STORMWATER MANAGEMENT REPORT
STAR TOWER HOLLYWOOD

13778.00
September 13, 2023

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PROFESSIONAL ENGINEER

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Table of Contents

INTRODUCTION

I. PROJECT LOCATION

The proposed Star Tower Hollywood project site is located at 410 North Federal Highway within the City of Hollywood, Broward County, Florida and is further identified as folio #5142 15 01 8240.

II. PROJECT DESCRIPTION

A. Existing Conditions

The existing property encompasses a vacant site of approximately 0.82-acres total. The stormwater runoff generated from the site is drained by natural percolation. The remainder sheet flows into the existing adjacent roadways, Taylor Street and N Federal Highway. No existing Environmental Resource Permit (ERP) through either South Florida Water Management District (SFWMD) or Broward County is available.

B. Proposed Conditions

The proposed development is comprised of a multi-residential high rise, consisting of 248 units, 6 levels of parking, 4,077 SF of restaurant area, 3,676 SF of retail space and additional supporting amenities. The stormwater runoff generated from the development will be routed into 125 LF of exfiltration trench to achieve water quality treatment prior to discharging into (2) drainage wells. The stormwater runoff generated from the roof will discharged directly into Drainage Well #1 since water quality treatment is not required.

STORMWATER MANAGEMENT DESIGN CRITERIA

The development's proposed stormwater management system design is based on the Broward County Resilient Environment Department (BCRED) and South Florida Water Management Division's (SFWMD) ERP Handbook.

I. SFWMD / BCRED CRITERIA

A. Datum Reference

All elevation information provided in this stormwater report, the proposed plans and the boundary and topographic survey references the North America Vertical Datum of 1988 (NAVD88).

B. Surface Waters/Wetland Impacts
No surface waters or wetlands are within or adjacent to this project.

C. Site Contamination
KEITH did not find existing site contamination records.

D. Hydraulic Conductivity
KEITH adopted geotechnical information from a nearby project site where an exfiltration test report performed by Langan Engineering and Environmental Services (dated 10/28/19) determined the hydraulic conductivity. According to the geotechnical report, a K value of 3.19 x 10^{-5} cfs/ft2 – ft of head will be used for the design. Refer to ***Appendix H*** for reference geotechnical report.

E. Ground Soil Storage
The pre-development and post-development will utilize the Flatwoods Soil Type based on the USDA and Broward County Land Use Plan Soils Map. Refer to ***Appendix F***.

F. Time of Concentration/Unit Hydrograph
The design for the pre-development and post-development will both utilize as time of concentration (TC) of **10 minutes** and the **Santa Barbara Unit Hydrograph**.

G. Salt Water Intrusion
The site is located within the salt water intrusion limits; therefore, a drainage well can be incorporated into the design. The design will use three (3) wells, capable of handling **300 gpm / ft-head**, based on the adjacent injection wells within the area. Refer to ***Appendix I*** for additional information. Weirs will be placed at elevation 5.00-ft NAVD to provide the necessary water quality prior to discharging into the well.

WATER QUANTITY

The proposed development contains a mixed-use building consisting of 248 residential units, 6 floor levels of parking, 4,077 SF of restaurant area, 3,676 SF of retail space and additional supporting amenities, such as a pool deck. The areas requiring water quality treatment (pool deck) will be routed directly into an exfiltration trench system to achieve water quality treatment. The areas not requiring treatment (roofs) will be routed directly into drainage wells. The drainage wells are designed to handle 300 gpm/ft of head of stormwater runoff, which is sufficient to handle the runoff from the roof. Refer to ***Appendix K*** for additional information regarding the drainage well calculations.

A. Design Rainfall

The design rainfalls are based on the NOAA Atlas 14 Point Precipitation Frequency Estimated which are included as ***Appendix B.*** Below is a summary of the design rainfalls for the Project:

Table 1 – Design Rainfall

Design Storm	Rainfall (Inches)
5-year, 1-day	7.40
25-year, 3-day	13.40
100-year, 3-day	18.10

B. Perimeter Berm Elevation

The Pre vs Post Development for the 25Yr-72Hr flood routing demonstrates that the post-development stages are lower than the pre-development stages; therefore, the minimum perimeter elevation for this

storm event is not required by BCRED. Refer to pre-development calculations in ***Appendix J*** and post-development calculations in ***Appendix K***.

C. Finish Floor Elevation

Minimum Finished Floor Elevations (FFE) for the proposed building were evaluated based on the higher of four criteria:

1. ASCE/SEI 24-05 - FEMA Base Flood Elevations (BFE) + 1-foot
   For buildings located in the special flood hazard area, the minimum elevation requirements in the Florida Building Code shall be to or above the FEMA base flood elevation (BFE) plus one (1) foot.

   The site is located within FEMA Flood Zone X per **FIRM Panel #12011C0569H** dated 08/18/14. Zone X does not require a minimum FFE criteria since this area is higher than the elevation of the 0.2% annual chance floor. Refer to ***Appendix B***.

2. 6" above the adjacent crown of road (City of Hollywood)
   The roadway adjacent to the east of the property (N Federal Highway) has an elevation of 7.61', which requires the minimum FFE to be designed at 8.11-ft NAVD. The roadway south of the property (Taylor St) has an elevation of 7.59', which requires the minimum FFE to be designed at 8.09-ft NAVD.

3. Max stage of 100-year,72-hour storm event with zero discharge (DFE)
   The peak stage for the 100Yr-72Hr storm event **(8.39-ft NAVD**) is not to exceed the minimum proposed FFE. The pre-development max stage is **(8.40-ft NAVD).**

WATER QUALITY

SFWMD water quality detention/retention (pre-treatment) criteria required for this project will be the greater of the following quantities:

1. 1" times the total area basin
2. 2.5" times the percent impervious area

The site will be observed as one basin, providing the necessary exfiltration trenches, where required, to meet the minimum required water quality volumes of the basin.

Refer to Table 2 – Summary of Water Quality Treatment Volume for the provided water quality volumes. For further breakdown of the Water Quality and Exfiltration trench calculations, refer to ***Appendix K***.

Table 1 – Summary of Water Quality Treatment Volume

Water Quality Volume		Exfiltration Trench
Required (ac-ft)	**Provided (ac-ft)**	**Provided (ft)**
0.045	0.080	125

A. DRAINAGE DESIGN

The stormwater runoff volume from the site will be handled through drainage well discharge on-site. The drainage wells are designed using the following criteria and parameters:

- The proposed discharge rate was assumed based on an adjacent well design per existing permit, set at 300 GMP/ft of head. Refer to ***Appendix I***.

- Maximum elevation of 8.00-ft NGVD (6.5 NAVD).
- Discharge begins in drainage well at a minimum of 2 feet above the high groundwater table (1.5'+2'=3.5' NAVD88) in order to overcome the fresh water/saltwater density differential.
  See Table 3 below for the gravity drainage well design parameters:

Table 3 – Drainage Well Design Parameters

DRAINAGE WELL DESIGN PARAMETERS		
Well Capacity (gpm cfs/ft head)	**No. Wells Proposed**	**Total Discharge (cfs)**
300 gpm/ ft head	3	6.02

CONCLUSION

The stormwater management system is designed to withstand different storm events through exfiltration trench and gravity drainage wells. The proposed improvements reduce the overall peak stages within the post-development conditions highlighted in Table 4 below. The majority of the runoff is generated from the building footprint and will be served by one (1) gravity drainage well. The runoff generated from the pool deck will be handled through 125 LF of exfiltration trench and two (2) drainage wells.

The required stormwater runoff requiring to be stored into the drainage wells was determined based on the rational method. The development is able to mitigate the runoff generated due to the proposed improvements.

Table 4 – Drainage Well Discharge Table

Stage (ft)	Discharge per Well (cfs)			Total Discharge (cfs)
	DW #1	DW #2	DW #3	
1.50	**0.00**	**0.00**	**0.00**	**0.00**
2.00	**0.00**	**0.00**	**0.00**	**0.00**
2.50	**0.00**	**0.00**	**0.00**	**0.00**
3.00	**0.00**	**0.00**	**0.00**	**0.00**
3.50	**0.00**	**0.00**	**0.00**	**0.00**
4.00	**0.33**	**0.33**	**0.33**	**1.00**
4.50	**0.67**	**0.67**	**0.67**	**2.01**
5.00	**1.00**	**1.00**	**1.00**	**3.00**
5.50	**1.34**	**1.34**	**1.34**	**4.01**
6.00	**1.67**	**1.67**	**1.67**	**5.01**
6.50	**2.01**	**2.01**	**2.01**	**6.03**
7.00	**2.01**	**2.01**	**2.01**	**6.03**
7.50	**2.01**	**2.01**	**2.01**	**6.03**

The peak storages calculated for the pre vs post development shows no adverse effects from the proposed development as shown in Table 5 below. As shown, each stage is lower in the post-development conditions compared to the pre-development conditions. The use of drainage wells significantly reduces the peak stages for the post-development conditions.

Table 5 – Summary of Stages & Discharges

Storm Event	Pre-development Peak Stage (ft - NAVD)	Post-development Peak Stage (ft – NAVD)
5yr-24hr Routing	7.54	5.99
25yr-72hr Routing	8.05	8.04
100yr-72hr Routing	8.40	8.39

Water treatment is necessary only for the runoff collected from the pool deck. The length and dimensions of the exfiltration trench sections are shown on sheets CP-101 of the engineering plans included with this report. An overview of the treatment volume is outlined in the table below.

Table 6 – Summary of Water Quality Treatment Volume

Water Quality Treatment Volume		Exfiltration Trench Length
Required (ac-ft)	**Proposed (ac-ft)**	**Proposed (ft)**
0.045	**0.080**	**125**

APPENDICES

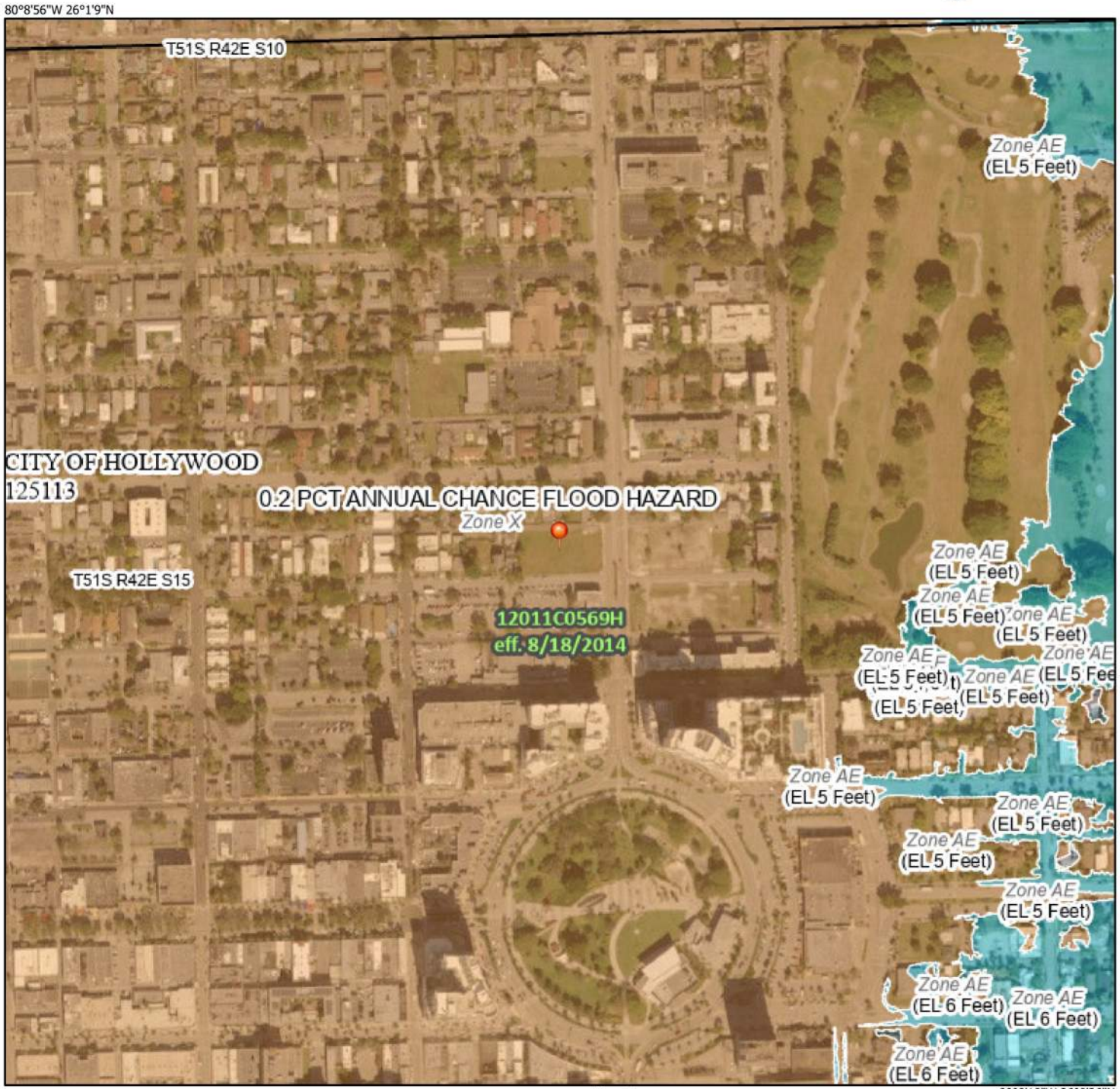
Appendix A – Aerial Map


SITE LOCATION
Polk St
Tyler St
N Young Cir
Hollywood Blvd

Appendix B – FEMA Flood Map

National Flood Hazard Layer FIRMette

FEMA



Basemap Imagery Source: USGS National Map 2023

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, Areas 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 — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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 6/27/2023 at 5:09 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.

