

# STORMWATER MANAGEMENT REPORT

*for*

## **Pierre Delray Site 2**

Bonita Springs, Florida

***Prepared for:***

**Zyscovich**

*Prepared by*



**BOHLER**  
ENGINEERING

2255 Glades Road, Suite #305E  
Boca Raton, FL 33431

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Andrew Savage, P.E.  
Florida Professional Engineer License No. 82408

March 25, 2020

## Table of Contents

Executive Summary.....	Section 1
Results & Conclusion.....	Section 2
Location Map .....	Section 3
Post-Development Drainage Calculations .....	Section 4
- Land-use Breakdown, Soil-Storage, & Storm Water Runoff Calculations	
- Water-Quality Calculations	
- Stage-Storage Tabulation	
<b>Appendices:</b>	
SFWMD Rainfall Maps.....	Appendix A
FEMA Flood Insurance Map .....	Appendix B
Site Plan .....	Appendix C
ADS Storm Tech Underground Chamber Plans.....	Appendix D
Cascade Flood Routing.....	Appendix E
Basin Map .....	Appendix F
Basin Pre vs. Post Calculations.....	Appendix G

# **Section 1**

## Executive Summary

# **Executive Summary**

## **Site Description**

The subject site is located on the southwest corner of East Atlantic Avenue and SE 3<sup>rd</sup> Avenue within the City of Delray Beach in Palm Beach County, Florida. The proposed site is approximately 0.43 acres in area. The project proposes to develop the site with a multi-use tenant building including a 3-story parking garage along with associated paver areas & landscaping. This site is currently doesn't have a South Florida Water Management District (SFWMD) Environmental Resource Permit (ERP).

## **Existing Conditions & Hydrology**

The existing site consists of a 0.43-acre parking lot to provide parking for the nearby SunTrust and other surrounding establishments. Currently, the existing site sheet flows storm runoff to an existing storm inlet located approximately 250 feet east of the site on East Atlantic Ave. The storm water enters the storm inlet then eventually discharges runoff into the Intracoastal Waterway east of the proposed site.

## **Proposed Conditions & Hydrology**

The proposed development for the site includes a 15,808 sq.-ft. mixed-use building with a garage including accompanying drive isles, parking, and landscaping. The project site intends to propose a new underground storage chamber vaulted system to treat water quality and capture storm water runoff. The proposed underground storage vaulted system will capture the required water quality volume and the runoff difference in acre-feet of the pre vs. post 10-year 1-day storm event that the proposed project will generate. See table below for the calculations of required storage in the vaulted system.

## **Groundwater Elevation**

The ground water table is approximately ten feet (10') below the existing ground surface. A water table elevation of 5.00' NAVD was used for calculations.

## **Floodplain**

This site is located within FEMA Flood Map 12099C0979F and is in Flood Zone "X".

## **Vertical Datum**

All elevations are based on North American Vertical Datum of 1988 (NAVD 88).

## **Methodology**

The purpose of this report is to demonstrate that the proposed storm water management system is in substantial compliance with the regulations set forth by the City of Delray Beach, Palm Beach County, and South Florida Water Management District (SFWMD). The peak stage elevation and volume were calculated by comparing the design storm runoff to the stage-storage relationship for the site. A "glass wall" peak stage analysis was used to compute the 10-year/ 24-hour design storm volume. Based off the required volume and space allowed underground on the proposed site, StormTech was able to design a

60' x 20' x 4' underground storage system supplying 4,800 cubic feet of storage to supply the proposed site.

### **10-Year/24-Hour Post-Development Design Storm Peak Volume**

Design Storm	Rainfall Depth (In.)	Volume (Ac.-Ft.)
10-Year / 24-Hour	8.87	0.30

### **Storage Calculations for Underground Vault System**

Post-Condition Runoff Volume: 0.30 Ac.-Ft

Pre-Condition Runoff Volume: 0.27 Ac.-Ft

Difference between post and pre-condition volume: **0.03 Ac.-Ft**

Water Quality storage required: **0.06 Ac.-Ft**

Water Quality storage provided: **0.09 Ac.-Ft**

**Total storage volume required to be held onsite: 0.09 Ac.-Ft**

**Total storage volume being held onsite: 0.09 Ac.-Ft**

### **100-Year 3-Day Flood Study**

The proposed finish floor elevation (FFE) of the building is 15.52' NAVD, and because this is less than 18" above the adjacent crown of road along both frontages, a drainage investigation must be performed to show the proposed FFE (15.52') is above the 100-year 3-day peak stage elevation. In order to conduct this investigation, a stormwater map was created using lidar elevation points for areas surrounding our project area. See appendix F for basin map. The basin area is approximately 9.74 acres consisting of 3.54 acres of building area, 5.66 acres of impervious area, and 0.54 acres of pervious area.

A stage-storage analysis was created to compare the 100-year 3-day storm peak stage elevation to the proposed FFE of the building. For the FFE to be less than 18" above the adjacent crown of road along both frontages and be accepted, the FFE must be above the 100-year 3-day storm event. After running calculations for the pre-conditions, it was determined the existing peak stage was 15.28' NAVD. With the proposed building being accounted for the post-conditions, it was determined the proposed peak stage elevation was 15.27' NAVD. See appendix G for calculations.

In an event the 100-year 3-day storm occurs, water will stage up within the basin, then escape through lower elevation areas of the basin boundary before the building on our project site location can be subject to flooding. After investigation of the 100-year 3-day storm event, it was confirmed the building FFE (15.52' NAVD) is above the 100-year storm peak stage.

## **Section 2**

### Results & Conclusion

## Results & Conclusion

The project shows conformance to City of Delray Beach, Palm Beach County, and South Florida Water Management District (SFWMD) criteria as seen in the post-development calculations. The site provides the water quality requirements and will retain the difference of the 10-year 1-day storm volume on site within the proposed underground storage chamber. Water quality is met through the proposed underground storage chamber before discharging off site. The required water quality storage is 0.06 acre-feet which the proposed project is providing 0.09 acre-feet with the weir elevation being at 15.34'. The weir elevation is at 15.34' to capture the water quality volume and the difference of the post vs. pre 10-year 1-day storm event. The runoff that occurs in post condition is being diverted to the same drainage system as the pre-condition on W. Atlantic Ave. The proposed finished floor elevation (15.52') is below the 9.74-acre basin post 100-year 3 day storm elevation (15.27'). Lastly, with the difference of the 10-year 1-day storm event being captured in the proposed underground storage chamber and routed to the same drainage system as pre-condition, the proposed development will not negatively impact the existing site and infrastructure.

<b><u>Pre vs. Post 10-Yr 24-Hr Storm</u></b>		
	<b>Volume (Ac-Ft)</b>	<b>Stage</b>
<b>Pre</b>	0.27	16.58
<b>Post</b>	0.30	15.13

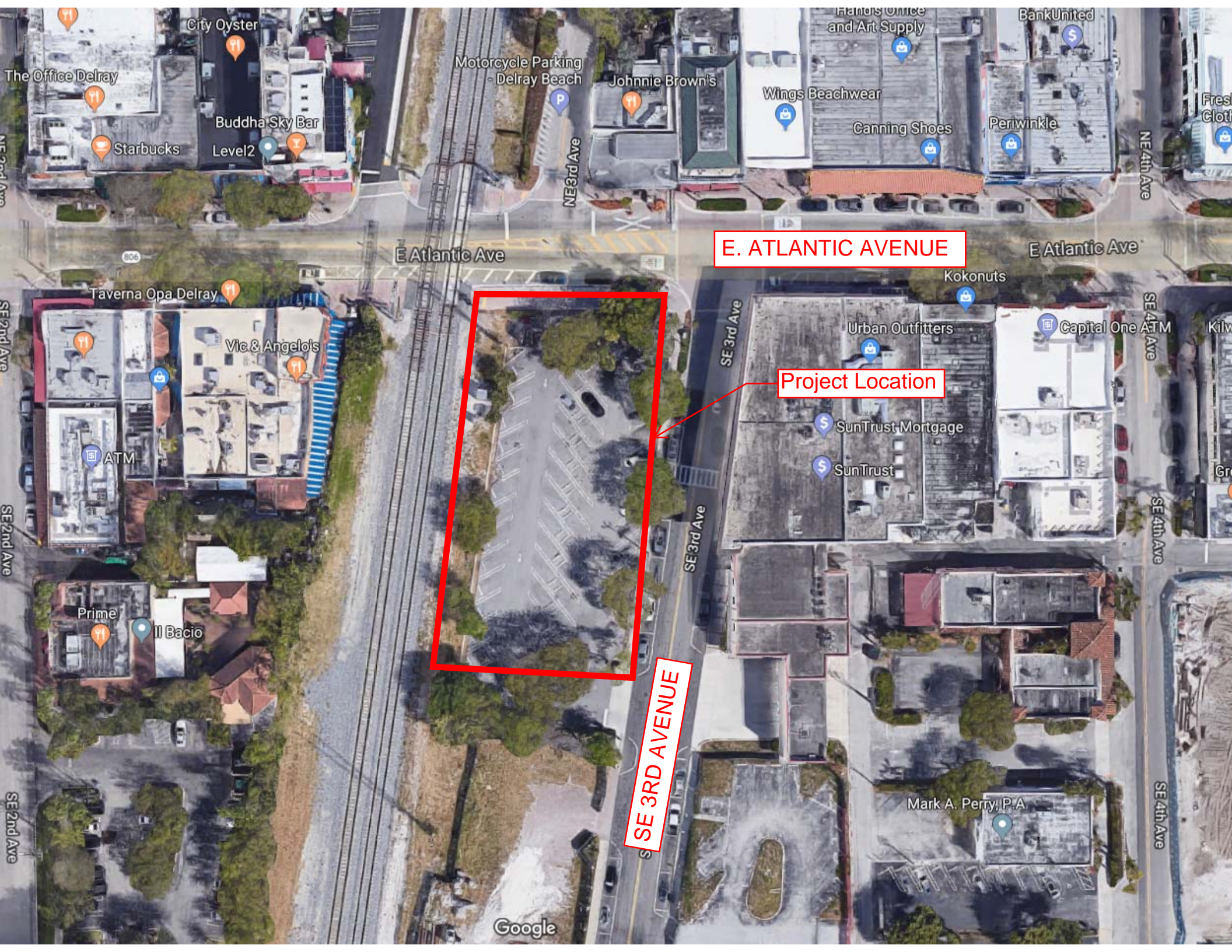
<b><u>Basin Pre vs. Post 100-Yr 72-Hr Storm</u></b>			
	<b>Pre</b>	<b>Post</b>	<b>Prop. FFE</b>
<b>Stage (Ft)</b>	15.28	15.27	15.52

<b><u>Water Quality (WQ) Requirements</u></b>			
<b>Required (Ac-FT)</b>	<b>Stage at Required WQ (Ft)</b>	<b>Provided (Ac-FT)</b>	<b>Stage at Provided WQ (Ft)</b>
0.06	14.00	0.09	15.34

## **Section 3**

### Location Map





E. ATLANTIC AVENUE

Project Location

SE 3RD AVENUE



## **Section 4**

### Post-Development Drainage Calculations



## Storm Water Management Calculations - Onsite

<b>SITE DATA</b>		
Total Site Area ( $A_T$ )=	0.43 Acres	100%
Total Building Area ( $A_B$ )=	0.36 Acres	84%
Total Canopy Area ( $A_C$ )=	0.00 Acres	0%
Total Pavement/Sidewalk Area =	0.05 Acres	12%
Total Landscape Area ( $A_P$ )=	0.02 Acres	5%
<b>SOIL STORAGE CALCULATIONS</b>		
Average Pervious Elevation =	16.7 Ft. +/-	NAVD
Seasonal High Water Table =	5.00 Ft.	NAVD
Depth to water table=	11.70 Ft.	
Soil Storage Type	Coastal	
From SFWMD Manual for to W.T. (Comp S) =	8.18 In.	
Compute overall soilstorage for site.=	0.37 In.	
$S = (\text{Comp S}) \times [A_P / A_T];$		
Compute CN value for site=	96	
$CN = 1000 / (S + 10)$		
<b>COMPUTE 100-Year, 72-Hour Runoff Volume for Proposed Site</b>		
Rainfall ( $P_{100-72}$ ),	18.40 In.	
$Q_{100-72} = (P_{100-72} - 0.2S^2) / (P_{100-72} + 0.8S) =$	17.96 In.	
Compute volume generated by storm		
$V = (P_{100-72} / 12) \times A_T =$		0.65 Ac.-Ft.
<b>COMPUTE 25-Year, 72-Hour Runoff Volume for Proposed Site</b>		
Rainfall ( $P_{25-72}$ ),	13.40 In.	
$Q_{25-72} = (P_{25-72} - 0.2S^2) / (P_{25-72} + 0.8S) =$	12.96 In.	
Compute volume generated by storm		
$V = (P_{25-72} / 12) \times A_T =$		0.47 Ac.-Ft.
<b>COMPUTE 10-Year, 24-Day Runoff Volume for Proposed Site</b>		
Rainfall ( $P_{10-24}$ ),	8.87 In.	
$Q_{10-24} = (P_{10-24} - 0.2S^2) / (P_{10-24} + 0.8S) =$	8.44 In.	
Compute volume generated by storm		
$V = (P_{10-24} / 12) \times A_T =$		0.31 Ac.-Ft.
<b>DESIGN CRITERIA</b>		
Broward County 100-Year Flood Elevation	6.50 Ft.	NAVD



