53	0.66	8.11	7.00
47.00	3.85	0.97	0.54	0.70	8.14	7.00
48.00	3.95	0.98	0.55	0.75	8.16	7.00
49.00	4.06	1.09	0.56	0.79	8.19	7.00
50.00	4.17	1.12	0.57	0.84	8.23	7.00
51.00	4.30	1.32	0.58	0.89	8.27	7.00
52.00	4.44	1.50	0.60	0.93	8.32	7.00
53.00	4.63	1.94	0.62	0.98	8.39	7.00
54.00	4.86	2.42	0.64	1.04	8.48	7.00
55.00	5.14	2.91	0.68	1.09	8.60	7.00
56.00	5.46	3.43	0.72	1.15	8.75	7.00
57.00	5.83	4.10	0.76	1.21	8.93	7.00
58.00	6.29	5.08	0.81	1.28	9.16	7.00
59.00	6.91	7.06	0.87	1.35	9.45	7.00
60.00	11.16	58.20	1.23	1.43	11.49	7.00
61.00	12.39	18.69	1.33	1.54	12.19	7.00
62.00	12.95	8.08	1.35	1.65	12.34	7.00
63.00	13.30	4.64	1.35	1.76	12.40	7.00
64.00	13.63	4.05	1.36	1.87	12.44	7.00
65.00	13.83	2.60	1.36	1.99	12.47	7.00
66.00	14.02	2.41	1.37	2.10	12.48	7.00
67.00	14.22	2.38	1.37	2.21	12.50	7.00
68.00	14.42	2.38	1.37	2.33	12.51	7.00
69.00	14.55	1.70	1.37	2.44	12.51	7.00
70.00	14.69	1.60	1.37	2.55	12.51	7.00
71.00	14.82	1.59	1.37	2.67	12.52	7.00
72.00	14.95	1.59	1.37	2.78	12.52	7.00
73.00	14.95	0.22	1.37	2.89	12.51	7.00
74.00	14.95	0.03	1.37	3.01	12.50	7.00
75.00	14.95	0.00	1.37	3.12	12.48	7.00

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)
76.00	14.95	0.00	1.36	3.23	12.46	7.00
77.00	14.95	0.00	1.36	3.34	12.44	7.00
78.00	14.95	0.00	1.36	3.46	12.43	7.00
79.00	14.95	0.00	1.36	3.57	12.41	7.00
80.00	14.95	0.00	1.35	3.68	12.39	7.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	1.37	72.00	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Aura Delray	12.52	72.00	7.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Aura Delray	12.47	0.00	3.67	0.00	8.80	0.00

Project Name: Aura Delray

Reviewer: Jay Huebner

Project Number: 190643

Period Begin: Sep 18, 2019;0000 hr End: Sep 21, 2019;0800 hr Duration: 80 hr

Time Step: 0.2 hr, Iterations: 10

Basin 1: Aura Delray

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 24 hr

Design Frequency: 5 year

1 Day Rainfall: 8 inches

Area: 12.24 acres

Ground Storage: 2.6 inches

Time of Concentration: 0.5 hours

Initial Stage: 7 ft NGVD

Stage (ft NGVD)	Storage (acre-ft)
7.00	0.00
7.50	0.50
8.00	0.99
8.50	1.66
9.00	2.35
9.50	3.07
10.00	3.41
10.50	3.79
11.00	4.21
11.50	4.88
12.00	6.45
12.50	9.47
13.00	13.88
13.50	18.93