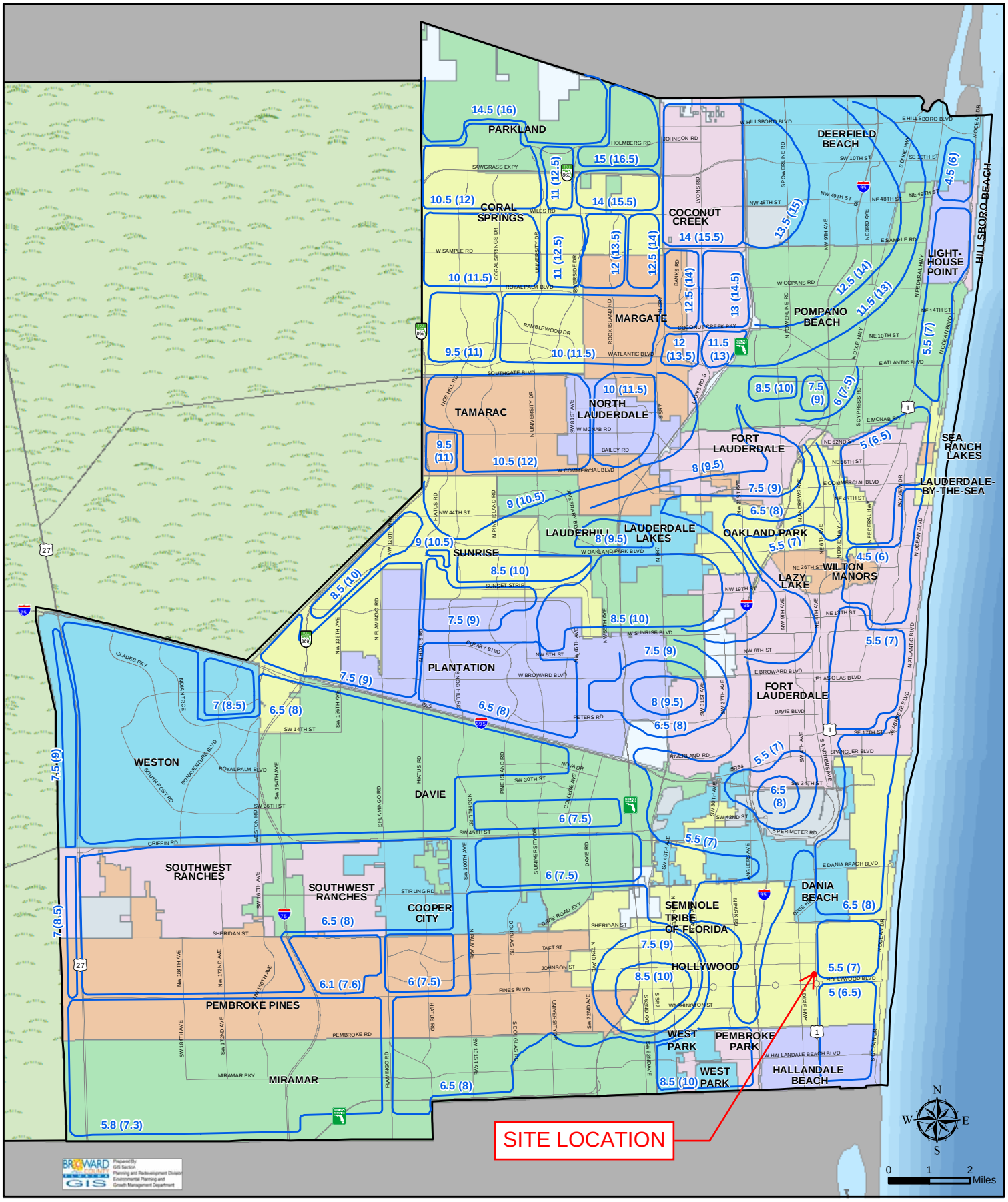
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix C – October High Groundwater Table


SITE LOCATION
Groundwater Elevation
The higher of 1.50 feet NAVD 88 or local control elevation (as defined by governing drainage district).
Zoom to

Appendix D – Broward County Flood Criteria Map

BROWARD COUNTY 100 YEAR FLOOD ELEVATIONS



100 Year Flood Contours NAVD (NGVD)
Example: 6.5 (8)

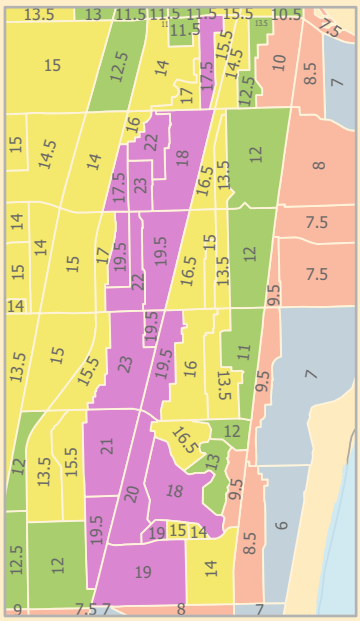
This map is for conceptual purposes only and should not be used for legal boundary determinations.

Elevations converted from NGVD to NAVD using the FEMA approved conversion factor for Broward County of (-)1.5, based on 1997 FEMA Flood Data

#12729 SNowicki 10/2014

Future Conditions 100-Year Flood Elevation Map

Plate WM 13.1
Future Conditions



The Future Conditions 100-Year Flood Elevation Map is intended to advance the resiliency efforts in Broward County by setting the foundation to improve standards for flood protection. The flood elevation mapping results (representing a 1% annual chance during years 2060-2069) are intended to serve as the basis for establishing future finished floor elevations for new buildings and major redevelopments in the County. The map was developed through integrated hydrologic modeling of surface and groundwater, incorporating future land use changes, projected sea level rise, rainfall intensification, and seasonal high tide to predict future flood conditions.

Future Conditions 100-Year Flood Map 2060

Find address or place

NE 26TH ST
WILTON DR
NE 23RD DR
N DIXIE HWY
NE 22TH AVE
NE 13TH AVE
NE 25TH ST
NE 24TH CT
NE 24TH ST
NE 23RD ST
NE 15TH AVE

Future Conditions 100-Year Flood Elevation (Feet NAVD88)

Elevation: 5.0

Zoom to

Appendix E – Precipitation Frequency Data Table

NOAA Atlas 14, Volume 9, Version 2
Location name: Hollywood, Florida, USA*
Latitude: 26.0146°, Longitude: -80.1436°
Elevation: 7 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.550** (0.442-0.691)	**0.638** (0.513-0.803)	**0.784** (0.628-0.989)	**0.906** (0.721-1.15)	**1.08** (0.829-1.41)	**1.21** (0.910-1.60)	**1.34** (0.978-1.82)	**1.48** (1.04-2.06)	**1.66** (1.12-2.38)	**1.80** (1.18-2.62)
10-min	**0.805** (0.647-1.01)	**0.935** (0.751-1.18)	**1.15** (0.919-1.45)	**1.33** (1.06-1.68)	**1.58** (1.21-2.06)	**1.77** (1.33-2.34)	**1.96** (1.43-2.67)	**2.16** (1.52-3.02)	**2.43** (1.64-3.49)	**2.63** (1.73-3.84)
15-min	**0.982** (0.789-1.23)	**1.14** (0.915-1.43)	**1.40** (1.12-1.77)	**1.62** (1.29-2.05)	**1.92** (1.48-2.51)	**2.16** (1.63-2.86)	**2.39** (1.75-3.25)	**2.64** (1.85-3.68)	**2.96** (2.00-4.26)	**3.21** (2.11-4.69)
30-min	**1.58** (1.27-1.98)	**1.84** (1.48-2.31)	**2.27** (1.82-2.87)	**2.64** (2.10-3.34)	**3.14** (2.42-4.11)	**3.54** (2.67-4.69)	**3.93** (2.87-5.35)	**4.34** (3.04-6.06)	**4.88** (3.30-7.02)	**5.29** (3.49-7.74)
60-min	**2.16** (1.74-2.72)	**2.50** (2.01-3.14)	**3.08** (2.47-3.88)	**3.60** (2.86-4.56)	**4.36** (3.39-5.76)	**4.99** (3.78-6.67)	**5.65** (4.14-7.74)	**6.36** (4.48-8.95)	**7.35** (4.99-10.6)	**8.14** (5.37-11.9)
2-hr	**2.75** (2.22-3.43)	**3.16** (2.55-3.94)	**3.89** (3.13-4.87)	**4.56** (3.65-5.74)	**5.58** (4.37-7.36)	**6.44** (4.92-8.60)	**7.37** (5.45-10.1)	**8.38** (5.95-11.8)	**9.82** (6.72-14.2)	**11.0** (7.30-16.0)
3-hr	**3.07** (2.49-3.82)	**3.51** (2.84-4.37)	**4.34** (3.50-5.42)	**5.13** (4.11-6.42)	**6.36** (5.02-8.41)	**7.42** (5.70-9.91)	**8.59** (6.38-11.7)	**9.88** (7.06-13.9)	**11.8** (8.08-16.9)	**13.3** (8.85-19.2)
6-hr	**3.58** (2.91-4.42)	**4.14** (3.37-5.12)	**5.22** (4.23-6.47)	**6.25** (5.04-7.78)	**7.87** (6.26-10.4)	**9.29** (7.18-12.3)	**10.8** (8.12-14.8)	**12.6** (9.04-17.6)	**15.1** (10.4-21.6)	**17.2** (11.5-24.7)
12-hr	**4.02** (3.29-4.93)	**4.82** (3.94-5.92)	**6.27** (5.11-7.72)	**7.61** (6.17-9.41)	**9.65** (7.68-12.6)	**11.4** (8.83-15.0)	**13.3** (9.96-17.9)	**15.3** (11.1-21.2)	**18.2** (12.7-25.9)	**20.6** (13.9-29.5)
24-hr	**4.52** (3.72-5.52)	**5.55** (4.56-6.78)	**7.37** (6.03-9.01)	**8.99** (7.33-11.0)	**11.4** (9.10-14.7)	**13.4** (10.4-17.5)	**15.6** (11.7-20.8)	**17.9** (12.9-24.5)	**21.1** (14.7-29.7)	**23.7** (16.1-33.6)
2-day	**5.24** (4.34-6.35)	**6.38** (5.27-7.73)	**8.37** (6.90-10.2)	**10.2** (8.32-12.4)	**12.8** (10.3-16.4)	**15.0** (11.8-19.4)	**17.4** (13.2-23.0)	**19.9** (14.5-27.1)	**23.4** (16.5-32.7)	**26.3** (18.0-37.0)
3-day	**5.85** (4.85-7.05)	**6.96** (5.77-8.40)	**8.94** (7.38-10.8)	**10.7** (8.82-13.0)	**13.4** (10.8-17.1)	**15.7** (12.3-20.2)	**18.1** (13.8-23.9)	**20.7** (15.1-28.0)	**24.3** (17.2-33.9)	**27.3** (18.8-38.3)
4-day	**6.39** (5.31-7.69)	**7.46** (6.19-8.98)	**9.38** (7.76-11.3)	**11.1** (9.17-13.5)	**13.8** (11.1-17.6)	**16.0** (12.6-20.6)	**18.4** (14.1-24.3)	**21.1** (15.5-28.5)	**24.8** (17.6-34.4)	**27.8** (19.2-38.9)
7-day	**7.80** (6.51-9.33)	**8.79** (7.32-10.5)	**10.6** (8.80-12.7)	**12.3** (10.1-14.8)	**14.8** (12.0-18.8)	**17.0** (13.5-21.8)	**19.4** (14.9-25.4)	**22.0** (16.3-29.6)	**25.7** (18.4-35.6)	**28.8** (19.9-40.1)
10-day	**8.99** (7.52-10.7)	**10.0** (8.37-11.9)	**11.9** (9.90-14.2)	**13.6** (11.3-16.3)	**16.2** (13.2-20.4)	**18.4** (14.6-23.4)	**20.8** (16.0-27.1)	**23.4** (17.4-31.4)	**27.1** (19.4-37.3)	**30.2** (21.0-41.9)
20-day	**12.1** (10.2-14.3)	**13.6** (11.4-16.1)	**16.2** (13.6-19.2)	**18.4** (15.3-21.9)	**21.5** (17.5-26.6)	**24.1** (19.1-30.1)	**26.6** (20.6-34.2)	**29.4** (21.8-38.8)	**33.1** (23.8-44.9)	**36.0** (25.2-49.6)
30-day	**14.6** (12.3-17.2)	**16.6** (14.0-19.6)	**19.8** (16.6-23.4)	**22.5** (18.8-26.7)	**26.1** (21.2-31.9)	**28.9** (22.9-35.8)	**31.6** (24.4-40.2)	**34.4** (25.6-45.0)	**38.0** (27.3-51.2)	**40.7** (28.6-55.9)
45-day	**17.7** (15.0-20.8)	**20.2** (17.1-23.8)	**24.2** (20.4-28.6)	**27.4** (23.0-32.4)	**31.5** (25.5-38.1)	**34.5** (27.4-42.5)	**37.3** (28.8-47.1)	**40.1** (29.8-52.0)	**43.4** (31.2-58.0)	**45.7** (32.3-62.6)
60-day	**20.3** (17.3-23.8)	**23.3** (19.7-27.3)	**27.8** (23.5-32.7)	**31.4** (26.4-37.0)	**35.8** (29.0-43.0)	**38.9** (30.9-47.6)	**41.7** (32.2-52.3)	**44.3** (33.0-57.2)	**47.3** (34.1-62.9)	**49.3** (34.9-67.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