## Water Quality Calculations - Onsite

### SITE DATA

Total Site Area ( $A_T$ )=	0.43 Acres	(100%)
Total Building/Canopy ( $A_B$ )=	0.36 Acres	(84%)
Total Pavement/Sidewalk + Building ( $A_L$ )=	0.05 Acres	(12%)
Total Green ( $A_P$ )=	0.02 Acres	(5%)

### Compute Water Quality Requirements

-Compute first inch of runoff over entire site

$$\begin{aligned}WQ_1 &= 1 \text{ Inch} \times A_T \times (1 \text{ Ft./12 In.}) \\&= 1/12 \times 0.43 \text{ Acres} \\&= 0.04 \text{ Ac.-Ft.} \quad \text{or} = 0.43 \text{ Ac.-In.}\end{aligned}$$

-Compute 2.5" x % of Imperviousness

A) Calculate site area for W.Q. Imperviousness

$$\begin{aligned}A_S &= A_T - (A_B + A_L) \\&= 0.43 - (0.36 + 0) \\&= 0.07 \text{ Acres}\end{aligned}$$

B) Calculate Imperviousness Area for W.Q.

$$\begin{aligned}A_{IMP} &= A_S - A_P \\&= 0.07 - 0.02 \\&= 0.05 \text{ Acres}\end{aligned}$$

C) Calculate percent imperviousness

$$\begin{aligned}\%_{IMP} &= (A_{IMP} / A_S) \times 100 \\&= (0.05 / 0.07) \times 100 \\&= 71\%\end{aligned}$$

D) Calculate 2.5 inches times the percent imperviousness

$$\begin{aligned}V_{2.5} &= 2.5 \text{ in.} \times \%_{IMP} \\&= 2.5 \text{ in.} \times 0.71 \\&= 1.78 \text{ In.}\end{aligned}$$

E) Calculate W.Q. volume required

$$\begin{aligned}WQ_{2.5} &= V_{2.5} \times (A_T - A_L) \\&= 1.78 \times (0.43 - 0) \\&= 0.06 \text{ Ac.-Ft.} \quad \text{or} = 0.72 \text{ Ac.-In.}\end{aligned}$$

-Determine W.Q. required for site

$$WQ = 0.06 \text{ Ac.-Ft.} \quad \text{or} = 0.72 \text{ Ac.-In.}$$

Since the 0.72 ac-in is greater than the 0.48 ac-in computed for 2.5 Inches times percent imperviousness the volume of 0.72 ac-in controls.



**BOHLER**  
ENGINEERING

Date: 11/21/2019  
Project: Pierre Delray Phase 2  
Project No: FLB190004

Calculated By: LJJ  
Checked By: ARS

**Post Stage-Storage Computations Onsite**

Basin	Landscape (Site)	Parking/Drive Isles	Hardscape	Building	UG Vaults	Total Area (Ac.)
Land Type	Pervious	Impervious	Impervious	Impervious		
Area (Acres)	0.02	0.05	0.00	0.36		0.43
Storage Type	Sloped	Sloped	Sloped	Flat		
Start (Ft.)	15.52	15.52	0.00	15.52		
End (Ft.)	16.70	15.52	0.00	15.52		
Stage (Ft.)	Storage (Ac-Ft)	Storage (Ac-Ft)	Storage (Ac-Ft)	Storage (Ac-Ft)	Storage (Ac-Ft)	Total Storage (Ac-Ft)
10.00	0.00	0.00	0.00	0.00		0.00
10.50	0.00	0.00	0.00	0.00		0.00
11.00	0.00	0.00	0.00	0.00		0.00
11.50	0.00	0.00	0.00	0.00		0.00
12.00	0.00	0.00	0.00	0.00		0.00
12.50	0.00	0.00	0.00	0.00	0.01	0.01
13.00	0.00	0.00	0.00	0.00	0.03	0.03
13.50	0.00	0.00	0.00	0.00	0.04	0.04
14.00	0.00	0.00	0.00	0.00	0.06	0.06
14.50	0.00	0.00	0.00	0.00	0.07	0.07
15.00	0.00	0.00	0.00	0.00	0.08	0.08
15.50	0.00	0.00	0.00	0.00	0.09	0.09
16.00	0.00	0.02	0.00	0.17	0.09	0.29
16.50	0.01	0.05	0.00	0.36	0.09	0.50
17.00	0.02	0.08	0.00	0.54	0.09	0.72
17.50	0.03	0.10	0.00	0.72	0.09	0.94
18.00	0.04	0.13	0.00	0.90	0.09	1.15

10-Year, 24-Hour	
Stage (Ft., NAVD)	Storage (Ac.-Ft.)
Volume Generated By Storm (Ac.-Ft.)	0.31

# **Appendix A**

## SFWMD Rainfall Map

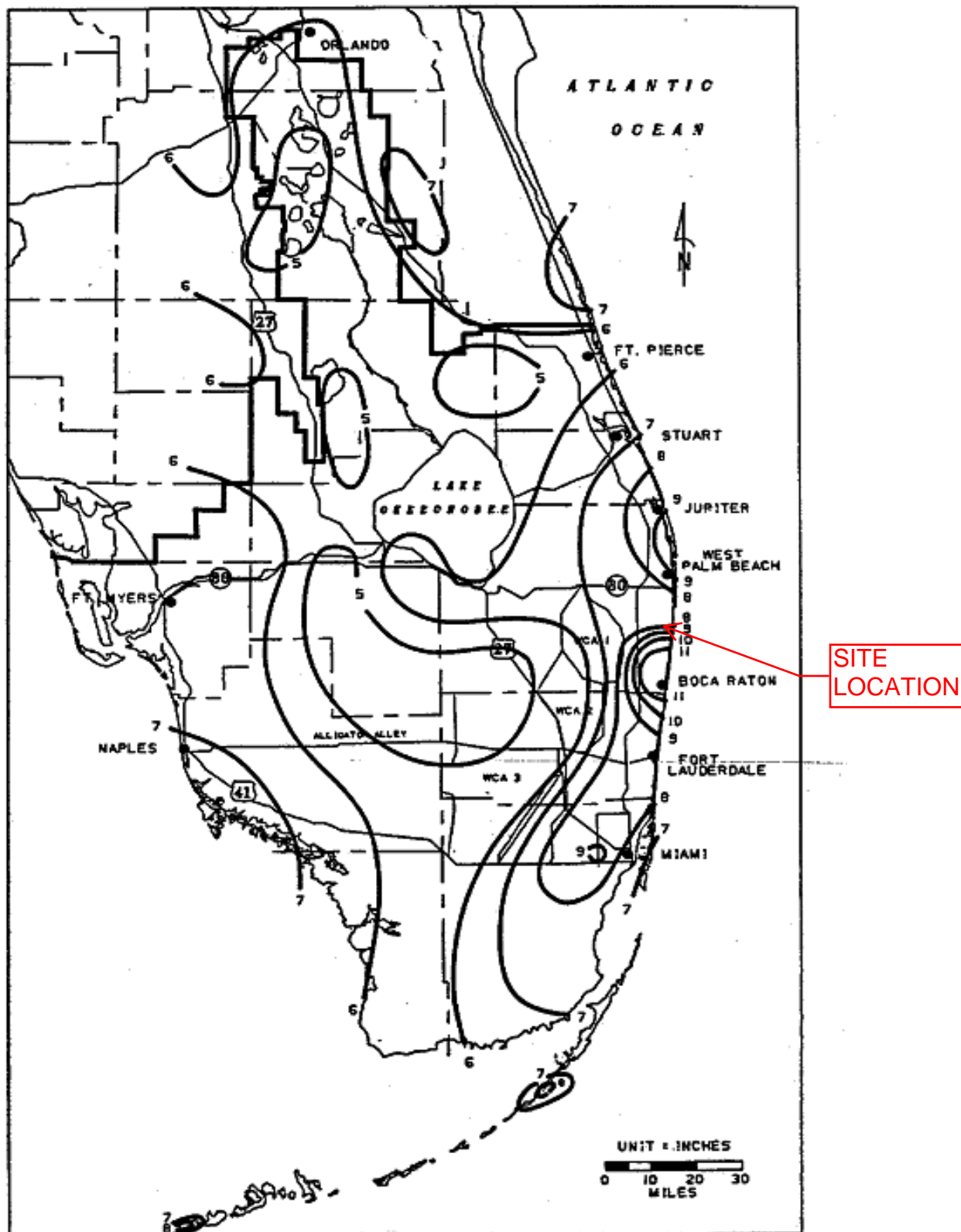


FIGURE C-4. 1-DAY RAINFALL: 10-YEAR RETURN PERIOD

## **Appendix B**

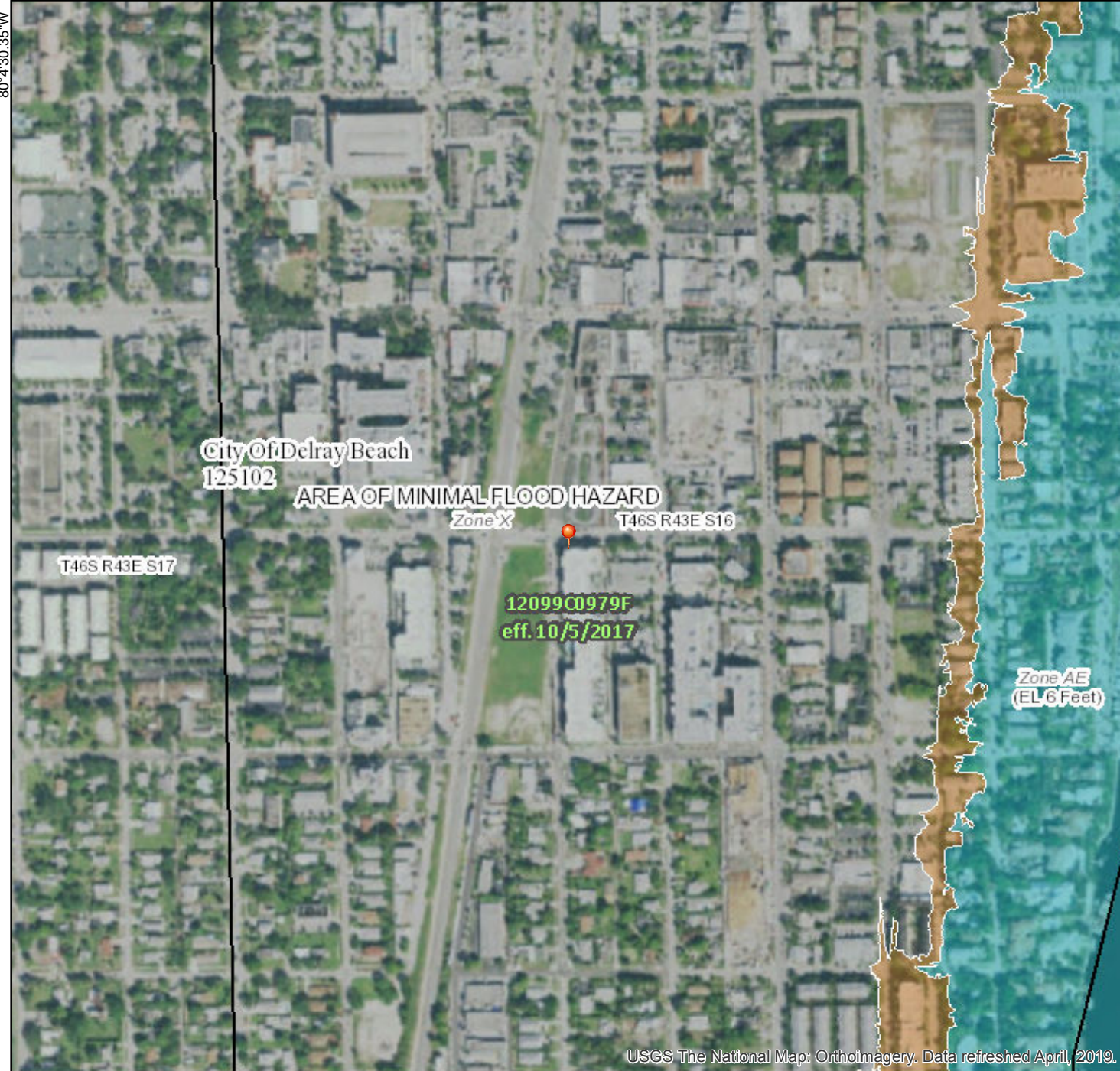
FEMA Flood Insurance Map



# National Flood Hazard Layer FIRMette



26°27'51.48"N



USGS The National Map: Orthoimagery. Data refreshed April, 2019. 1:6,000

## 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
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		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