Offsite Receiving Body: Offsitel

Time (hr)	Stage (ft NGVD)
0.00	7.00
100.00	7.00

Structure: 1

From Basin: Aura Delray

To Basin: Offsitel

Structure Type: Gravity

Weir: Sharp Crested, Crest Elev = 13 ft NGVD, Length = 5 ft

Bleeder: Inv-Tri, Invert Elev = 7 ft NGVD, Height = 0.5 ft

Width = 0.5 ft

Default Coefs: Weir Coef = 2.5, Orifice Coef = 0.6

Pipe: Diameter = 2 ft, Manning's n = 0.012, Length = 100 ft

US Invert Elev = 4 ft NGVD, DS Invert Elev = 4 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	7.00	7.00
1.00	0.08	0.00	0.00	0.00	7.00	7.00
2.00	0.16	0.00	0.00	0.00	7.00	7.00
3.00	0.26	0.00	0.00	0.00	7.00	7.00
4.00	0.36	0.00	0.00	0.00	7.00	7.00
5.00	0.50	0.00	0.00	0.00	7.00	7.00
6.00	0.66	0.11	0.00	0.00	7.00	7.00
7.00	0.86	0.41	0.00	0.00	7.02	7.00
8.00	1.10	0.79	0.00	0.00	7.07	7.00

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)
9.00	1.37	1.29	0.01	0.00	7.16	7.00
10.00	1.70	1.99	0.06	0.00	7.29	7.00
11.00	2.15	3.28	0.21	0.01	7.49	7.00
12.00	5.25	35.84	0.63	0.05	8.43	7.00
13.00	6.14	12.11	0.95	0.12	9.83	7.00
14.00	6.54	5.41	1.09	0.21	10.59	7.00
15.00	6.80	3.16	1.13	0.30	10.88	7.00
16.00	7.04	2.78	1.16	0.39	11.03	7.00
17.00	7.18	1.79	1.17	0.49	11.09	7.00
18.00	7.33	1.66	1.17	0.59	11.12	7.00
19.00	7.47	1.65	1.18	0.68	11.15	7.00
20.00	7.62	1.65	1.18	0.78	11.18	7.00
21.00	7.71	1.17	1.18	0.88	11.19	7.00
22.00	7.81	1.11	1.18	0.98	11.19	7.00
23.00	7.90	1.10	1.18	1.07	11.19	7.00
24.00	8.00	1.11	1.18	1.17	11.18	7.00
25.00	8.00	0.15	1.17	1.27	11.14	7.00
26.00	8.00	0.02	1.16	1.37	11.07	7.00
27.00	8.00	0.00	1.15	1.46	11.00	7.00
28.00	8.00	0.00	1.13	1.56	10.89	7.00
29.00	8.00	0.00	1.12	1.65	10.78	7.00
30.00	8.00	0.00	1.10	1.74	10.67	7.00
31.00	8.00	0.00	1.08	1.83	10.56	7.00
32.00	8.00	0.00	1.06	1.92	10.45	7.00
33.00	8.00	0.00	1.04	2.00	10.33	7.00
34.00	8.00	0.00	1.02	2.09	10.22	7.00
35.00	8.00	0.00	1.00	2.17	10.11	7.00
36.00	8.00	0.00	0.98	2.26	10.00	7.00
37.00	8.00	0.00	0.96	2.34	9.89	7.00
38.00	8.00	0.00	0.94	2.41	9.77	7.00
39.00	8.00	0.00	0.92	2.49	9.66	7.00
40.00	8.00	0.00	0.90	2.57	9.55	7.00
41.00	8.00	0.00	0.88	2.64	9.47	7.00
42.00	8.00	0.00	0.87	2.71	9.42	7.00
43.00	8.00	0.00	0.86	2.78	9.37	7.00
44.00	8.00	0.00	0.85	2.85	9.32	7.00
45.00	8.00	0.00	0.84	2.92	9.27	7.00
46.00	8.00	0.00	0.83	2.99	9.23	7.00
47.00	8.00	0.00	0.82	3.06	9.18	7.00
48.00	8.00	0.00	0.81	3.13	9.13	7.00
49.00	8.00	0.00	0.80	3.19	9.09	7.00
50.00	8.00	0.00	0.79	3.26	9.04	7.00
51.00	8.00	0.00	0.78	3.32	9.00	7.00
52.00	8.00	0.00	0.76	3.39	8.95	7.00
53.00	8.00	0.00	0.75	3.45	8.90	7.00
54.00	8.00	0.00	0.74	3.51	8.86	7.00
55.00	8.00	0.00	0.73	3.57	8.82	7.00
56.00	8.00	0.00	0.72	3.63	8.77	7.00
57.00	8.00	0.00	0.71	3.69	8.73	7.00
58.00	8.00	0.00	0.70	3.75	8.69	7.00
59.00	8.00	0.00	0.69	3.81	8.65	7.00
60.00	8.00	0.00	0.68	3.86	8.60	7.00
61.00	8.00	0.00	0.67	3.92	8.56	7.00
62.00	8.00	0.00	0.66	3.97	8.52	7.00
63.00	8.00	0.00	0.65	4.03	8.49	7.00
64.00	8.00	0.00	0.63	4.08	8.45	7.00
65.00	8.00	0.00	0.62	4.13	8.41	7.00
66.00	8.00	0.00	0.61	4.18	8.37	7.00
67.00	8.00	0.00	0.60	4.23	8.33	7.00
68.00	8.00	0.00	0.59	4.28	8.29	7.00
69.00	8.00	0.00	0.58	4.33	8.26	7.00
70.00	8.00	0.00	0.57	4.38	8.22	7.00
71.00	8.00	0.00	0.56	4.42	8.19	7.00
72.00	8.00	0.00	0.54	4.47	8.15	7.00
73.00	8.00	0.00	0.53	4.51	8.12	7.00
74.00	8.00	0.00	0.52	4.56	8.09	7.00
75.00	8.00	0.00	0.51	4.60	8.06	7.00

