CITY OF APALACHICOLA

PLANNING & ZONING BOARD
QUASI-JUDICIAL PUBLIC HEARING
MONDAY, MAY 13th, 2024
City Meeting Room – 74 6th Street
Agenda

Quasi-Judicial Public Hearing: Immediately following Regular Meeting @ 6:00 PM

1. Discussion & Decision for proposed Accessory Structure (Storage/Carport, Stormwater Best Management Practice) to be placed in the **O/R** Zone at **92 Avenue E,** more specifically described as Block 30 SW ½ of Lots 4 & 5 for Kevin Curry – Owner; Representative – Sam Berkheiser. Applicant is requesting approval of a special exception for an accessory structure to be used as a carport, storage, and stormwater best management practice.
    - The Certificate of Appropriateness and Site Plan were conceptually approved at the 4/8/24 P&Z meeting contingent on:
        - Site specific geotechnical information presented to and approved by the P&Z Board at the next meeting
        - Special Exception approval

Other/New Business:

Outstanding/Unresolved Issues:

In our continuing effort to keep the citizens of Apalachicola informed, this agenda is posted on our website at www.cityofapalachicola.com prior to the scheduled meeting for public review. Additional information such as the City Land Development Code and zoning related maps, along with other development information is also available on the website for your convenience. Please direct any questions concerning items on this agenda or the Planning & Zoning Board to Bree Robinson (850)323-0985 or brobinson@cityofapalachicola.com.

Ad - The Times

NOTICE OF PUBLIC HEARING - PLANNING & ZONING CITY OF APALACHICOLA, FLORIDA

The Apalachicola Planning & Zoning Board will hold a Public Hearing on **Monday, May 13TH, 2024** immediately following the Planning & Zoning Regular Meeting at 6PM in the City Meeting Room, **74 6th Street,** Apalachicola, Florida to address the following special exception requests and receive citizen comments relating to proposed changes on the parcel listed below. A decision will immediately follow. The following special exception requests items will be discussed, considered, and decided upon:

1. Proposed Accessory Structure at 92 Avenue E, more specifically described as Block 30 SW 1/2 Lots 4 & 5. Applicant is requesting approval of an accessory structure for use of storage/carport in the O/R Zone.

The Apalachicola Land Development Code allows for such use if special exception approval is granted. All interested parties are encouraged to attend and be heard with respect to this request. For further information, contact the City Planner, Bree Robinson, at 850-323-0985 or brobinson@cityofapalachicola.com .

April 25, May 2, 2024

######

Sign

PUBLIC NOTICE

A SPECIAL EXCEPTION REQUEST FOR THIS PROPERTY HAS BEEN FILED WITH THE PLANNING & ZONING BOARD FOR AN ACESSORY STRUCTURE

A PUBLIC HEARING FOR THIS REQUEST WILL BE HELD MAY 13TH @ 6:00PM IN THE CITY MEETING ROOM (74 6TH STREET)

QUESTIONS? CALL (850)323-0985 OR EMAIL BROBINSON@CITYOFAPALACHICOLA.COM

WE LOVE
LAND
STUDIO, INC.

PROJECT INTRODUCTION:

Curry Residence | 92 Avenue E Apalachicola, FL 32320
Mr. & Mrs. Curry are new homeowners in Apalachicola. The current site has a very high lot coverage rate due to the previous owner's expansions and activity. They are requesting a simple structural carport for their car to protect it from the elements and enclosed shed. They would like to achieve this goal in the most ecologically responsible way possible while addressing the current nonconforming, impervious lot coverage.

Project goals:
+ reduce impervious lot coverage within acceptable municipal requirements
+ address current drainage issues on site
+ improve storm water quality and overall site runoff
+ improve usable outdoor space
+ add native and naturalized planting

Additional concerns for this site:
- current impervious lot coverage is approximately 48%
- drainage issues
- water pooling on site and overflowing off site at east corner
- existing impervious stone patio is set on compacted soil and gravel
- invasive plant species removal

Standard Apalachicola best management practices as outlined in the 'City of Apalachicola Guide to Specific Storm water Best Management Practices' highlight the use of detention ponds and vegetated swales. These traditional methods are not always applicable on a small residential scale- and are not applicable to this current site.

PROPOSAL:

Please review landscape plans (by We Love Land Studio, Inc) and architecture plans (by ERC Construction, llc.) to follow.

Introduction to the site specific underground storm water infiltration system included in plans:
We are proposing a storm water infiltration system that will capture the storm water from the proposed carport/shed, clean it, store it, and allow it to infiltrate back into the soil on site to recharge the groundwater aquifer. This system, when installed, will improve water quality and reduce runoff. Since the existing site is sloped, stormwater runoff are increased. We can capture and treat more water with the structure in place than without. **It will also take pressure off of the city's current storm water system and reduce the outflow of water volume, and pollutants, to the surrounding waterways.** This system benefits everyone; the homeowner, the city, and the bay.

A note to the board: The proposed system is considered a storm water best management practice throughout the country and in environmentally delicate areas adjacent to waterways here in Florida. (Please see attached NDS case study with design packet.) We believe the city can benefit tremendously through the responsible use of this practice. Whether implemented to retrofit existing sites, or utilized with new construction, it has the ability to retain, treat, and infiltrate the storm water produced on most sites.

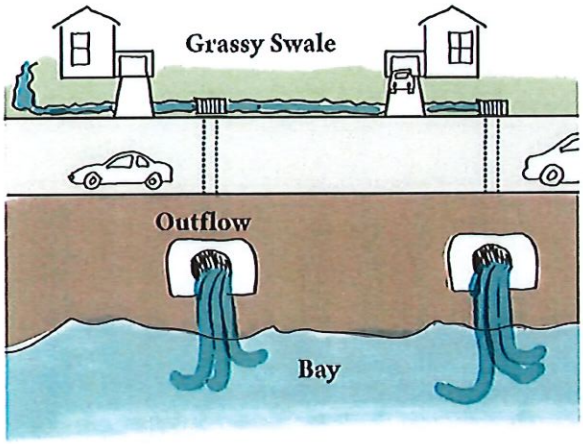
"Of primary importance to minimizing the effects of stormwater on water quality is the First Flush. This term describes the washing action that stormwater has on accumulated pollutants in a watershed. In the early stages of runoff the land surfaces, especially the impervious surfaces like streets and parking areas, are flushed clean by the stormwater. This creates a shock load of pollutants that are flushed into the nearby coastal waters.

Studies in Florida have determined that the first one inch of runoff generally carries 90% of the pollution from a storm. Treatment of the first flush is the key to proper stormwater management." - City of Apalachicola 'Guide to Site Specific Stormwater Best Management Practices' - Page 4

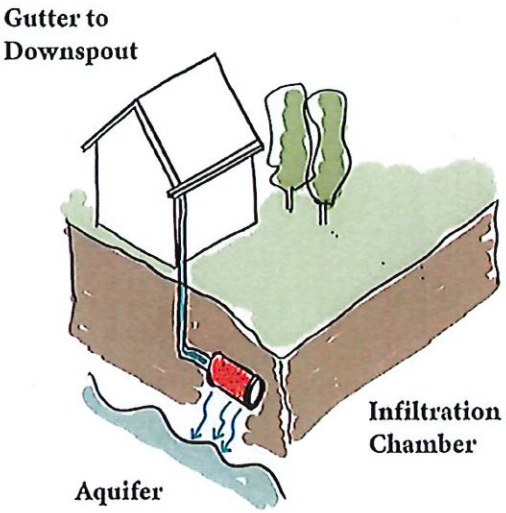
Not only does this system most effectively treat the 'first flush', it gives residents more flexibility within their property while simultaneously reducing the strain on the current city storm water drainage system and will reduce the contaminants entering the bay. Our goal with this document is to illustrate the benefits of the proposed system, so the city can find a responsible way to include it in the future overall city strategy of stormwater best management practices.

Thank you for your time and consideration.

SYSTEMS COMPARISON:



Current stormwater trajectory flows mostly above ground, or in pipes throughtout the city, before being expelled into the waterways. This process puts a majority of the 'first flush' directly into the bay. A small portion of this water recharges the aquifer through infiltration.



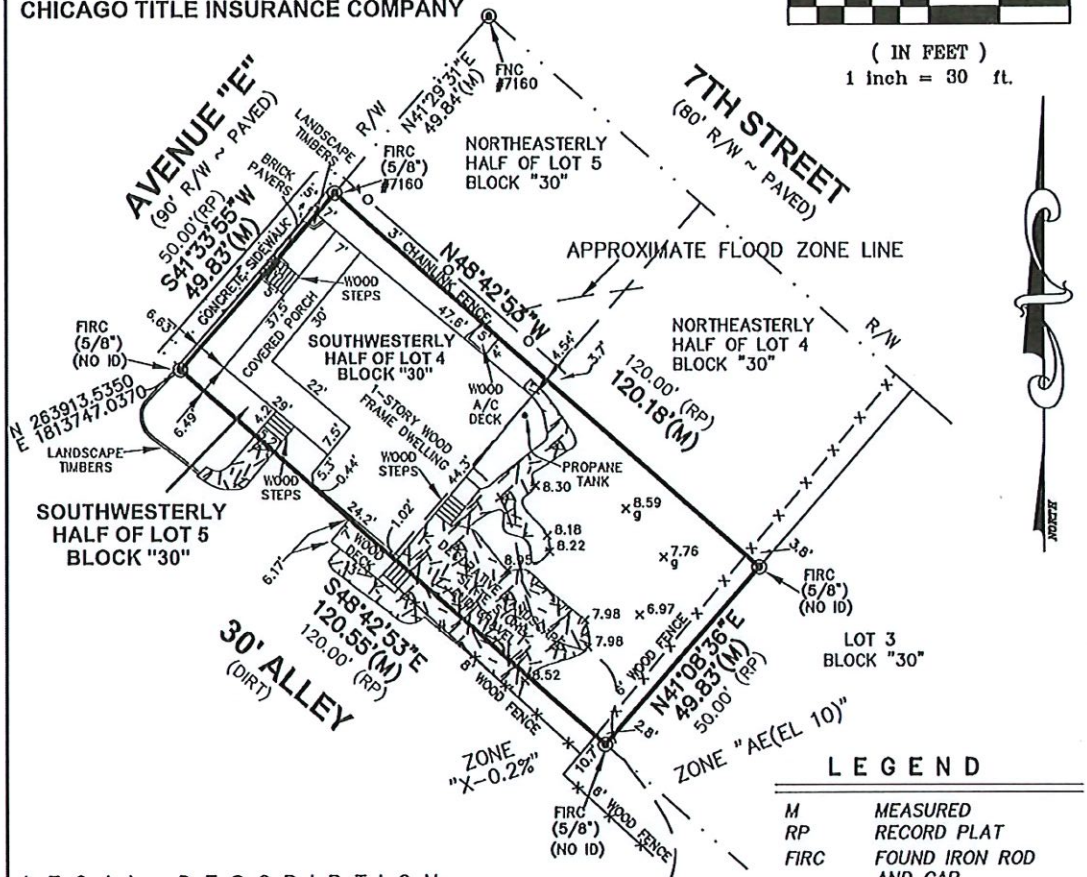
Underground infiltration chamber storm water system captures the water and treats the 'first flush' naturally before recharging the aquifer localized and on-site.

PLAT OF BOUNDARY SURVEY CERTIFIED TO:
KEVIN CURRY and KAREN CURRY,
DONNA DUNCAN, P.A.,
CHICAGO TITLE INSURANCE COMPANY

GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.



LEGEND

M	MEASURED
RP	RECORD PLAT
FIRC	FOUND IRON ROD AND CAP
FNC	FOUND NAIL & CAP
SIRC	SET (5/8") IRON ROD AND CAP #7160
R/W	RIGHT-OF-WAY
	NOT TO SCALE
	POINT NOT SET OR FOUND

LEGAL DESCRIPTION:

Southwesterly half of Lots 4 and 5, Block "30" of the CITY OF APALACHICOLA, as per map or plat in common use on file at the Clerk of the Circuit Court in Franklin County, Florida

NOTES:

1. SURVEY SOURCE: Record plat and a field survey performed by the undersigned surveyor.
2. BEARING REFERENCE: ALL BEARINGS established using Florida Grid North datum.
3. NO IMPROVEMENTS have been located in this survey other than shown hereon.
4. There are NO VISIBLE ENCROACHMENTS other than those shown hereon.
5. This survey is dependent upon EXISTING MONUMENTATION.
6. Not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.
7. FLOOD ZONES and SETBACKS depicted hereon are not to be used for construction permitting purposes. All FLOOD ZONES and SETBACKS should be verified by the appropriate County Departments.

I hereby certifiy that this was performed under my responsible direction and supervision and the plat and description are true and accurate to the best of my knowledge and belief. The survey meets or exceeds the standards for practice for land surveying as established by the Florida Board of Professional Surveyors and Mappers (F.A.C. 5J-17.051/.052).

The undersigned surveyor has not been provided a current title opinion or abstract of matters affecting title or boundary to the subject property. It is possible there are deeds of records, unrecorded deeds, easements or other instruments which could affect the boundaries.

JAMES T. RODDENBERRY
Surveyor and Mapper
Florida Certificate No: 4261

FLOOD ZONE INFORMATION:

Subject property is located in Zone "X-0.2%" and "AE (EL 10)" as per Flood Insurance Rate Map Community Panel No: 120089 0526F, Index date: February 05, 2014, Franklin County, Florida.

T R & A
THURMAN RODDENBERRY & ASSOCIATES, INC
PROFESSIONAL SURVEYORS AND MAPPERS
P.O. BOX 100 • 125 SHELDON STREET • SOPCHOPPY, FLORIDA 32358
PHONE NUMBER: 850-962-2538 FAX NUMBER: 850-962-2538
LB # 7160

DATE: 02/14/24	DRAWN BY: BB	P.B.682 PG.17	COUNTY: FRANKLIN
FILE: 05430.DWG	DATE OF LAST FIELD WORK: 02/13/24	CHECKED BY: AW	JOB NUMBER: 05-430

NDS®
Put water in its place

Mayman Residence
Ponce Inlet, FL

Case Study

NDS StormChamber™ System

TRANSFORMING A SURFACE POND INTO USABLE LAND WITH UNDERGROUND CHAMBER SYSTEM

An existing single-family residence nestled on a beautiful waterfront property on the Ponce Inlet in Florida was going through a remodel and expansion. County regulations required new stormwater storage – primarily roof and hardscape drainage.

The contractor reached out to NDS to determine the best possible drainage solution for the homeowner, who wanted a system that was aesthetically pleasing and would complement the landscape and atmosphere of the yard. They didn't want a retention pond and were hoping for more usable green space.

An NDS representative was able to visit the jobsite and helped confirm an underground stormchamber solution would be ideal.

NDS STORMCHAMBER™ SIZE PERFECT FOR RESIDENCE

One of the NDS StormChamber sizes is an 18 in. version. It is often the go-to solution for small residential applications since it's ideal for depth restrictions.

After assessing the site's exact needs, NDS Design Worx® services developed a StormChamber system layout, which married up to the overall site plan for the property. The placement of approximately 4 rows of 18 in. high chambers would need to be placed for a total of 1,300 cubic ft. of water storage capability.

Stormchambers are great for residential applications since they are a cost-effective way to store and infiltrate water. It's a simpler installation and less expensive than other types of underground stormwater management systems because it has no header pipe manifold to contend with, which is often required on competitive systems.

PROJECT SUMMARY

PROJECT TYPE
Infiltration

PROPERTY
Residence

STAKEHOLDERS
SiteOne
Mills Design Group
Tom Anthony Construction

NDS PRODUCTS USED
StormChamber™ system units: (5) SC-1820-S-O, (19) SC-1820-M-O, (5) SC-1820-E-O, (2) SC-WFF-75

NDS StormChamber units are manufactured from thermoformed high-density weight polyethylene (HMWPE), provide a 100-year life expectancy and can handle H-20 loads.

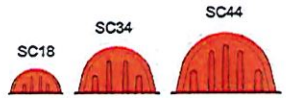
DESIGN WORX SERVICES A BENEFIT DURING INSTALLATION

A pro-con meeting was held with the team to review the steps and make sure that the install would go well. An NDS rep was also on hand during construction of the new subsurface pond. Even with minor challenges related to excavating sandy soil, the contractor reported the installation was "quick and clean," and completed on schedule in less than two weeks.