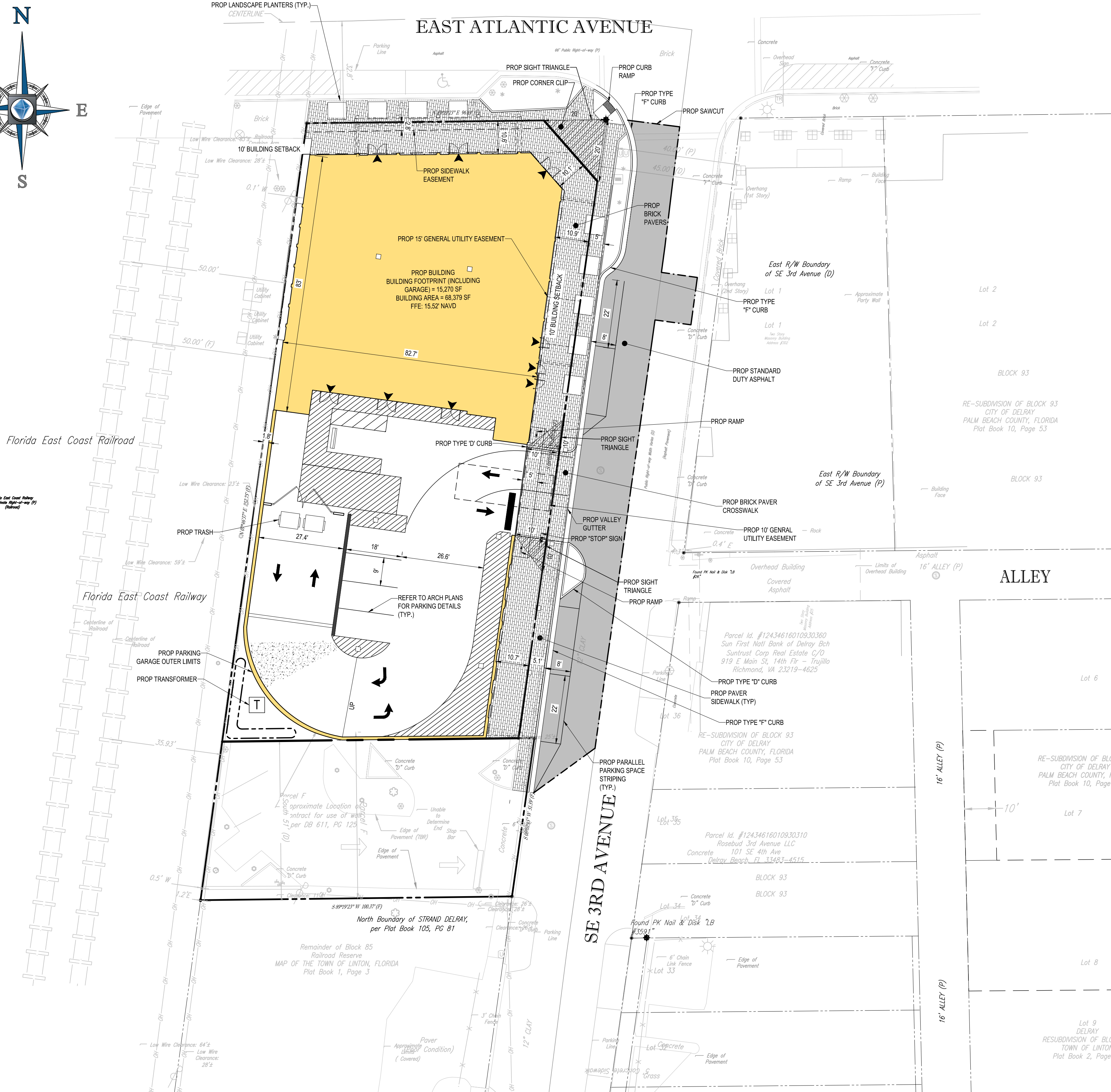
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **7/16/2019 at 8:58:00 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded 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**

## Site Plan





1. ALL HANDICAPPED PARKING SPACES AND ACCESS AISLES ADJACENT TO THE HANDICAP PARKING SPACES SHALL HAVE A MAXIMUM OF 2% SLOPE IN ALL DIRECTIONS WITHIN THE HANDICAP PARKING SPACE.
2. SLOPES EXCEEDING 5% BUT LESS THAN 8% WILL REQUIRE A RAMP AND MUST CONFORM TO THE REQUIREMENTS FOR RAMP DESIGN (HANDRAILS, CURBS, LANDINGS). NO RAMP SHALL EXCEED AN 8% RUNNING SLOPE OR 2% CROSS SLOPE.
3. IN THE CASE THAT A NEW SIDEWALK WILL BE CONSTRUCTED IN THE RW OF A SITE THE RUNNING SLOPE OF THE SIDEWALK SHALL NOT EXCEED 5% AND THE CROSS SLOPE SHALL NOT EXCEED 2%. THIS STANDARD APPLIES TO CROSS WALKS IN THE DRIVEWAY AS WELL AND WILL REQUIRE SPECIAL ATTENTION DURING STAKING TO MAKE SURE THE 2% CROSS SLOPE IS MET IN THE CROSS WALK.
4. IT WILL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO ENSURE THAT THE HANDICAP PARKING SPACES, ACCESSIBLE ROUTES, AND SIDEWALKS/CROSSWALKS ARE CONSTRUCTED TO MEET ADA REQUIREMENTS.
5. ANY REQUIREMENTS LISTED ABOVE THAT CAN NOT BE MET SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY. ANYTHING NOT BUILT TO THE ABOVE STANDARDS WILL REQUIRE REMOVAL AND REPLACEMENT AT THE GENERAL CONTRACTOR'S EXPENSE.
6. ALL CONSTRUCTION TO COMPLY WITH THE AMERICANS WITH DISABILITIES ACT AND THE FLORIDA ACCESSIBILITY CODE.

	EX LEASE LINE
	EX ADJACENT BOUNDARY LINES
	EX EASEMENT LINES
	PROP BUILDING SETBACK
	PROP TYPE "F" CURB
	PROP TYPE "D" CURB
	PROP STANDARD ASPHALT
	PROP CONCRETE
	PROP BRICK PAVERS
	PROP SITE TRIANGLE

SITE DATA TABLE		
JURISDICTION	CITY OF DELRAY BEACH	
OVERLAY DISTRICT	CENTRAL BUSINESS DISTRICT (CBD)	
FUTURE LAND USE	COMMUNITY FACILITIES (CF)	
PROPOSED FUTURE LAND USE	COMMERCIAL CORE (CC)	
SITE AREA	18,880 SF (0.43 AC)	
BUILDING AREA	LEVEL 1 GROSS BUILDING AREA (UNDER A/C): 6,189 SF PARKING: 8,470 SF PAVED: 3,013 SF SHAFT: 611 SF	
	LEVEL 2 GROSS BUILDING AREA (UNDER A/C): 7,571 SF PARKING: 9,554 SF SHAFT: 612 SF	
	LEVEL 3 GROSS BUILDING AREA (UNDER A/C): 6,266 SF PARKING: 9,353 SF SHAFT: 612 SF	
	LEVEL 4 PARKING: 15,608 SF SHAFT: 521 SF TOTAL: 68,379 SF	
	CURRENT ZONING	COMMUNITY FACILITIES (CF)
	PROPOSED USE	CENTRAL BUSINESS DISTRICT (CBD)
	MAX. ALLOWED BUILDING HEIGHT	38' (3 STORIES)
	PROVIDED BUILDING HEIGHT	48'
	FRONT SETBACK	10' MIN 15' MAX
	SIDE SETBACK	0'
REAR SETBACK	10'	
REQUIRED PARKING	LEVEL 1 RETAIL: 10.58 SPACES (1 SPACE/500 SF)	
	LEVEL 2 OFFICE: 13.06 SPACES (1 SPACE/500 SF)	
PROVIDED PARKING	LEVEL 3 OFFICE: 10.51 SPACES (1 SPACE/500 SF) TOTAL: 34.15 SPACES REQUIRED	
	LEVEL 1 4 FULL PARKING SPACES 1 ADA PARKING SPACE	
	LEVEL 2 7 COMPACT PARKING SPACES 4 FULL PARKING SPACES 2 ADA PARKING SPACES	
	LEVEL 3 7 COMPACT PARKING SPACES 4 FULL PARKING SPACES 2 ADA PARKING SPACES	
	LEVEL 4 4 COMPACT PARKING SPACES 27 FULL PARKING SPACES TOTAL: 82 SPACES PROVIDED	
	REQUIRED BICYCLE PARKING	PROFESSIONAL OFFICE: 7.47 SPACES (1 SPACE/2,000 SF)  RETAIL/RESTAURANT/COMMERCIAL: 6.76 SPACES (1 SPACE/1,000 SF)
	PROVIDED BICYCLE PARKING	20 SPACES
	LOT COVERAGE	CIVIC SPACE: 0.0 SF (0%) (OPEN) LANDSCAPE AREA: 507 SF (3.16%) TOTAL FLOOR AREA: 6,800 SF (36.07%) PARKING & PAVED AREA: 11,483 SF (60.82%) GROUND FLOOR AREA: 15,270 SF (80.88%) TOTAL LOT AREA: 16,880.02 SF (100%)
		FEMA FLOOD ZONE

1. ALL DIMENSIONS SHOWN ARE SHOWN AT FACE OF CURB, UNLESS OTHERWISE NOTED. BIC INDICATES DIMENSION IS TO BACK OF CURB. NAVD = NGVD - 1.5'
2. ALL SIGNS SHALL BE REMOVED PRIOR TO A SEPARATE PERMIT.
3. THE PROPERTY SHOWN HEREON APPEARS TO LIE IN FLOOD ZONE "C" ACCORDING TO THE FLOOD INSURANCE RATE MAP, PANEL NUMBER 12099C079F, OCTOBER 5, 2017 FOR PALM BEACH COUNTY, FLORIDA.
4. PAVEMENT MAINTENANCE AND PARKING STRIPS, SHALL BE "DRY LAY" THERMOPLASTIC 60 MILS IN THICKNESS.
5. SOD TO BE INSTALLED AT THE BACK OF ALL CURBS, PAVEMENT EDGES, SWALES AND DETENTION AREAS ON ALL AREAS SOUTH OF THE MAIN BUILDING AND HANGARS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITIES. THE PROJECT SHALL BE BROUGHT TO GRADE, SEEDED AND ALL DEBRIS AND MATERIALS SHALL BE HAULED OFF-SITE AND DUMPED AT A STATE OF FLORIDA LICENSED FACILITY.
7. CONTRACTOR SHALL BE RESPONSIBLE THAT ALL ACCESSIBLE ROUTES MEET THE FLORIDA ACCESSIBILITY CODE PRIOR TO INSTALLING FINAL PAVEMENT AND CONCRETE.
8. CONSTRUCTION PLAN APPROVAL DOES NOT EXEMPT THE CONTRACTOR FROM OBTAINING THE REQUIRED BUILDING, ELECTRICAL, PLUMBING AND MECHANICAL PERMITS. THESE INCLUDE BUT ARE NOT LIMITED TO ANY STRUCTURE, SIGN, WALL, ENCLOSURE OR SCREENING, ETC.
9. ALL SIGNS WILL BE REMOVED PRIOR TO A SEPARATE PERMIT.
10. ALL CONSTRUCTION AND RESTORATION WORK WITHIN BROWARD COUNTY RIGHT OF WAY SHALL COMPLY WITH THE LATEST EDITION OF FOOT DESIGN STANDARDS AND THE FOOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
11. THE SHIFTS SHALL BE 0700-1900 HOURS, 7 DAYS A WEEK, 50 HOURS PER WEEK. ALL SHALL CONFORM TO THE CITY OF DELRAY BEACH STANDARD DETAILS, LID 1.1 & LID 1.2