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)
76.00	8.00	0.00	0.50	4.64	8.03	7.00
77.00	8.00	0.00	0.49	4.68	7.99	7.00
78.00	8.00	0.00	0.47	4.72	7.95	7.00
79.00	8.00	0.00	0.46	4.76	7.91	7.00
80.00	8.00	0.00	0.44	4.80	7.88	7.00

STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	1.18	21.00	0.00	0.00

BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
Aura Delray	11.19	21.00	7.00	0.00

BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
Aura Delray	5.66	0.00	4.79	0.00	0.87	0.00

REFERENCE MATERIAL

Prepared By:



HSQ GROUP, INC.

Engineers • Planners • Surveyors

1001 Yamato Road, Suite 105

Boca Raton, Florida 33431

(561) 392-0221 Phone



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May 15, 2020

Mr. Matt Lynch
Trinsic Acquisition Company, LLC
4800 N. Federal Hwy, Suite 207A
Boca Raton, FL 33431
Email: mlynch@trinsicres.com

RE: **Exfiltration Tests**
Trinsic Residential Group Project
NW Corner of W. Atlantic Ave. & N. Congress Ave.
Delray Beach, Florida
GFA Project No.: 19-2923.01

Dear Mr. Lynch,

GFA International performed four (4) exfiltration tests at the locations shown in **Figure 1** for the above-mentioned project to assess the hydraulic conductivity coefficient data for the design of the drainage area. The exfiltration tests were performed in accordance with the SFWMD Constant Head "Usual Condition" Open Hole Test Method to a depth of 6 feet below ground surface (BGS). The calculated hydraulic conductivity coefficients for the exfiltration tests were as follows:

Exfiltration Test	Hydraulic Conductivity*
EX-1	$1.2 \times 10^{-4} \text{ ft}^3/\text{sec}/\text{ft}^2\text{-ft}$
EX-2	$1.0 \times 10^{-4} \text{ ft}^3/\text{sec}/\text{ft}^2\text{-ft}$
EX-3	$2.5 \times 10^{-4} \text{ ft}^3/\text{sec}/\text{ft}^2\text{-ft}$
EX-4	$2.2 \times 10^{-4} \text{ ft}^3/\text{sec}/\text{ft}^2\text{-ft}$

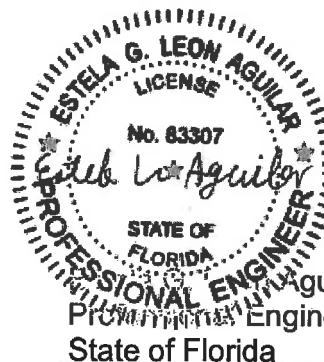
*Water table was not encountered within drill depth. Water table is assumed to be at 6 feet BGS for calculation purposes.