This new underground system not only performs well during storms but has provided the homeowner with more usable green space in their backyard.

NDS Design Worx Services Utilized:

1. Product specification
2. Drainage calculation
3. System layout
4. Installation instructions



NDS STORMCHAMBERS

92 AVENUE E
APALACHICOLA, FL

NDS STORMCHAMBER SYSTEM SPECIFICATIONS

1. CHAMBERS SHALL BE NDS STORMCHAMBER .
2. CHAMBERS SHALL BE ARCH SHAPED AND SHALL BE MANUFACTURED FROM HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE.
3. CHAMBERS MEET OR EXCEED ASTM F2922 AND ASTM F2787. MEET AASHTO HS-20, HS-25 AND HL-93 LIVE LOADING PER AASHTO LRFD SECTION 12.
4. MANUFACTURED NOMINAL DIMENSIONS OF START, MIDDLE AND END CHAMBERS
   - SC18 3.17 FT WIDE X 18 INCHES TALL.
   - SC34 5 FT WIDE X 34 INCHES TALL.
   - SC44 6.35 FT WIDE X 44 INCHES TALL.
5. MINIMUM COVER FOR SC18 AND SC34 IS 18 INCHES, MINIMUM COVER FOR SC44 IS 22 INCHES .
6. SEDIMENTRAP MANUFACTURED WITH HIGH MOLECULAR WEIGHT, HIGH DENSITY POLYETHYLENE.
7. NON-WOVEN POLYPROPYLENE FILTER FABRIC TMG-4OZNWG BY TMPG OR APPROVED EQUAL
8. WOVEN POLYPROPYLENE FILTER FABRIC 300HTM BY WINFAB OR APPROVED EQUAL.
9. THE PERFORMANCE OF NDS STORMCHAMBER" IS DIRECTLY CORRELATED TO THE LOAD BEARING CAPACITY, PLASTICITY, AND PERMEABILITY OF NATIVE SOIL; FROST-HEAVE POTENTIAL; VOLUME AND LOAD-RATING OF PROJECT TRAFFIC; INSTALLATION METHODS USED; AS WELL AS THE TYPE, GRADATION, AND THICKNESS OF THE SURROUNDING AND OVERLAY ROCK.

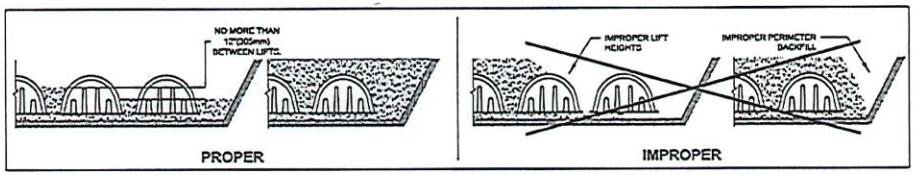
REQUIREMENTS FOR CONSTRUCTION EQUIPMENT

1. NDS RECOMMENDS 3 BACKFILL METHODS, STONESHOOTER LOCATED OFF THE CHAMBER BED, BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE AND BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR. CONVEYORS OR EXCAVATORS SHOULD BE LOCATED SUCH THAT THEIR LOADS DO NOT INFLUENCE THE CHAMBERS SHOULD BE USED TO PLACE BACKFILL STONE.
2. NO CONSTRUCTION EQUIPMENT ALLOWED ON TOP OF THE CHAMBER SYSTEM UNTIL MINIMUM STONE COVER REQUIREMENTS HAVE BEEN MET, 6-INCH FOR SC-18 AND SC-34 AND 12-INCH FOR SC-44, ONLY THEN SHOULD A SKID STEER OR SMALL DOZER (D4) BE ALLOWED ON TOP.
3. NO WHEEL LOADS SHOULD BE APPLIED OVER THE SYSTEM. ONCE THE MINIMUM STONE HAS BEEN PLACED OVER THE CROWN OF THE CHAMBERS, ONLY SMALL WALK BEHIND VIBRATORY COMPACTION EQUIPMENT CAN BE USED UNTIL A 12 INCHES OF COVER IS ACHIEVED. LIGHTWEIGHT TRACKED DOZERS WITH A MAXIMUM GROUND PRESSURE OF 1100 PSF ARE PERMITTED OVER THE STRUCTURE.
4. DOZERS MUST SPREAD STONE WORKING IN A DIRECTION PARALLEL WITH THE CHAMBER ROWS; NOT WORKING ACROSS THE CHAMBER ROWS. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMCHAMBER STANDARD WARRANTY.
5. ONCE 18"(457mm) OF COMPACTED MATERIAL IS OVER THE CHAMBERS, HIGHWAY VEHICLES OF HS-20 AND HS-25 CAN BE OPERATED OVER THE STRUCTURES.
6. A FRONT END LOADER CAN BE OPERATED OVER THE STRUCTURES AS LONG AS THE MAXIMUM WHEEL LOAD DOES NOT EXCEED 16000 POUNDS. COMPACTING EQUIPMENT CAN BE OPERATED OVER THE STRUCTURES AS LONG AS THE DYNAMIC FORCE FROM THE DRUM DOES NOT EXCEED 20000 POUNDS AND THE GROSS VEHICLE WEIGHT DOES NOT EXCEED 12000 POUNDS.

BACKFILL, HANDLING AND INSTALLATION REQUIREMENTS

1. THIS DOCUMENT IS NOT A SUBSTITUTE FOR THE INSTALLATION GUIDE.
2. STORMCHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE NDS STORMCHAMBER INSTALLATION GUIDE.
3. STORMCHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS. **CONTACT NDS SPECIALIST 571-521-9538 OR LOCAL REPRESENTATIVE.**
4. IN HOT WEATHER CONDITIONS, IF POSSIBLE, STORE ALL CHAMBERS AND BACKFILL STONE IN A SHADED AREA UNTIL THEY ARE READY TO BE INSTALLED. OUR RECOMMENDATION IS THAT THE SYSTEM BE LAID OUT AND ALL PIPES CONNECTED THE DAY PRIOR TO BACKFILLING WITH STONE. **WHEN TEMPERATURES ARE ABOVE 85°F, BACKFILLING SHOULD BE RESTRICTED TO COOLER MORNING PERIODS ONLY.**
5. 3/4" TO 2" CLEAN, CRUSHED, WASHED, ANGULAR STONE AASHTO M43 DESIGNATION OF #3 OR #4 OR CRUSHED CONCRETE OF THE SAME SIZE. SEE ACCEPTABLE FILL MATERIAL TABLE ON PAGE 3.
6. FOOTING OF CHAMBERS SHOULD BE CONNECTED WITH A DRYWALL SCREW WHEN OVERLAPPING AND INSTALLING.
7. MINIMUM SPACING BETWEEN THE CHAMBER ROWS SC18 & SC34 = 6 INCHES, SC44 = 9 INCHES.
8. INLET, OUTLET, AND INSPECTION PIPES MUST BE INSERTED A MINIMUM OF 12 INCHES (300 mm) INTO CHAMBER.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. PLACE THE BACKFILL MATERIAL IN 6-8 INCH LOOSE LIFTS AND COMPACT. USE MECHANICAL HAND TAMPERS OR APPROVED COMPACTING EQUIPMENT TO COMPACT ALL BACKFILL AND EMBANKMENT IMMEDIATELY ADJACENT TO EACH SIDE OF THE INSTALLATION AND OVER TOP OF THE INSTALLATION TO THE MINIMUM DEPTH SPECIFIED.
11. PLACE BACKFILL SO THERE IS NO MORE THAN A TWO LIFT DIFFERENTIAL BETWEEN ANY OF THE CHAMBERS AT ANYTIME DURING THE BACKFILLING PROCESS (12 INCHES) .
12. PERIMETER STONE MUST BE BROUGHT UP EVENLY WITH CHAMBER ROWS. PERIMETER MUST BE FULLY BACKFILLED WITH STONE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL.

BACKFILL METHODS

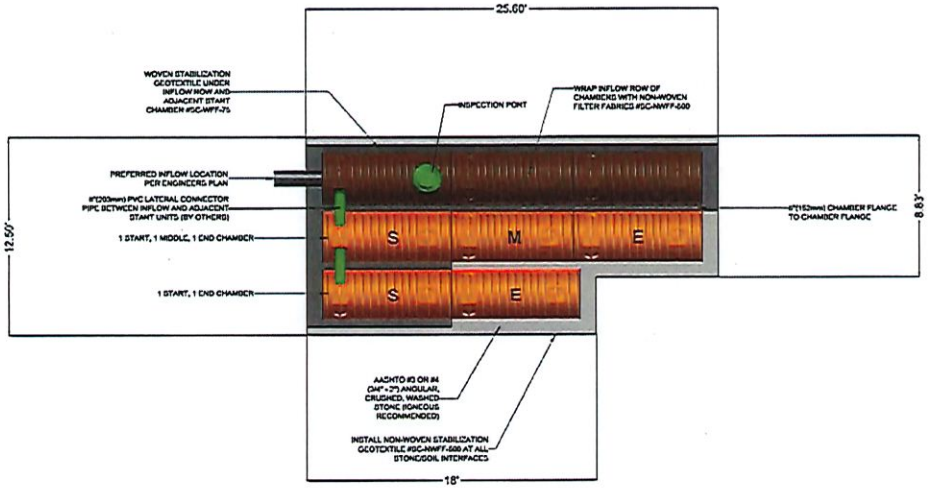


PROJECT NAME : 92 AVENUE E PROJECT LOCATION : APALACHICOLA, FL	PROJECT # 4691 - 4692 DATE: 3/19/2024 REVISION: 3/21/2024 DRAWN BY: ARH	STORMCHAMBER® NDS Design Worx	NDS STORMCHAMBER SYSTEM DETAILS NDS SPECIALIST: 571-521-9538

CHAMBER PART	WIDTH (IN)(MM)	HEIGHT (IN)(MM)	WEIGHT (LBS)	ACTUAL LENGTH (IN)(MM)	INSTALLED LENGTH (IN)(MM)	CHAMBER VOLUME (CF)(CM)	INSTALLED STORAGE VOLUME(CF)(CM)
START	38"(965)	16"(457)	53	101"(2565)	96"(2438)	22.5(0.63	46.5(1.31)
MIDDLE	38"(965)	16"(457)	53	99.5"(2527)	91.25"(2318)	21.4(0.60)	40.7(1.15)
END	38"(965)	16"(457)	53	100.25"(2546)	96"(2438)	22.5(0.63)	46.5(1.31)
CLOSED	38"(965)	16"(457)	53	101"(2565)	101"(2565)	23.6(0.68)	68.0(1.92)

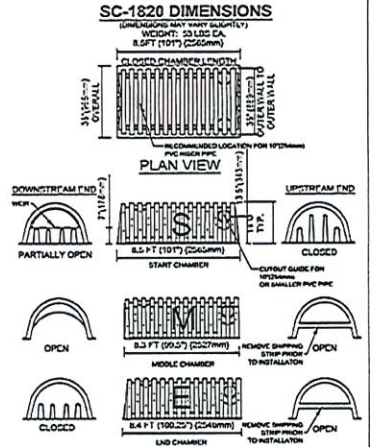
6"(152mm) ABOVE AND BELOW CHAMBER, 6"(152mm) CHAMBER SPACING, 12"(305mm) PERIMETER STONE AND 40% POROSITY

PLAN VIEW

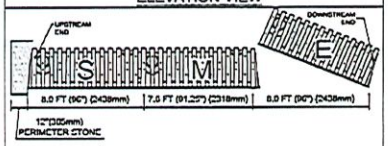


SC-1820 DIMENSIONS

(DIMENSIONS MAY VARY SLIGHTLY)
WEIGHT: 53 LBS EA.

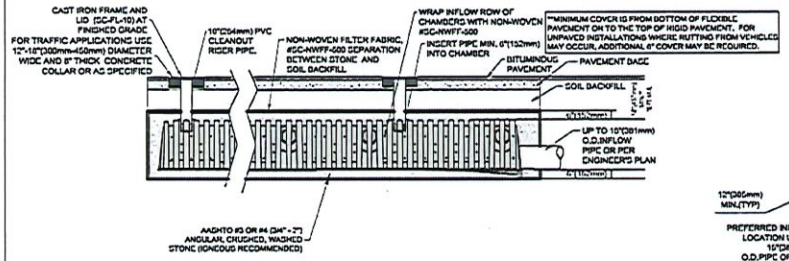


DELIVERY LENGTHS
ELEVATION VIEW

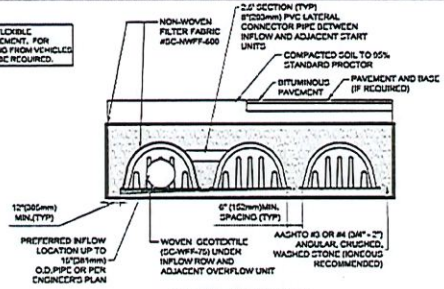


NOTES:
1. START CHAMBERS (CLOSED AT THE SIDE PORTAL END) ARE PLACED AT THE INFLOW END OF THE ROWS.
2. BEGIN PLACEMENTS WITH START CHAMBERS AND END ROWS WITH END CHAMBERS.
3. PLACE FIRST RIB OF THE NEXT CHAMBER IN THE ROW OVER THE LAST RIB OF THE PREVIOUS CHAMBER WITH SCREWS.

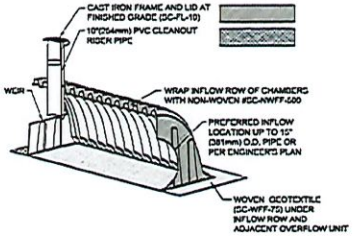
INSTALLED LENGTHS
ELEVATION VIEW



TYPICAL SIDE VIEW



TYPICAL FRONT VIEW



START CHAMBER CUTAWAY

MATERIAL LIST

DESCRIPTION	STOCK CODE	QTY	UNITS
CHAMBERS AND ACCESSORIES:			
START CHAMBER	SC-1820-S-O	3	EACH
MIDDLE CHAMBER	SC-1820-M-O	2	EACH
END CHAMBER	SC-1820-E-O	3	EACH
CLOSED CHAMBER	SC-1820-C-O	N/A	EACH
SEDIMENTRAP™	SC-ST	N/A	EACH
NON-WOVEN GEOTEXTILE	SC-NWFF-500	1	ROLLS
WOVEN STABILIZATION GEOTEXTILE	SC-WFF-75	1	ROLLS
24"D X 12"H HDPE PIPE FOR SEDIMENTRAP™	SC-2412P	N/A	EACH
10" CAST IRON FRAME AND LID	SC-FL-10	1	EACH
MATERIALS BY OTHERS:			
10"(254mm) DIAMETER RISER PIPE	OTHERS	1	EACH
8"(203mm) LATERAL CONNECTOR PIPE	OTHERS	2	EACH
IN-PLACE EXCAVATION (NO BULKING FACTOR)	OTHERS	27	CU YD
STONE BACKFILL	OTHERS	20	CU YD
1/4" X 1-1/2" NUT AND BOLT	OTHERS	8	EACH
3" SCREWS	OTHERS	8	EACH
IMPERVIOUS LINER	OTHERS	N/A	SQ YD
4" PERFORATED UNDERDRAIN	OTHERS	N/A	LF