[illegible]

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

**811**

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ISSUED FOR MUNICIPAL &  
AGENCY REVIEW & APPROVAL

PROJECT No.:	FLB190004
DRAWN BY:	LJL
CHECKED BY:	AS
DATE:	03/16/2020
CAD I.D.:	FLB190004-SSP-0

PROJECT:

PIERRE DELRAY PHASE 2 -  
SPRAB SITE PLAN PACKAGE  
(AKA NEW MXU BUILDING)

\_\_\_\_\_ FOR \_\_\_\_\_

**ZYSCOVICH**  
ARCHITECTS

PROPOSED  
DEVELOPMENT  
SWC SE 3RD AVE. & ATLANTIC AVE.  
PALM BEACH COUNTY  
DELRAY BEACH, FL

 **BOHLER**  
ENGINEERING

---

**2255 GLADES ROAD, SUITE 305E  
BOCA RATON, FLORIDA 33431**

Phone: (561) 571-0280  
Fax: (561) 571-0281

FLORIDA BUSINESS CERT. OF AUTH. NO. 30780  
LANDSCAPE ARCHITECT BUSINESS LIC. NO. LC26000551

A circular professional engineer seal for the State of Florida. The outer ring contains the text "ANDREW RONALD SAVAGE" at the top and "PROFESSIONAL ENGINEER" at the bottom, separated by two stars. Inside this ring, the word "LICENSE" is at the top and "STATE OF FLORIDA" is at the bottom, also separated by two stars. In the center of the seal is the license number "No. 82408".

SHEET TITLE:	
SITE PLAN	
SHEET NUMBER:	
C-301	
REVISION 0 - 03/16/2020	



## **Appendix D**

### ADS StormTech Underground Chamber Plan

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	EPM NAME EPM NUMBER EPM EMAIL
ADS SALES REP	SALES NAME SALES NUMBER SALES EMAIL
PROJECT NO.	



ADVANCED DRAINAGE SYSTEMS, INC.

# PIERRE DELRAY SITE 2

## DELRAY BEACH, FL

**SiteASSIST™**  
by StormTech  
FOR STORMTECH  
INSTRUCTIONS,  
DOWNLOAD THE  
INSTALLATION APP



### SC-740 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH SC-740.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

- STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

### NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
- FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

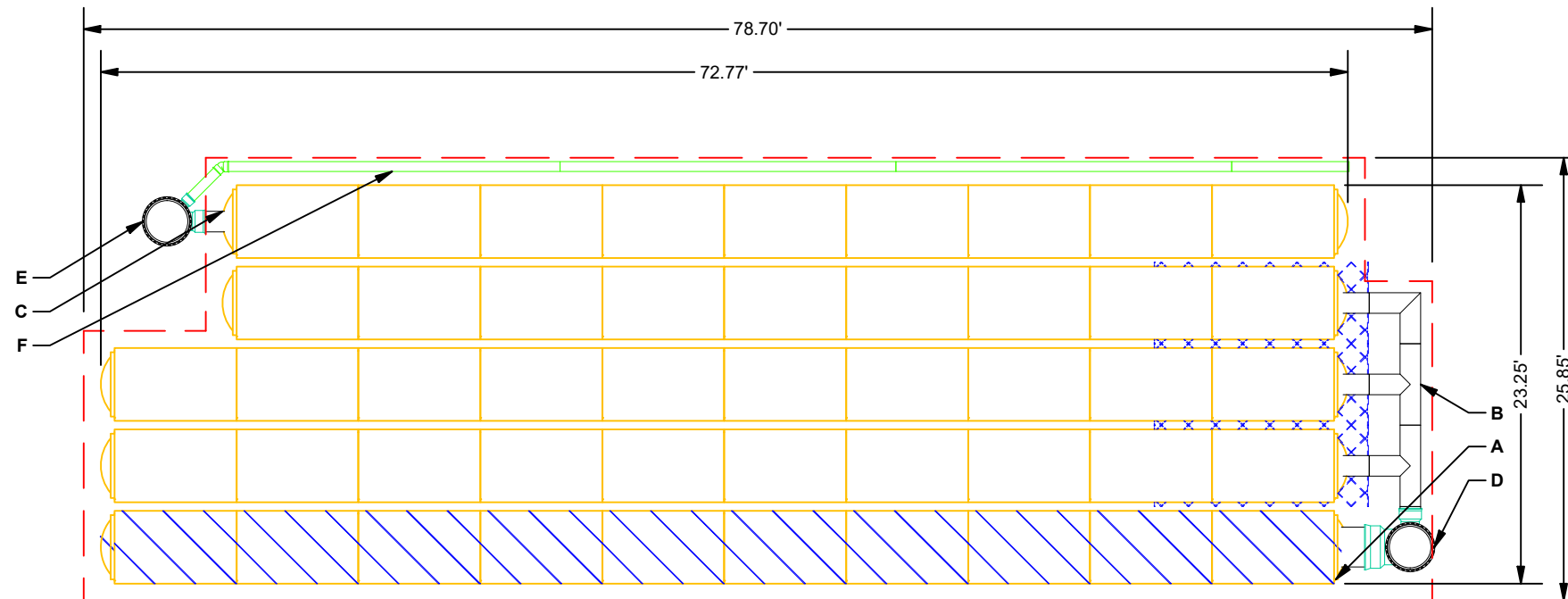
**USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.**



CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

STORMTECH SC-740 CHAMBERS  
STORMTECH SC-740 END CAPS  
STONE ABOVE (in)  
STONE BELOW (in)  
% STONE VOID  
INSTALLED SYSTEM VOLUME (CF)  
(PERIMETER STONE INCLUDED)  
(COVER STONE INCLUDED)  
(BASE STONE INCLUDED)  
SYSTEM AREA (SF)  
SYSTEM PERIMETER (ft)

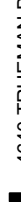

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):  
 MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):  
 MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):  
 MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):  
 MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):  
 TOP OF STONE:  
 TOP OF SC-740 CHAMBER:  
 12" x 12" TOP MANIFOLD INVERT:  
 12" BOTTOM CONNECTION INVERT:  
 24" ISOLATOR ROW INVERT:  
 BOTTOM OF SC-740 CHAMBER:  
 UNDERDRAIN INVERT:  
 BOTTOM OF STONE:

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	24" BOTTOM PREFABRICATED END CAP/TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS	0.10"	
MANIFOLD	B	12" X 12" TOP, ADS N-12	12.50"	
PIPE CONNECTION	C	12" BOTTOM CONNECTION	1.20"	
NYLOPLAST (INLET W/ ISO ROW)	D	30" DIAMETER (24" SUMP MIN)		5.7 CFS IN
NYLOPLAST (OUTLET)	E	30" DIAMETER (DESIGN BY ENGINEER)		2.0 CFS OUT
UNDERDRAIN	F	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



-  ISOLATOR ROW  
(SEE DETAIL)
-  PLACE MINIMUM 12.50' OF ADS GEOSYNTHETICS 315WTK WOVEN  
GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER  
FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS
-  — — — BED LIMITS

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH SHEET #7 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- NOT FOR CONSTRUCTION

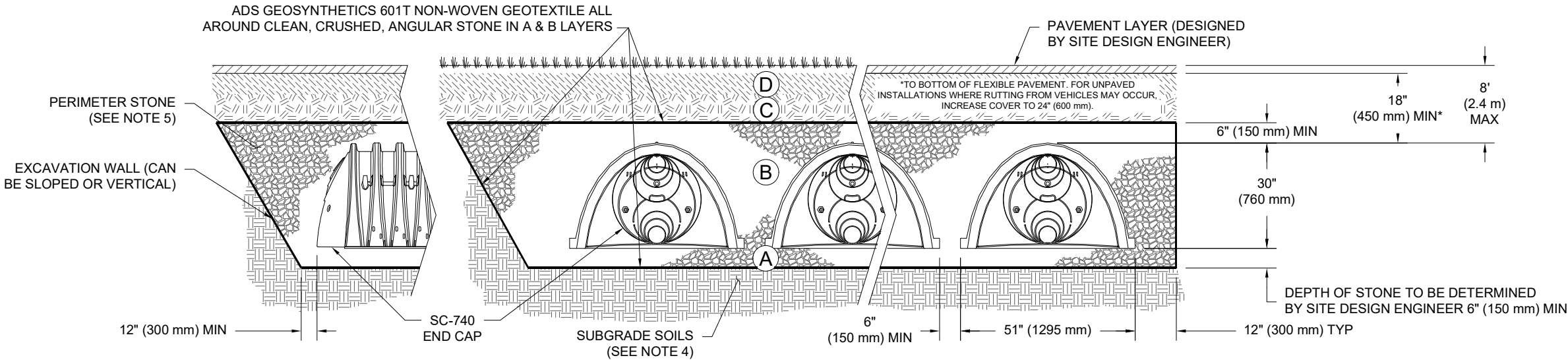
<div><div>4DS</div><div>ADVANCED DRAINAGE SYSTEMS, INC.</div></div> <div>4640 TRUEMAN BLVD HILLIARD, OH 43026 1-800-733-7473</div>	<div><div>StormTech<sup>®</sup></div><div>Detention - Retention - Water Quality</div></div> <div>70 INWOOD ROAD, SUITE 3   ROCKY HILL   CT   06067 860-529-8188   888-892-2694   WWW.STORMTECH.COM</div>				REV	DRW	CHK	DESCRIPTION	PIERRE DELRAY SITE 2 DELRAY BEACH, FL
						DATE:	DRAWN: LL		
						PROJECT #:	CHECKED: N/A		
	SHEET								
2 OF 6									

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ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	<b>FINAL FILL:</b> FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	<b>INITIAL FILL:</b> FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE.  MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 <sup>1</sup> A-1, A-2-4, A-3  OR  AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	<b>EMBEDMENT STONE:</b> FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	<b>FOUNDATION STONE:</b> FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. <sup>2,3</sup>

- PLEASE NOTE:
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
  - STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
  - WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
  - ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

PIERRE DELRAY SITE 2  
DELRAY BEACH, FL

DESCRIPTION

CHK

DRW

REV

DATE:

DRAWN: LL

CHECKED: N/A

PROJECT #:

StormTech®  
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HILLIARD, OH 43026  
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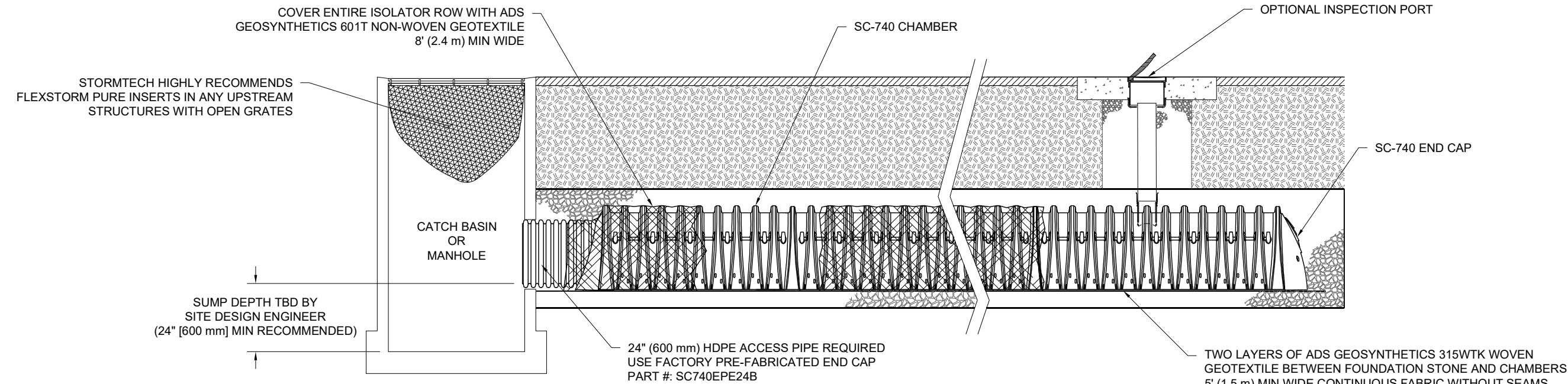
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ADVANCED DRAINAGE SYSTEMS, INC.