The test results are attached to this letter.

GFA appreciates the opportunity to be of service to you on this project and look forward to a continued association. Please do not hesitate to contact GFA if you have any questions or comments, or if GFA may further assist you as your plans proceed.

Sincerely,
GFA International, Inc.
FBPE CA # 4930

Alberto J. Mercado, E.I.
Project Engineer



Estela G. Leon Aguilar
May 15 2020 3:59 PM

Estela G. Leon Aguilar, M.S., P.E.
Professional Engineer #83307
State of Florida

DocuSign

This item has been digitally signed and sealed by [Estela G. León Aguilar] on the date adjacent to the seal.
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

1215 Wallace Drive • Delray Beach, Florida 33444 • (561) 347-0070 • (561) 347-0868 (fax) • www.teamgfa.com

OFFICES THROUGHOUT FLORIDA



TRINISIC RESIDENTIAL GROUP PROJECT
 NW CORNER OF W. ATLANTIC AVE. & N. CONGRESS AVE.
 DELRAY BEACH, FL
 GFA PROJECT NO. 19-2923.01

FIGURE 1 – TEST LOCATION PLAN

NOTE: BORING LOCATIONS WERE LOCATED USING A MEASURING TAPE AND EXISTING LANDMARKS AS REFERENCE POINTS. IN ADDITION, THE LATITUDE, LONGITUDE, AND ELEVATION NOTED ON THE BORING LOGS WERE TAKEN FROM GOOGLE EARTH. THEREFORE, LOCATIONS SHOWN ON THE PLAN ARE APPROXIMATE.





HYDRAULIC CONDUCTIVITY TEST RESULTS

Project name:

Trinsic Residential Group Project

Project number:

19-2923.01

Date:

5/14/2020

SFWMD USUAL Open Hole Formula:

$$K = \frac{4Q}{\pi d(2H_2^2 + 4H_2D_s + H_2d)}$$

Exfiltration Number	First volume of water reading (after stabilization)	Final volume of water reading	Elapsed time	Average flow rate at constant head Q	Average flow rate at constant head Q*0.00223	Perforated casing diameter or hole diameter (d)	Water table* H ₂	Total length of bore hole	Length of bore hole below stabilized ground water (Ds)	Hydraulic Conductivity (K)
	gallon	gallon	min.	gallon/minute	ft ³ /sec	ft	ft	ft	ft	ft ³ /sec/ft ² - ft of head
EX-1	34620.0	34630.4	10	1.04	0.0023	0.33	6.0	6.0	0.0	1.2E-04
EX-2	34653.2	34662.2	10	0.90	0.0020	0.33	6.0	6.0	0.0	1.0E-04
EX-3	34684.7	34706.0	10	2.13	0.0047	0.33	6.0	6.0	0.0	2.5E-04
EX-4	34586.8	34605.8	10	1.90	0.0042	0.33	6.0	6.0	0.0	2.2E-04

*Water table was not encountered within drill depth. Water table is assumed to be at 6 feet BGS for calculation purposes.

GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

BORING NUMBER EX01

PAGE 1 OF 1

CLIENT Trinsic Acquisition Company, LLC

PROJECT NAME Trinsic Residential Group Project

PROJECT NUMBER 19-2923.01

PROJECT LOCATION W Atlantic Ave. & N Congress Ave., Delray Beach

DATE STARTED 5/14/20 **COMPLETED** 5/14/20

LATITUDE 26.461401 **LONGITUDE** -80.094796

DRILLING CONTRACTOR GFA International Inc.