PROJECT NAME : 92 AVENUE E - SYSTEM #2
PROJECT LOCATION : APALACHICOLA, FL

PROJECT # 4692

DATE: 3/19/2024	REVISION:
DRAWN BY: ARH	

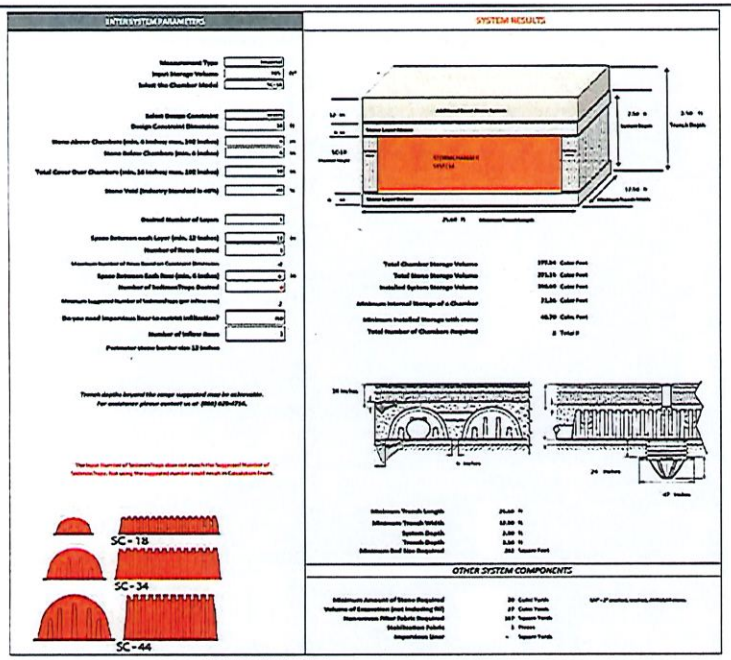
STORMCHAMBER®

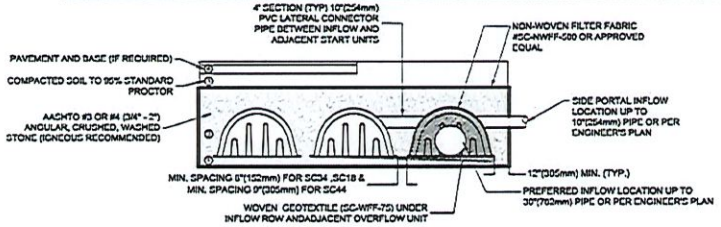
NDS Design Worx

NDS STORMCHAMBER SYSTEM DETAILS

NDS SPECIALIST: 571-621-6530

DRAWING# 1820-DT	
REV. H	DATE 3/21/2024





ACCEPTABLE FILL MATERIALS: NDS STORMCHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATION	COMPACTION/DENSITY REQUIREMENT
4	FILL MATERIAL FOR LAYER '4'STARTS FROM THE TOP OF THE '3' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THIS LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS OR PER ENGINEERS PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.		PREPARE PER ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
3	FILL MATERIAL FOR LAYER '3' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('2' LAYER) TO 18" [457mm] ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THIS LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, 35% FINES. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 A-1, A-2-4, A-3 OR AASHTO M43 #3; 357, 4, 467, 5, 56, 57, 6,67,68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTION AFTER 12" [305mm] OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" [152 mm] LIFTS TO A MIN. 95% STANDARD PROCTOR DENSITY. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs. [53kN]. DYNAMIC FORCE NOT TO EXCEED 20,000lbs [89kN].
2	EMBEDMENT STONE SURROUNDING THE CHAMBERS FROM THE FOUNTAIN STONE ('1' LAYER) TO THE '3' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION ¾"-2 INCH [19-51mm]	AASHTO M43 - #3, 4	95% TD9.
1	FOUNDATION STONE BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION ¾"-2 INCH [19-51mm]	AASHTO M43 - #3, 4	PLATE COMPACTOR OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY. T99 AASHTO.

INSPECTION AND MAINTENANCE OF STORMCHAMBER SEDIMENTRAP ROW

STORMCHAMBER™ WITH SEDIMENTRAP™ ROW IS DESIGNED FOR EASE OF INSPECTION AND REDUCED LONG-TERM MAINTENANCE COST MONITORING T.S.S. BUILDUP IN A SEDIMENTRAP™ CAN BE DONE WITHOUT THE NEED FOR A THIRD PARTY AS THE TRAP SITS DIRECTLY BELOW THE OBSERVATION PORT. A CAMERA WITH LIGHT AND/OR LONG MEASURING STICK CAN SUCCESSFULLY INSPECT AND DETERMINE WHEN MAINTENANCE IS NEEDED. AS NEEDED, SEDIMENT REMOVAL WITH A VACUUM TRUCK REQUIRES LITTLE OR NO WATER JETTING AS WITH OTHER COMPETING SYSTEMS.

INSPECTION AND MAINTENANCE SCHEDULE

THE QUANTITY AND LOCATION OF INSPECTION PORTS VARY BY SITE. PLEASE REFER TO THE SITE PLAN AND LAYOUT TO CONFIRM INSPECTION PORT LOCATIONS. NEW INSTALLATIONS SHOULD BE INSPECTED QUARTERLY AND AFTER EACH LARGE STORM EVENT TO SEE HOW IT PERFORMS. IT IS RECOMMENDED THAT A LOGBOOK BE MAINTAINED SHOWING THE DEPTH OF WATER IN THE STORMCHAMBER AT EACH OBSERVATION IN ORDER TO DETERMINE THE RATE AT WHICH THE STORMCHAMBER SYSTEM DEWATERS AFTER RUNOFF PRODUCING STORM EVENTS. ONCE THE PERFORMANCE CHARACTERISTICS OF THE STORMCHAMBER HAVE BEEN VERIFIED, THE MONITORING SCHEDULE CAN BE REDUCED TO AN ANNUAL BASIS, UNLESS THE PERFORMANCE DATA SUGGESTS THAT A MORE FREQUENT SCHEDULE IS REQUIRED.
SEDIMENT SHOULD BE SERVICED WHEN DEPOSITS APPROACH WITHIN 6 INCHES FROM THE TOP OF THE SEDIMENTRAP OR CHAMBER BOTTOM.

1: MAINTENANCE WITH SEDIMENTRAP - VACUUM TRUCK METHOD

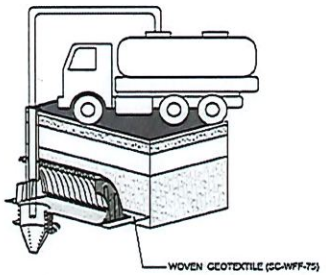
REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILD-UP IN THE SEDIMENTRAPS.IF SEDIMENT BUILD-UP IN THE SEDIMENTRAP IS WITHIN 6 INCHES FROM THE TOP OF THE SEDIMENTRAP OR CHAMBER BOTTOM THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILD-UP IS LESS THAN6 INCHES, LOG THE RESULTS AND PLACE THE LIDS BACK ON.

- INSERT VACUUM TUBE THROUGH 10 INCH CLEAN OUT RISER.
- VACUUM TUBE WILL NEED TO REACH THE BOTTOM DEPTH OF SEDIMENTRAP (TYP. 7-10 FEET BELOW FINISHED GRADE).
- REMOVE SEDIMENT USING VACUUM TRUCK/EQUIPMENT UNTIL NO FURTHER SEDIMENT IS BEING REMOVED.
- INSPECT SEDIMENT BUILD-UP AGAIN TO ENSURE PROPER CLEANOUT.

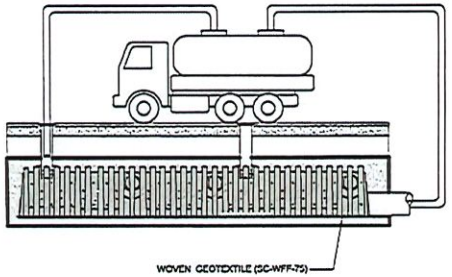
2: MAINTENANCE WITHOUT SEDIMENTRAP - WATER JET METHOD

REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILD-UP ON THE UNDERLYING WOVEN FABRIC UNDER THE CHAMBERS. IF SEDIMENT BUILD-UP ON THE BOTTOM IS GREATER THAN 3 INCHES THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILD-UP IS LESS THAN 3 INCHES, LOG THE RESULTS AND PLACE THE LIDS BACK ON.

- REMOVE SEDIMENT FROM SEDIMENT ROW USING A HIGH PRESSURE WATER JET SYSTEM.
- PREFERRED EQUIPMENT REQUIRED SHOULD HAVE A FIXED FLOOR CLEANING NOZZLE (REAR FACING) WITH A SPREAD OF AROUND 45 INCHES.
- APPLY AS MANY PASSES IN THE ROW UNTIL THE BACKFLUSH WATER IS CLEAN.
- VACUUM AREAS UNDER INSPECTION PORTS AND OUT OF ANY MANHOLES.



MAINTENANCE WITH SEDIMENTRAPS USING VACUUM TRUCK



MAINTENANCE WITHOUT SEDIMENTRAPS USING WATER JET

PROJECT NAME : 92 AVENUE E - SYSTEM #2
PROJECT LOCATION : APALACHICOLA, FL

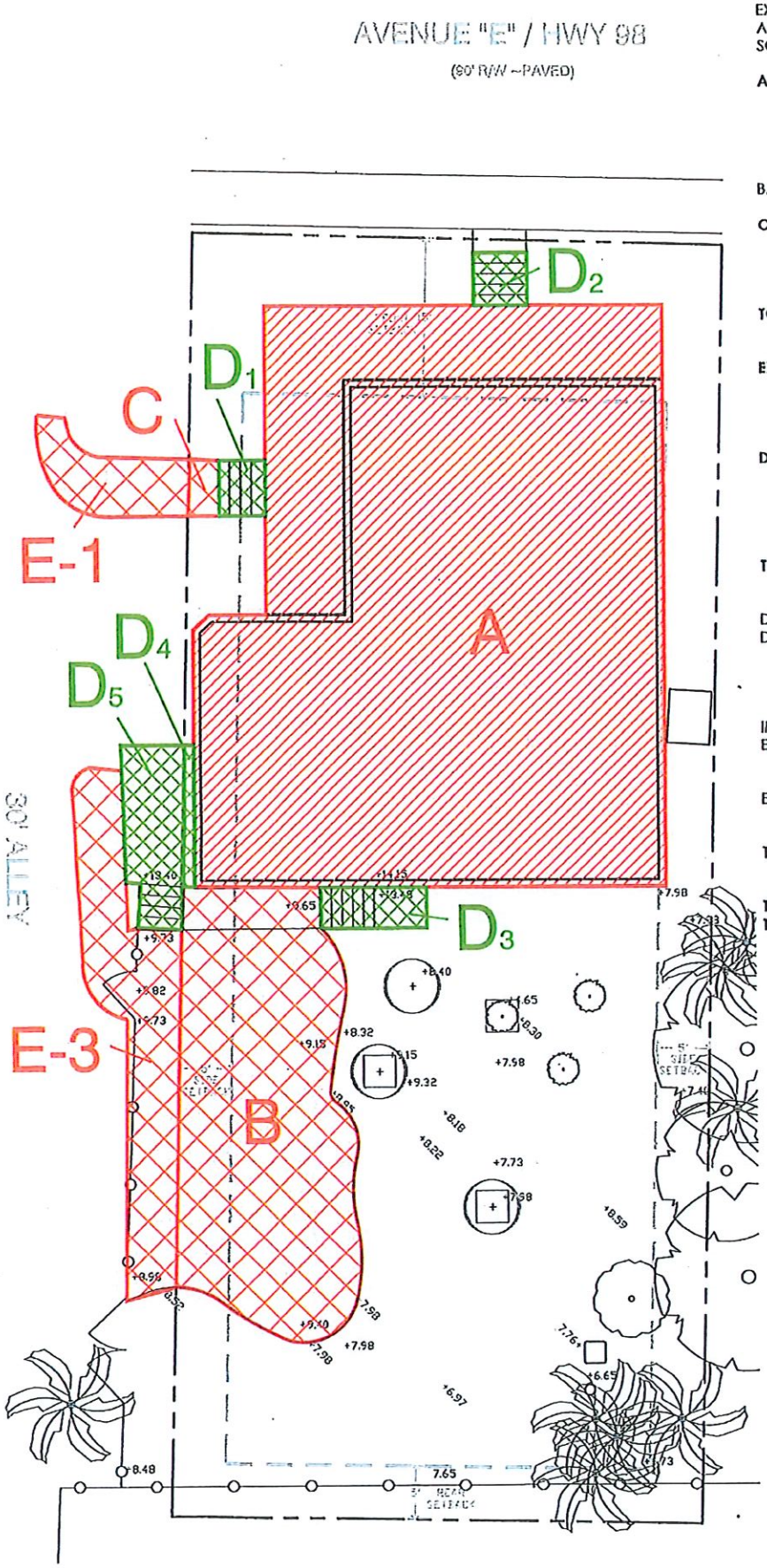
PROJECT # 4692

DATE: 3/19/2024	REVISION:
DRAWN BY: ARH	

STORMCHAMBER® NDS Design Worx

NDS STORMCHAMBER SYSTEM DETAILS

NDS SPECIALIST: 571-521-9538



EXISTING IMPERVIOUS
AREA CALCULATIONS:
SOUTHWESTERLY HALF OF LOTS 4&5 BLOCK "30"

A. 1 STORY FRAME DWELLING,
PORCHES & STAIRS -
2,220 SF | 37%

DECORATIVE SLATE STONE -

B. 634.79 SF | 10.58%

C. 14.97 SF | 00.25%

TOTAL DECORATIVE SLATE STONE AREA :
649.76 SF | 10.83%

TOTAL EXISTING IMPERVIOUS AREA:
2,869.76 SF | 47.83%

EXISTING IMPERVIOUS AREA TO BE REMOVED:
649.76 SF | 10.83% (AREAS B & C)

EXISTING DECK AREA:

D1+D2+D3+D4 = 97.82 SF | 1.63% (10% MAX.)

*ALL EXISTING DECK WILL BE INSPECTED AND ADJUSTED (IF NECESSARY) TO HAVE A 1/8" GAP BETWEEN BOARDS

TOTAL IMPERVIOUS AREA TO REMAIN:
2,220 SF | 37%

DECK AREA LOCATED IN CITY R.O.W. :
D5 WOODEN PORCH & STAIRS
89.66 SF
*AREA E-2 IS DECK & PART OF A HISTORIC STRUCTURE

IMPERVIOUS AREAS IN CITY R.O.W.:
E-1 DECORATIVE STONE PATH
81.2 SF

E-2 DECORATIVE STONE PAVING
265 SF

TOTAL EXISTING IMPERVIOUS AREA IN R.O.W. :
346.2 SF

TOTAL EXISTING IMPERVIOUS AREA IN R.O.W. TO BE REMOVED: (E-1 & E-3)
346.2 SF

*TOTAL PROPERTY AREA LOT CALCULATIONS:
BLOCK 30 SOUTHWESTERLY HALF OF LOTS 4&5
APPX. 50' x 120' = 6,000 SF

TOTAL AREA = 6,000 SF

0 5 10

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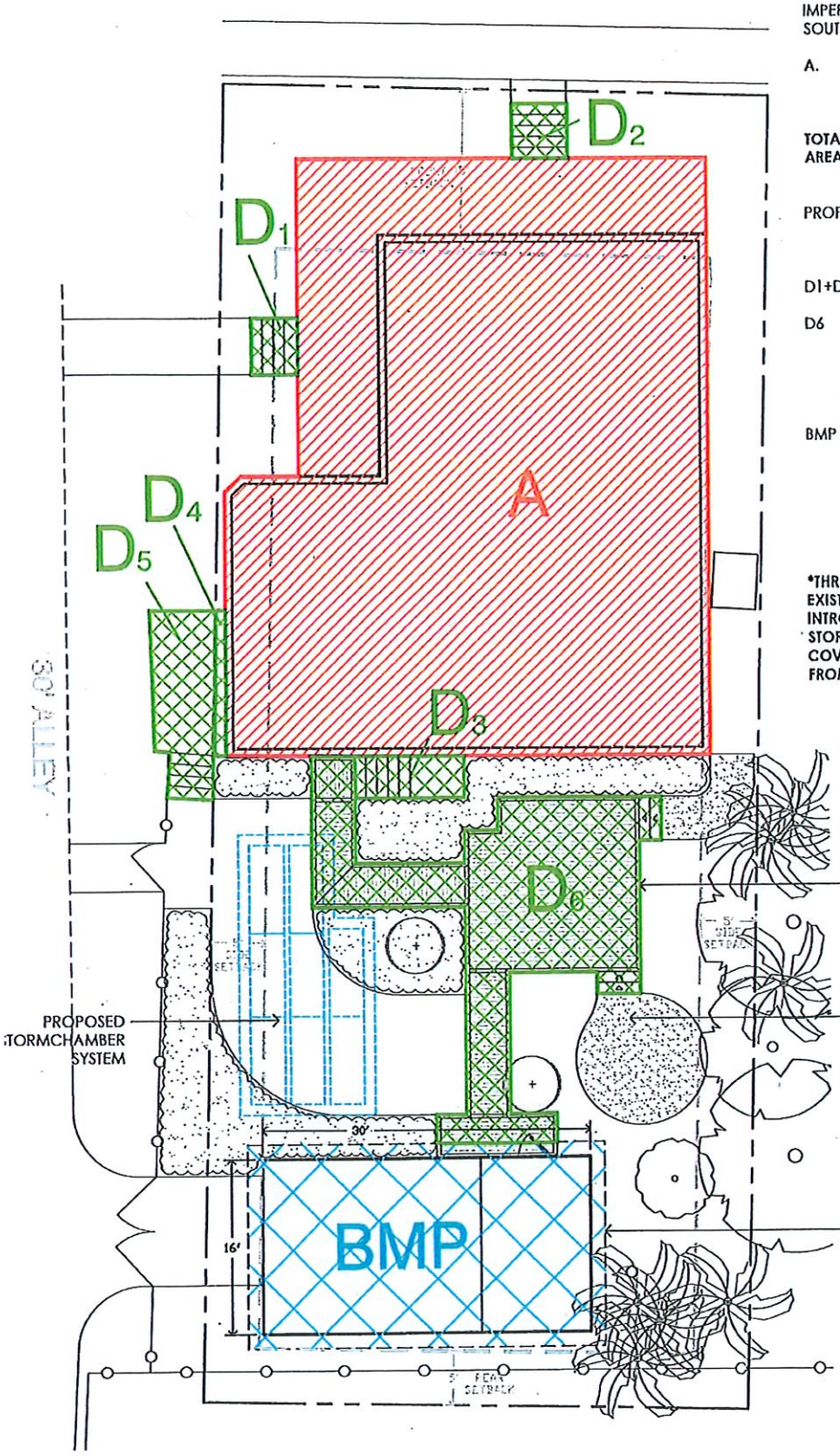
EXISTING CONDITIONS | IMPERVIOUS COVERAGE CALCULATIONS