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SHEET

3 OF 6



SC-740 ISOLATOR ROW DETAIL  
NTS

INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
    - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
    - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
    - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
    - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
    - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
  - B. ALL ISOLATOR ROWS
    - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
    - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
      - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
      - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
    - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
  - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
  - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



4640 TRUEMAN BLVD  
HILLIARD, OH 43026  
1-800-733-7473

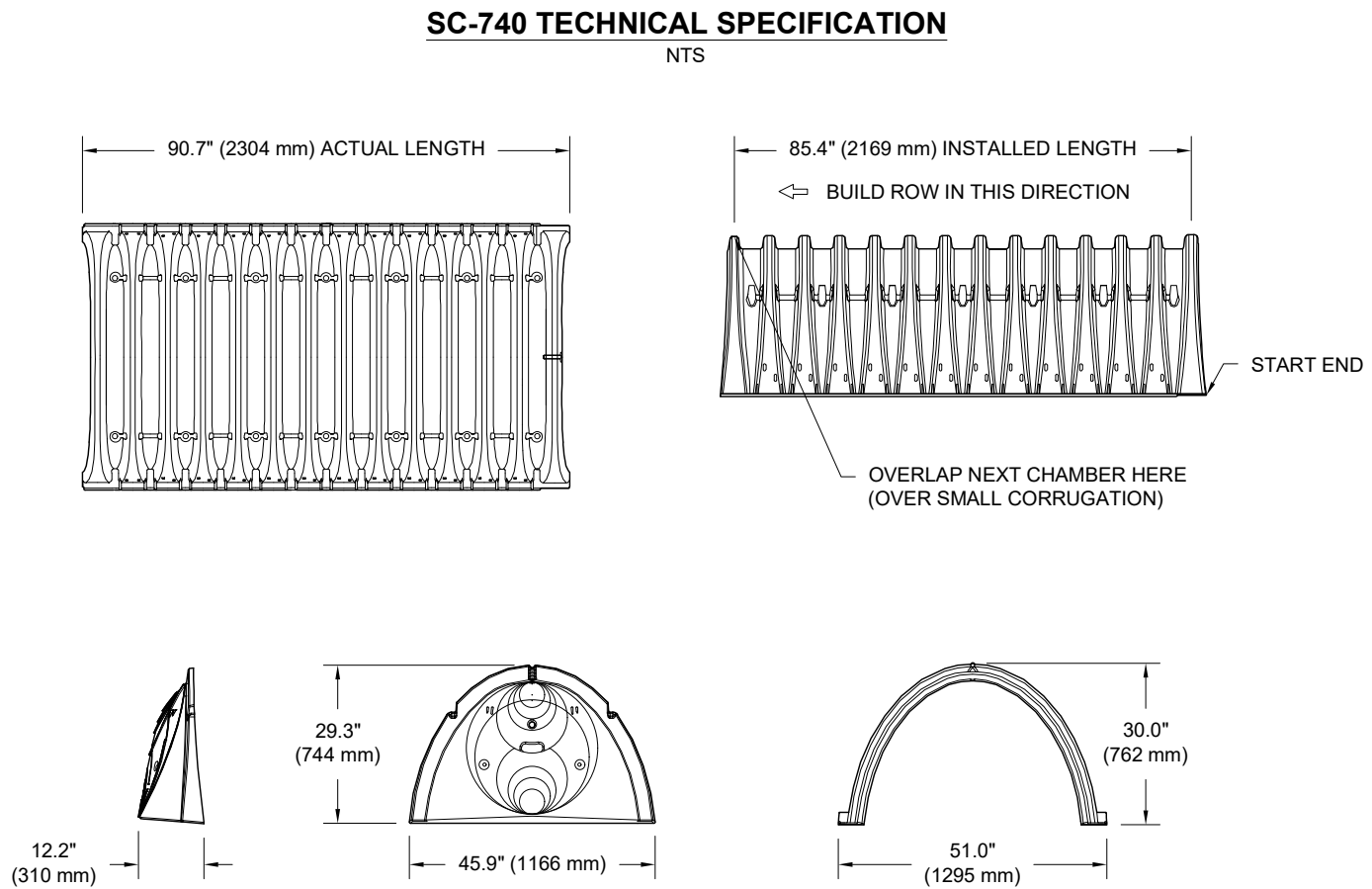
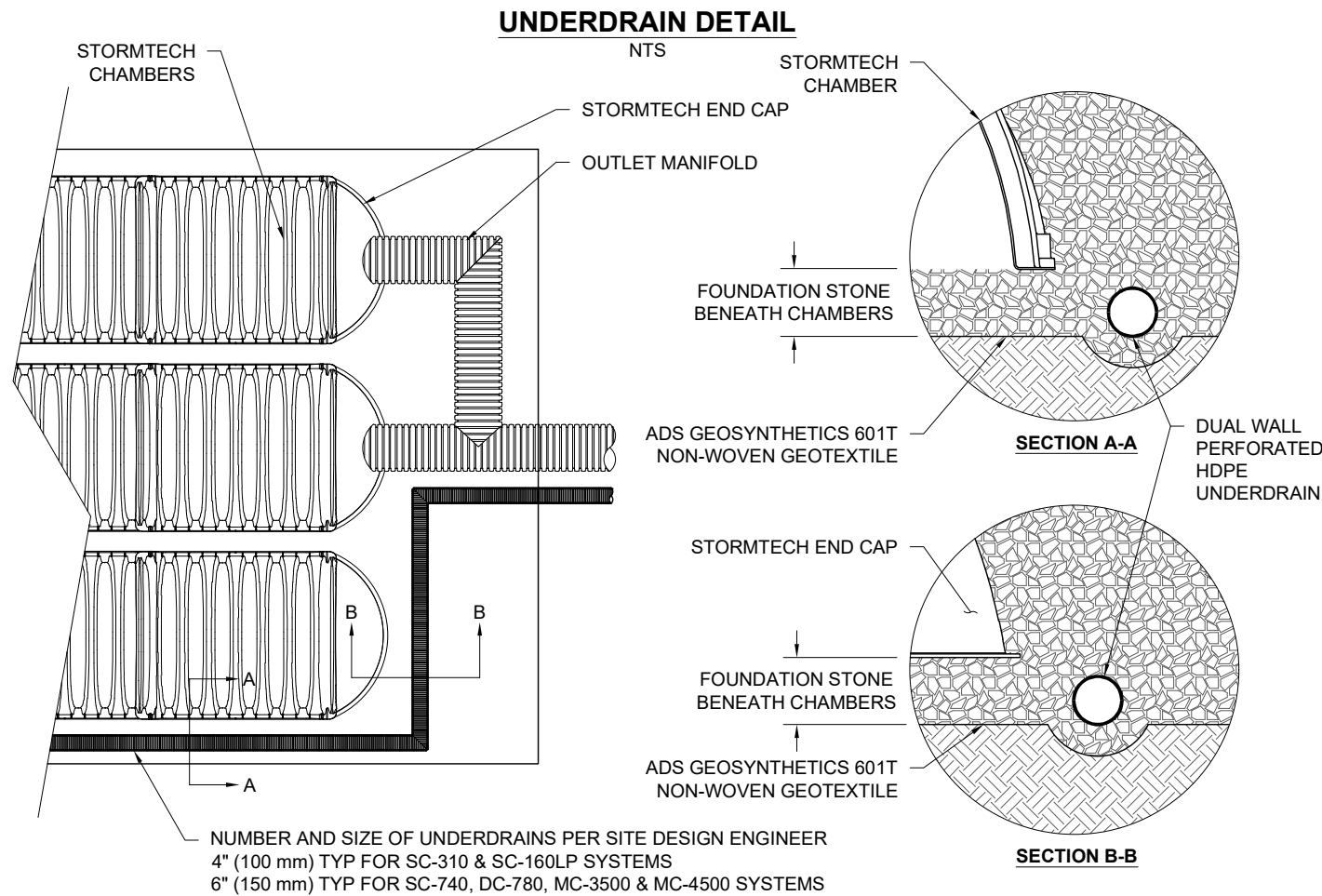
**ADS**  
ADVANCED DRAINAGE SYSTEMS, INC.

PIERRE DELRAY SITE 2		DATE:	DRAWN: LL	CHECKED: N/A
DELRAY BEACH, FL				
PROJECT #:				

REV	DRW	CHK	DESCRIPTION

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NOMINAL CHAMBER SPECIFICATIONS			
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)	
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)	
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)	
WEIGHT	75.0 lbs.	(33.6 kg)	

\*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"  
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

\* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

PIERRE DELRAY SITE 2  
DELRAY BEACH, FL

DESCRIPTION

DRW

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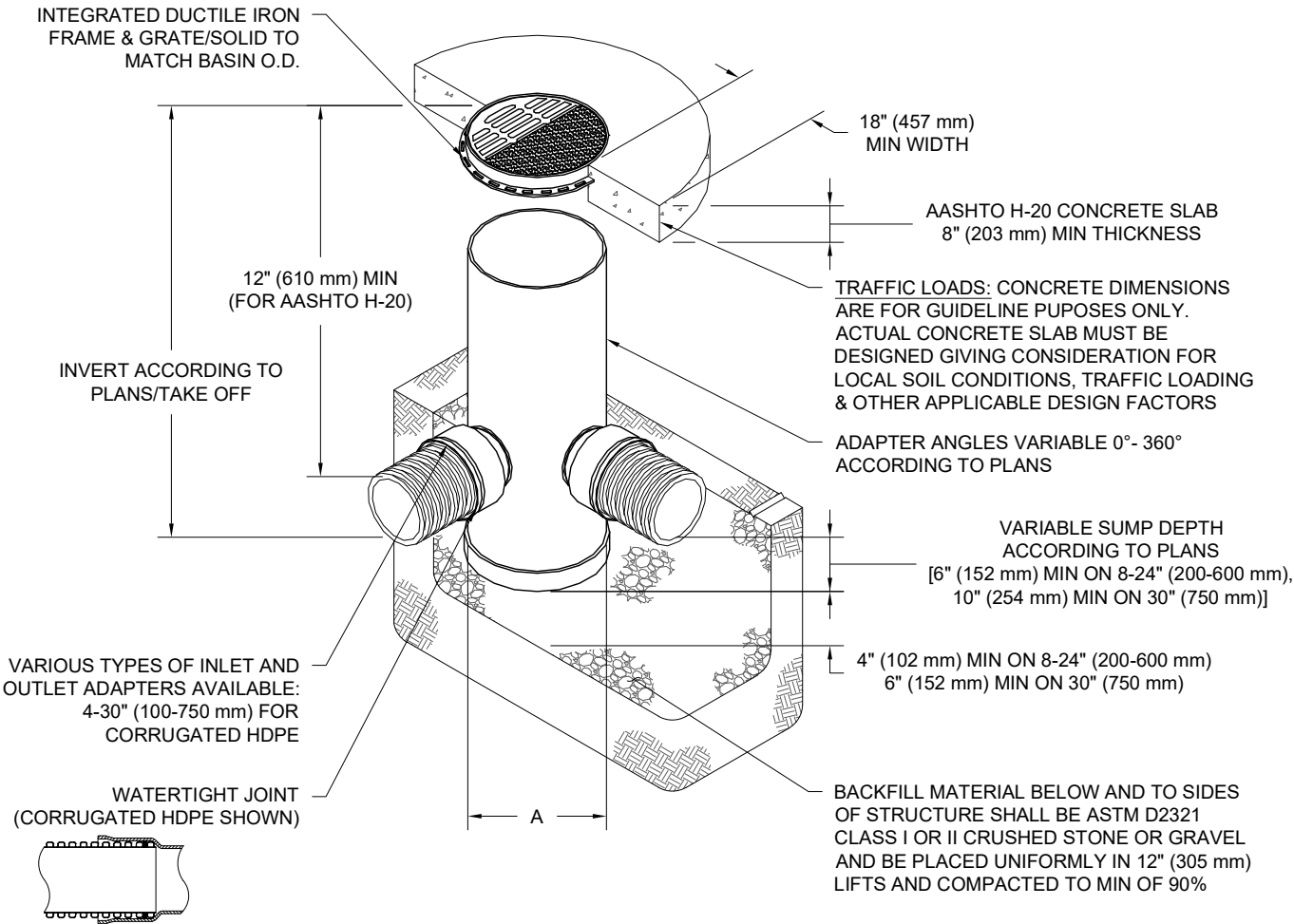
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SHEET  
5 OF 6