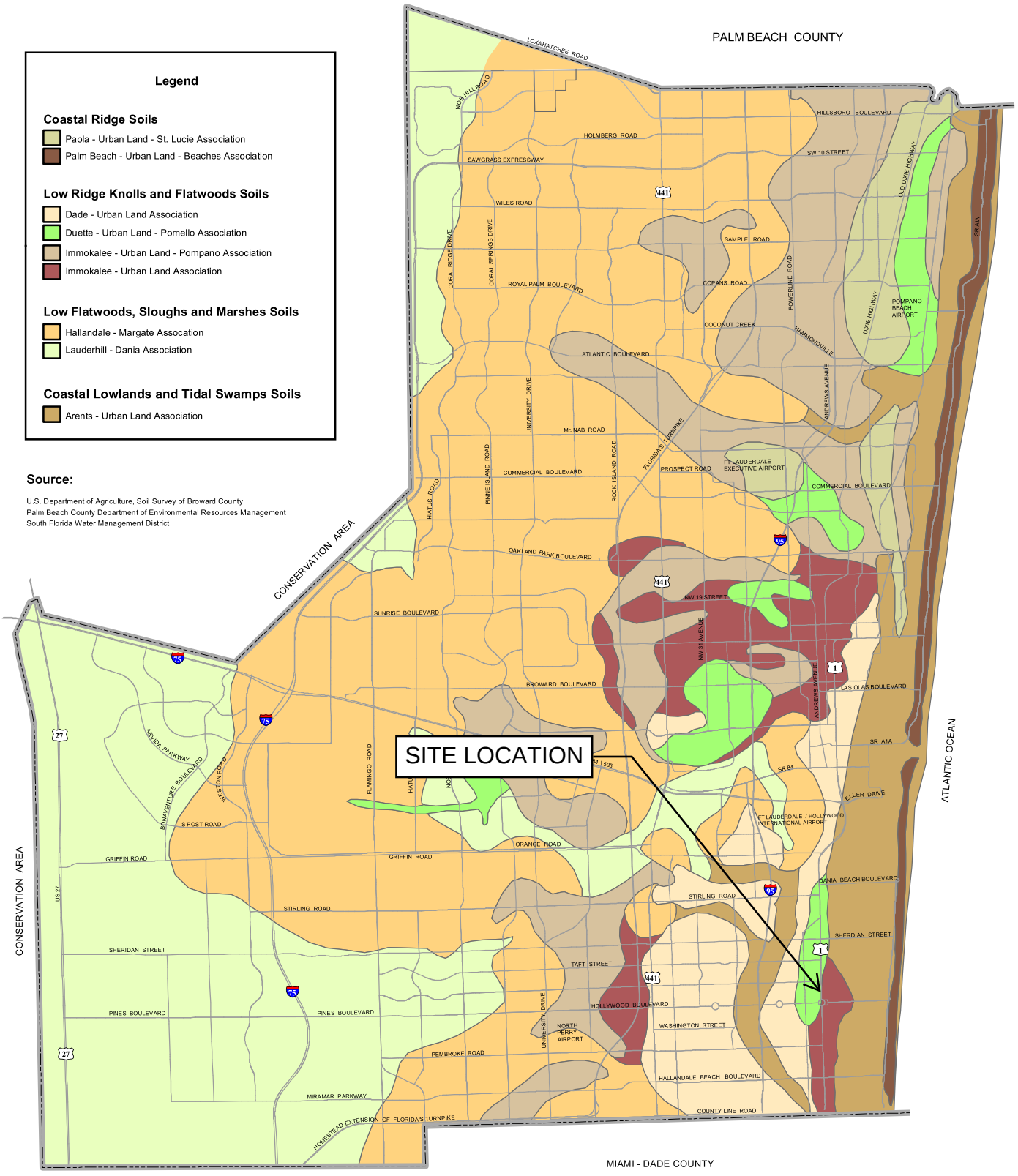
Back to Top

PF graphical

Appendix F – Soil Map

BROWARD COUNTY LAND USE PLAN

Natural Resource Map Series- Eastern Broward County: Soils



This Is a generalized map. This map should not be used to determine parcel boundaries or limits of depicted items. Please contact the Broward County Planning Council office regarding questions pertaining to parcel boundaries or limits.

Appendix G – Saline Intrusion Map

DELINEATION OF SALTWATER INTRUSION

Legend

- Salt Water Intrusion Area, at least 250 mg/L of chloride
- Wellfield Protection Zone One
- County Boundary
- Urban Boundary
- Major Roads
- Water Conservation Area
- Inland Water

Source: Salt water Intrusion Area - Environmental Planning and Community Resilience Division, 2014.

Wellfield Protection Zones - Environmental Engineering & Permitting Divsion, 2013

Palm Beach County

Miami-Dade County

Atlantic Ocean

SITE LOCATION

This map is for conceptual purposes only and is not intended for legal boundary determinations.

Prepared by: GIS Section
Planning and Development Management Division
Environmental Protection & Growth Management Department

0 2.5 5 Miles

MAP NO. C-4

14252 cjennings 5/10/2018

Appendix H – Reference Geotechnical Report

DUE DILIGENCE GEOTECHNICAL ENGINEERING STUDY

PARC PLACE
1747 Van Buren Street
Hollywood, Florida

Prepared For:

BTI Partners
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Suite 1870
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Prepared By:

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ROGER A. ARCHABAL LICENSE No 48404 STATE OF FLORIDA PROFESSIONAL ENGINEER 8/28/19

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28 August 2019
330061201

LANGAN

TABLE OF CONTENTS

INTRODUCTION

This report presents the results of our due diligence geotechnical engineering study performed for the proposed Parc Place Towers development ("the Project") located at 1747 Van Buren, Hollywood, Florida. The purpose of this study was to: (1) obtain information regarding site-specific subsurface conditions, (2) understand the existing site conditions relative to the proposed development, (3) evaluate potential foundation support alternatives for the proposed structures, and (4) develop preliminary recommendations for foundation support, site preparation, and earthwork related construction activities. This work was performed in general accordance with our 22 July 2019 proposal, which was authorized by Mr. Joshua Breakstone.

Our understanding of the existing site conditions is based on the recently performed limited field investigation, and from review of nearby projects performed by Langan.

We were provided with a preliminary architectural plans for the new proposed development. These plans and reports include:

- A set of preliminary architectural plans for the new development, prepared by MODIS Architects, LLC with a date of 26 June 2019; and
- A survey map of the existing structures, prepared by Cousins Surveyors & Associates, Inc. and with a latest revised date of 11 August 2017.

All elevations given in this report, if not specified, are in feet and refer to the National American Vertical Datum of 1929 (NAVD).

SITE DESCRIPTION

The subject property consists of distinct Parcels (identified as 1 through 7 on the Cousins survey) and is owned by MG3 Hollywood LLC. The parcels are bound by Van Buren Street to the south, South Federal Highway to the west, South Young Circle to the northwest, Harrison Street to the north, and South 17th Avenue to the east. A Site and Vicinity Map plan is provided as Figure 1.

The property's multiple parcels encompass approximately 2 acres. The parcels are currently occupied by varied improvements including the following: the Hollywood Bread Building and parking garage on the south and west side, several one-story to two-story vacant buildings along the north and east sides, asphalt parking and drives outside the buildings, concrete sidewalks drives outside the buildings and limited green space. The existing site grades are relatively flat and range typically between approximately el +5 and el +7 ft.

PROPOSED CONSTRUCTION

Our understanding of the proposed development is based on the aforementioned MODIS preliminary architectural concept dated 26 June 2019. The project will consist of the demolition of all structures within the aforementioned parcels. The existing Home Tower and the existing Charter School located within and around the parcels are not part of the proposed development and will remain.

On the western Parcels (1-3, 6), the proposed development consists of the construction of a 25-story tower, a 12-story tower, atop a 9-story parking podium with a pool deck. On the eastern Parcels (4-5), the development consists of a previously approved parking garage (approximately 10 to 12 stories).

We assume that finished site grades will remain around el +6 to +7 in order to match existing grade. We anticipate finished floor elevations will be on the order of 1 to 2 ft above finished site grade. A structural engineer was not engaged at the time of this due diligence work; hence, we estimated the structural loading.

Our preliminary foundation recommendations are based on an assumed structural floor load of about 150 to 200 pounds per square foot (psf) as well as column spacing of about 30 ft by 30 ft for the tower structures and about 60 ft by 20 ft for the parking garage structure. We estimated that maximum column loads for the 25-story tower structure will be on the order of 3500 to 4000 kips (1750 to 2000 tons); the 12-story tower structure will be in the order of 1500 to 2000 kips (750 to 1000 tons); the 9-story parking podium structure will be in the order of 1200 to 1600 kips (600 to 800 tons); and the 10 to 12-story parking garage structure will be in the order of 1800 to 2200 kips (900 to 1100 tons).

SUBSURFACE INVESTIGATION

Field Investigation

Langan performed the subsurface investigation between 5 and 7 August 2019. The site investigation consisted of one Standard Penetration Tests (SPT) boring and one percolation test. Approximate locations of the test boring and percolation test are shown on Figure 2. The boring and exfiltration test locations were marked in the field by our representative by estimating right angles with reference to the lot boundaries and existing site features. The ground surface elevation at the boring location was estimated from the field survey. The test boring and percolation test were performed by specialty drilling subcontractor under the direction and observation of a Langan engineer.

Test Boring

One test boring was drilled to 150 feet below ground surface. The boring was advanced using rotary drilling techniques, stabilized with drilling mud and casing. Split-spoon sampling was typically done continuously in the upper 12 ft and at 5 ft intervals thereafter. Continuous sampling was performed in selected borings to better delineate changes in strata or the vertical extent of weak zones within the subsurface materials. The soil samples were visually examined and classified by Langan's geotechnical engineers both in the field and in our office. Detailed subsurface descriptions and information are presented on the test boring log attached in Appendix A.

Percolation Test

One percolation test (identified as P1) was performed at the project site. The location of this percolation test is attached in Figure 2. The percolation test was performed in a borehole drilled to depths of 10 ft. The test was done in accordance with the South Florida Water Management District (SFWMD)'s Constant-Head Open-Hole method in order to obtain representative SFWMD "k-value" which will be used for the storm drainage design at the site. Detailed percolation test results are summarized in Appendix B.

SUBSURFACE CONDITIONS

General Subsurface Conditions

The soil boring (designated as SB-1) from our recent site investigation revealed subsurface conditions consisting of the following strata:

Stratum 1 – Pavement and Surface Fill

The majority of the site, outside of the existing buildings, is covered by asphalt pavement for the driveways access or on-grade parking lots. Several small areas of the site are covered by landscaping and concrete sidewalks/drives. The surficial material encountered during our site investigation, consisted of approximately 1 inch of asphalt followed by about 4 inches of limerock base course fill. Below this, there is apparent fill or reworked natural soils consisting of black medium to fine sand. The N-value in this stratum was 14 blows per foot (bpf).