IMPERVIOUS AREA CALCULATIONS:
SOUTHWESTERLY HALF OF LOTS 4&5 BLOCK "30'

A. 1 STORY FRAME DWELLING, PORCHES & STAIRS - 2,220 SF | 37%

TOTAL APPROXIMATE EXISTING IMPERVIOUS AREA TO REMAIN:
2,220 SF or 37%

PROPOSED IMPERVIOUS AREA CALCULATIONS:

EXISTING DECK AREA:

D1+D2+D3+D4 = 97.82 SF | 1.63%

D6 PROPOSED DECKING:
439.11 SF or 7.32% of 6,000 SF

TOTAL DECKING AREA = 536.93 | 9%
(*BUILT TO CITY ORDINANCE 23-05)

BMP SECONDARY STRUCTURE:

610 SF OF METAL ROOF
*SEE STORMCHAMBER DESIGN FOR DETAILS OF STORMWATER TREATMENT AREA UTILIZING STORMWATER BMPs

***THROUGH THE REMOVAL OF PORTIONS OF THE EXISTING IMPERVIOUS SURFACES AND THE INTRODUCTION OF THE PROPOSED STORMWATER BMPs, THE IMPERVIOUS SITE COVERAGE WILL BE REDUCED FROM 47.82% TO 37.00%**

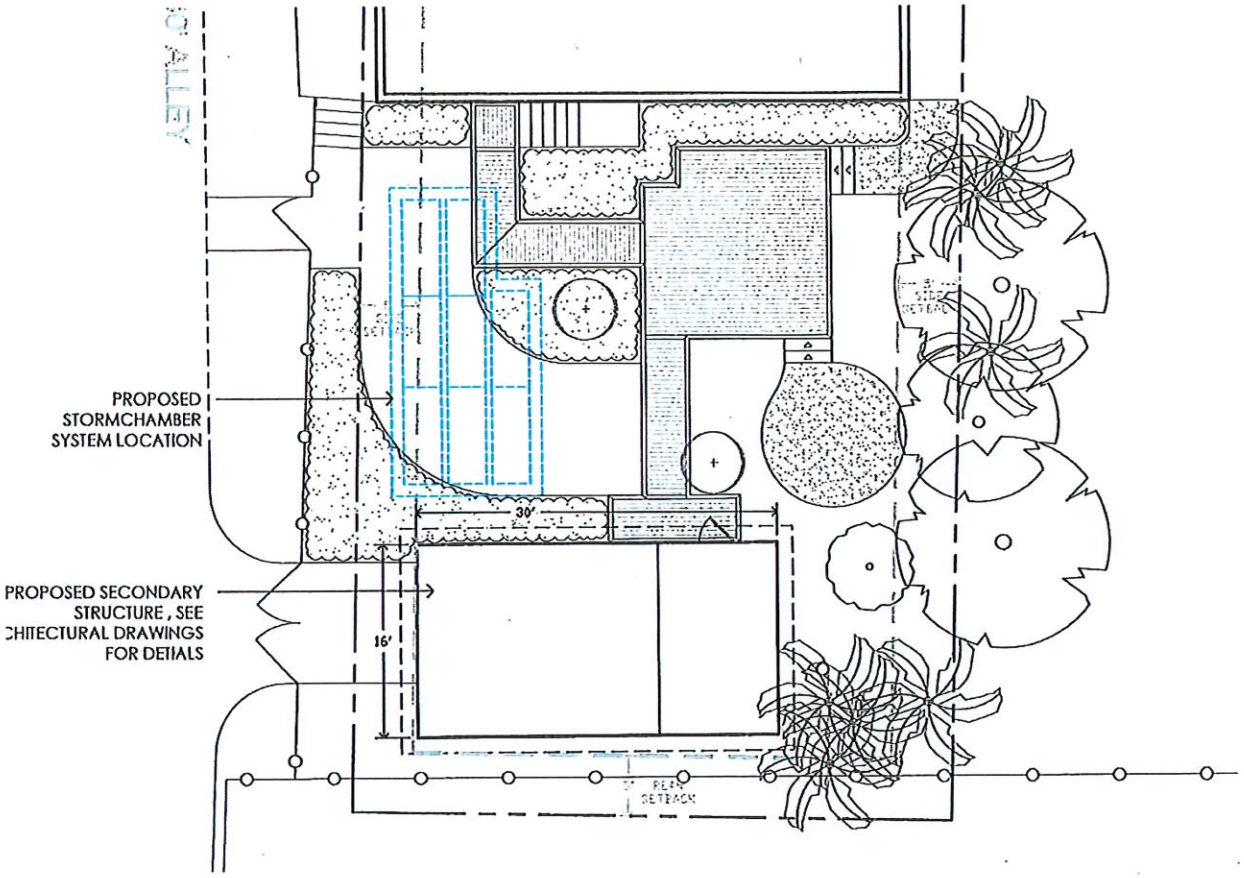
*TOTAL PROPERTY AREA LOT CALCULATIONS:
BLOCK 30 SOUTHWESTERLY HALF OF LOTS 4&5
APPX. 50' x 120' = 6,000 SF

TOTAL AREA = 6,000 SF

0 5 10

WE LOVE LAND STUDIO, INC.

PROPOSED CONDITIONS | IMPERVIOUS COVERAGE CALCULATIONS



NDSCAPE DESIGN- DESIGN CONCEPT & STORMWATER CALCULATIONS:

SIGN CONCEPT-

e goal of the Storm water Best Management Practice at work for this project is to ensure the proposed secondary structure (16' x 30') does not have a negative storm water impact on the site. e structure has a metal roof, one open side (facing the alley) with screening on two sides, provides a covered parking space and an elevated enclosed storage area (approximately 10'x16'). e storm water best management practice concept utilized employs the use of underground storm water chambers that are designed and specified to capture the precipitation that falls on the w metal roof. Water Quality will be addressed by the proposed storm water chamber system. It is designed to treat the initial 1" of storm water runoff from the roof (610 SF) by filtering out and diment and contaminants. The entirety of the storm water that is captured will infiltrate out from the system into the surrounding soil. This system has the capacity to treat the total storm water lume from a 2 yr (or 1" of rain for a 24 hr) storm event (or flood attenuation).

ORM WATER CALCULATIONS-

WATER QUALITY VOLUME CALCULATIONS:

610SF	=	Drainage Area (Square Feet / SF) -	Total Area of Metal Roof w/ 4:12 roof pitch and 1'-4" overhang
1"	=	Rainfall Depth (inches / in.) -	Typical amount of Rainfall treated to ensure water quality in a 2yr. Storm event
50.83CF	=	Required Volume (Cubic Feet / CF) -	Generated from 1" of rainfall on Drainage Area

GEOTECHNICAL DATA UTILIZED FOR STORMWATER CALCULATIONS:

50.88CF	=	Required Water Quality
Soil Group	=	A
0.60"- 2.00"	=	Ksat - per Hour (infiltration rate provided by USDA Websoil Survey)

*Geotechnical Data acquired from (USDA - Web Soil Survey & Site Soil Report)

2 YEAR / 24 HOUR STORM DATA:

6.00"	=	Rainfall depth occurring in a 24 hour period
0.25"	=	Rainfall depth occurring per hour during storm event

*Data from the Soil Conservation Services Historic rainfall data, a 2 year 24 hour storm event is the design standard for stormwater infiltration systems

FLOOD ATTENUATION CALCULATIONS:

Required Flood Attenuation Volume	=	Rainfall Volume x Time Duration x Cubic Foot Conversion x Total Proposed Stormwater Drainage Area (Metal Roof Area)
30SCF	=	.25 inches per hour x 24 hours x 610 Square Feet

SUMMARY OF REQUIRED STORMWATER VOLUMES TO BE TREATED:

50.88CF	=	Water Quality Treatment
30SCF	=	Flood Attenuation Volume

NDS STORMCHAMBER CAPACITY SUMMARY:

398.69CF = Installed System Storage Capacity, see attached NDS StormChamber documents for further details.

RECOVERY TIME CALCULATIONS:

Total Recovery Time (Hours)	=	Installed System Depth (inches) / Infiltration rate (inches per Hour)
From 50 to 15 HRS	=	30" / 0.60"- 2.00" per Hour (as per infiltration rate (Ksat) provided by USDA Websoil Survey)

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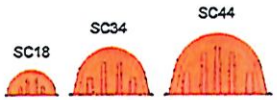


NDS STORMCHAMBERS

92 AVENUE E
APALACHICOLA, FL

NDS STORMCHAMBER SYSTEM SPECIFICATIONS

1. CHAMBERS SHALL BE NDS STORMCHAMBER .
2. CHAMBERS SHALL BE ARCH SHAPED AND SHALL BE MANUFACTURED FROM HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE.
3. CHAMBERS MEET OR EXCEED ASTM F2922 AND ASTM F2787. MEET AASHTO HS-20, HS-25 AND HL-93 LIVE LOADING PER AASHTO LRFD SECTION 12.
4. MANUFACTURED NOMINAL DIMENSIONS OF START, MIDDLE AND END CHAMBERS
   - SC18 3.17 FT WIDE X 18 INCHES TALL.
   - SC34 5 FT WIDE X 34 INCHES TALL.
   - SC44 6.35 FT WIDE X 44 INCHES TALL.
5. MINIMUM COVER FOR SC18 AND SC34 IS 18 INCHES, MINIMUM COVER FOR SC44 IS 22 INCHES .
6. SEDIMENTRAP MANUFACTURED WITH HIGH MOLECULAR WEIGHT, HIGH DENSITY POLYETHYLENE.
7. NON-WOVEN POLYPROPYLENE FILTER FABRIC TMG-4OZNWG BY TMPG OR APPROVED EQUAL
8. WOVEN POLYPROPYLENE FILTER FABRIC 300HTM BY WINFAB OR APPROVED EQUAL.
9. THE PERFORMANCE OF NDS STORMCHAMBER™ IS DIRECTLY CORRELATED TO THE LOAD BEARING CAPACITY, PLASTICITY, AND PERMEABILITY OF NATIVE SOIL; FROST-HEAVE POTENTIAL; VOLUME AND LOAD-RATING OF PROJECT TRAFFIC; INSTALLATION METHODS USED; AS WELL AS THE TYPE, GRADATION, AND THICKNESS OF THE SURROUNDING AND OVERLAY ROCK.

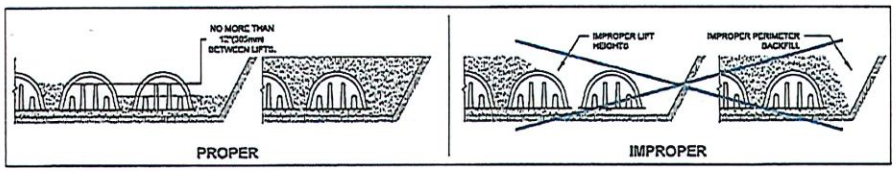
REQUIREMENTS FOR CONSTRUCTION EQUIPMENT

1. NDS RECOMMENDS 3 BACKFILL METHODS, STONESHOOTER LOCATED OFF THE CHAMBER BED, BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE AND BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR. CONVEYORS OR EXCAVATORS SHOULD BE LOCATED SUCH THAT THEIR LOADS DO NOT INFLUENCE THE CHAMBERS SHOULD BE USED TO PLACE BACKFILL STONE.
2. NO CONSTRUCTION EQUIPMENT ALLOWED ON TOP OF THE CHAMBER SYSTEM UNTIL MINIMUM STONE COVER REQUIREMENTS HAVE BEEN MET, 6-INCH FOR SC-18 AND SC-34 AND 12-INCH FOR SC-44, ONLY THEN SHOULD A SKID STEER OR SMALL DOZER (D4) BE ALLOWED ON TOP.
3. NO WHEEL LOADS SHOULD BE APPLIED OVER THE SYSTEM. ONCE THE MINIMUM STONE HAS BEEN PLACED OVER THE CROWN OF THE CHAMBERS, ONLY SMALL WALK BEHIND VIBRATORY COMPACTION EQUIPMENT CAN BE USED UNTIL A 12 INCHES OF COVER IS ACHIEVED. LIGHTWEIGHT TRACKED DOZERS WITH A MAXIMUM GROUND PRESSURE OF 1100 PSF ARE PERMITTED OVER THE STRUCTURE.
4. DOZERS MUST SPREAD STONE WORKING IN A DIRECTION PARALLEL WITH THE CHAMBER ROWS; NOT WORKING ACROSS THE CHAMBER ROWS. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMCHAMBER STANDARD WARRANTY.
5. ONCE 18"(457mm) OF COMPACTED MATERIAL IS OVER THE CHAMBERS, HIGHWAY VEHICLES OF HS-20 AND HS-25 CAN BE OPERATED OVER THE STRUCTURES.
6. A FRONT END LOADER CAN BE OPERATED OVER THE STRUCTURES AS LONG AS THE MAXIMUM WHEEL LOAD DOES NOT EXCEED 16000 POUNDS. COMPACTING EQUIPMENT CAN BE OPERATED OVER THE STRUCTURES AS LONG AS THE DYNAMIC FORCE FROM THE DRUM DOES NOT EXCEED 20000 POUNDS AND THE GROSS VEHICLE WEIGHT DOES NOT EXCEED 12000 POUNDS.