NYLOPLAST DRAIN BASIN

NTS



NOTES

- 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
- DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
- FOR COMPLETE DESIGN AND PRODUCT INFORMATION: [WWW.NYLOPLAST-US.COM](http://WWW.NYLOPLAST-US.COM)
- TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

PIERRE DELRAY SITE 2  
DELRAY BEACH, FL

DESCRIPTION

CHK

DRW

REV

DATE:

DRAWN: LL


PROJECT #:

CHECKED: N/A

3130 VERONA AVE  
BUFORD, GA 30518  
PHN (770) 932-2443  
FAX (770) 932-2490  
[www.nyloplast-us.com](http://www.nyloplast-us.com)

  
**Nyloplast**

4640 TRUEMAN BLVD  
HILLIARD, OH 43026  
1-800-733-7473

  
**ADS**  
ADVANCED DRAINAGE SYSTEMS, INC.

SHEET  
6 OF 6

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

# **Appendix E**

## Cascade Flood Routing

Project Name: Pierre Delray Site 2

Reviewer: LJL

Project Number: FLB190004

Period Begin: Jan 01, 2000;0000 hr End: Jan 16, 2000;0000 hr Duration: 360 hr

Time Step: 0.2 hr, Iterations: 10

Basin 1: Basin 1

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 24 hr

Design Frequency: 10 year

1 Day Rainfall: 8.87 inches

Area: 0.43 acres

Ground Storage: 1.11 inches

Time of Concentration: 0.17 hours

Initial Stage: 5 ft NGVD

PRE

Stage (ft NGVD)	Storage (acre-ft)
13.00	0.00
13.50	0.00
14.00	0.00
14.50	0.00
15.00	0.00
15.50	0.01
16.00	0.09
16.50	0.24
17.00	0.45
17.50	0.67
18.00	0.89

Offsite Receiving Body: Offsitel

Time (hr)	Stage (ft NGVD)
0.00	5.00
10.00	5.00
9999.00	5.00

## STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
=====	=====	=====	=====	=====

## BASIN MAXIMUM AND MINIMUM STAGES

Basin	Max (ft)	Time (hr)	Min (ft)	Time (hr)
=====	=====	=====	=====	=====
Basin 1	16.58	25.40	5.00	0.00

## BASIN WATER BUDGETS (all units in acre-ft)

Basin	Total Runoff	Structure Inflow	Structure Outflow	Initial Storage	Final Storage	Residual
=====	=====	=====	=====	=====	=====	=====
Basin 1	0.27	0.00	0.00	0.00	0.27	0.00

Project Name: Pierre Delray Site 2

Reviewer: LJL

Project Number: FLB190004

Period Begin: Jan 01, 2000;0000 hr End: Jan 16, 2000;0000 hr Duration: 360 hr

Time Step: 0.2 hr, Iterations: 10

Basin 1: Basin 1

Method: Santa Barbara Unit Hydrograph

Rainfall Distribution: SFWMD - 24 hr

Design Frequency: 10 year

1 Day Rainfall: 8.87 inches

Area: 0.43 acres

Ground Storage: 0.37 inches

Time of Concentration: 0.17 hours

Initial Stage: 5 ft NGVD

POST

Stage (ft NGVD)	Storage (acre-ft)
-----	-----
12.52	0.01
13.02	0.03
13.52	0.04
14.02	0.06
14.52	0.07
15.02	0.08
15.52	0.09

Offsite Receiving Body: Offsitel

Time (hr)	Stage (ft NGVD)
-----	-----
0.00	5.00
10.00	5.00
9999.00	5.00

Structure: 1

From Basin: Basin 1

To Basin: Offsitel

Structure Type: Gravity

Weir: Broad Crested, Crest Elev = 15.2 ft NGVD, Length = 1.5 ft, Weir Coef = 3.28

Bleeder: Circular, Invert Elev = 12.8 ft NGVD, Diameter = 0.5 ft

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

Pipe: None

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	5.00	5.00
1.00	0.09	0.00	0.00	0.00	12.52	5.00
2.00	0.18	0.01	0.00	0.00	12.54	5.00
3.00	0.28	0.03	0.00	0.00	12.58	5.00
4.00	0.40	0.04	0.00	0.00	12.64	5.00
5.00	0.55	0.05	0.00	0.00	12.74	5.00
6.00	0.74	0.07	0.01	0.00	12.87	5.00
7.00	0.96	0.09	0.06	0.00	12.96	5.00
8.00	1.22	0.11	0.10	0.01	13.00	5.00
9.00	1.52	0.13	0.12	0.02	13.03	5.00
10.00	1.89	0.16	0.16	0.03	13.06	5.00
11.00	2.39	0.24	0.22	0.05	13.12	5.00
12.00	5.82	2.44	1.22	0.10	14.72	5.00
13.00	6.80	0.31	0.79	0.19	13.76	5.00
14.00	7.26	0.18	0.20	0.22	13.10	5.00
15.00	7.54	0.12	0.12	0.23	13.03	5.00
16.00	7.81	0.12	0.12	0.24	13.02	5.00
17.00	7.97	0.07	0.08	0.25	12.98	5.00
18.00	8.12	0.07	0.07	0.26	12.97	5.00
19.00	8.28	0.07	0.07	0.26	12.97	5.00

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)
20.00	8.44	0.07	0.07	0.27	12.97	5.00
21.00	8.55	0.05	0.05	0.27	12.95	5.00
22.00	8.66	0.05	0.05	0.28	12.94	5.00
23.00	8.76	0.05	0.05	0.28	12.94	5.00
24.00	8.87	0.05	0.05	0.29	12.94	5.00
25.00	8.87	0.00	0.02	0.29	12.89	5.00
26.00	8.87	0.00	0.01	0.29	12.86	5.00
27.00	8.87	0.00	0.01	0.29	12.85	5.00
28.00	8.87	0.00	0.00	0.29	12.84	5.00
29.00	8.87	0.00	0.00	0.29	12.83	5.00
30.00	8.87	0.00	0.00	0.29	12.83	5.00
31.00	8.87	0.00	0.00	0.29	12.82	5.00
32.00	8.87	0.00	0.00	0.29	12.82	5.00
33.00	8.87	0.00	0.00	0.29	12.82	5.00
34.00	8.87	0.00	0.00	0.29	12.82	5.00
35.00	8.87	0.00	0.00	0.29	12.82	5.00
36.00	8.87	0.00	0.00	0.29	12.81	5.00
37.00	8.87	0.00	0.00	0.29	12.81	5.00
38.00	8.87	0.00	0.00	0.29	12.81	5.00
39.00	8.87	0.00	0.00	0.29	12.81	5.00
40.00	8.87	0.00	0.00	0.29	12.81	5.00
41.00	8.87	0.00	0.00	0.29	12.81	5.00
42.00	8.87	0.00	0.00	0.29	12.81	5.00
43.00	8.87	0.00	0.00	0.29	12.81	5.00
44.00	8.87	0.00	0.00	0.29	12.81	5.00
45.00	8.87	0.00	0.00	0.29	12.81	5.00
46.00	8.87	0.00	0.00	0.29	12.81	5.00
47.00	8.87	0.00	0.00	0.29	12.81	5.00
48.00	8.87	0.00	0.00	0.29	12.81	5.00
49.00	8.87	0.00	0.00	0.29	12.81	5.00
50.00	8.87	0.00	0.00	0.29	12.81	5.00
51.00	8.87	0.00	0.00	0.29	12.81	5.00
52.00	8.87	0.00	0.00	0.29	12.81	5.00
53.00	8.87	0.00	0.00	0.29	12.81	5.00
54.00	8.87	0.00	0.00	0.29	12.81	5.00
55.00	8.87	0.00	0.00	0.29	12.80	5.00
56.00	8.87	0.00	0.00	0.29	12.80	5.00
57.00	8.87	0.00	0.00	0.29	12.80	5.00
58.00	8.87	0.00	0.00	0.29	12.80	5.00
59.00	8.87	0.00	0.00	0.29	12.80	5.00
60.00	8.87	0.00	0.00	0.29	12.80	5.00
61.00	8.87	0.00	0.00	0.29	12.80	5.00
62.00	8.87	0.00	0.00	0.29	12.80	5.00
63.00	8.87	0.00	0.00	0.29	12.80	5.00
64.00	8.87	0.00	0.00	0.29	12.80	5.00
65.00	8.87	0.00	0.00	0.29	12.80	5.00
66.00	8.87	0.00	0.00	0.29	12.80	5.00
67.00	8.87	0.00	0.00	0.29	12.80	5.00
68.00	8.87	0.00	0.00	0.29	12.80	5.00
69.00	8.87	0.00	0.00	0.29	12.80	5.00
70.00	8.87	0.00	0.00	0.29	12.80	5.00
71.00	8.87	0.00	0.00	0.29	12.80	5.00
72.00	8.87	0.00	0.00	0.29	12.80	5.00
73.00	8.87	0.00	0.00	0.29	12.80	5.00
74.00	8.87	0.00	0.00	0.29	12.80	5.00
75.00	8.87	0.00	0.00	0.29	12.80	5.00
76.00	8.87	0.00	0.00	0.29	12.80	5.00
77.00	8.87	0.00	0.00	0.29	12.80	5.00
78.00	8.87	0.00	0.00	0.29	12.80	5.00
79.00	8.87	0.00	0.00	0.29	12.80	5.00
80.00	8.87	0.00	0.00	0.29	12.80	5.00
81.00	8.87	0.00	0.00	0.29	12.80	5.00
82.00	8.87	0.00	0.00	0.29	12.80	5.00
83.00	8.87	0.00	0.00	0.29	12.80	5.00
84.00	8.87	0.00	0.00	0.29	12.80	5.00
85.00	8.87	0.00	0.00	0.29	12.80	5.00
86.00	8.87	0.00	0.00	0.29	12.80	5.00
87.00	8.87	0.00	0.00	0.29	12.80	5.00
88.00	8.87	0.00	0.00	0.29	12.80	5.00
89.00	8.87	0.00	0.00	0.29	12.80	5.00