Stratum 2 – Upper Sand

Beneath Stratum 1, an upper sand stratum was encountered consisting of gray to brown fine to medium sand. The thickness of this stratum was about 4½ feet and it extended to about the 6½ ft depth (el 0.0). This stratum is very loose to loose with N-values varying between 3 and 9 blows per foot bpf (average N-value of about 6 bpf).

Stratum 3 –Upper Cemented Sand and Sand

Underlying Stratum 2, Stratum 3 consists of tan to white and light brown cemented sand with varying fraction of sand. The top of this stratum was encountered at about the 6½ ft depth (el 0.0) and its thickness was about 16½ feet. The cemented sand was generally very soft to soft in relative hardness with a range of SPT N-values of between 4 bpf and 8 bpf.

Stratum 4 – Intermediate Sand

Stratum 4 consists of a 15 ft thick very loose to medium dense fine sand. The top of this stratum was encountered at about the 23 ft depth (el -16.5) and extended to about the 38 ft depth (el -31.5). This stratum was very loose in relative density with a range of SPT N-values from weight of hammer (WOH) to 3 bpf, and averaged 1 bpf.

Stratum 5 –Intermediate Cemented Sand and Sand

Beginning at about the 38 ft depth (el -31.5), cemented sand and sand was encountered and extended to the 86½ ft depth (el -80). This stratum is somewhat erratic between the 38 and 48 ft depths with N-values varying between 8 and 28 bpf. Below 48 ft and continuing to about 86½ ft, the cemented sand becomes more competent with N-values ranging from refusal (greater than 50 bpf) to 17 bpf, but typically greater than 25 bpf. This stratum is considered moderately hard to hard. Discrete isolated voidy conditions were found in this stratum.

Stratum 6 – Lower Sand

Stratum 6 consists of an approximately 10 ft thick loose to medium dense fine to coarse sand. The top of this stratum was encountered at about the 86½ ft depth (el -80.0) and extended to the 96½ ft depth (el -90.0). SPT N-values ranged from 7 to 10 bpf.

Stratum 7 – Lower Cemented Sand and Sand

Below the lower sand stratum, cemented sand and sand was encountered and continued to the termination depths of the borings. This stratum is somewhat erratic between the 96½ and 116 ft depths with N-values varying between 4 and 18 bpf. Below the 116 ft depth, the cemented sand becomes competent with N-values generally at refusal (greater than 50 bpf) with isolated values at 11 and 38 bpf. This stratum is considered hard to moderately hard.

Groundwater

Groundwater, at the time of our investigation, was measured during the initial drilling and after completion of the drilling at the test boring location. Groundwater was measured at depth of 6.0 ft below existing grade. This depth equates to groundwater elevation of el +0.5. Based on our experience, the typical groundwater levels in the project vicinity area range between el 0 to el +3 NGVD. Changes in groundwater elevations should be expected due to seasonal fluctuations based on precipitation.

PRELIMNARY FOUNDATION EVALUATIONS

Our subsurface investigation of the site revealed subsurface conditions consistent with the general geology of the area based on our previous nearby studies. The geotechnical considerations identified for supporting the

buildings associated with the proposed development are:

- The presence of the weak upper cemented sand layer (Stratum 3);
- The presence of the very loose to loose upper sand (Stratum 4);
- Competent zones of cemented sand in the intermediate depth range (Stratum 5 below 48 ft);
- The thickness, relative density and consistency of the lower sand layer (Stratum 6)
- The very hard competent lower cemented sand (Stratum 7)

The upper strata (Stratum 1 through Stratum 4) are weak and erratic and not suitable for support of the proposed towers and parking garage structures without significant settlements or ground improvement along with large shallow foundations. Effective and efficient pile foundation bearing support for the structures could be achieved in Stratum 5 which begins below the 48 ft depth (el -41.5). The upper strata, however, would be suitable for support of a slab on-grade or for foundations of light structure, after the proper surficial compaction. Theoretically, soil improvement, such as vibro-replacement (stone columns), could be performed to increase the stability of Strata 1 through Strata 4 for support of the shorter tower and parking garage structure. However, based on our experience, the cost of soil improvement combined with the cost of the very large shallow foundations would not be an economically beneficial alternative compared to deep foundation support with auger cast-in-place (ACIP) piles.

Stratum 5 consist of moderately hard to very hard interbedded Cemented Sand, Sandstone and Sand. Pile foundations embedded between el -55 and el -60 could provide cost-effective and efficient bearing support for the proposed towers and parking garage structures. Based on the boring performed on site, the relatively competent character of the Stratum 5 cemented sand and the relatively thin and suitably dense condition of the lower Stratum 6 sand layer, we expect tolerable settlement (less than 2 to 3 inches) for the proposed structures with piles embedded within Stratum 5. However, in the final geotechnical study, if the deeper soil conditions prove to be erratic in the Stratum 5 bearing layer as well as the Stratum 6 lower sand, settlement of the taller 25-story tower may not be tolerable (greater than 5 to 6 inches), necessitating deeper foundations for this structure. The final geotechnical study will need to confirm the uniformity of support within Stratum 5 as well as the thickness and relative density of the Stratum 6 sand.

Stratum 7 consists of a relatively homogenous medium to hard cemented layer. Pile foundations appropriately penetrating this stratum could also be used for support of the proposed 25-story tower should the final geotechnical study show erratic characteristics in Strata 5 and 6 lower. In this case, settlement would be limited to under about 1 to 2 inches.

PRELIMINARY FOUNDATION RECOMMENDATIONS

Based on our knowledge of the area and the limited due diligence study, we preliminary recommend that the proposed towers and parking garage structures be supported on high capacity, intermediate length 16, 18, and 24-in-diameter augercast piles. The following piles design criteria can be used, subject to modification as necessary per the additional final exploration borings, test piles and pile load tests. Pile grout compressive strength of at least 8000 psi was assumed.

9-Story Parking Podium (outside tower footprints)

Pile Size and Type:	16-in-dia augercast
Compression Capacity:	200 to 240 tons
Uplift Capacity:	100 to 120 tons
Lateral Capacity[a]:	5 tons
Approximate Pile Tip elevation[a]:	el -55 to el -60

12-Story Tower & Independent 10 to 12-Story Parking Garage Structure

Pile Size and Type:	18-in-dia augercast
Compression Capacity:	300 to 335 tons
Uplift Capacity:	150 to 200 tons
Lateral Capacity[1]:	6 tons
Approximate Pile Tip elevation[2]:	el -55 to el -60

25-Story Tower

Pile Size and Type:	24-in-dia augercast
Compression Capacity:	500 to 540 tons
Uplift Capacity:	250 to 300 tons
Lateral Capacity[1]:	8 tons
Approximate Pile Tip elevation[3]:	el -55 to el -60 if uniform subsurface conditions found or el -125 to el -130 if erratic conditions found

[1] *Assumes about ½ inch lateral deflection. If additional lateral capacity is required, piles on a 1H:6H batter could be used.*
[2] *Assumes minimum 20 ft socket into Stratum 5.*
[3] *Assumes minimum 20 ft socket into Stratum 5 for uniform soil conditions and 10 to 15 ft into Stratum 7 if erratic conditions are encountered.*

Ground Floor Slab

Since only granular and cemented soils were encountered at the project site, the ground floor slab can be designed as a conventional slab-on-grade after the slab subgrade is prepared, as discussed herein. After completion of surface proof-rolling / compaction and pile cap/grade beam construction, the area for ground floor slab plus 3 ft beyond in each direction can be raised with the engineered fill to about 4 inches below the slab bottom. The top 4 inches of the slab subgrade should consist of crushed limestone or No. 57 stone to create a stable slab subgrade surface. Compaction should be applied to the slab subgrade with either a roller or a heavy plate compactor to achieve 95% of the material's maximum dry density as determined by the Modified Compaction Test, ASTM D1557. Engineered fill should be placed in maximum 12 inch thick lifts and compacted as previously stated.

OTHER CONSIDERATIONS

Site Preparation (including Removal of Existing Structures)

Numerous existing structures and ground features will be demolished in order to allow for the new development. The demolition debris, including all existing foundation elements (footings), floor slabs, utilities, sidewalks/walkways, parking lot pavements, piles etc. should be completely removed to allow for unobstructed construction of future foundations and utilities.

We suggest that any available foundation plans of the existing structures scheduled for demolition should be reviewed and compared to the proposed foundation plans to identify any potential conflicts between the proposed foundations and the existing foundations.

Once the debris and foundation elements have been removed, the bottom of the exposed excavations should be checked by a Langan engineer. All surface grass, vegetation, topsoil and pavement should also be stripped to the sand or limerock fill. Cleared or stripped areas should be proofrolled with a 5-ton (static drum weight) vibratory roller. Subsequently, if required, engineered fill shall be used to bring the site to the finish floor or pavement subgrade elevation.

Footing Subgrade Preparation

Lightweight surficial elements

After excavating to the required footing elevation, if the exposed bearing subgrade surface is the Stratum 2-Upper Sand or engineered fill, the subgrade material should be compacted to at least 95% of the material's maximum dry density as determined by the Modified Proctor Compaction Test (ASTM D1557).

Engineered Fill

The on-site Strata 1 and 2 fine sand generated from the site earthwork activities can be reused as engineered fill. If imported fill is required, it should consist of inorganic granular soils free of deleterious materials with no more than 10 percent passing the No. 200 sieve and should be approved by a Langan geotechnical engineer. All limestone material used as engineered fill should be crushed into fragments not larger than 3 inches. All imported material shall be certified as environmentally free of contamination.

Engineered fill will be necessary in specific areas to raise grades at the site and to backfill below or around footings and grade beams or to support slabs-on-grade. The fill materials must be placed under the observation of a Langan geotechnical engineer, who will be testing each compacted layer of soil. The fill should be placed in lifts of no greater than 12 inches thick, and each lift should be compacted with either a 5-ton vibratory roller or a heavy plate compactor to 95% of the material's maximum dry density as determined by ASTM D1557. In restricted areas where a small compactor or a plate compactor must be used, the lift thickness should be reduced to 6 to 9 inches, as directed by the Langan geotechnical engineer.

Backfilling Over Utility Lines

All utilities should be installed in accordance with the Broward County Public Works specifications as well as the civil engineering drawings and specifications. When backfilling over any utility line, the fill should be placed in lifts and compacted to the compaction requirements mentioned above. The loose lift thickness is expected to vary between 6 inches and 12 inches, based on the compaction equipment used by the contractor. Final lift thickness should be determined once the type of equipment to be used is known. The backfill material to be used over utility lines should consist of sand, or on-site crushed limerock (if placed in a dry condition). If crushed limerock is used, the limerock should not exceed 3 inches in size. Additionally, all backfill should meet the requirements of the pipe manufacturer's specifications.

Construction Excavation and Dewatering

All construction excavations should meet the Occupational Safety and Health Administration (OSHA) requirements. Based on the borings and test pits, a sloped open-cut excavation should be sufficient for the construction of shallow foundations at the site. Where stable limestone is present, the cemented character of the material should allow for near vertical construction excavations within the stratum. This should be verified by Langan's field geotechnical engineer. This option may preclude the need for forming of many of the footing foundations by using the limestone excavation wall as the form. This will provide a cost benefit for the project. To minimize construction excavations, the bottom of the foundation elements (footings) should be kept as high as possible.

Pre-Construction Conditions Documentation

The subject site is surrounded by existing buildings on the south, west, east and north sides. A pre-construction conditions documentation should be performed to record the existing conditions of the adjacent structures and ground features prior to construction at the subject site. The pre-construction conditions documentation would involve visually inspecting and videotape documenting the structures; measuring and photographing observable existing cracks, deterioration, or other signs of distress; and establishing crack reference lines and locations of elevation control points. We recommend that this pre-construction conditions documentation be done by our

firm to ensure proper documentation procedures are followed. The pre-construction documentation would provide valuable information of the existing conditions of the structures adjacent to the proposed development. In addition, it would serve as a qualitative record document of the existing conditions of the adjacent structures prior to the start of construction.

Additional Test Borings for Final Geotechnical Study

In order to prepare the final geotechnical engineering report with efficient foundation recommendations, additional test borings will need to be performed once the demolition is completed and access to the demolished site locations are made available. At this time, we anticipate about 9 to 10 test borings, ranging in depth between 80 ft and 150 ft deep, will need to be performed.

LIMITATIONS

The preliminary evaluations and recommendations given in this report are based on our engineering judgment as to the appropriate foundation support systems and required site preparation procedures for the proposed development. They are based on subsurface conditions inferred from the test boring performed on site, experience on nearby projects and on the available development information. The due diligence report has been prepared to assist the owner, contractor and design-team members in their preliminary due diligence effort. Any changes in structures or locations should be brought to our attention so that we may determine how such changes may affect our recommendations.