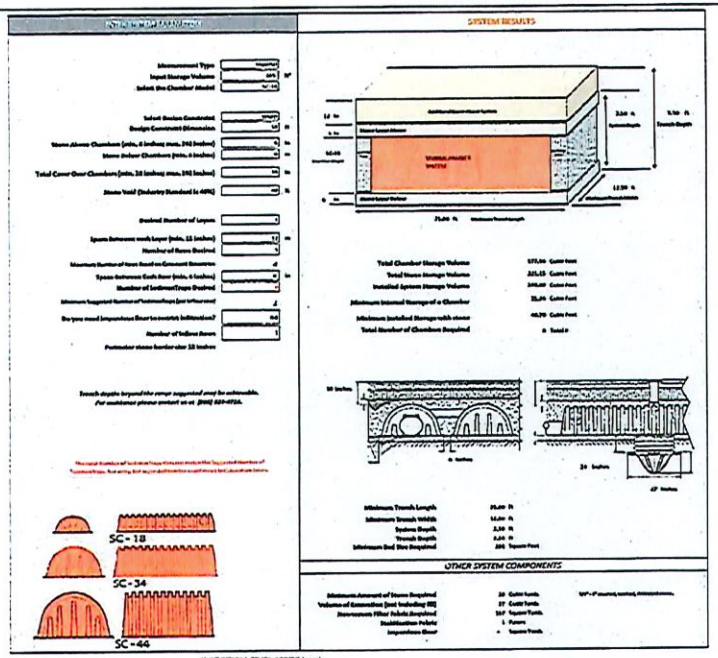
BACKFILL, HANDLING AND INSTALLATION REQUIREMENTS

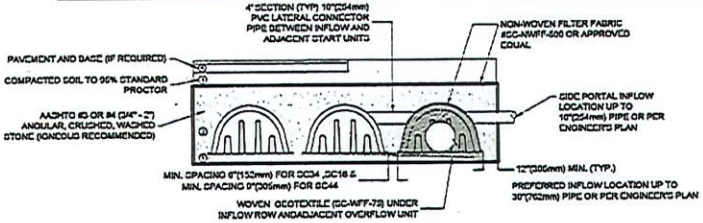
1. THIS DOCUMENT IS NOT A SUBSTITUTE FOR THE INSTALLATION GUIDE.
2. STORMCHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE NDS STORMCHAMBER INSTALLATION GUIDE.
3. STORMCHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS. **CONTACT NDS SPECIALIST 571-521-9538 OR LOCAL REPRESENTATIVE.**
4. IN HOT WEATHER CONDITIONS, IF POSSIBLE, STORE ALL CHAMBERS AND BACKFILL STONE IN A SHADED AREA UNTIL THEY ARE READY TO BE INSTALLED. OUR RECOMMENDATION IS THAT THE SYSTEM BE LAID OUT AND ALL PIPES CONNECTED THE DAY PRIOR TO BACKFILLING WITH STONE. **WHEN TEMPERATURES ARE ABOVE 85°F, BACKFILLING SHOULD BE RESTRICTED TO COOLER MORNING PERIODS ONLY.**
5. 3/4" TO 2" CLEAN, CRUSHED, WASHED, ANGULAR STONE AASHTO M43 DESIGNATION OF #3 OR #4 OR CRUSHED CONCRETE OF THE SAME SIZE. SEE ACCEPTABLE FILL MATERIAL TABLE ON PAGE 3.
6. FOOTING OF CHAMBERS SHOULD BE CONNECTED WITH A DRYWALL SCREW WHEN OVERLAPPING AND INSTALLING.
7. MINIMUM SPACING BETWEEN THE CHAMBER ROWS SC18 & SC34 = 6 INCHES, SC44 = 9 INCHES.
8. INLET, OUTLET, AND INSPECTION PIPES MUST BE INSERTED A MINIMUM OF 12 INCHES (300 mm) INTO CHAMBER.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. PLACE THE BACKFILL MATERIAL IN 6-8 INCH LOOSE LIFTS AND COMPACT. USE MECHANICAL HAND TAMPERS OR APPROVED COMPACTING EQUIPMENT TO COMPACT ALL BACKFILL AND EMBANKMENT IMMEDIATELY ADJACENT TO EACH SIDE OF THE INSTALLATION AND OVER TOP OF THE INSTALLATION TO THE MINIMUM DEPTH SPECIFIED.
11. PLACE BACKFILL SO THERE IS NO MORE THAN A TWO LIFT DIFFERENTIAL BETWEEN ANY OF THE CHAMBERS AT ANYTIME DURING THE BACKFILLING PROCESS (12 INCHES) .
12. PERIMETER STONE MUST BE BROUGHT UP EVENLY WITH CHAMBER ROWS. PERIMETER MUST BE FULLY BACKFILLED WITH STONE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL.

BACKFILL METHODS



PROJECT NAME : 92 AVENUE E PROJECT LOCATION : APALACHICOLA, FL	PROJECT # 4691 - 4692 DATE: 3/18/2024 REVISION: 3/21/2024 DRAWN BY: ARH	NDS STORMCHAMBER SYSTEM DETAILS NDS SPECIALIST: 571-521-9538





ACCEPTABLE FILL MATERIALS: NDS STORMCHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATION	COMPACTION/DENSITY REQUIREMENT
4	FILL MATERIAL FOR LAYER 'A' STARTS FROM THE TOP OF THE 'B' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THIS LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS OR PER ENGINEERS PLANS, CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.		PREPARE PER ENGINEERS PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
3	FILL MATERIAL FOR LAYER 'B' STARTS FROM THE TOP OF THE EMBEDMENT STONE (2" LAYER) TO 18" [457mm] ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THIS LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, 35% FINES. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 A-1, A-2-4, A-3 OR AASHTO M43 #3; 357, 4, 467, 5, 56, 57, 6,67,68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTION AFTER 12" [305mm] OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" [152 mm] LIFTS TO A MIN. 95% STANDARD PROCTOR DENSITY. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs. [53kN]. DYNAMIC FORCE NOT TO EXCEED 20,000lbs [89kN].
2	EMBEDMENT STONE SURROUNDING THE CHAMBERS FROM THE FOUNTAIN STONE ("1" LAYER) TO THE "3" LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION ¾"-2 INCH [19-51mm]	AASHTO M43 - #3, 4	90% T99.
1	FOUNDATION STONE BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION ¾"-2 INCH [19-51mm]	AASHTO M43 - #3, 4	PLATE COMPACTOR OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY. T99 AASHTO.

INSPECTION AND MAINTENANCE OF STORMCHAMBER SEDIMENTRAP ROW

STORMCHAMBER™ WITH SEDIMENTRAP™ ROW IS DESIGNED FOR EASE OF INSPECTION AND REDUCED LONG-TERM MAINTENANCE COST MONITORING T.S.S. BUILDUP IN A SEDIMENTRAP™ CAN BE DONE WITHOUT THE NEED FOR A THIRD PARTY AS THE TRAP SITS DIRECTLY BELOW THE OBSERVATION PORT. A CAMERA WITH LIGHT AND/OR LONG MEASURING STICK CAN SUCCESSFULLY INSPECT AND DETERMINE WHEN MAINTENANCE IS NEEDED. AS NEEDED, SEDIMENT REMOVAL WITH A VACUUM TRUCK REQUIRES LITTLE OR NO WATER JETTING AS WITH OTHER COMPETING SYSTEMS.

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1: MAINTENANCE WITH SEDIMENTRAP - VACUUM TRUCK METHOD

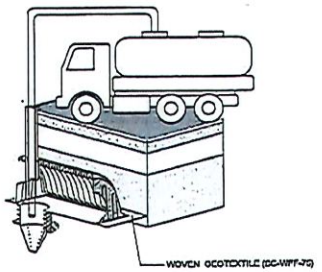
REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILD-UP IN THE SEDIMENTRAPS.IF SEDIMENT BUILD-UP IN THE SEDIMENTRAP IS WITHIN 6 INCHES FROM THE TOP OF THE SEDIMENTRAP OR CHAMBER BOTTOM THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILD-UP IS LESS THAN6 INCHES, LOG THE RESULTS AND PLACE THE LIDS BACK ON.

- INSERT VACUUM TUBE THROUGH 10 INCH CLEAN OUT RISER.
- VACUUM TUBE WILL NEED TO REACH THE BOTTOM DEPTH OF SEDIMENTRAP (TYP. 7-10 FEET BELOW FINISHED GRADE).
- REMOVE SEDIMENT USING VACUUM TRUCK/EQUIPMENT UNTIL NO FURTHER SEDIMENT IS BEING REMOVED.
- INSPECT SEDIMENT BUILD-UP AGAIN TO ENSURE PROPER CLEANOUT.

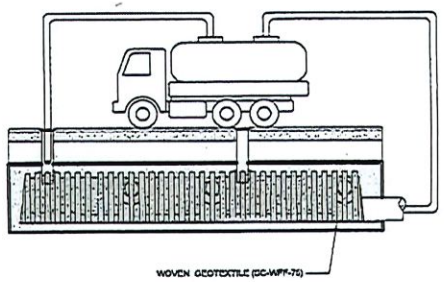
2: MAINTENANCE WITHOUT SEDIMENTRAP - WATER JET METHOD

REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILD-UP ON THE UNDERLYING WOVEN FABRIC UNDER THE CHAMBERS. IF SEDIMENT BUILD-UP ON THE BOTTOM IS GREATER THAN 3 INCHES THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILD-UP IS LESS THAN 3 INCHES, LOG THE RESULTS AND PLACE THE LIDS BACK ON.

- REMOVE SEDIMENT FROM SEDIMENT ROW USING A HIGH PRESSURE WATER JET SYSTEM.
- PREFERRED EQUIPMENT REQUIRED SHOULD HAVE A FIXED FLOOR CLEANING NOZZLE (REAR FACING) WITH A SPREAD OF AROUND 45 INCHES.
- APPLY AS MANY PASSES IN THE ROW UNTIL THE BACKFLUSH WATER IS CLEAN.
- VACUUM AREAS UNDER INSPECTION PORTS AND OUT OF ANY MANHOLES.



MAINTENANCE WITH SEDIMENTRAPS USING VACUUM TRUCK



MAINTENANCE WITHOUT SEDIMENTRAPS USING WATER JET

PROJECT NAME : 92 AVENUE E - SYSTEM #2
PROJECT LOCATION : APALACHICOLA, FL

PROJECT # 4692
DATE: 3/18/2024 REVISION:
DRAWN BY: ARH

STORMCHAMBER® NDS Design Worx

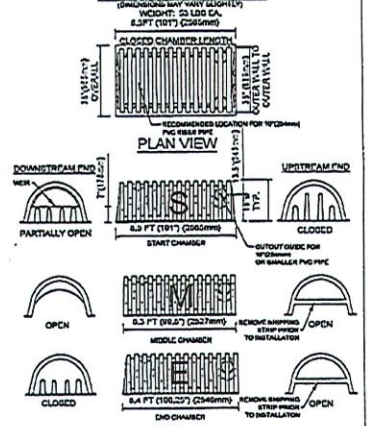
NDS STORMCHAMBER SYSTEM DETAILS
NDS SPECIALIST: 571-621-6536

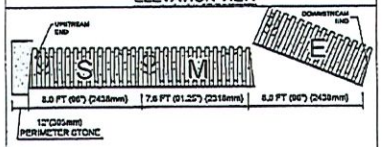
CHAMBER PART	WIDTH (IN)(MM)	HEIGHT (IN)(MM)	WEIGHT (LBS)	ACTUAL LENGTH (IN)(MM)	INSTALLED LENGTH (IN)(MM)	CHAMBER VOLUME (CF)(CM)	INSTALLED STORAGE VOLUME(CF)(CM)
START	38"(965)	16"(457)	53	101"(2565)	96"(2438)	22.5(0.63	46.5(1.31)
MIDDLE	38"(965)	16"(457)	53	99.8"(2527)	91.25"(2318)	21.4(0.60)	46.7(1.10)
END	38"(965)	16"(457)	53	100.25"(2546)	96"(2438)	22.5(0.63)	46.5(1.31)
CLOGED	38"(965)	16"(457)	53	101"(2565)	101"(2565)	23.8(0.88)	66.0(1.82)

6"(152mm) ABOVE AND BCLOW CHAMBER, 6"(152mm) CHAMBER SPACING, 12"(305mm) PERIMETER STONE AND 40% POROSITY

SC-1820 DIMENSIONS

(DIMENSIONS MAY VARY SLIGHTLY)
WEIGHT: 53 LBS EA.
8.3FT (101") (2565mm)

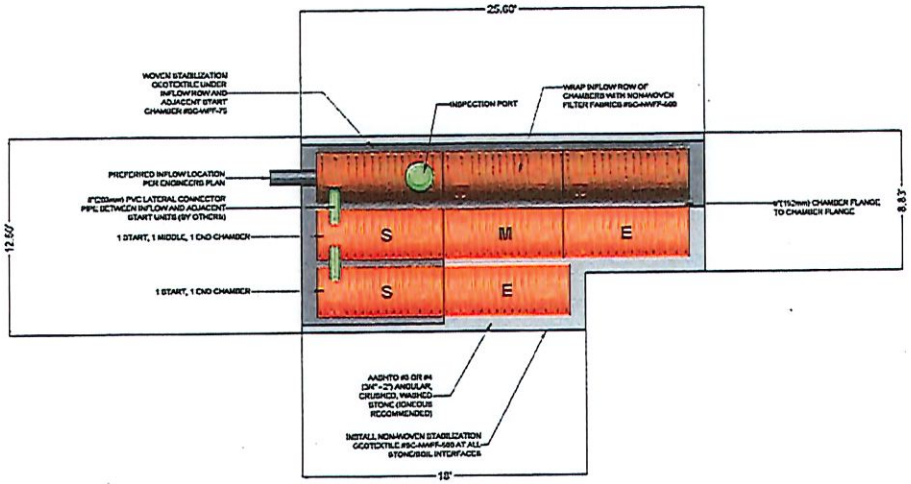


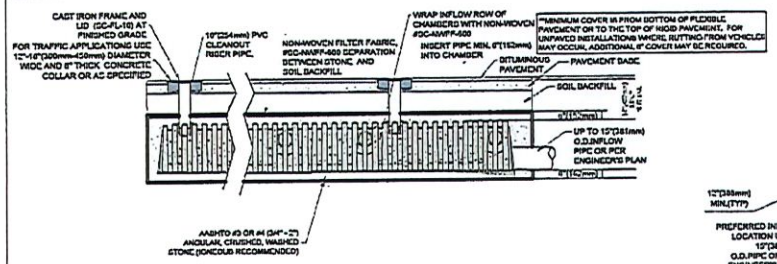


NOTES:
1. START CHAMBERS (CLOSED AT THE SIDE PORTAL END) ARE PLACED AT THE INFLOW END OF THE ROWS.
2. BOTH PLACEMENTS WITH START CHAMBERS AND END ROWS WITH END CHAMBERS.
3. PLACE FIRST RIB OF THE NEXT CHAMBER IN THE ROW OVER THE LAST RIB OF THE PREVIOUS CHAMBER WITH SCREWS.