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)
90.00	8.87	0.00	0.00	0.29	12.80	5.00
91.00	8.87	0.00	0.00	0.29	12.80	5.00
92.00	8.87	0.00	0.00	0.29	12.80	5.00
93.00	8.87	0.00	0.00	0.29	12.80	5.00
94.00	8.87	0.00	0.00	0.29	12.80	5.00
95.00	8.87	0.00	0.00	0.29	12.80	5.00
96.00	8.87	0.00	0.00	0.29	12.80	5.00
97.00	8.87	0.00	0.00	0.29	12.80	5.00
98.00	8.87	0.00	0.00	0.29	12.80	5.00
99.00	8.87	0.00	0.00	0.29	12.80	5.00
100.00	8.87	0.00	0.00	0.29	12.80	5.00
101.00	8.87	0.00	0.00	0.29	12.80	5.00
102.00	8.87	0.00	0.00	0.29	12.80	5.00
103.00	8.87	0.00	0.00	0.29	12.80	5.00
104.00	8.87	0.00	0.00	0.29	12.80	5.00
105.00	8.87	0.00	0.00	0.29	12.80	5.00
106.00	8.87	0.00	0.00	0.29	12.80	5.00
107.00	8.87	0.00	0.00	0.29	12.80	5.00
108.00	8.87	0.00	0.00	0.29	12.80	5.00
109.00	8.87	0.00	0.00	0.29	12.80	5.00
110.00	8.87	0.00	0.00	0.29	12.80	5.00
111.00	8.87	0.00	0.00	0.29	12.80	5.00
112.00	8.87	0.00	0.00	0.29	12.80	5.00
113.00	8.87	0.00	0.00	0.29	12.80	5.00
114.00	8.87	0.00	0.00	0.29	12.80	5.00
115.00	8.87	0.00	0.00	0.29	12.80	5.00
116.00	8.87	0.00	0.00	0.29	12.80	5.00
117.00	8.87	0.00	0.00	0.29	12.80	5.00
118.00	8.87	0.00	0.00	0.29	12.80	5.00
119.00	8.87	0.00	0.00	0.29	12.80	5.00
120.00	8.87	0.00	0.00	0.29	12.80	5.00
121.00	8.87	0.00	0.00	0.29	12.80	5.00
122.00	8.87	0.00	0.00	0.29	12.80	5.00
123.00	8.87	0.00	0.00	0.29	12.80	5.00
124.00	8.87	0.00	0.00	0.29	12.80	5.00
125.00	8.87	0.00	0.00	0.29	12.80	5.00
126.00	8.87	0.00	0.00	0.29	12.80	5.00
127.00	8.87	0.00	0.00	0.29	12.80	5.00
128.00	8.87	0.00	0.00	0.29	12.80	5.00
129.00	8.87	0.00	0.00	0.29	12.80	5.00
130.00	8.87	0.00	0.00	0.29	12.80	5.00
131.00	8.87	0.00	0.00	0.29	12.80	5.00
132.00	8.87	0.00	0.00	0.29	12.80	5.00
133.00	8.87	0.00	0.00	0.29	12.80	5.00
134.00	8.87	0.00	0.00	0.29	12.80	5.00
135.00	8.87	0.00	0.00	0.29	12.80	5.00
136.00	8.87	0.00	0.00	0.29	12.80	5.00
137.00	8.87	0.00	0.00	0.29	12.80	5.00
138.00	8.87	0.00	0.00	0.29	12.80	5.00
139.00	8.87	0.00	0.00	0.29	12.80	5.00
140.00	8.87	0.00	0.00	0.29	12.80	5.00
141.00	8.87	0.00	0.00	0.29	12.80	5.00
142.00	8.87	0.00	0.00	0.29	12.80	5.00
143.00	8.87	0.00	0.00	0.29	12.80	5.00
144.00	8.87	0.00	0.00	0.29	12.80	5.00
145.00	8.87	0.00	0.00	0.29	12.80	5.00
146.00	8.87	0.00	0.00	0.29	12.80	5.00
147.00	8.87	0.00	0.00	0.29	12.80	5.00
148.00	8.87	0.00	0.00	0.29	12.80	5.00
149.00	8.87	0.00	0.00	0.29	12.80	5.00
150.00	8.87	0.00	0.00	0.29	12.80	5.00
151.00	8.87	0.00	0.00	0.29	12.80	5.00
152.00	8.87	0.00	0.00	0.29	12.80	5.00
153.00	8.87	0.00	0.00	0.29	12.80	5.00
154.00	8.87	0.00	0.00	0.29	12.80	5.00
155.00	8.87	0.00	0.00	0.29	12.80	5.00
156.00	8.87	0.00	0.00	0.29	12.80	5.00
157.00	8.87	0.00	0.00	0.29	12.80	5.00
158.00	8.87	0.00	0.00	0.29	12.80	5.00
159.00	8.87	0.00	0.00	0.29	12.80	5.00

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)
160.00	8.87	0.00	0.00	0.29	12.80	5.00
161.00	8.87	0.00	0.00	0.29	12.80	5.00
162.00	8.87	0.00	0.00	0.29	12.80	5.00
163.00	8.87	0.00	0.00	0.29	12.80	5.00
164.00	8.87	0.00	0.00	0.29	12.80	5.00
165.00	8.87	0.00	0.00	0.29	12.80	5.00
166.00	8.87	0.00	0.00	0.29	12.80	5.00
167.00	8.87	0.00	0.00	0.29	12.80	5.00
168.00	8.87	0.00	0.00	0.29	12.80	5.00
169.00	8.87	0.00	0.00	0.29	12.80	5.00
170.00	8.87	0.00	0.00	0.29	12.80	5.00
171.00	8.87	0.00	0.00	0.29	12.80	5.00
172.00	8.87	0.00	0.00	0.29	12.80	5.00
173.00	8.87	0.00	0.00	0.29	12.80	5.00
174.00	8.87	0.00	0.00	0.29	12.80	5.00
175.00	8.87	0.00	0.00	0.29	12.80	5.00
176.00	8.87	0.00	0.00	0.29	12.80	5.00
177.00	8.87	0.00	0.00	0.29	12.80	5.00
178.00	8.87	0.00	0.00	0.29	12.80	5.00
179.00	8.87	0.00	0.00	0.29	12.80	5.00
180.00	8.87	0.00	0.00	0.29	12.80	5.00
181.00	8.87	0.00	0.00	0.29	12.80	5.00
182.00	8.87	0.00	0.00	0.29	12.80	5.00
183.00	8.87	0.00	0.00	0.29	12.80	5.00
184.00	8.87	0.00	0.00	0.29	12.80	5.00
185.00	8.87	0.00	0.00	0.29	12.80	5.00
186.00	8.87	0.00	0.00	0.29	12.80	5.00
187.00	8.87	0.00	0.00	0.29	12.80	5.00
188.00	8.87	0.00	0.00	0.29	12.80	5.00
189.00	8.87	0.00	0.00	0.29	12.80	5.00
190.00	8.87	0.00	0.00	0.29	12.80	5.00
191.00	8.87	0.00	0.00	0.29	12.80	5.00
192.00	8.87	0.00	0.00	0.29	12.80	5.00
193.00	8.87	0.00	0.00	0.29	12.80	5.00
194.00	8.87	0.00	0.00	0.29	12.80	5.00
195.00	8.87	0.00	0.00	0.29	12.80	5.00
196.00	8.87	0.00	0.00	0.29	12.80	5.00
197.00	8.87	0.00	0.00	0.29	12.80	5.00
198.00	8.87	0.00	0.00	0.29	12.80	5.00
199.00	8.87	0.00	0.00	0.29	12.80	5.00
200.00	8.87	0.00	0.00	0.29	12.80	5.00
201.00	8.87	0.00	0.00	0.29	12.80	5.00
202.00	8.87	0.00	0.00	0.29	12.80	5.00
203.00	8.87	0.00	0.00	0.29	12.80	5.00
204.00	8.87	0.00	0.00	0.29	12.80	5.00
205.00	8.87	0.00	0.00	0.29	12.80	5.00
206.00	8.87	0.00	0.00	0.29	12.80	5.00
207.00	8.87	0.00	0.00	0.29	12.80	5.00
208.00	8.87	0.00	0.00	0.29	12.80	5.00
209.00	8.87	0.00	0.00	0.29	12.80	5.00
210.00	8.87	0.00	0.00	0.29	12.80	5.00
211.00	8.87	0.00	0.00	0.29	12.80	5.00
212.00	8.87	0.00	0.00	0.29	12.80	5.00
213.00	8.87	0.00	0.00	0.29	12.80	5.00
214.00	8.87	0.00	0.00	0.29	12.80	5.00
215.00	8.87	0.00	0.00	0.29	12.80	5.00
216.00	8.87	0.00	0.00	0.29	12.80	5.00
217.00	8.87	0.00	0.00	0.29	12.80	5.00
218.00	8.87	0.00	0.00	0.29	12.80	5.00
219.00	8.87	0.00	0.00	0.29	12.80	5.00
220.00	8.87	0.00	0.00	0.29	12.80	5.00
221.00	8.87	0.00	0.00	0.29	12.80	5.00
222.00	8.87	0.00	0.00	0.29	12.80	5.00
223.00	8.87	0.00	0.00	0.29	12.80	5.00
224.00	8.87	0.00	0.00	0.29	12.80	5.00
225.00	8.87	0.00	0.00	0.29	12.80	5.00
226.00	8.87	0.00	0.00	0.29	12.80	5.00
227.00	8.87	0.00	0.00	0.29	12.80	5.00
228.00	8.87	0.00	0.00	0.29	12.80	5.00
229.00	8.87	0.00	0.00	0.29	12.80	5.00



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)
230.00	8.87	0.00	0.00	0.29	12.80	5.00
231.00	8.87	0.00	0.00	0.29	12.80	5.00
232.00	8.87	0.00	0.00	0.29	12.80	5.00
233.00	8.87	0.00	0.00	0.29	12.80	5.00
234.00	8.87	0.00	0.00	0.29	12.80	5.00
235.00	8.87	0.00	0.00	0.29	12.80	5.00
236.00	8.87	0.00	0.00	0.29	12.80	5.00
237.00	8.87	0.00	0.00	0.29	12.80	5.00
238.00	8.87	0.00	0.00	0.29	12.80	5.00
239.00	8.87	0.00	0.00	0.29	12.80	5.00
240.00	8.87	0.00	0.00	0.29	12.80	5.00
241.00	8.87	0.00	0.00	0.29	12.80	5.00
242.00	8.87	0.00	0.00	0.29	12.80	5.00
243.00	8.87	0.00	0.00	0.29	12.80	5.00
244.00	8.87	0.00	0.00	0.29	12.80	5.00
245.00	8.87	0.00	0.00	0.29	12.80	5.00
246.00	8.87	0.00	0.00	0.29	12.80	5.00
247.00	8.87	0.00	0.00	0.29	12.80	5.00
248.00	8.87	0.00	0.00	0.29	12.80	5.00
249.00	8.87	0.00	0.00	0.29	12.80	5.00
250.00	8.87	0.00	0.00	0.29	12.80	5.00
251.00	8.87	0.00	0.00	0.29	12.80	5.00
252.00	8.87	0.00	0.00	0.29	12.80	5.00
253.00	8.87	0.00	0.00	0.29	12.80	5.00
254.00	8.87	0.00	0.00	0.29	12.80	5.00
255.00	8.87	0.00	0.00	0.29	12.80	5.00
256.00	8.87	0.00	0.00	0.29	12.80	5.00
257.00	8.87	0.00	0.00	0.29	12.80	5.00
258.00	8.87	0.00	0.00	0.29	12.80	5.00
259.00	8.87	0.00	0.00	0.29	12.80	5.00
260.00	8.87	0.00	0.00	0.29	12.80	5.00
261.00	8.87	0.00	0.00	0.29	12.80	5.00
262.00	8.87	0.00	0.00	0.29	12.80	5.00
263.00	8.87	0.00	0.00	0.29	12.80	5.00
264.00	8.87	0.00	0.00	0.29	12.80	5.00
265.00	8.87	0.00	0.00	0.29	12.80	5.00
266.00	8.87	0.00	0.00	0.29	12.80	5.00
267.00	8.87	0.00	0.00	0.29	12.80	5.00
268.00	8.87	0.00	0.00	0.29	12.80	5.00
269.00	8.87	0.00	0.00	0.29	12.80	5.00
270.00	8.87	0.00	0.00	0.29	12.80	5.00
271.00	8.87	0.00	0.00	0.29	12.80	5.00
272.00	8.87	0.00	0.00	0.29	12.80	5.00
273.00	8.87	0.00	0.00	0.29	12.80	5.00
274.00	8.87	0.00	0.00	0.29	12.80	5.00
275.00	8.87	0.00	0.00	0.29	12.80	5.00
276.00	8.87	0.00	0.00	0.29	12.80	5.00
277.00	8.87	0.00	0.00	0.29	12.80	5.00
278.00	8.87	0.00	0.00	0.29	12.80	5.00
279.00	8.87	0.00	0.00	0.29	12.80	5.00
280.00	8.87	0.00	0.00	0.29	12.80	5.00
281.00	8.87	0.00	0.00	0.29	12.80	5.00
282.00	8.87	0.00	0.00	0.29	12.80	5.00
283.00	8.87	0.00	0.00	0.29	12.80	5.00
284.00	8.87	0.00	0.00	0.29	12.80	5.00
285.00	8.87	0.00	0.00	0.29	12.80	5.00
286.00	8.87	0.00	0.00	0.29	12.80	5.00
287.00	8.87	0.00	0.00	0.29	12.80	5.00
288.00	8.87	0.00	0.00	0.29	12.80	5.00
289.00	8.87	0.00	0.00	0.29	12.80	5.00
290.00	8.87	0.00	0.00	0.29	12.80	5.00
291.00	8.87	0.00	0.00	0.29	12.80	5.00
292.00	8.87	0.00	0.00	0.29	12.80	5.00
293.00	8.87	0.00	0.00	0.29	12.80	5.00
294.00	8.87	0.00	0.00	0.29	12.80	5.00
295.00	8.87	0.00	0.00	0.29	12.80	5.00
296.00	8.87	0.00	0.00	0.29	12.80	5.00
297.00	8.87	0.00	0.00	0.29	12.80	5.00
298.00	8.87	0.00	0.00	0.29	12.80	5.00
299.00	8.87	0.00	0.00	0.29	12.80	5.00