FL Certificate of Authorization No. 6601

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FIGURES

NOTE:

1. **LOCATION BOUNDARIES ARE APPROXIMATE..**
2. **AERIAL FROM 2018, FROM GOOGLE EARTH.**

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Langan CT, Inc.
Langan International LLC
Collectively known as Langan
FL CERTIFICATE OF AUTHORIZATION No. 00006601

Project

PARC PLACE

1747 VAN BUREN STREET
HOLLYWOOD

BROWARD **FLORIDA**

Drawing Title

SITE VICINITY MAP

Project No.	330061201
Date	AUGUST 2019
Scale	1"=550'
Drawn By	HK
Checked By	RA

Drawing No.

FIG.1

Sheet 1 of 1

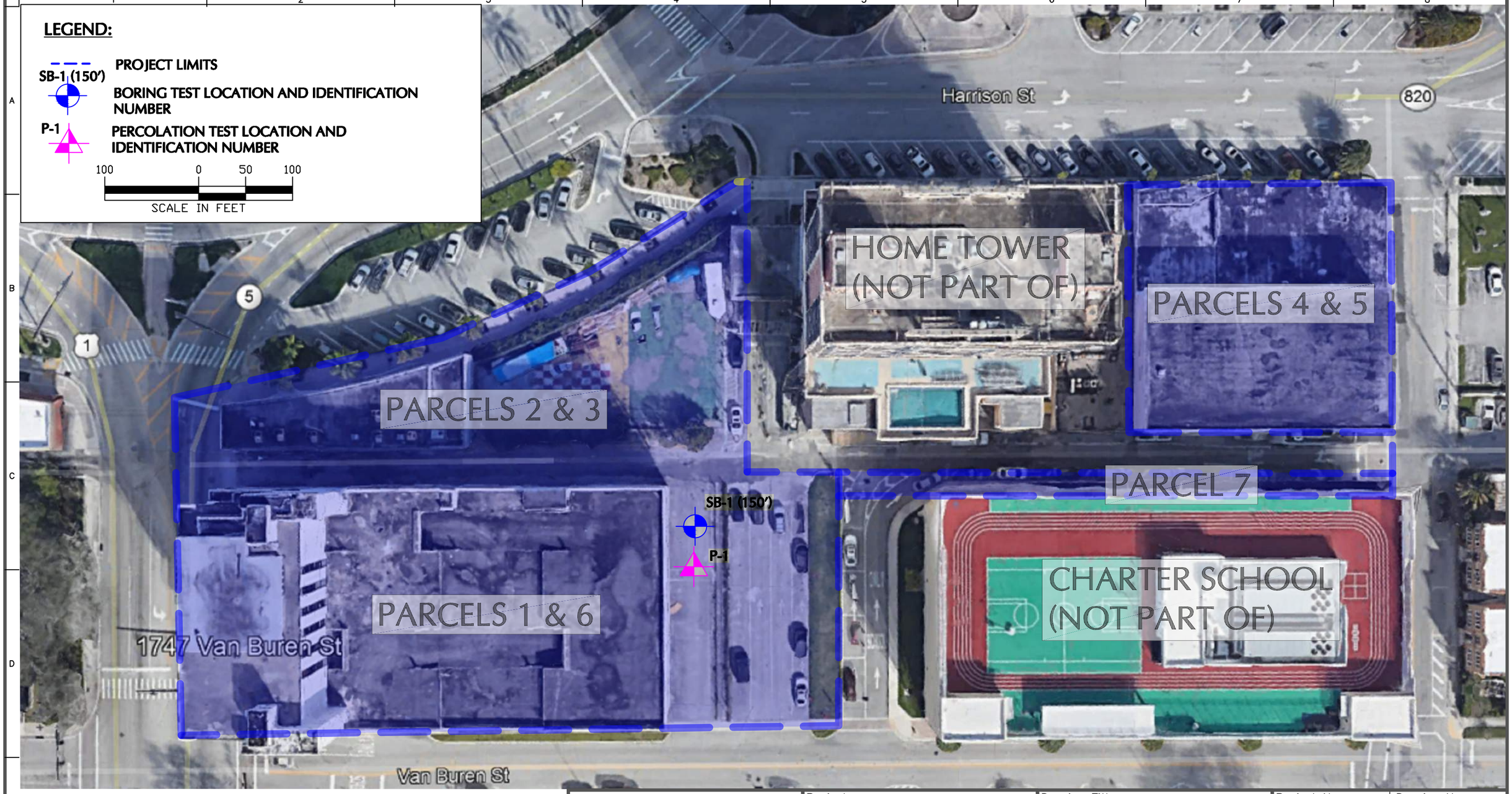
Filename: \\langan.com\data\FTL\data2\330061201\Project Data\CAD\2019-08-23 Boring and Perc Location plan.dwg Date: 8/27/2019 Time: 18:16 User: ghernandez Style Table: ---- Layout: ANSIB-BL (3)

LEGEND:

- PROJECT LIMITS
- SB-1 (150') — BORING TEST LOCATION AND IDENTIFICATION NUMBER
- P-1 — PERCOLATION TEST LOCATION AND IDENTIFICATION NUMBER

100 0 50 100

SCALE IN FEET



NOTE:

1. BORING AND PERCOLATION LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. AERIAL FROM 2018, FROM GOOGLE EARTH.

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Langan CT, Inc.
Langan International LLC
Collectively known as Langan

FL CERTIFICATE OF AUTHORIZATION No. 00006601

Project

PARC PLACE

1747 VAN BUREN STREET
HOLLYWOOD

BROWARD **FLORIDA**

Drawing Title

BORING AND PERCOLATION LOCATION PLAN

Project No.	330061201
Date	AUGUST 2019
Scale	1"=100'
Drawn By	HK
Checked By	RA

Drawing No.

FIG.2

Sheet 1 of 1

Filename: \\langan.com\data\FTL\data2\330061201\Project Data\CAD\2019-08-23 Boring and Perc Location plan.dwg Date: 8/27/2019 Time: 18:13 User: ghernandez Style Table: ---- Layout: ANSIB-BL

APPENDIX A
LOG OF BORING

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LOG OF BORING **SB-1**

SHEET 1 OF 5

PROJECT: Parck Place		PROJECT NO.: 330061201	
LOCATION: 1747 Van Buren Street, Hollywood, FL		ELEVATION AND DATUM: Approx. +6.5 [ft, NGVD]	
DRILLING EQUIPMENT: MCE-55		DATE STARTED: 8/4/19	DATE FINISHED: 8/5/19 / COMPLETION DEPTH: 150 ft.
SIZE AND TYPE OF BIT: 2 1/4", 2 3/4"		NUMBER OF SAMPLES: DIST. 36 / UNDIST. - / CORE -	
CASING DIAMETER (in): 2 3/4"	CASING DEPTH(ft): 148	WATER LEVEL (ft.): FIRST ▽ 6 / COMPL. ▼ / 24 HR. ▼	
SAMPLER: 2" OD Split Spoon		DRILLING FOREMAN: Carlos Molinares	
SAMPLER HAMMER: Automatic Hammer	WEIGHT(lbs): 140 / DROP(in): 30	INSPECTING ENGINEER: Ruben Ponciano	

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
+6.5	Asphalt (1 inch) Tan LIMEROCK (4 inches) Black fine to medium SAND (Possible Fill)			S1	SS	18	5 6 8 8	14	
+4.5	Light gray fine to medium SAND		2	S2	SS	14	4 4 5 4	9	
	Dark brown fine to medium SAND, trace organic silt ▽		4	S3	SS	16	4 2 1 1	3	
0.0	Tan CEMENTED SAND		6	S4	SS	12	1 2 2 3	4	
	Light brown to brown CEMENTED SAND, some fine sand, trace silt		8	S5	SS	13	2 3 5 5	8	
			10						Set casing at 13 ft Advanced casing to 13 ft
			12						
	Light brown to brown CEMENTED SAND, some fine sand, trace silt		14	S6	SS	12	6 4 3 2	7	
			16						Advanced casing to 18 ft Good circulation
	Tan to white CEMENTED SAND, some sandy silt		18	S7	SS	13	5 4 3 5	7	
			20						
			22						Advanced casing to 23 ft Easy drilling Good circulation
-16.5	Light brown fine to medium SAND, trace cemented sand		24	S8	SS	5	3 2 1 2	3	
			26						Advanced casing to 28 ft Easy drilling Good circulation
			28						
	White to tan SAND, some shell fragments and limestone			S9	SS	12	1 1 WOH/12"	1	

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LOG OF BORING **SB-1**

SHEET 2 OF 5

PROJECT	PROJECT NO.
Parck Place	330061201
LOCATION	**ELEVATION AND DATUM**
1747 Van Buren Street, Hollywood, FL	Approx. +6.5 [ft, NGVD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
			32						Advanced casing to 33 ft
			34	S10	SS	14	1 WOH/18"	WOH	
	Light green fine SAND		36	S11	SS	8	1 2 1 2	3	
									Advanced casing to 38 ft Easy drilling Good circulation
-31.5			38	S12	SS	16	3 13 15 16	28	
	Light gray CEMENTED SAND, some fine to medium sand		40						
			42						Advanced casing to 43 ft Easy drilling Poor circulation from 42 ft - 43 ft
	Light gray CEMENTED SAND, some fine to medium sand		44	S13	SS		9 6 2 2	8	
			46						Advanced casing to 48 ft Easy drilling Lost circulation at 46 ft
-41.5			48	S14	SS	2	50/5"	50/5"	
	Tan CEMENTED SAND		50						
			52						Advanced casing to 53 ft Easy drilling Lost circulation
	Light brown to white CEMENTED SAND and sandstone fragments		54	S15	SS	3	55/4"	55/4"	
			56						Advanced casing to 58 ft Easy drilling Lost circulation
	Light gray CEMENTED SAND, some coarse sand		58	S16	SS	18	6 11 17 39	28	
			60						
			62						Advanced casing to 63 ft Moderate drilling Lost circulation
	Light brown CEMENTED SAND, some coarse sand		64	S17	SS	8	46 45 24 14	69	

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LOG OF BORING **SB-1**

SHEET 3 OF 5

PROJECT	PROJECT NO.
Parck Place	330061201
LOCATION	**ELEVATION AND DATUM**
1747 Van Buren Street, Hollywood, FL	Approx. +6.5 [ft, NGVD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
			66						Advanced casing to 68 ft Moderate drilling No circulation
	Light gray CEMENTED SAND, some fine to medium sand		68	S18	SS	12	17 20 20	40	
			70						Advanced casing to 73 ft Easy drilling No circulation
			72						
			74	S19	SS	8	7 WOH/18"	WOH	
	Light brown CEMENTED SAND, some coarse sand		76	S20	SS	19	10 13 15 14	28	
			78						Advanced casing to 78 ft No circulation
	Light brown CEMENTED SAND, some coarse sand		80	S21	SS	14	8 7 11 13	18	
			82						Advanced casing to 83 ft Easy drilling No circulation
	Light gray to light brown CEMENTED SAND		84	S22	SS	13	11 9 8 11	17	
-80.0			86						Advanced casing to 88 ft Easy drilling No circulation
	Light gray fine to coarse SAND, some cemented sand		88	S23	SS	12	4 5 5 4	10	
			90						Advanced casing to 93 ft Easy drilling No circulation
			92						
	Light gray fine to coarse SAND, some cemented sand		94	S24	SS	17	7 3 4 3	7	
			96						No water sample. Too sandy Advanced casing to 98 ft Easy drilling No circulation
-90.0									
	Light gray CEMENTED SAND and SAND		98	S25	SS	16	5 5 6 7	11	

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LOG OF BORING **SB-1**

SHEET 4 OF 5

PROJECT	PROJECT NO.
Parck Place	330061201
LOCATION	**ELEVATION AND DATUM**
1747 Van Buren Street, Hollywood, FL	Approx. +6.5 [ft, NGVD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
			102						Advanced casing to 103 ft Easy drilling No circulation
	Light gray CEMENTED SAND and SAND, trace limestone fragments		104	S26	SS	18	14 9 9 15	18	
			106						Advanced casing to 108 ft Easy drilling No circulation
	No recovery		108	S27	SS	0	1 2 5 7	7	
	Light gray CEMENTED SAND and SAND		110	S28	SS	16	5 8 5 11	13	
			112						Advanced casing to 113 ft Easy drilling No circulation
	Light gray CEMENTED SAND and SAND		114	S29	SS	5	7 3 1 1	4	
-109.5			116						Advanced casing to 118 ft
	Light gray CEMENTED SAND, trace fine to medium sand		118	S30	SS	2	52/3"	52/3"	
			120						
			122						Advanced casing to 123 ft Easy to moderate drilling No circulation
	Light gray CEMENTED SAND, some fine to medium sand		124	S31	SS	10	4 3 8 50/5"	11	
			126						Advanced casing to 128 ft Easy drilling No circulation
	Light gray CEMENTED SAND and fine to medium SAND		128	S32	SS	18	14 30 20 49	50	
			130						
			132						Advanced casing to 133 ft Hard drilling No circulation
	Light brown CEMENTED SAND		134	S33	SS	1	55/3"	55/3"	