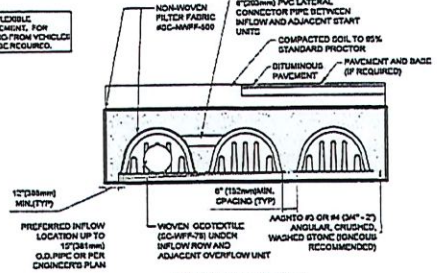
INSTALLED LENGTHS
ELEVATION VIEW

PLAN VIEW

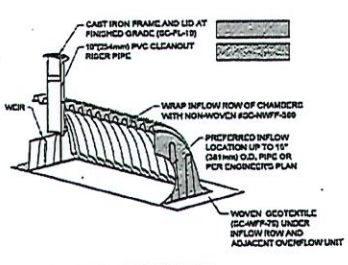




TYPICAL SIDE VIEW



TYPICAL FRONT VIEW



START CHAMBER CUTAWAY

MATERIAL LIST

DESCRIPTION	STOCK CODE	QTY	UNITS
CHAMBERS AND ACCESSORIES:			
START CHAMBER	SC-1820-S-O	3	EACH
MIDDLE CHAMBER	SC-1820-M-O	2	EACH
END CHAMBER	SC-1820-E-O	3	EACH
CLOGED CHAMBER	SC-1820-C-O	N/A	EACH
SEDIMENTRAP™	SC-ST	N/A	EACH
NON-WOVEN GEOTEXTILE	SC-NWFF-500	1	ROLLS
WOVEN STABILIZATION GEOTEXTILE	SC-WFF-75	1	ROLLS
24"Ø X 12'H HDPE PIPE FOR SEDIMENTRAP™	SC-2412P	N/A	EACH
10" CAST IRON FRAME AND LID	SC-FL-10	1	EACH
MATERIALS BY OTHERS:			
10"(254mm) DIAMETER RISER PIPE	OTHERS	1	EACH
8"(203mm) LATERAL CONNECTOR PIPE	OTHERS	2	EACH
IN-PLACE EXCAVATION (NO BULKING FACTOR)	OTHERS	27	CU YD
STONE BACKFILL	OTHERS	20	CU YD
1/4" X 1-1/2" NUT AND BOLT	OTHERS	8	EACH
3" SCREWS	OTHERS	8	EACH
IMPERVIOUS LINER	OTHERS	N/A	SQ YD
4" PERFORATED UNDERDRAIN	OTHERS	N/A	LF

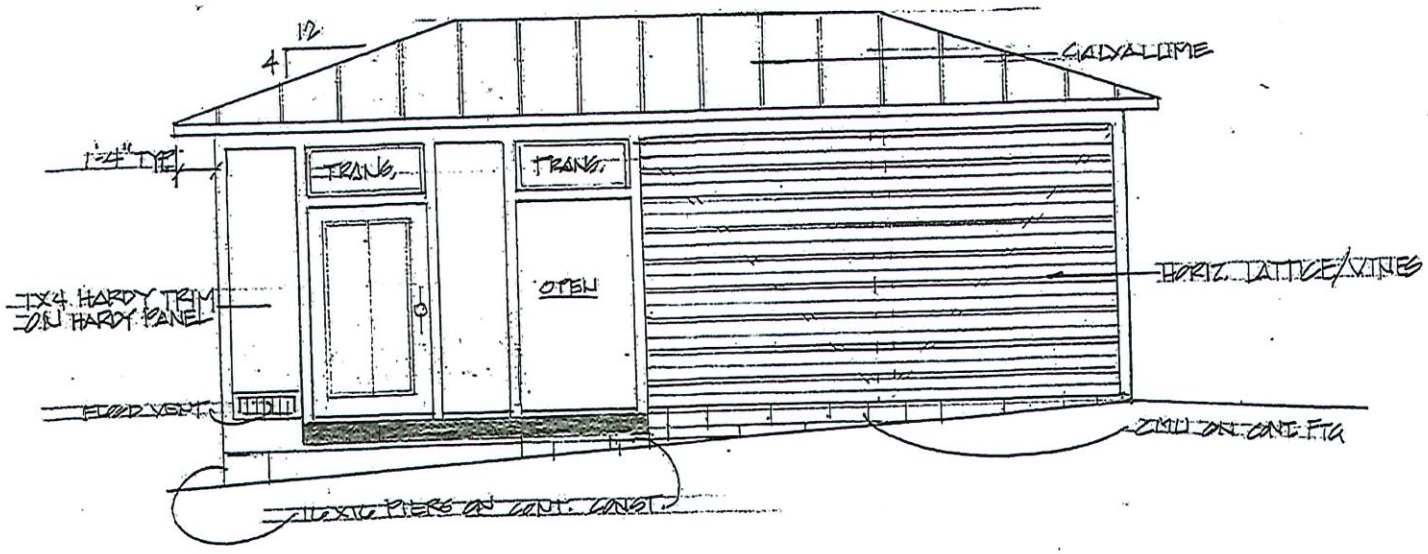
PROJECT NAME : 92 AVENUE E - SYSTEM #2
PROJECT LOCATION : APALACHICOLA, FL

PROJECT # 4692
DATE: 3/6/2024 REVISION:
DRAWN BY: ARH

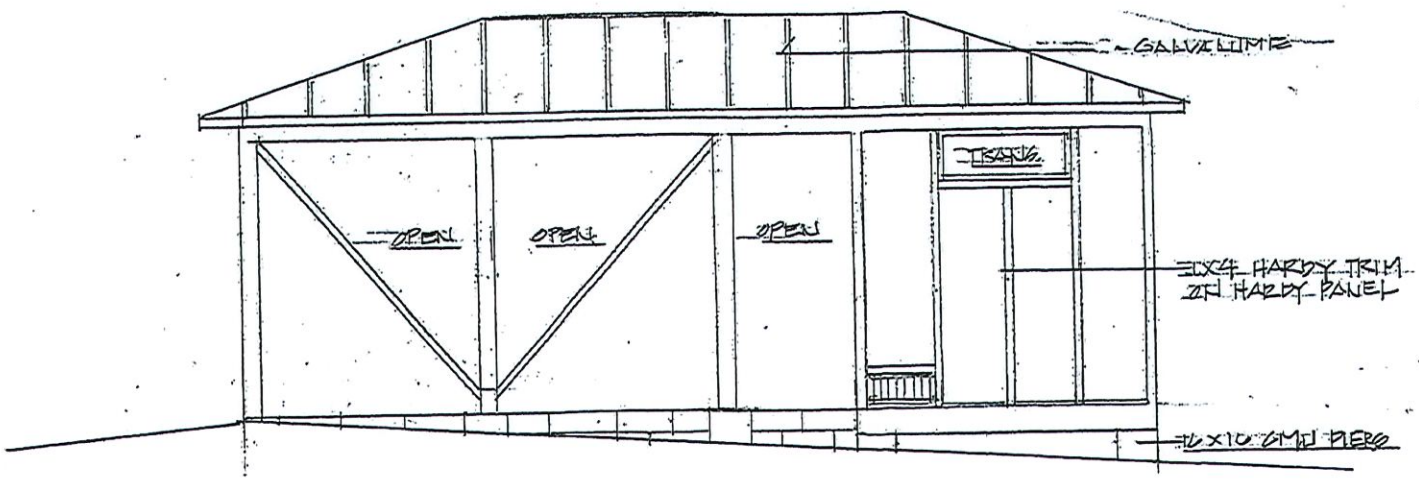
STORMCHAMBER® NDS Design Worx

NDS STORMCHAMBER SYSTEM DETAILS
NDS SPECIALIST: 571-621-6538

DRAWING# 1820 -DT
REV. H DATE 3/21/2024

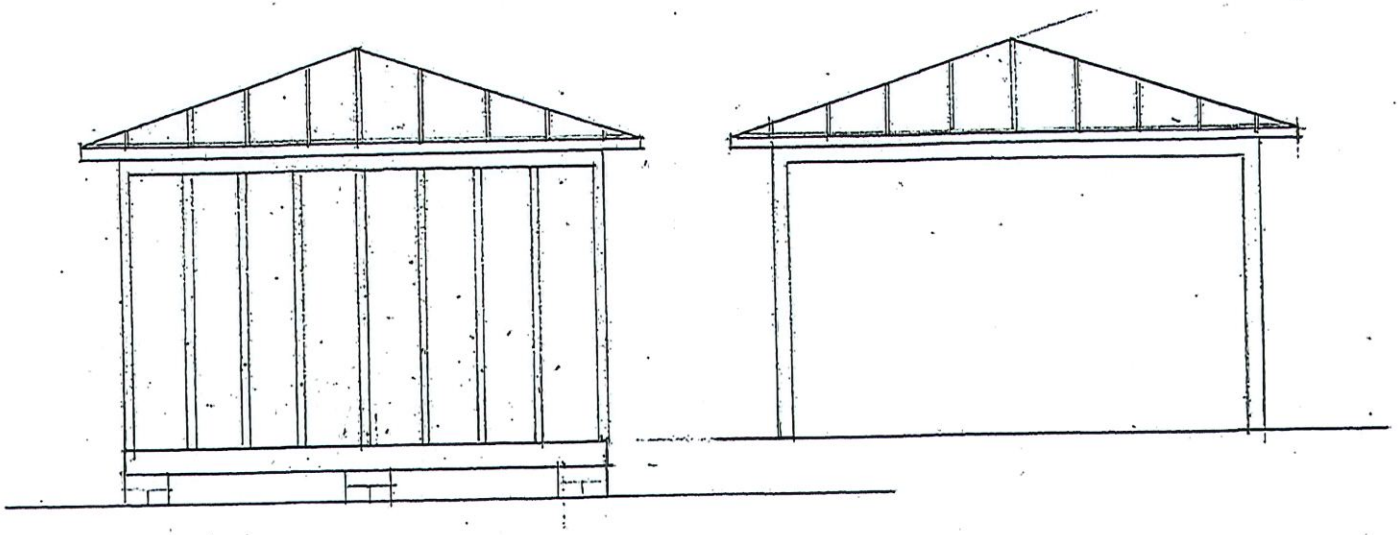


North Elevation ¼"=1'-0"

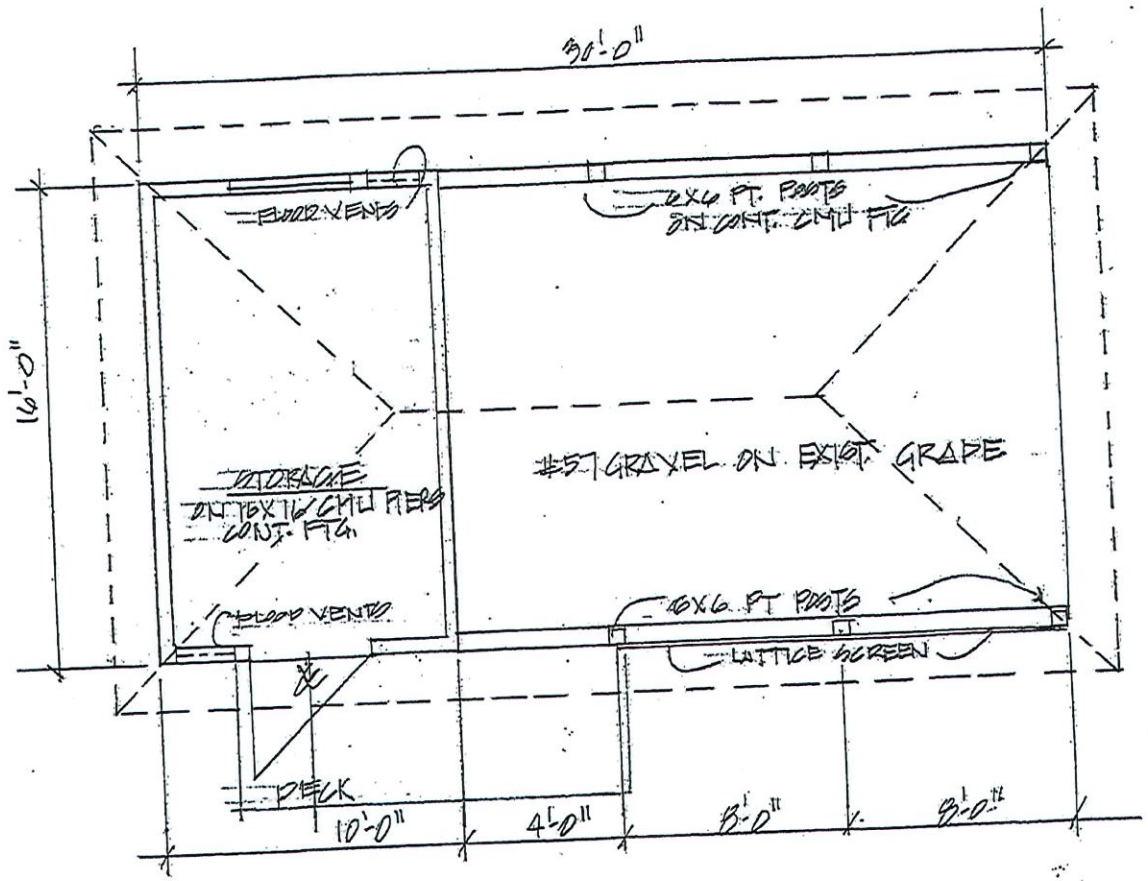


South Elevation

1/4"=1'-0"



East and West Elevations ¼"=1'-0"



Storage Building and Carport Plan 1/4"=1'-0"

Definitions/Code of Note:

***Impervious surface coverage*:** Those hard surface man-made areas that do not allow, or minimally allow, the penetration of water, that reduce the natural rate or percolation of water or result in an increase in the natural quantity and rate of storm water runoff. Examples include but are not limited to roof tops, parking, clay, asphalt, concrete, brick, compacted gravel, paved recreational areas such as pools, tennis courts, and landscape pavers. Exceptions: Pervious decks as described herein and **items identified on a site plan as a best management practice to treat stormwater shall be allowed within open space and not considered impervious.** Pervious decks are defined as decks with a minimum spacing of ⅛ inch between decking boards. Pervious decks shall be limited to an additional ten percent additional total lot coverage (i.e. ten percent additional total lot coverage above the code maximum for impervious coverage applicable to each zoning category; e.g. if max impervious coverage is forty percent then a deck may be added which covers additional lot area up to a total of fifty percent lot coverage when adding the total impervious lot coverage and the pervious deck coverage). (LDC, Ch. 101, Art. I, Sec. 101-8 Definitions.)

***Storm water* management *system*:** A surface water system that is designed and constructed or implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, over drainage, environmental degradation, and water pollution or otherwise affect the quantity and quality of discharges from the system.

Stormwater* best management practice *(BMP): The term "best management practices (BMP)" means those practices and principles designed to manage water from rainfall events, reduce nonpoint sources of pollution and in some cases, protect wildlife and habitat. Methods may include structural devices or nonstructural practices, such as, but not limited to compensatory storage, swales, gutters, rain barrels and rain gardens. A City of Apalachicola Guide to Site-Specific Stormwater Best Management Practices is available to download from the city's website.

Lot coverage means the area of the lot covered by the ground floor of all principal and accessory uses and structures, including all areas covered by the roof of such uses and structures, measured along the exterior faces of the walls, along the foundation wall line, between the exterior faces of supporting columns, from the centerline of walls separating two buildings or as a combination of the foregoing, whichever produces the greatest total ground coverage for such uses and structures. Lot coverage shall also include all impervious surfaces such as drives, parking areas, walkways, swimming pools, patios, terraces and the like.

Sec. 115-1. - City requirements.

(1) Certain types of residential and commercial development trigger State stormwater permitting permits depending on size and type of proposed development. As an area of critical state concern, the city has adopted more stringent stormwater standards than state requirements. A more comprehensive overview of state permitting requirements and the relationship to the city standards may be found online at cityofapalachicola.com/building.Dept.cfm:

a. Residential. Applications for all new residential development in special waterfront district or areas of special hazard (A&V zone) must include a stormwater management plan which may consist of a best management practice (BMP) as part of their site plan. Proposed improvements that increase lot coverage shall also provide for stormwater treatment by indicating the stormwater treatment best management practice that will be utilized.

Sec. 111-272. - O/R office residential.

(a) *District intent.* The provisions of the O/R district are intended to apply to areas with a specialized intensive residential character wherein a variety of housing types and compatible limited non-retail commercial, education, religious, recreation uses are permitted. This district shall occur in that area shown as office residential on the Official Land Use Map of Apalachicola.

(b) *Permitted uses and structures.*

(1) *Principal.*

a. Single-family residential.

b. Two-family residential.

c. Professional offices and services.

d. Studios and galleries for photography, music, art, dance, vocal and drama.

e. Medical offices and services.

f. Bed and breakfasts.

(2) *Accessory.* Accessory uses and structures are considered incidental and subordinate to permitted principal and approved special exception uses and structures. Habitable accessory uses are not permitted. All accessory uses must be approved by special exception. Accessory uses are subject to the following requirements: the accessory use must be subordinate to the principal use; must be related to the principal use; is not a separate commercial or retail business; does not require separate signage; and does not increase traffic or parking beyond the principal use requirements. Additional restrictions governing accessory uses, including, but not limited to, size and parking may be determined by the planning and zoning board.

(3) *Special exceptions.* After public notice and hearing and appropriate conditions and safeguards, the planning and zoning board may permit as special exceptions:

a. Funeral homes.

b. Utilities substations.

c. Hospitals and clinics.

d. Public buildings.

e. Cemeteries.

f. Churches and church-sponsored businesses.

g. Schools.

h. Residential apartment units.

i. Child care centers.

(c) *Prohibited uses and structures.*

(1) Mobile homes or housetrailers.

(2) Establishments for the conduct of retail trade.

(3) Storage yards or warehouses.

(4) Any structure or use not of a nature specifically or provisionally permitted herein.

(d) *Development standards.*

(1) *Minimum lot or site size.*

a. Single-family and other principal uses.