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)
300.00	8.87	0.00	0.00	0.29	12.80	5.00
301.00	8.87	0.00	0.00	0.29	12.80	5.00
302.00	8.87	0.00	0.00	0.29	12.80	5.00
303.00	8.87	0.00	0.00	0.29	12.80	5.00
304.00	8.87	0.00	0.00	0.29	12.80	5.00
305.00	8.87	0.00	0.00	0.29	12.80	5.00
306.00	8.87	0.00	0.00	0.29	12.80	5.00
307.00	8.87	0.00	0.00	0.29	12.80	5.00
308.00	8.87	0.00	0.00	0.29	12.80	5.00
309.00	8.87	0.00	0.00	0.29	12.80	5.00
310.00	8.87	0.00	0.00	0.29	12.80	5.00
311.00	8.87	0.00	0.00	0.29	12.80	5.00
312.00	8.87	0.00	0.00	0.29	12.80	5.00
313.00	8.87	0.00	0.00	0.29	12.80	5.00
314.00	8.87	0.00	0.00	0.29	12.80	5.00
315.00	8.87	0.00	0.00	0.29	12.80	5.00
316.00	8.87	0.00	0.00	0.29	12.80	5.00
317.00	8.87	0.00	0.00	0.29	12.80	5.00
318.00	8.87	0.00	0.00	0.29	12.80	5.00
319.00	8.87	0.00	0.00	0.29	12.80	5.00
320.00	8.87	0.00	0.00	0.29	12.80	5.00
321.00	8.87	0.00	0.00	0.29	12.80	5.00
322.00	8.87	0.00	0.00	0.29	12.80	5.00
323.00	8.87	0.00	0.00	0.29	12.80	5.00
324.00	8.87	0.00	0.00	0.29	12.80	5.00
325.00	8.87	0.00	0.00	0.29	12.80	5.00
326.00	8.87	0.00	0.00	0.29	12.80	5.00
327.00	8.87	0.00	0.00	0.29	12.80	5.00
328.00	8.87	0.00	0.00	0.29	12.80	5.00
329.00	8.87	0.00	0.00	0.29	12.80	5.00
330.00	8.87	0.00	0.00	0.29	12.80	5.00
331.00	8.87	0.00	0.00	0.29	12.80	5.00
332.00	8.87	0.00	0.00	0.29	12.80	5.00
333.00	8.87	0.00	0.00	0.29	12.80	5.00
334.00	8.87	0.00	0.00	0.29	12.80	5.00
335.00	8.87	0.00	0.00	0.29	12.80	5.00
336.00	8.87	0.00	0.00	0.29	12.80	5.00
337.00	8.87	0.00	0.00	0.29	12.80	5.00
338.00	8.87	0.00	0.00	0.29	12.80	5.00
339.00	8.87	0.00	0.00	0.29	12.80	5.00
340.00	8.87	0.00	0.00	0.29	12.80	5.00
341.00	8.87	0.00	0.00	0.29	12.80	5.00
342.00	8.87	0.00	0.00	0.29	12.80	5.00
343.00	8.87	0.00	0.00	0.29	12.80	5.00
344.00	8.87	0.00	0.00	0.29	12.80	5.00
345.00	8.87	0.00	0.00	0.29	12.80	5.00
346.00	8.87	0.00	0.00	0.29	12.80	5.00
347.00	8.87	0.00	0.00	0.29	12.80	5.00
348.00	8.87	0.00	0.00	0.29	12.80	5.00
349.00	8.87	0.00	0.00	0.29	12.80	5.00
350.00	8.87	0.00	0.00	0.29	12.80	5.00
351.00	8.87	0.00	0.00	0.29	12.80	5.00
352.00	8.87	0.00	0.00	0.29	12.80	5.00
353.00	8.87	0.00	0.00	0.29	12.80	5.00
354.00	8.87	0.00	0.00	0.29	12.80	5.00
355.00	8.87	0.00	0.00	0.29	12.80	5.00
356.00	8.87	0.00	0.00	0.29	12.80	5.00
357.00	8.87	0.00	0.00	0.29	12.80	5.00
358.00	8.87	0.00	0.00	0.29	12.80	5.00
359.00	8.87	0.00	0.00	0.29	12.80	5.00
360.00	8.87	0.00	0.00	0.29	12.80	5.00

## STRUCTURE MAXIMUM AND MINIMUM DISCHARGES

Struc	Max (cfs)	Time (hr)	Min (cfs)	Time (hr)
1	1.36	12.20	0.00	0.00

## BASIN MAXIMUM AND MINIMUM STAGES

```
=====
      Basin      Max (ft)      Time (hr)      Min (ft)      Time (hr)
=====
      Basin 1      15.13      12.20      5.00      0.00
=====
```

## BASIN WATER BUDGETS (all units in acre-ft)

```
=====
      Basin      Total      Structure      Structure      Initial      Final
      Runoff      Inflow      Outflow      Storage      Storage      Residual
=====
      Basin 1      0.30      0.00      0.29      0.01      0.02      0.00
=====
```

# **Appendix F**

## Basin Map

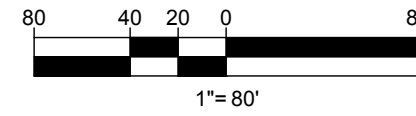




BASIN MAP

**ZYSCOVICH**  
ARCHITECTS

DELRAY BEACH, FL 33483 | PLAN REV. A





## **Appendix G**

Basin Pre Vs. Post Calculations



**BOHLER**  
ENGINEERING

Date: 9/17/2019

Project: Pierre Delrav Phase 2

Project No.: FLB190004

Calculated By: LJJ

Checked By: ARS

### Pre Storm Water Management Calculations - Drainage Basin

<b>SITE DATA</b>		
Total Site Area ( $A_T$ )=	9.74 Acres	100%
Total Building Area ( $A_B$ )=	3.54 Acres	36%
Total Canopy Area ( $A_C$ )=	0.00 Acres	0%
Total Pavement/Sidewalk Area + Building Area ( $A_I$ )=	5.66 Acres	58%
Total Landscape Area ( $A_P$ )=	0.54 Acres	6%
<b>SOIL STORAGE CALCULATIONS</b>		
Average Pervious Elevation =	15.5 Ft. +/-	NAVD
Seasonal High Water Table =	9.50 Ft.	NAVD
Depth to water table=	6.00 Ft.	
Soil Storage Type	Coastal	
From SFWMD Manual for to W.T. (Comp S) =	8.18 In.	
Compute overall soilstorage for site.=	0.45 In.	
$S = (\text{Comp S}) \times [A_P / A_T];$		
Compute CN value for site=	96	
$CN = 1000 / (S + 10)$		
<b>COMPUTE 100-Year, 72-Hour Runoff Volume for Drainage Basin</b>		
Rainfall ( $P_{100-72}$ ),	18.00 In.	
$Q_{100-72} = (P_{100-72} - 0.2S^2) / (P_{100-72} + 0.8S) =$	17.47 In.	
Compute volume generated by storm		
$V = (P_{100-72} / 12) \times A_T =$		14.18 Ac.-Ft.



**BOHLER**  
ENGINEERING

Date: 9/17/2019

Project: Pierre Delray Phase 2

Project No: FLB190004

Calculated By: LJJ

Checked By: ARS

**Pre Stage-Storage Computations Drainage Basin**

Basin	Landscape (Site)	Parking/Drive Isles	Building	Total Area (Ac.)
Land Type	Pervious	Impervious	Impervious	
Area (Acres)	0.54	5.66	3.54	9.74
Storage Type	Sloped	Sloped	Sloped	
Start (Ft.)	13.10	12.60	12.10	
End (Ft.)	15.50	15.00	15.50	
Stage (Ft.)	Storage (Ac-Ft)	Storage (Ac-Ft)	Storage (Ac-Ft)	Total Storage (Ac-Ft)
10.00	0.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00	0.00
12.00	0.00	0.00	0.00	0.00
12.50	0.00	0.00	0.08	0.08
13.00	0.00	0.19	0.42	0.61
13.50	0.02	0.96	1.02	1.99
14.00	0.09	2.31	1.88	4.28
14.50	0.22	4.26	3.00	7.48
15.00	0.41	6.79	4.38	11.58
15.50	0.65	9.62	6.02	16.29
16.00	0.92	12.45	7.79	21.16
16.50	1.19	15.28	9.56	26.03
17.00	1.46	18.11	11.33	30.90
17.50	1.73	20.94	13.10	35.77
18.00	2.00	23.77	14.87	40.64

100-Year, 72-Hour	
Stage (Ft., NAVD)	Storage (Ac.-Ft.)
15.00	11.58
15.50	16.29
Volume Generated By Storm (Ac.-Ft.)	14.18
Peak Stage (Ft., NAVD)	15.28





## Post Storm Water Management Calculations - Drainage Basin

<b>SITE DATA</b>		
Total Site Area ( $A_T$ )=	9.74 Acres	100%
Total Building Area ( $A_B$ )=	3.55 Acres	36%
Total Canopy Area ( $A_C$ )=	0.00 Acres	0%
Total Pavement/Sidewalk Area + Building Area ( $A_I$ )=	5.66 Acres	58%
Total Landscape Area ( $A_P$ )=	0.54 Acres	6%
<b>SOIL STORAGE CALCULATIONS</b>		
Average Pervious Elevation =	15.5 Ft. +/-	NAVD
Seasonal High Water Table =	9.50 Ft.	NAVD
Depth to water table=	6.00 Ft.	
Soil Storage Type	Coastal	
From SFWMD Manual for to W.T. (Comp S) =	8.18 In.	
Compute overall soilstorage for site.=	0.45 In.	
$S = (\text{Comp S}) \times [A_P / A_T];$		
Compute CN value for site=	96	
$CN = 1000 / (S + 10)$		
<b>COMPUTE 100-Year, 72-Hour Runoff Volume for Drainage Basin</b>		
Rainfall ( $P_{100-72}$ ),	18.00 In.	
$Q_{100-72} = (P_{100-72} - 0.2S^2) / (P_{100-72} + 0.8S) =$	17.47 In.	
Compute volume generated by storm		
$V = (P_{100-72} / 12) \times A_T =$		14.18 Ac.-Ft.



**BOHLER**  
ENGINEERING

Date: 9/17/2019

Project: Pierre Delray Phas 2

Project No: FLB190004

Calculated By: LJJ

Checked By: ARS

**Post Stage-Storage Computations Drainage Basin**

Basin	Landscape (Site)	Parking/Drive Isles	Building	Total Area (Ac.)
Land Type	Pervious	Impervious	Impervious	
Area (Acres)	0.54	5.66	3.55	9.75
Storage Type	Sloped	Sloped	Sloped	
Start (Ft.)	13.10	12.60	12.10	
End (Ft.)	15.50	15.00	15.50	
Stage (Ft.)	Storage (Ac-Ft)	Storage (Ac-Ft)	Storage (Ac-Ft)	Total Storage (Ac-Ft)
10.00	0.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00	0.00
12.00	0.00	0.00	0.00	0.00
12.50	0.00	0.00	0.08	0.08
13.00	0.00	0.19	0.42	0.61
13.50	0.02	0.96	1.02	2.00
14.00	0.09	2.31	1.88	4.29
14.50	0.22	4.26	3.00	7.48
15.00	0.41	6.79	4.39	11.59
15.50	0.65	9.62	6.03	16.30
16.00	0.92	12.45	7.80	21.18
16.50	1.19	15.28	9.58	26.05
17.00	1.46	18.11	11.35	30.92
17.50	1.73	20.94	13.12	35.80
18.00	2.00	23.77	14.90	40.67

100-Year, 72-Hour	
Stage (Ft., NAVD)	Storage (Ac.-Ft.)
15.00	11.59
15.50	16.30
Volume Generated By Storm (Ac.-Ft.)	14.18
Peak Stage (Ft., NAVD)	15.27