LANGAN

LOG OF BORING **SB-1**

SHEET 5 OF 5

PROJECT	PROJECT NO.
Parck Place	330061201
LOCATION	**ELEVATION AND DATUM**
1747 Van Buren Street, Hollywood, FL	Approx. +6.5 [ft, NGVD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
			136						Advanced casing to 138 ft Moderate drilling No circulation
	White to tan CEMENTED SAND, trace sand, some sea shells		138	S34	SS	12	14 18 20 52/5"	38	
			140						
			142						Advanced casing to 143 ft Moderate drilling No circulation
	Tan CEMENTED SAND		144	S35	SS	1	50/2"	50/2"	
			146						Advanced casing to 148 ft Moderate drilling No circulation
	Tan CEMENTED SAND		148	S36	SS	2	50/2"	50/2"	
-143.5	SB-1 terminated at 150 ft		150						
			152						
			154						
			156						
			158						
			160						
			162						
			164						
			166						
			168						

APPENDIX B
PERCOLATION TEST LOG

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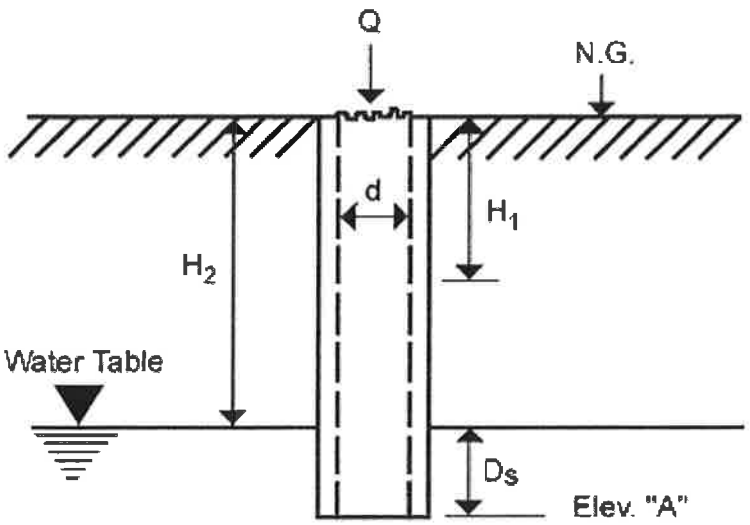
USUAL OPEN-HOLE TEST



$$K = \frac{4Q}{\pi d (2H_2^2 + 4H_2D_S + H_2d)}$$

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)

Figure F-1

TABLE 1

SUMMARY OF PERCOLATION TEST RESULTS

Parc Place

1747 Van Buren Street

Hollywood, Florida

330061201

Test No.	Date Performed	Approximate Ground Surface Elevation (NGVD,Feet)	Diameter of Test Hole (Inches)	Depth of Hole (Feet)	Depth to Water Table before Test (Feet)	Depth to Water Table during Test (Feet)	Water Head above Water Table During Test (H2) (Feet)	Saturated Hole Depth, Ds (Feet)	Average Flow Rate, Q (GPM)	K, Hydraulic Conductivity (cfs/ft^2 - ft head)
P1	8/7/2019	+6.5	5.0	10.0	6.0	0.0	6.0	4.0	0.8	3.19E-05

Notes:

(1) The hydraulic conductivity values were calculated based on the South Florida Water Management Districts' USUAL OPEN HOLE CONSTANT HEAD percolation test procedure as shown on the following page.

(2) The approximate percolation test location is shown on Figure 2.

Appendix I – Existing Adjacent Drainage Well Capacities

6.) STAGE-STORAGE CALCS/ DRAINAGE WELL CALCS HOLLYWOOD CIRCLE CTA PROJECT #04-0140

A.) ADJACENT SITE RADIUS (NW CORNER OF YOUNG CIRCLE) EXISTING WELL CAPICITY RESULTS
WELL #1 = 400 G.P.M.
WELL #2 = 350 G.P.M.

B.) UTILIZE 300 GALLONS PER MINUTE (GPM) DISCHARGE PER FOOT OF HEAD.

B.) MAXIMUM WELL DISCHARGE= 1,200 GPM PER WELL (300 GPM X 4' HEAD=1,200 GPM)

C.) DISCHARGE FROM WELL	300	GPM/ FT HEAD	0.67	CFS/ FT HEAD

D.) # DRAINAGE WELLS 6

E.) BEGIN DISCHARGE FROM WELL AT ELEVATION 2.6' NAVD. (DISCHARGE FROM WELL BEGINS ONCE A MINIMUM OF 2' OF HEAD IS BUILT-UP OVER WATER TABLE ELEVATION OF 0.5 NAVD, IN ORDER TO OVERCOME FRESH WATER- SALT WATER DENSITY DIFFERENTIAL).

F.) EXFILTRATION TRENCH VOLUME PROVIDED 0.38 ac-ft.
EXFILTRATION TRENCH VOLUME MOLDELED 0.19 ac-ft.

STAGE	STORAGE (AF)	WELL DISCHARGE (CFS)	
0.5	0.00	0	
1	0.03	0	
2	0.09	0	
2.5	0.11	0	
3	0.14	2.02	(0.50' HEAD x 0.67) x 6 WELLS
4	0.19	6.05	(1.50' HEAD x 0.67) x 6 WELLS
5	0.19	10.08	(2.50' HEAD x 0.67) x 6 WELLS
6	0.24	14.11	(3.5' HEAD x 0.67) x 6 WELLS
7	0.48	16.13	(4.0' HEAD x 0.67) x 6 WELLS
8	0.90	16.13	(4.0' HEAD x 0.67) x 6 WELLS
9	1.33	16.13	(4.0' HEAD x 0.67) x 6 WELLS
10	1.76	16.13	(4.0' HEAD x 0.67) x 6 WELLS

FT. OF HEAD	DRAINAGE WELL #1	DRAINAGE WELL #2	DRAINAGE WELL #3	DRAINAGE WELL #4	DRAINAGE WELL #5	DRAINAGE WELL #6	TOTAL DISCHRGE
0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.34	0.34	0.34	0.34	0.34	0.34	2.02
4	1.01	1.01	1.01	1.01	1.01	1.01	6.05
5	1.68	1.68	1.68	1.68	1.68	1.68	10.08
6	2.35	2.35	2.35	2.35	2.35	2.35	14.11
7	2.69	2.69	2.69	2.69	2.69	2.69	16.13
8	2.69	2.69	2.69	2.69	2.69	2.69	16.13
9	2.69	2.69	2.69	2.69	2.69	2.69	16.13
10	2.69	2.69	2.69	2.69	2.69	2.69	16.13

Appendix J – Pre-Development Calculations

Project: Star Tower Hollywood Date: 06/28/2023
Flood Routing Description:

Client : Job Number: 13778.00
Design Engineer :
Project Address / Location : City: Hollywood County: Broward State: Florida
Section/Township/Range:
Surfacewater License:
FEMA FIRM Information:
Project Description:

Total Drainage Basin: 0.816 Acres

Hydrogeologic Information :

Table 1.	1 Day Storm Event			3 Day Storm Event		
RAINFALL DATA	Rainfall Inches	Runoff Inches	Runoff Ac-Ft	Rainfall Inches	Runoff Inches	Runoff Ac-Ft
100 Year Return Period	15.6	9.67	0.658	18.1	11.94	0.812
25 Year Return Period				13.4	7.72	0.525
10 Year Return Period	9.0	4.06	0.276	12.2	6.70	0.456
5 Year Return Period	7.4	2.84	0.193	10.0	4.87	0.331
3 Year Return Period						
5 Yr Return Period - 1 Hr	3.2	0.40	0.027			

Runoff estimation - USDA SCS formula

$$\text{Runoff (in) } Q = \frac{(P-0.2S)^2}{P+0.8S}$$

Where: P = accumulated rainfall (in.)
S = Soil Storage Value

Table 2. SUMMARY OF FLOOD ROUTING	Agency maps	SBUH Calculated **with Q**-1 Day Storm		SBUH Calculated **with Q**-3 Day Storm		SBUH Calculated ***Zero Q**-3 Day Storm		Calc. 5Yr 1 hour Peak Stage (ft)
		Peak Stage(ft)	Peak Q (CFS)	Peak Stage(ft)	Peak Q (CFS)	Peak Stage(ft)	Peak Q (CFS)	
100 Year Return Period		8.21	0.00	8.40	0.00	8.40	0.00	Zero Q (Water Budget)
25 Year Return Period				8.05	0.00	8.05	0.00	
10 Year Return Period		7.67	0.00	7.95	0.00	7.95	0.00	
5 Year Return Period		7.54	0.00	7.75	0.00	7.75	0.00	7.04
3 Year Return Period								

For 5 yr - 1 hr rainfall, Calculate 5 yr Vol by subtracting Exfil vol in inches from 5 yr 1 h rainfall, then calc Runoff using SCS formula. From stage storage table find Zero Discharge Stage. Uses Max. Elev of Lookup Stage or highest top of EXFIL trench. If exfil vol exceeds 5 year 1 hour vol. Uses Max. Elev of highest top of EXFIL trench.

* Zero Q indicates there is no offsite discharge included in the calculations (only Exfil Trench and Wells). Hypothetical stage calc. for PRE-POST Analysis.

Table 3. WATER QUALITY STORAGE REQUIREMENTS:			
Based on Total Drainage Basin Acreage		Ac-Ft	
1" x Basin Area		0.068	
2.5" x WQPI x (Basin Area 1	0.00 Inches	0.000	
Required Wet Detention (Total basin incl Offsite)			
0.5" Pretreatment-Com. Prjs,x(Basin Area - water area)		0.034	
Credit for Inlets in Grass Areas, GAC=0.2" x (TDA		0.014	N

Table 4. WATER QUALITY STORAGE SOURCE	**Basin Storage Elev.**	(Ac-Ft)	WQ Eq WDV (Ac-Ft)	WQ Eq WDV Inches
Retention (RV) @				
Dry Det. (DDV) @				
Wet Det. (WDV) @				
Equiv WDV=WDV+RV/.5+DDV/.75)			0.000	
Exfil Trench Storage		0.000	0.000	
Total WQ EQ WDV - **Provided**			**0.000**	
Total WQ EQ WDV - ***Required***			0.068	1.00

Exfil Vol. in Stage Storage =	(Ac-FT)	(Inches)
	0.000	0.00

Project: Star Tower Hollywood Date: 06/28/2023

. Flood Routing Description:
Client :

Job Number: 13778.00

Total Drainage Basin:	0.816	Acres	Y	Y/N -Do you want to limit the Exfiltration Trench Vol. to a maximum of 3.28" over the site?
Water Table Elevation =	1.50	Feet	N	Y/N -Deduct EXFIL Vol. from Rainfall amount rather than include Vol. in Stage Storage table
Time of Conc. (hr.) =	0.17		Y	Y/N -Use EXFIL Vol. in Stage Storage, up to Water Quality Vol., without safety Factor of 2.
Calculated weighted soil (s)	6.75	Soil Storage Value (S) = Storage under pervious area / Total Area		
Calculated CN value	59.7	Soil Storage under pavement and buildings is not considered in computations		

Table 16. STAGE STORAGE TABLE

Stage Elevation (feet)	Storage (Ac-ft)	Storage (CF)
1.50	0.000	0
2.00	0.000	0
2.50	0.000	0
3.00	0.000	0
3.50	0.000	0
4.00	0.000	0
4.50	0.000	0
5.00	0.000	0
5.50	0.000	0
6.00	0.000	0
6.50	0.000	0
7.00	0.016	688
7.50	0.169	7,371
8.00	0.486	21,162
8.50	0.894	38,922
9.00	1.302	56,694
9.50	1.710	74,467
10.00	2.118	92,239
10.50	2.526	110,012

Compacted Ground storage table

Depth to water table (Ft)	1.00	2.00	3.00	4.00
Ground storage(In)	0.45	1.88	4.05	6.75

Mean depth to ground water table (ft)= 5.91 (Pervious Area)

Soil Storage Type	Ground Storage Values (In Inches)			
Depth to Ground Water (Ft)	**1**	**2**	**3**	**4**
* Depressional	0.45	1.58	3.3	5.1
Flatwoods	0.45	1.88	4.05	6.75
Coastal Type	0.45	1.88	4.95	8.18

* (Low Flatwoods & Costal Lowlands)
Ground Storage Values reflect 25% reduction of Available Storage, to take into account compaction of native soils.