1. Area: 6,000 square feet.
2. Width: 60 feet.
3. Depth: 100 feet.

b. Two-family.

1. Area: 9,000 square feet.
2. Width: 90 feet.
3. Depth: 100 feet.

(2) *Minimum building setbacks.*

a. Front: 15 feet.

b. Side, interior lot: 7½ feet each side, or any combination of setbacks on each side that equals at least 15 feet, provided that no such setback shall be less than five feet.

c. Side, corner lot: 15 feet.

d. Rear: 25 feet.

(3) *Minimum building size.* Single-family dwelling: 800 square feet.

(4) *Maximum building restrictions.*

a. Lot coverage: 40 percent.

b. Permissible building height: 35 feet.

(e) *Applicable regulations.*

(1) *Parking regulations.* See section 111-288.

(2) *Special exceptions.* Unless otherwise specified, special exceptions must comply with development standards for principal uses. If deemed appropriate by the planning and zoning board in order to grant a special exception, certain more stringent standards may be imposed. Any accessory use proposed as part of a special exception request must meet the following conditions: must not be for habitable purposes, must be subordinate to the principal use; must be related to principal use; is not a separate commercial or retail business; does not require separate signage and does not increase traffic or parking beyond the principal use requirements. Additional restrictions concerning accessory uses, including, but not limited to, size and parking may be determined by the planning and zoning board.

INFORMATION SOURCES/CREDITS

Waterfront Property Owners Guide, Florida Department of Environmental Protection, Revised, 2008

Stormwater Management - A Guide for Floridians, Florida Department of Environmental Regulation

The Florida Development Manual: A Guide to Sound Land and Water Management, 1988, Florida Department of Environmental Regulation (Protection)

Franklin County Guide to Responsible Coastal Development, Franklin County Planning Department

Stormwater To Street Trees: Engineering Urban Forest for Stormwater Management, U.S. Environmental Protection Agency

How To Operate & Maintain Your Stormwater Management System, Southwest Florida Water Management District

Enhancing Sustainable Communities With Green Infrastructure, Environmental Protection Agency

City of Apalachicola

Guide to Site Specific STORMWATER Best Management Practices

City of Apalachicola Site Specific Stormwater Best Management Practices, Apalachicola Planning Department, May 2015

This booklet was created with Technical Assistance Funds from the Department of Economic Opportunity.

Special Thanks for Research and Support

Betty Webb, Administrator, City of Apalachicola

Apalachicola City Commission

Anita Grove, Margot Posten, Apalachicola National Estuarine Research Reserve

Lee Marchman, Florida Department of Environmental Protection

Michael Bateman, Northwest Florida Water Management District

Rebecca Jetton, Mark Yelland, Florida Department of Economic Opportunity

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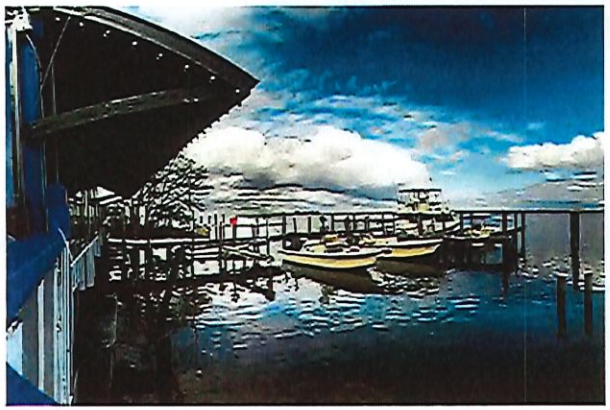


THE BIG PICTURE

Because stormwater runoff is generated from dispersed land surfaces—pavements, yards, driveways, and roofs—efforts to control stormwater pollution must consider individual, household, and public behaviors and activities that can generate pollution from these surfaces. These common individual behaviors have the potential to generate stormwater pollution:

- **Littering**
- **Disposing of trash and recyclables**
- **Disposing of pet-waste**
- **Applying lawn-chemicals**
- **Washing cars,**
- **Changing motor-oil on impervious driveways**
- **Household behaviors like disposing leftover paint and household chemicals**

COMMON SENSE TIPS

1. Use Garden and Lawn Chemicals Wisely - Follow package directions carefully, and only use pesticides, herbicides and fertilizers when other methods fail. Do not apply if rain is in the forecast. WHY? Excessive fertilizers and chemicals wash off the property and into surface and ground waters.

2. Keep irrigation water on the lawn and garden, not on paved surfaces.

3. Divert rain spouts to unpaved areas or swales, and wash vehicles where water will drain to vegetated areas. WHY? This allows runoff to soak into the soil and not wash off the property into nearby waterbodies after picking up pollutants.

4. Compost Leaves, Grass and Shrub Clippings. Use these materials as mulch to supplement fertilizers. Do not rake these materials into roadways or swales. WHY? These materials will decompose, returning nutrients to the soil so that you can use less fertilizers. If placed in roads or swales, yard debris will block drainage flows and end up in your nearest waterbodies.

5. Don't Drain Used Motor Oil Into Storm Drains. Take used motor oil and antifreeze to service stations to recycle them. WHY? These products are toxic and add pollutants to surface waters if placed or washed into storm drains.

6. Service Your Car Regularly. Have your car inspected and maintained regularly. WHY? To prevent leakage of motor oil, antifreeze and other fluids that can end up in the nearest waterbody. Well maintained vehicles reduce harmful emissions that also can contaminate surface waters.

STRUCTURAL DETENTION BMPS - PONDS

In areas with slowly percolating soils, high water tables and flat terrain, permanently wet detention systems and wetland treatments systems are likely to be the preferred BMPs. Detention systems are storage areas that maintain a planned permanent level of water even after stormwater discharge has ceased. If properly planned and constructed, wet detention areas provide multiple benefits including "lake-front" property, possibilities for recreation and wildlife habitat, water for irrigation and fire protection.

DETENTION PONDS

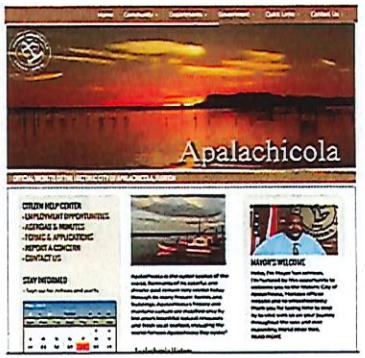
If your property is located in an area where the water table is near the surface, a wet detention pond may be the BMP for managing your stormwater. Although wet ponds are not commonly used on residential lots, if your property has a natural contour that forces water to drain into one or two locations, a pond may be good BMP. Detention ponds are more commonly used for to serve large areas, such as subdivisions or commercial developments.

Untreated stormwater is a source of pollution to Apalachicola Bay. Oils and petroleum from cars, asphalt from roads, chemicals and greases from businesses and even household soaps, garden fertilizers and pesticides can all harm aquatic life if washed directly into the bay. Additionally, coastal land clearing and construction activities can degrade water quality if the soil or cleared debris is allowed to wash directly into the water.

If you plan new commercial or large scale development in the City or if you own property along the Apalachicola River or Bay and you propose new construction or significant land clearing, you will need to provide a plan for how you intend to keep untreated stormwater runoff from draining into the coastal waters. (City of Apalachicola Land Use Regulations, Section VIII)

The type of development you propose will determine the design and permitting approval process for your stormwater plan. Commercial or large scale residential projects are required to receive State permitting and/or notifications from the Florida Department of Environmental Protection and the Northwest Florida Water Management District.

Small scale development adjacent to coastal waters can meet the City's stormwater standards with Green Infrastructure Low Impact Development (LID) measures to ensure that non-point pollution is treated before making its way to area coastal waters.



You can visit the Cityofapalachicola.com website to learn more about stormwater planning efforts in the city. You can also download the City of Apalachicola Stormwater Regulations by scanning the code below.

LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions.

THE FIRST FLUSH

Of primary importance to minimizing the effects of stormwater on water quality is the First Flush. This term describes the washing action that stormwater has on accumulated pollutants in a watershed. In the early stages of runoff the land surfaces, especially the impervious surfaces like streets and parking areas, are flushed clean by the stormwater. This creates a shock load of pollutants that are flushed into the nearby coastal waters.

Studies in Florida have determined that the first one inch of runoff generally carries 90% of the pollution from a storm. Treatment of the first flush is the key to proper stormwater management.

BEST MANAGEMENT PRACTICES (BMPS)

Best Management Practices (BMPs) are methods used to reduce stormwater pollution. BMPs are classified into two categories - Nonstructural and Structural. Nonstructural measures are preventative in nature and include such concepts as Green Infrastructure (GI) site planning, good housekeeping techniques and landscape planning. Nonstructural BMPs are considered the first line of defense and are the easiest methods for homeowners to use. Structural controls include traditional facilities such as detention ponds, retentions basins, trenches, pervious paving and filters. Structural BMPs are generally used for commercial or large scale residential subdivisions and require engineering to implement. The Florida Land Development Manual - Guide to Sound Land and Water Management contains specific information on such BMPs. You can download that manual at www.dep.state.fl.us or call the Florida Department of Environmental Protection at (850) 245-7508 for more information.

STRUCTURAL RETENTION BMPS - BASINS AND SWALES

Retention BMPs retain stormwater onsite, allowing it to infiltrate into the ground or to evaporate. These practices reduce the volume of stormwater and are the most effective for reducing stormwater pollution since the the first flush is not discharged to surface waters. Commonly used retention BMPs include retention basins and grassed swales.

RETENTION BASINS

If you live in an area with sandy soils or where the water table is deep, you can create retention areas to treat stormwater. Retention areas are simply small depressions in your landscape where the water can pond for a short time before soaking into the ground or evaporating. These areas can be planted with appropriate native vegetation that helps maintain soil permeability, filter runoff and use less fertilizers/pesticides. These types of landscaped retention areas are also called "bioretention" practices.

GRASSED SWALES

Swales, also called grassed waterways, are one of the oldest stormwater BMPs, and have been used along streets and highways for years. A swale is a man-made depression in the land which should run parallel to the area to be treated and the wetland. Proper placement of a swale and berm system slows down the rapid flow of stormwater runoff entering water bodies. After the swale catches the flow, it is held back by the berm. Impurities sink to the bottom and the cleaner water lining the surface spills over when the swale becomes full. Slowly the stormwater evaporates and percolates through the soil. The percolation process cleanses stormwater runoff and helps recharge underground aquifers.

Swales are most effective in areas with good drainage and sufficient land to allow for adequate percolation. A swale should have gently sloping sides of at least three (3) feet horizontal to each one (1) foot vertical. These dimensions allow for easier maintenance which should only require mowing and periodic removal of trash and other debris.

Maintenance requirements for swales are not significantly greater than those for a normal lawn. However public education is essential, especially for residents who live in developments served by swales. Residents need to be informed about the benefits provided by their swale so they take pride in maintaining it and do not fill it in. Leaves, limbs and other vegetation, along with debris and oil should not be disposed of in the swale.

VEGETATION IS IMPORTANT TO STORMWATER MANAGEMENT

Vegetation provides several benefits in managing stormwater. It absorbs the energy of rain, prevents erosion, maintains the soil's capacity to absorb water, promotes infiltration. Vegetation also slows the velocity of runoff, reducing peak discharge rate. Vegetation is especially important in reducing erosion and sedimentation during construction, By phasing and limiting the removal of vegetation, and by decreasing the area that is cleared and limiting the time bare land is exposed to rainfall, sedimentation at construction sites can be reduced by up to 90%.

VEGETATED BUFFERS

If you own a medium to large size parcel of waterfront property, you may wish to consider a vegetated buffer between your property and the water as a filter for runoff. This vegetation helps reduce pollutants in surface and ground waters flowing into a waterbody.

RESHAPE OR CONTOUR

Contouring or reshaping your property allows you to provide areas where water can pond temporarily and soak into the ground.

TERRACING

If your property is steeply sloped, you may wish to incorporate the technique of terracing to minimize stormwater runoff from cascading down a steep yard. Terracing your yard can help slow down the water, minimizing the potential for erosion. Terracing can create dramatic views and broaden your yard's use for landscaping or gardening.

SITE SPECIFIC STORMWATER BMPS FOR HOMEOWNERS

Depending on the lot size and lot coverage, there are several effective nonstructural and simple structural stormwater BMPs that can be built and used by property owners. Some of the most popular methods include Guttering into Rain Barrels, Cisterns or Rain Gardens, Porous Paving, Vegetated Buffers, Contouring and Terracing.

GUTTERING

One of the easiest methods of managing residential stormwater is through the use of guttering which is directed by down spouts to either your lawn or flower bed rather than to your driveway. Another variation on that method is to set up a rain barrel or cistern to capture your roof runoff and use it to irrigate your yard. This method of treatment is best used for small to medium residential lots where space is at a premium.

The Apalachicola National Estuarine Research Reserve offers classes periodically on how to build Rain Barrels and other Green Infrastructure BMPs. Contact them at 850-670-7708 to learn more.

How To Build A Rain Barrel

It's pretty easy to build your own rain barrels from plastic drums or trash cans. Start with a plastic 55-gallon drum with a cover. Place the drum near a downspout, drill a hole in the side near the bottom and screw in a drain valve. This installation will work if you plan to run a soaker hose to your garden. If you want to use a wand or a spray nozzle, you'll need to elevate the barrel on a stand for more water pressure. Water is heavy (55 gallons weighs 440 lbs.), so use 4x4 treated lumber for the legs and secure everything with construction screws or stainless steel lags. If you have large gardens and want to store more water, double-size the stand and add a second barrel.

Cut holes in the bottoms of the barrels with a 2-1/4-in. hole saw. Then screw in a 2-in. male threaded electrical conduit adapter. Squirt a thin bead of silicone caulk around the opening and screw on a threaded electrical PVC coupler to cinch the barrel between the two fittings Next, glue together sections of 2-in. PVC pipe, unions, reducers and valves. As long as you're at it, install an overflow pipe so you can direct the excess where you want it. Finally, cut a hole in one of the covers and mount a screen to filter out leaves and debris.

You can download complete instructions for how to build a rain barrel at http://www.epa.gov/region3/p2/make-rainbarrel.pdf

RAIN GARDENS

A rain garden is a good option for homeowners with a medium to large lot with plenty of open space. You will want to gutter the rain at least 10 feet away from the house as this is a wet-detention form of stormwater management.

A rain garden is basically a plant pond - a garden bed that you plant with special deep-rooted species. These plants help the water rapidly seep into the soil. You direct the rainwater from the downspouts to the garden via a swale (a stone channel) or plastic piping. The garden captures the water and, when properly designed, drains it into the soil within a day. If there's an especially heavy rainfall, excess water may overflow the rain garden and run into the storm sewer system. Even so, the rain garden will have done its job. It will have channeled water away from your foundation and reduced the load on the sewer system. A rain garden also reduces the amount of lawn chemicals and pet wastes that may otherwise run off into local waters.

Create the rain garden by building a berm in a low spot in the yard, then build swales to channel runoff from the gutters and higher parts of the yard. The water is then absorbed into the soil through the network of deep plant roots. Use a mix of plants adapted to your area and to the different water depths.

Learn more about how to build a rain garden by visiting: www.familyhandyman.com/garden/how-to-build-a-rain-garden-in-your-yard/view-all.

How Big Should My Rain Garden Be?

To determine the best size for your garden, estimate the volume of water that would flow off the roof and down the spout that feeds it during a 1-in. rainfall (the rainfall from an average storm). To do this, calculate the rough area of the roof that drains down the spout. For example, in a 2,400-sq.-ft. rectangular home with a downspout at each corner, you'd have approximately 600 sq. ft. of runoff going to each downspout. Multiply by rainfall depth (1 in., or 1/12 ft.) to get the volume of water—50 cu. ft. in this case. If your soil porosity can handle a 6-in.-deep (that is, 1/2 ft.) garden bed, dividing by 1/2 ft. gives you a 100-sq.-ft. (10 x 10 ft.) garden size.