GROUND WATER LEVELS:

DRILLING METHOD

AT TIME OF DRILLING

LOGGED BY Marcos Ruiz CHECKED BY Alberto Mercado

AT END OF _____

NOTES

AFTER DRILLING —

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			
			Brown, fine to medium grained SAND (SP) with LIMESTONE fragments.
10.0	2.0		
2.5			Brown, fine to medium grained SAND (SP).
7.5			
5.0			
6.0			
			Bottom of borehole at 6.0 feet.

Bottom of borehole at 6.0 feet.



GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

BORING NUMBER EX02

PAGE 1 OF 1

CLIENT Trinsic Acquisition Company, LLC

PROJECT NAME Trinsic Residential Group Project

PROJECT NUMBER 19-2923.01

PROJECT LOCATION W Atlantic Ave. & N Congress Ave., Delray Beach

DATE STARTED 5/14/20 COMPLETED 5/14/20

LATITUDE 26.461389 LONGITUDE -80.095651

DRILLING CONTRACTOR GFA International Inc.

GROUND WATER LEVELS:

DRILLING METHOD _____

AT TIME OF DRILLING —

LOGGED BY Marcos Ruiz CHECKED BY Alberto Mercado

AT END OF —

NOTES _____

AFTER DRILLING —

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			
			Tan, fine to medium grained SAND (SP) with LIMESTONE fragments.
10.0			
2.0			
			Brown, fine to medium grained SAND (SP) with LIMESTONE fragments, with trace of debris (concrete, wood, steel, wire, plastic).
2.5			
7.5			
5.0			
5.0			
6.0			
			Bottom of borehole at 6.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 5/15/20 14:34 - R:\GINT\PROJECTS\19-2923.01 TRINSIC RESIDENTIAL CO#1.GPJ



GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

BORING NUMBER EX03

PAGE 1 OF 1

CLIENT Trinsic Acquisition Company, LLC

PROJECT NAME Trinsic Residential Group Project

PROJECT NUMBER 19-2923.01

PROJECT LOCATION W Atlantic Ave. & N Congress Ave., Delray Beach

DATE STARTED 5/14/20 COMPLETED 5/14/20

LATITUDE 26.461126 LONGITUDE -80.095215

DRILLING CONTRACTOR GFA International Inc.

GROUND WATER LEVELS:

DRILLING METHOD _____

AT TIME OF DRILLING —

LOGGED BY Marcos Ruiz CHECKED BY Alberto Mercado

AT END OF —

NOTES _____

AFTER DRILLING —

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			
			Light brown, fine to medium grained SAND (SP).
10.0			
2.5			
			3.0 8.0
			Dark brown, fine to medium grained SAND (SP) with trace of limestone fragments.
7.5			
5.0			
5.0			6.0 5.0
			Bottom of borehole at 6.0 feet.



GFA International, Inc.
1215 Wallace Dr.
Delray Beach, FL 33444
561-347-0070
561-395-5805

BORING NUMBER EX04

PAGE 1 OF 1

CLIENT Trinsic Acquisition Company, LLC

PROJECT NAME Trinsic Residential Group Project

PROJECT NUMBER 19-2923.01

PROJECT LOCATION W Atlantic Ave. & N Congress Ave., Delray Beach

DATE STARTED 5/14/20 COMPLETED 5/14/20

LATITUDE 26.460572 LONGITUDE -80.094853

DRILLING CONTRACTOR GFA International Inc.