Project: Star Tower Hollywood Date: 06/28/2023

. Flood Routing Description:

Client : Job Number: 13778.00

Table 17. SITE ACREAGE INFORMATION

	Input Information													
	LAND USES	Acres	High Elev.	Low Elev.	% Imperv. Paved	% Bldgs.	% Water	Imperv. Paved Acres	Perv. Acres	Bldgs. Acres	Non Bldgs. Acres	Water Lake Acres	Perv. Area Avg. El.	perv. acres * avg el
	BASIN TOTALS / AVERAG	0.816	8.03	1.50	0.00	0.00	0.00	0.00	0.82	0.00	0.82	0.00	7.41	
1	Pervious/Landscape	0.816	8.03	6.78	0	0	0	0.00	0.82	0.00	0.82	0.00	7.41	6.
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
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14														
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39														
	BASIN SUBTOTALS / AVG	0.816	8.03	6.78	0.00	0.00	0.00	0.00	0.82	0.00	0.82	0.00	7.41	6.

Table 18. UNDERGROUND STORAGE INFORMATION

	Underground Storage	Area (SF)	Top Elev	Bottom Elev	% Voids
1	Underground Storage 1				
2	Underground Storage 2				
3	Underground Storage 3				
4	Underground Storage 4				
5	Underground Storage 5				

BASIN TOTALS / AVERAGE	0.816	8.03	1.50	0.00	0.00	0.00	0.00	0.82	0.00	0.82	0.00	7.41	6.

Basin % Imper. for Water Quality Purposes = 0.00

Basin % Impervious (incl. Bldg., No lakes)= 0.00

Project: Star Tower Hollywood Date: 06/28/2023

. Flood Routing Description:

Client :

Job Number: 13778.00

Detail - Stage - Storage Information

Table 19. STAGE - STORAGE INFORMATION Surface storage (Ac-Ft)

	LAND USES	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.
		1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Total Surface Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.169
	Underground Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Exfil Trench Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	TOTAL Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.169
1	Pervious/Landscape	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.169
2														
3														
4														
5														
6														
7														
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40														
	Total Surface Storage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.17

Underground Storage

		1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
1	Underground Storage 1													
2	Underground Storage 2													
3	Underground Storage 3													
4	Underground Storage 4													
5	Underground Storage 5													
	Total Underground Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Exfil Trench Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	TOTAL Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.169
	Stage Elevation	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50

Appendix K – Post-Development Calculations

WATER QUANTITY

Project: Star Tower Hollywood Date: 06/28/2023
Flood Routing Description:

Client :
Job Number: 13778.00
Design Engineer :
Project Address / Location : City: Hollywood County: Broward State: Florida
Section/Township/Range:
Surfacewater License:
FEMA FIRM Information:
Project Description:

Total Drainage Basin: 0.816 Acres

Hydrogeologic Information :

Table 1.	1 Day Storm Event			3 Day Storm Event		
RAINFALL DATA	Rainfall Inches	Runoff Inches	Runoff Ac-Ft	Rainfall Inches	Runoff Inches	Runoff Ac-Ft
100 Year Return Period	15.6	15.17	1.032	18.1	17.67	1.202
25 Year Return Period				13.4	12.97	0.882
10 Year Return Period	9.0	8.57	0.583	12.2	11.79	0.802
5 Year Return Period	7.4	6.95	0.473	10.0	9.59	0.652
3 Year Return Period						
5 Yr Return Period - 1 Hr	3.2	1.64	0.111			

Runoff estimation - USDA SCS formula

$$\text{Runoff (in) } Q = \frac{(P-0.2S)^2}{P+0.8S}$$

Where: P = accumulated rainfall (in.)
S = Soil Storage Value

Table 2. SUMMARY OF FLOOD ROUTING	Agency maps	SBUH Calculated **with Q**-1 Day Storm		SBUH Calculated **with Q**-3 Day Storm		SBUH Calculated ***Zero Q**-3 Day Storm		Calc. 5Yr 1 hour Peak Stage (ft)
		Peak Stage(ft)	Peak Q (CFS)	Peak Stage(ft)	Peak Q (CFS)	Peak Stage(ft)	Peak Q (CFS)	
100 Year Return Period		8.56	6.02	8.39	6.02	8.39	6.02	Zero Q (Water Budget)
25 Year Return Period				8.04	5.86	8.04	5.86	
10 Year Return Period		8.06	6.00	7.33	5.31	7.33	5.31	
5 Year Return Period		5.99	4.99	5.70	4.41	5.70	4.41	7.92
3 Year Return Period								

For 5 yr - 1 hr rainfall, Calculate 5 yr Vol by subtracting Exfil vol in inches from 5 yr 1 h rainfall, then calc Runoff using SCS formula. From stage storage table find Zero Discharge Stage. Uses Max. Elev of Lookup Stage or highest top of EXFIL trench. If exfil vol exceeds 5 year 1 hour vol. Uses Max. Elev of highest top of EXFIL trench.

* Zero Q indicates there is no offsite discharge included in the calculations (only Exfil Trench and Wells). Hypothetical stage calc. for PRE-POST Analysis.

Table 3. WATER QUALITY STORAGE REQUIREMENTS:			
Based on Total Drainage Basin Acreage		Ac-Ft	
1" x Basin Area		0.068	
2.5" x WQPI x (Basin Area 1	2.20 Inches	0.143	
Required Wet Detention (Total basin incl Offsite)			
0.5" Pretreatment-Com. Prjs,x(Basin Area - water area)		0.032	
Credit for Inlets in Grass Areas, GAC=0.2" x (TDA		0.008	N

Project: Star Tower Hollywood Date: 06/28/2023

Flood Routing Description:
Client :

Job Number: 13778.00

Total Drainage Basin:	0.816	Acres	Y	Y/N -Do you want to limit the Exfiltration Trench Vol. to a maximum of 3.28" over the site?
Water Table Elevation =	1.50	Feet	N	Y/N -Deduct EXFIL Vol. from Rainfall amount rather than include Vol. in Stage Storage table
Time of Conc. (hr.) =	0.17		Y	Y/N -Use EXFIL Vol. in Stage Storage, up to Water Quality Vol., without safety Factor of 2.
Calculated weighted soil (s)	0.36	Soil Storage Value (S) = Storage under pervious area / Total Area		
Calculated CN value	96.5	Soil Storage under pavement and buildings is not considered in computations		

Table 16. STAGE STORAGE TABLE

Stage Elevation (feet)	Storage (Ac-ft)	Storage (CF)
1.50	0.000	0
2.00	0.007	292
2.50	0.013	583
3.00	0.020	875
3.50	0.027	1,166
4.00	0.033	1,458
4.50	0.040	1,750
5.00	0.047	2,041
5.50	0.054	2,333
6.00	0.060	2,624
6.50	0.067	2,916
7.00	0.074	3,208
7.50	0.086	3,739
8.00	0.116	5,062
8.50	0.180	7,834
9.00	0.385	16,763
9.50	0.590	25,693
10.00	0.795	34,623
10.50	1.000	43,553

Compacted Ground storage table

Depth to water table (Ft)	1.00	2.00	3.00	4.00
Ground storage(In)	0.45	1.88	4.05	6.75

Mean depth to ground water table (ft)= 6.00 (Pervious Area)

Soil Storage Type	**Ground Storage Values (In Inches)**			
Depth to Ground Water (Ft)	**1**	**2**	**3**	**4**
* Depressional	0.45	1.58	3.3	5.1
Flatwoods	0.45	1.88	4.05	6.75
Coastal Type	0.45	1.88	4.95	8.18

* (Low Flatwoods & Costal Lowlands)
Ground Storage Values reflect 25% reduction of Available Storage, to take into account compaction of native soils.

Project: Star Tower Hollywood Date: 06/28/2023

. Flood Routing Description:

Client : Job Number: 13778.00

Table 17. SITE ACREAGE INFORMATION

	Input Information													
	LAND USES	Acres	High Elev.	Low Elev.	% Imperv. Paved	% Bldgs.	% Water	Imperv. Paved Acres	Perv. Acres	Bldgs. Acres	Non Bldgs. Acres	Water Lake Acres	Perv. Area Avg. El.	perv. acres * avg el
	BASIN TOTALS / AVERAG	0.816	8.50	1.50	40.07	49.75	4.78	0.33	0.04	0.41	0.41	0.04	7.50	
1	Pool	0.039	8.50	8.50	0	0	100	0.00	0.00	0.00	0.04	0.04	0.00	0.
2	Pervious/Landscape	0.044	8.00	7.00	0	0	0	0.00	0.04	0.00	0.04	0.00	7.50	0.
3	Impervious	0.111	8.50	7.50	100	0	0	0.11	0.00	0.00	0.11	0.00	0.00	0.
4	Building	0.406	8.50	8.50	0	100	0	0.00	0.00	0.41	0.00	0.00	0.00	0.
5	Pool Deck	0.216	8.50	8.50	100	0	0	0.22	0.00	0.00	0.22	0.00	0.00	0.
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	BASIN SUBTOTALS / AVG	0.816	8.50	7.00	40.07	49.75	4.78	0.33	0.04	0.41	0.41	0.04	7.50	0.

Table 18. UNDERGROUND STORAGE INFORMATION

	Underground Storage	Area (SF)	Top Elev	Bottom Elev	% Voids
1	Underground Storage 1				
2	Underground Storage 2				
3	Underground Storage 3				
4	Underground Storage 4				
5	Underground Storage 5				

	BASIN TOTALS / AVERAGE	0.816	8.50	1.50	40.07	49.75	4.78	0.33	0.04	0.41	0.41	0.04	7.50	0.

Basin % Imper. for Water Quality Purposes = 88.14

Basin % Impervious (incl. Bldg., No lakes)= 94.34

Project: Star Tower Hollywood Date: 06/28/2023

. Flood Routing Description:
Client : Job Number: 13778.00

Table 20. SOIL - STORAGE INFORMATION

Detail - Soil Storage Information

	LAND USES	Depth to Water Table	Ground Storage Under Pervious	
			Inches	Ac-Ft
	TOTAL/AVERAGE		6.75	0.02
1	Pool	0.00	0.00	0.000
2	Pervious/Landscape	6.00	6.75	0.025
3	Impervious	0.00	0.00	0.000
4	Building	0.00	0.00	0.000
5	Pool Deck	0.00	0.00	0.000
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	TOTAL/AVERAGE		6.75	0.025

Soil Storage Value (S) = Storage under pervious area / Total Area

Soil Storage under pavement and buildings is not considered in computations

S=	0.36397059

WATER QUANTITY

Project: Star Tower Hollywood Date: 06/28/2023

Flood Routing Description:
Client :

Job Number: 13778.0(

Table 21. STAGE / DISCHARGE DATA TABLE

Drainage Basin: Recieving Water Body: Runoff Formula:

SFWMD allowable discharge: CFS Project Acreage : 0.82 Q=Allowable runoff (CFS)

Historic/Prev. Permit Discharge = CFS CSM=Cubic Feet per Sec. per Sq. Mile

Stage / Discharge Data Table																			
Stage (feet)	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	10.50
On-Site (Well Discharge)	0.00	0.00	0.00	0.00	0.00	1.00	2.01	3.01	4.01	5.01	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02
Total Discharge (Includes Well) (CFS)	0.00	0.00	0.00	0.00	0.00	1.00	2.01	3.01	4.01	5.01	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02

Discharge Structure Description:

Notes

WATER QUALITY

Project: Star Tower Hollywood Date: 06/28/2023
Flood Routing Description:

Client :
Job Number: 13778.00
Design Engineer :
Project Address / Location : City: Hollywood County: Broward State: Florida
Section/Township/Range:
Surfacewater License:
FEMA FIRM Information:
Project Description:

Total Drainage Basin: 0.255 Acres

Hydrogeologic Information :

Table 1.	1 Day Storm Event			3 Day Storm Event		
RAINFALL DATA	Rainfall Inches	Runoff Inches	Runoff Ac-Ft	Rainfall Inches	Runoff Inches	Runoff Ac-Ft
100 Year Return Period	15.6	15.60	0.332	18.1	18.10	0.385
25 Year Return Period				13.4	13.40	0.285
10 Year Return Period	9.0	8.99	0.191	12.2	12.22	0.260
5 Year Return Period	7.4	7.37	0.157	10.0	10.02	0.213
3 Year Return Period						
5 Yr Return Period - 1 Hr	3.2	0.25	0.005			

Runoff estimation - USDA SCS formula

$$\text{Runoff (in) } Q = \frac{(P-0.2S)^2}{P+0.8S}$$

Where: P = accumulated rainfall (in.)
S = Soil Storage Value

Table 2. SUMMARY OF FLOOD ROUTING	Agency maps	SBUH Calculated **with Q**-1 Day Storm		SBUH Calculated **with Q**-3 Day Storm		SBUH Calculated ***Zero Q**-3 Day Storm		Calc. 5Yr 1 hour Peak Stage (ft)
		Peak Stage(ft)	Peak Q (CFS)	Peak Stage(ft)	Peak Q (CFS)	Peak Stage(ft)	Peak Q (CFS)	
100 Year Return Period		9.55	0.00	9.76	0.00	4.86	2.74	Zero Q (Water Budget)
25 Year Return Period				9.37	0.00	4.69	2.39	
10 Year Return Period		9.00	0.00	9.27	0.00	4.50	2.01	
5 Year Return Period		8.87	0.00	9.09	0.00	4.37	1.73	5.00
3 Year Return Period								

For 5 yr - 1 hr rainfall, Calculate 5 yr Vol by subtracting Exfil vol in inches from 5 yr 1 h rainfall, then calc Runoff using SCS formula. From stage storage table find Zero Discharge Stage. Uses Max. Elev of Lookup Stage or highest top of EXFIL trench. If exfil vol exceeds 5 year 1 hour vol. Uses Max. Elev of highest top of EXFIL trench.