GROUND WATER LEVELS:

DRILLING METHOD _____

AT TIME OF DRILLING —

LOGGED BY Marcos Ruiz CHECKED BY Alberto Mercado

AT END OF —

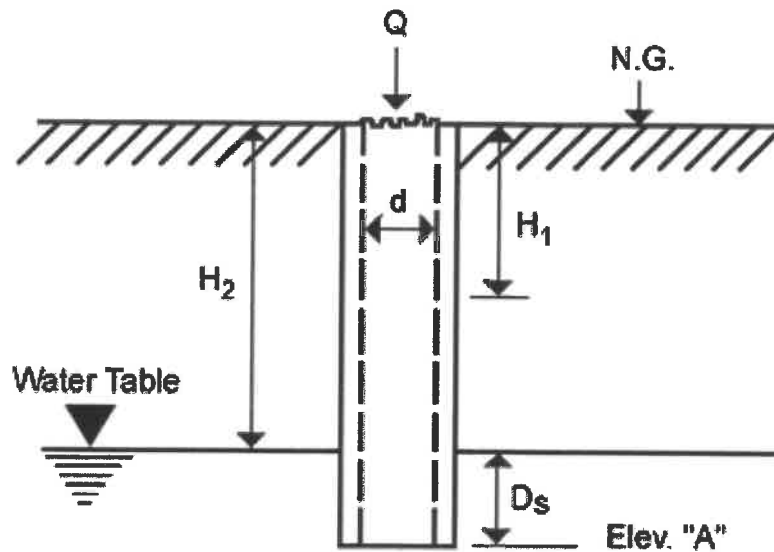
NOTES _____

AFTER DRILLING —

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			
			Light brown, fine to medium grained SAND (SP) with trace of shell fragments.
10.0			
2.5			2.5 Brown, fine to medium grained SAND (SP) with trace of limestone fragments. 9.5
			4.0 Brown, fine to medium grained SAND (SP) with trace of limestone fragments, with shell fragments. 8.0
7.5			
5.0			
			6.0 Bottom of borehole at 6.0 feet. 6.0

GENERAL BH / TP / WELL - GINT STD US.GDT - 5/15/20 14:34 - R:\GINT\PROJECTS\19-2923.01 TRINSIC RESIDENTIAL CO#1.GPJ

USUAL OPEN-HOLE TEST



$$K = \frac{4Q}{\pi d (2H_2^2 + 4H_2D_s + H_2d)}$$

K = Hydraulic Conductivity (cfs/ft.² – ft. head)

Q = “Stabilized” Flow Rate (cfs)

d = Diameter of Test Hole (feet)

H_2 = Depth to Water Table (feet)

D_s = Saturated Hole Depth (feet)

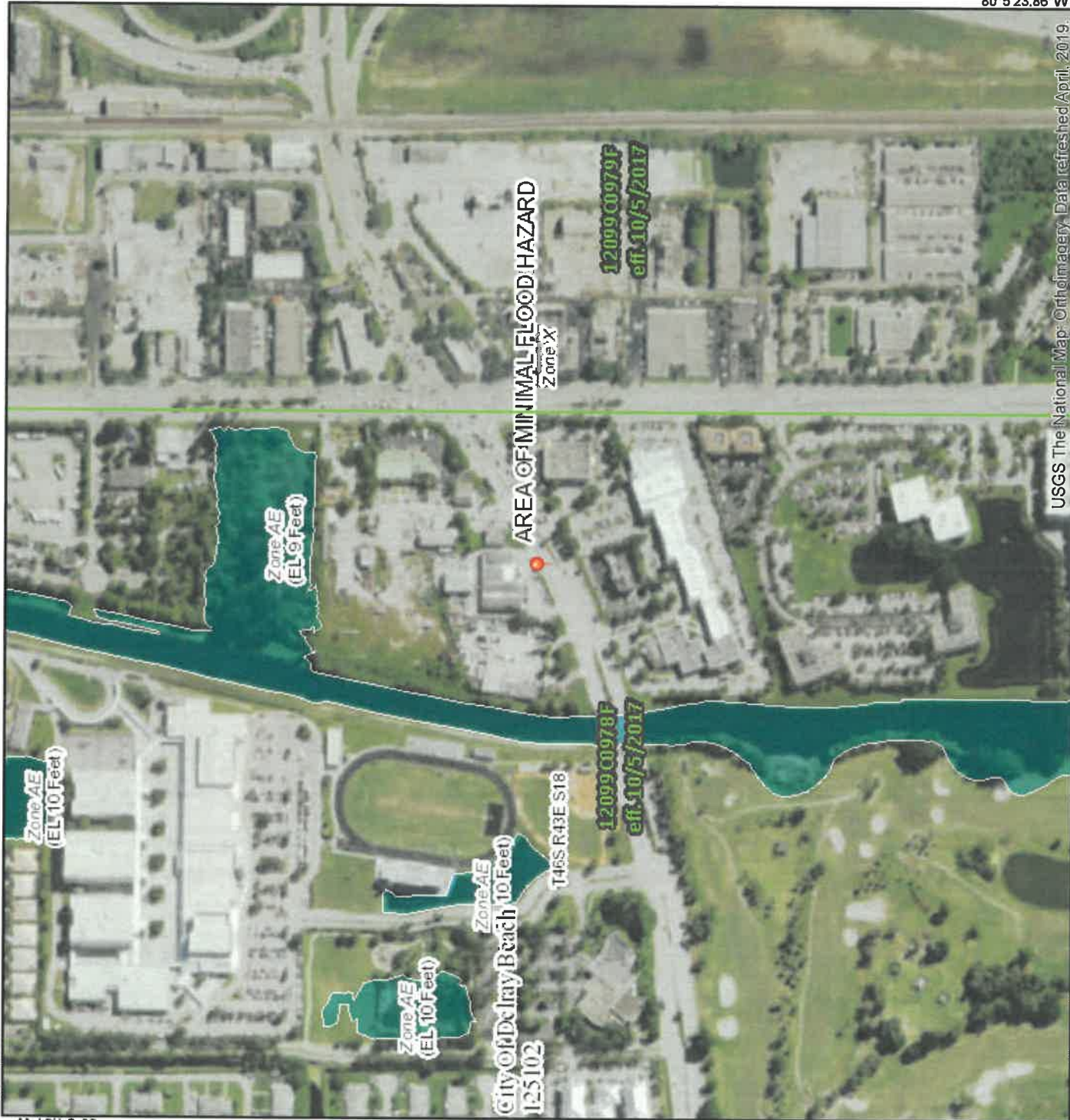
Elev. “A” = Proposed Trench Bottom Elev. (ft. – NGVD)

H_1 = Average Head on Unsaturated Hole Surface (ft. head)

National Flood Hazard Layer FIRMette



28°27'51.33"N



USGS The National Map: Orthoimagery. Data refreshed April, 2019.

28°27'19.12"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, Area 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
	Effective LOMRs
GENERAL STRUCTURES	Area of Minimal Flood Hazard (Zone X)
	Area of Undetermined Flood Hazard (Zone X)
OTHER FEATURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
MAP PANELS	Cross Sections with 1% Annual Chance Water Surface Elevation
	Coastal Transect
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	Digital Data Available
	No Digital Data Available
	Unmapped