* Zero Q indicates there is no offsite discharge included in the calculations (only Exfil Trench and Wells). Hypothetical stage calc. for PRE-POST Analysis.

Table 3. WATER QUALITY STORAGE REQUIREMENTS:			
Based on Total Drainage Basin Acreage		Ac-Ft	
1" x Basin Area		0.021	
2.5" x WQPI x (Basin Area 1	2.50 Inches	0.045	
Required Wet Detention (Total basin incl Offsite)			
0.5" Pretreatment-Com. Prjs,x(Basin Area - water area)		0.009	
Credit for Inlets in Grass Areas, GAC=0.2" x (TDA		0.004	N

Table 4. **WATER QUALITY STORAGE SOURCE**	**Basin Storage Elev.**	(Ac-Ft)	WQ Eq WDV (Ac-Ft)	WQ Eq WDV Inches
Retention (RV) @				
Dry Det. (DDV) @				
Wet Det. (WDV) @				
Equiv WDV=WDV+RV/.5+DDV/.75)			0.000	
Exfil Trench Storage		0.040	0.080	3.78
Total WQ EQ WDV - **Provided**			**0.080**	3.78
Total WQ EQ WDV - ***Required***			0.045	2.12

	(Ac-FT)	(Inches)
Exfil Vol. in Stage Storage =	0.063	2.95

WATER QUALITY

Project: Star Tower Hollywood Date: 06/28/2023

Flood Routing Description:
Client :

Job Number: 13778.00

Total Drainage Basin:	0.255	Acres	Y	Y/N -Do you want to limit the Exfiltration Trench Vol. to a maximum of 3.28" over the site?
Water Table Elevation =	1.50	Feet	N	Y/N -Deduct EXFIL Vol. from Rainfall amount rather than include Vol. in Stage Storage table
Time of Conc. (hr.) =	0.17		Y	Y/N -Use EXFIL Vol. in Stage Storage, up to Water Quality Vol., without safety Factor of 2.
Calculated weighted soil (s)	0.00	Soil Storage Value (S) = Storage under pervious area / Total Area		
Calculated CN value	100.0	Soil Storage under pavement and buildings is not considered in computations		

Table 16. STAGE STORAGE TABLE

Stage Elevation (feet)	Storage (Ac-ft)	Storage (CF)
1.50	0.000	0
2.00	0.005	227
2.50	0.010	455
3.00	0.016	682
3.50	0.021	910
4.00	0.026	1,137
4.50	0.031	1,365
5.00	0.037	1,592
5.50	0.042	1,820
6.00	0.047	2,047
6.50	0.052	2,275
7.00	0.057	2,502
7.50	0.063	2,730
8.00	0.063	2,730
8.50	0.063	2,730
9.00	0.190	8,284
9.50	0.318	13,838
10.00	0.445	19,391
10.50	0.573	24,945

Compacted Ground storage table

Depth to water table (Ft)	1.00	2.00	3.00	4.00
Ground storage(In)	0.45	1.88	4.05	6.75

Mean depth to ground water table (ft)= 0.00 (Pervious Area)

Soil Storage Type	**Ground Storage Values (In Inches)**			
Depth to Ground Water (Ft)	**1**	**2**	**3**	**4**
* Depressional	0.45	1.58	3.3	5.1
Flatwoods	0.45	1.88	4.05	6.75
Coastal Type	0.45	1.88	4.95	8.18

* (Low Flatwoods & Costal Lowlands)
Ground Storage Values reflect 25% reduction of Available Storage, to take into account compaction of native soils.

WATER QUALITY

Project: Star Tower Hollywood Date: 06/28/2023

. Flood Routing Description:

Client : Job Number: 13778.00

Table 17. SITE ACREAGE INFORMATION

	Input Information													
	LAND USES	Acres	High Elev.	Low Elev.	% Imperv. Paved	% Bldgs.	% Water	Imperv. Paved Acres	Perv. Acres	Bldgs. Acres	Non Bldgs. Acres	Water Lake Acres	Perv. Area Avg. El.	perv. acres * avg el
	BASIN TOTALS / AVERAG	0.255	8.50	1.50	84.71	0.00	15.29	0.22	0.00	0.00	0.26	0.04	0.00	
1	Pool	0.039	8.50	8.50	0	0	100	0.00	0.00	0.00	0.04	0.04	0.00	0.
2	Pool Deck	0.216	8.50	8.50	100	0	0	0.22	0.00	0.00	0.22	0.00	0.00	0.
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	BASIN SUBTOTALS / AVG	0.255	8.50	8.50	84.71	0.00	15.29	0.22	0.00	0.00	0.26	0.04	0.00	0.

Table 18. UNDERGROUND STORAGE INFORMATION

	Underground Storage	Area (SF)	Top Elev	Bottom Elev	% Voids
1	Underground Storage 1				
2	Underground Storage 2				
3	Underground Storage 3				
4	Underground Storage 4				
5	Underground Storage 5				

BASIN TOTALS / AVERAGE	0.255	8.50	1.50	84.71	0.00	15.29	0.22	0.00	0.00	0.26	0.04	0.00	0.

Basin % Imper. for Water Quality Purposes = 100.00

Basin % Impervious (incl. Bldg., No lakes)= 100.00

WATER QUALITY

Project: Star Tower Hollywood Date: 06/28/2023

Flood Routing Description:

Client :

Job Number: 13778.00

Detail - Stage - Storage Information

Table 19. STAGE - STORAGE INFORMATION

		Surface storage (Ac-Ft)												
	LAND USES	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.	Elev.
		1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Total Surface Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Underground Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Exfil Trench Storage	0.000	0.005	0.010	0.016	0.021	0.026	0.031	0.037	0.042	0.047	0.052	0.057	0.063
	TOTAL Storage	0.000	0.005	0.010	0.016	0.021	0.026	0.031	0.037	0.042	0.047	0.052	0.057	0.063
1	Pool	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	Pool Deck	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
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	Total Surface Storage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Underground Storage

		1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
1	Underground Storage 1													
2	Underground Storage 2													
3	Underground Storage 3													
4	Underground Storage 4													
5	Underground Storage 5													
	Total Underground Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Exfil Trench Storage	0.000	0.005	0.010	0.016	0.021	0.026	0.031	0.037	0.042	0.047	0.052	0.057	0.063
	TOTAL Storage	0.000	0.005	0.010	0.016	0.021	0.026	0.031	0.037	0.042	0.047	0.052	0.057	0.063
	Stage Elevation	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50

Project: Star Tower Hollywood Date: 06/28/2023

. Flood Routing Description:
Client :

Job Number: 13778.00

Table 20. SOIL - STORAGE INFORMATION

Detail - Soil Storage Information

	LAND USES	Depth to Water Table	Ground Storage Under Pervious	
			Inches	Ac-Ft
	TOTAL/AVERAGE		0.00	0.00
1	Pool	0.00	0.00	0.000
2	Pool Deck	0.00	0.00	0.000
3				
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	TOTAL/AVERAGE		0.00	0.000

Soil Storage Value (S) = Storage under pervious area / Total Area

Soil Storage under pavement and buildings is not considered in computations

S= 0

WATER QUALITY

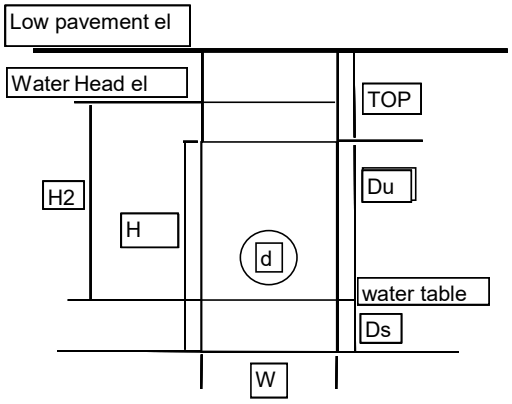
Project: Star Tower Hollywood Date: 06/28/2023

Flood Routing Description:
Client :

Job Number: 13778.00

Table 22-1 EXILTRATION TRENCH -1 INFORMATION

INPUT INFORMATION	
Trench Width (Ft) (W)	8.00
Trench Height (Ft) (H)	7.00
Diameter of Pipe (inches) (d)	18
Invert of Pipe (Ft) (IE)	1.5
Top of trench elevation	5
Low pavement elevation	7.7
Water Head elevation (Ft)	7.50
Avg. Hydraulic Conductivity (Cfs/Ft^2) (k)	3.19E-05



Length of Exfiltration trench Provided (Ft) (L)	125
Water table elevation (Ft)	1.50
Trench Data	
Depth To Top Of Trench (Ft) (TOP)	2.50
Bottom of trench elevation	-2.00
Saturated Trench Depth (Ds)	3.50
Non-Saturated Trench Depth (Du)	3.50
Depth To Water Table or Trench Bottom (Ft) (H2)	6.00
Trench Storage Begins at Higher of Water Table or Trench Bot. Elev.	1.50

= Water head El - Top of Trench El.
= Top of Trench El. - Trench Height (H)
= Trench Height below water Table
= Trench depth above water Table
= Water head El to the water table or bottom of trench

Trench Volumes Stored & Exfiltrated in 1 hour (CF)

Note: 3630 in Eqn. is conversion factor from (Ac-In) to (CF)-> (43560 SF/Ac)(1FT/12In)

1 Hr. Vol by exfil SFWMD Eq.7 (Du > Ds and W < 2H) (CF)	3,499	Vtrn=3630*L*[k*((H2*W)+(2*H2*Du)-Du^2+(2*H2*Ds))+((1.39x10^-4)*(W*Du))]					
1 Hr. Vol by exfil SFWMD Eq.8 (Du < Ds or W > 2H) (CF)	0	Vtrn=3630*L*[k*((2*H2*Du)-Du^2+(2*H2*Ds))+((1.39x10^-4)*(W*Du))]					
This Trench Volume with **Safety Factor of 2** (V(trnSF))	1,750	V(TrnSF)=Vtrn/(Safety Factor of 2)			0.040	Ac-Ft	0.48 Ac-In
Max. Vol allowed in Exfil (3.28" = 0.273 Ac-Ft / Ac) (Val) (CF)	3,036	Vtot=Vdesign+Vsto			0.070	Ac-Ft	0.84 Ac-In
Total EXFIL Vol Provided **ALL EXFIL** Trenches (Vtot) (CF)	**1,750**	Vtot=Vdesign+Vsto			**0.040**	Ac-Ft	0.48 Ac-In
Equivalent Wet Detention Vol:50% credit **ALL EXFIL** (Vwteq) (CF)	3,499	Vwteq=Vtot *2			0.080	Ac-Ft	0.96 Ac-In
Total System **ALL EXFIL** WQ Equivalent Wet Det. Vol Provided	3,499	CF	0.080	Ac-Ft	**NOTE:This line is Sum of all Exfiltration Trenches**		
Total System **ALL EXFIL** Volume Used in **Stage-Storage**	2,730	CF	0.063	Ac-Ft	**NOTE:This line is Sum of all Exfiltration Trenches**		

NOTE: For Exfiltration Trench design, a factor of safety of 2 is used for WQ in all conditions (WQ vol & above WQ vol), per the "New" SFWMD formula.
Select on the Stage-Storage tab, whether to use the safety factor for the Exfil trench, up to the required WQ amount, in the flood routing Stage-Storage volumes.
Because of the built in safety factor of only using the trench discharge for one hour during the 72 hour storm event, some Agencies allow the use of the Exfiltration trench volume, up to the required Water Quality Volume, without a safety factor of 2, for use in storm routing calculations.