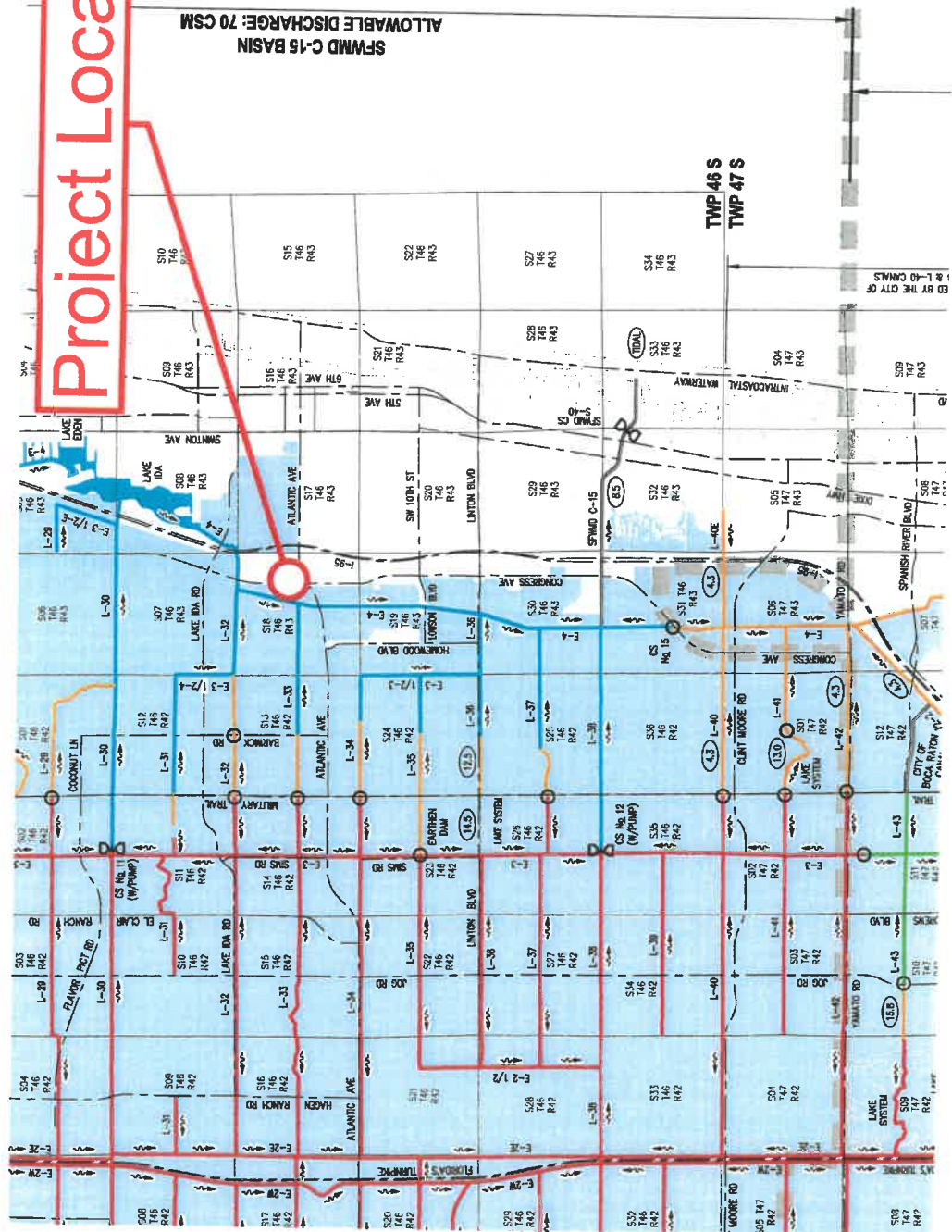
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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 7/3/2019 at 4:45:03 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.

Project Location



SFWMD C-15 BASIN
ALLOWABLE DISCHARGE: 70 CSM



LEGEND

- LWDD SERVICE AREA
- BOUNDARY LINE FOR SFWMD BASIN AREAS
- PRINCIPAL ROADWAY
- L-3 DENOTES SOME SPECIFIC CANAL MAINTENANCE ELEVATIONS
- L-42 LWDD CANAL DESIGNATIONS (UNLESS OTHERWISE NOTED)
- L-42 DIRECTION OF FLOW
- CS No. 15 MAJOR LWDD (UNLESS OTHERWISE NOTED) DRAINAGE CONTROL STRUCTURE
- O LWDD MINOR CONTROL STRUCTURE

MAINTAINED CANAL ELEVATIONS:

- CANAL ELEVATION = 8.5' NGVD (SEE NOTE No. 1)
- CANAL ELEVATION = 0.2' NGVD (SEE NOTE No. 1)