POROUS PAVING

Porous paving blocks (or other pervious material such as uncompacted rock or shell) can be an effective stormwater management option for patios, driveways and pathways. As its name implies, this is a highly porous form of concrete. It's made from aggregate (small stones) and cement, which binds the aggregate together. However, unlike conventional concrete, pervious concrete contains little, if any, sand. This results in a substantial number of open spaces in the concrete, basically a lot of holes through which water can flow into the ground.

The purpose of porous concrete is to allow rain to soak into these areas rather than run off your property. Porous concrete is particularly suitable for driveways or patios. Properly installed, a driveway constructed with porous concrete can remain pervious and act as a retention area, thereby reducing stormwater volume and pollution load. However, porous concrete is only feasible and cost effective on sites with gentle slopes, permeable soils and relatively deep water tables.

PERMEABLE CONCRETE PAVERS

For patios or walkways, permeable concrete pavers may be a suitable option. The pavers are solid, but if they're spaced correctly, water drains between them. Pavers are placed over a bed of sand or gravel, which filters water before it percolates into the soil. Permeable pavers are made from concrete or cut stone and are available in several styles.

Most permeable paver blocks are designed to support vehicles, but are sufficiently open to allow water to drain through them. The spaces are filled with gravel or sand. Grass or low ground cover can grow in the open spaces, which helps reduce heat buildup.

Note: Pervious paving is considered lot coverage and is subject to the lot coverage restrictions identified in the zoning code district standards.

CITY OF APALACHICOLA

192 Coach Wagoner Boulevard . Apalachicola, Florida 32320 .
850-653-9319 . Fax 850-653-2205 . www.cityofapalachicola.com

Bree Robinson – City Planner

P&Z
Public Hearing 5/13/24
City Staff Report + Supplemental Information from Applicant

Background:

The following special exception requests items will be discussed, considered, and decided upon at the 5/13/24 BOA Public Hearing:

1. **Discussion & Decision for proposed Accessory Structure (Storage/Carport, Stormwater Best Management Practice) to be placed in the O/R Zone at 92 Avenue E, more specifically described as Block 30 SW ½ of Lots 4 & 5** for Kevin Curry – Owner; Representative – Sam Berkheiser. Applicant is requesting approval of a special exception for an accessory structure to be used as a carport, storage, and stormwater best management practice.
    i. The Certificate of Appropriateness and Site Plan were conceptually approved at the 4/8/24 P&Z meeting contingent on:
        1. Site specific geotechnical information presented to and approved by the P&Z Board at the next meeting
        2. Special Exception approval

Advertisements giving public notice of these requests and the public hearing were published in The Times on 4/25/24 and 5/2/24. The advertisement language is within the agenda packet. A Public Notice sign was also posted on the property – the sign was posted 4/16/24 and has been in place since. The content of the signs are attached to this report. The agendas detailing these requests with all supplementary information were published on the City website 4/10/24 for plenty of time for public notice and review. Citizen Input was sought out through letters sent out to abutting and nearby property owners 4/17/24 with direction either return the letters to City Hall with comments, email comments, or attend the Public Hearing. Comments are noted under Citizen Input Findings.

Citizen Input Findings:

The letters sent out gave a brief overview of the requests and had a form on the back for citizens to fill out if they were for or against the Special Exception request and give comments on why or why not. One email response and 2 letters were returned by 5/7/24. Any comments received after this date will be presented at the meeting by staff. The results of these letters were:

For: 0	Against: 3
Comments: • N/A	**Comments:** OUR LOT IS THE LOW SPOT IN THE AREA AND GETS RUNOFF FROM SURROUNDING PROPERTIES. WE WOULD RATHER SEE THE CITY PUT IN STORMWATER DRAINS TO SERVE OUR PROPERTY AND THE NEIGHBOURING ONES. THE EXISTING DRAINS ARE TOO FAR AWAY AND TOO HIGH TO DO ANY GOOD. • **Comments:** There is no way you can stop the water run off ruining your neighbors property • The City of Apalachicola continues to have severe drainage problems. Block 30, Lots 4, 5, 3, 2, and 1 need storm drainage lines that connect to a drainage system. The method used by the City of Apalachicola at Avenue D and 8th Street appeared to decrease the flow of storm water in the above areas. Please note that the water table in Block 30, Lots 3, 2, 1 and the lots on 7th and Hwy. 98 is high. When you dig sixteen inches to eighteen in those areas, the water continues to rise. When there is rain, water from structures in lots 4 &5 SW and 4 & 5 NE goes to my fence, and then under my house. When the water is full underneath my house it goes to Lot 2 and then to Lot1. There are two areas on 7th Street where water runs in my neighbor's property (Lot 2) and then on to my property. The last rain in this area poured rain on my sidewalk and front porch. Standing water remains like a pond in my neighbor's yard. Another structure will allow additional rain on my property and my neighbor's property. This is a severe problem, and the City of Apalachicola must work with property owners in the above areas to • resolve the concerns.

Letters are available for viewing at City Hall with a public records request.

Applicable Code:

- **Sec. 111-272. – O/R Office Residential.**
  - (b)**(2)Accessory**. Accessory uses and structures are considered incidental and subordinate to permitted principal and approved special exception uses and structures. Habitable accessory uses are not permitted. <u>All accessory uses must be approved by special exception.</u> Accessory uses are subject to the following requirements: the accessory use must be subordinate to the principal use; must be related to the principal use; is not a separate commercial or retail business; does not require separate signage; and does not increase traffic or parking beyond the principal use requirements. Additional restrictions governing accessory uses, including, but not limited to, size and parking may be determined by the planning and zoning board.
  - (e)(2)**Special exceptions.** Unless otherwise specified, special exceptions must comply with development standards for principal uses. If deemed appropriate by the planning and zoning board in order to grant a special exception, certain more stringent standards may be imposed. Any accessory use proposed as part of a special exception request must meet the following conditions: must not be for habitable purposes, must be subordinate to the principal use; must be related to principal use; is not a separate commercial or retail business; does not require separate signage and does not increase traffic or parking beyond the principal use requirements. Additional restrictions concerning accessory uses, including, but not limited to, size and parking may be determined by the planning and zoning board.
  - (d)(4)Maximum building restrictions.
    - a.Lot coverage: 40 percent.

- https://library.municode.com/fl/apalachicola/codes/code_of_ordinances?nodeId=SPBLADECO_CH111LAUS_ARTIIIZO_DIV3ZODIRE_S111-272OROFRE

- **Sec. 101-9. – Definitions**
  - **Impervious surface coverage:** Those hard surface man-made areas that do not allow, or minimally allow, the penetration of water, that reduce the natural rate or percolation of water or result in an increase in the natural quantity and rate of storm water runoff. Examples include but are not limited to roof tops, parking, clay, asphalt, concrete, brick, compacted gravel, paved recreational areas such as pools, tennis courts, and landscape pavers. Exceptions: Pervious decks as described herein and items identified on a site plan as a best management practice to treat stormwater shall be allowed within open space and not considered impervious. Pervious decks are defined as decks with a minimum spacing of ⅛ inch between decking boards. Pervious decks shall be limited to an additional ten percent additional total lot coverage (i.e. ten percent additional total lot coverage above the code maximum for impervious coverage applicable to each zoning category; e.g. if max impervious coverage is forty percent then a deck may be added which covers additional lot area up to a total of fifty percent lot coverage when adding the total impervious lot coverage and the pervious deck coverage). (LDC, Ch. 101, Art. I, Sec. 101-8 Definitions.)
  - **Storm water management system:** A surface water system that is designed and constructed or implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, over drainage, environmental degradation, and water pollution or otherwise affect the quantity and quality of discharges from the system.
  - **Stormwater best management practice (BMP):** The term "best management practices (BMP)" means those practices and principles designed to manage water from rainfall events, reduce nonpoint sources of pollution and in some cases, protect wildlife and habitat. Methods may include structural devices or nonstructural practices, such as, but not limited to compensatory storage, swales, gutters, rain barrels and rain gardens. A City of Apalachicola Guide to Site-Specific Stormwater Best Management Practices is available to download from the city's website.
  - **Lot coverage** means the area of the lot covered by the ground floor of all principal and accessory uses and structures, including all areas covered by the roof of such uses and structures, measured along the exterior faces of the walls, along the foundation wall line, between the exterior faces of supporting columns, from the centerline of walls separating two buildings or as a combination of the foregoing, whichever produces the greatest total ground coverage for such uses and structures. Lot coverage shall also include all impervious surfaces such as drives, parking areas, walkways, swimming pools, patios, terraces and the like.
- **Sec 115-1. City Requirements**
  - (1)Certain types of residential and commercial development trigger State stormwater permitting permits depending on size and type of proposed development. As an area of critical state concern, the city has adopted more stringent stormwater standards than state requirements. A more comprehensive overview of state permitting requirements and the relationship to the city standards may be found online at cityofapalachicola.com/building.Dept.cfm:
    - a.Residential. Applications for all new residential development in special waterfront district or areas of special hazard (A&V zone) must include a stormwater management plan which may consist of a best management practice (BMP) as part of their site plan. Proposed improvements that increase lot coverage shall also provide for stormwater treatment by indicating the stormwater treatment best management practice that will be utilized.
  - **(2)Stormwater runoff control:**
    - a.Only those areas necessary for construction activities shall be cleared.
    - b.During construction, building debris shall be removed from the stormwater flow path and deposited in trash receptacles and temporary stormwater control barriers shall be installed and maintained.
    - c.Temporary stormwater controls shall be maintained until permanent controls are installed. Permanent controls, when required, shall be constructed prior to the issuance of a certificate of occupancy.

- d.Direct connection between building gutters and downspouts and onsite stormwater systems into the city's stormwater conveyances is not allowed.

- **(3)Stormwater best management practices (BMP's):**
  - a.Stormwater impacts shall be minimized by using site-suitable BMP's that maximize infiltration of stormwater and prevent or minimize offsite discharge. Stormwater flow paths for property as it is planned to be developed shall be determined and berms, shallow depressions, swales, contouring, terracing, landscaping, rain gardens, rain barrels, paving materials, concrete pavers and other stormwater management practices shall be included in the plan to intercept, infiltrate and treat stormwater before it reaches wetlands, surface waters or the city's stormwater conveyances.
  - b.Minimize soil exposure through organized scheduling of grading and construction activities; retain existing vegetation whenever feasible; stabilize all denuded areas after final grading; temporarily stabilize disturbed areas that are inactive and will be exposed to rain for 30 days or more utilizing stabilization techniques such as mulches, vegetation and sod. Control runoff by diverting stormwater away from stripped areas or newly seeded slopes; minimize the length and steepness of slopes, protect outlets to prevent erosion. Install sediment trapping structures such as silt traps, sediment basins, filter fabric, perimeter dikes. Inspect and maintain control measures regularly.
  - c.Best management practice methods may be in required open spaces.
  - d.Guidance regarding state permitting requirements and exemptions may be found at the city's web site. Examples of BMP's and low impact development practices are provided in the city's May 2015 Guide to Site Specific Stormwater Best Management Practices can also be found on the city's web site.
- **(4)General design requirements:**
  - a.The storm water system shall be designed in accordance with Rule 62-330 F.A.C., and city standards for a 25- year, 24- hour event except that detention with filtration systems shall not be allowed and that off-line retention systems shall be used whenever the soil conditions will allow percolation of the treatment volume within 72 hours. When soil conditions will not allow infiltration practices to be used, the storm water system shall consist of a wet detention system with a vegetated littoral zone. To enhance the effectiveness of the wet detention system, landscape retention pretreatment practices such as the placement of storm sewer inlets in grassed areas shall be employed in combination with the detention system.
  - b.To provide flood protection, the additional volume generated by the development from a 25-year storm event 24-hour duration shall be controlled by a detention facility and released at a rate of discharge not to exceed the peak discharge rate from the site in its undeveloped condition. Special engineering features all be incorporated in minimize the transport of pollutants remaining in the detention facility.
  - c.All detention facilities shall discharge design flow through structural discharge facilities. When direct discharge will degrade waters of natural streams, marshes, environmentally sensitive areas, shellfish classification waters, or lands naturally receiving sheet flow, the discharge structure shall direct the flow to an intermediate spreader swale system.
  - d.No new untreated point sources of discharge will be permitted.
- **(5)General information for engineered plans:**
  - a.The location of areas on the site where storm water collects or percolates into the ground; and the size, location and land use of any off-site areas which drain onto, through or from the project area.
  - b.A map showing topography at a minimum contour interval of one-foot, vegetative cover, soils and seasonally high-water table elevations. Also show the location of any soils boring or percolation tests.
  - c.Details of hydrograph, side slopes, depths, elevations of all system components including wetlands, a topographical map with a minimum contour interval of one foot.

- d.An erosion and sediment control plan to retain sediment on-site. The plan shall describe, in detail, the type and location of control measures the stage of development at which they will be put into place and provisions for maintenance.
- e.A description of scheduled maintenance, if applicable, of the storm water system.

- **(6)Calculations to be submitted:**
  - a.All runoff calculations used in the design of the storm water system including a description of the methodology, assumptions and parameters. Include calculations showing discharges, elevations and volumes retained or detained and the volume of storm water treated for applicable design storm events. If a computer program is used for analysis, a copy of the printout shall be submitted.
  - b.Computations of state-storage and stage-discharge for all structures.
  - c.Computation of off-site inflows.
  - d.Actual acreages and percentage of the project area for impervious surfaces, natural water bodies and wetlands, artificial lakes, retention or detention area, swales, pervious surfaces and total project area.
  - e.Computation of pre-development and post-development runoff and storage.
  - f.Identification of the entity responsible for the perpetual care, operation, maintenance, and associated liabilities of the system. If the entity is to be a public body such as a county, municipality, or special district, a letter or other evidence of acceptance must be included. If the entity is a non-public body such as a homeowner's association or private corporation or person, documentation of its existence, fiscal and legal ability, and willingness to accept the responsibility must be included.

Attachments:

- Representative Letter & Project Intro
- Design Layout & Storm Water Calculations
- Proposed Impervious Layout
- Materials Site Plan
- Existing Impervious Layout
- Geotechnical Engineering Report

City Engineers are currently reviewing the submitted materials for compliance.
An update on their review will be provided at the meeting by City staff.

WE LOVE
LAND
STUDIO, INC.

April 25, 2024

Project Location - 92 Avenue E Apalachicola, FL 32320

To Whom It May Concern,

The proposed underground storm water chamber system has been designed to treat and store rainwater produced by the addition of the secondary carport/shed structure. The system has been designed to ensure that storm water best management practices are implemented responsibly to protect the environment and surrounding areas.

The layout of the system was designed with and verified by the manufacturer's engineering department; and the overall flow rates have been verified using site-specific geotechnical data collected and produced by Magnum Engineering Inc. The associated geotechnical engineering report, site plans and details, calculations, and manufacturer documents prepared for this project are located in the following pages.

Please allow this letter to serve as verification that this proposed storm water best management practice has been designed to meet and exceed the design standard requirements (water quality treatment and storage) set by the State of Florida or City of Apalachicola for the 2yr 24 hour design storm event. While the system exceeds the necessary water quality treatment and storage capacity required for the 2yr 24 hour storm event, please note that it is not required to and may not treat larger storm events (such as hurricanes) that exceed the current State of Florida design standards for the 2yr 24 hour storm event.

Please contact me with any additional questions or concerns at 850-370-0215 (office).

Regards,

Samuel W. Berkheiser III

Registered Landscape Architect
LA6667589
State of Florida

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APRIL 25, 2024

PROJECT INTRODUCTION:

Curry Residence | 92 Avenue E Apalachicola, FL 32320
Mr. & Mrs. Curry are new homeowners in Apalachicola. The current site has a very high lot coverage rate due to the previous owner's expansions and activity. They are requesting a simple structural carport for their car to protect it from the elements and enclosed shed. They would like to achieve this goal in the most ecologically responsible way possible while addressing the current nonconforming, impervious lot coverage.

Project goals:
+ reduce impervious lot coverage within acceptable municipal requirements
+ address current drainage issues on site
+ improve storm water quality and overall site runoff
+ improve usable outdoor space
+ add native and naturalized planting

Additional concerns for this site:
- current impervious lot coverage is approximately 48%
- drainage issues
- water pooling on site and overflowing off site at east corner
- existing impervious stone patio is set on compacted soil and gravel
- invasive plant species removal

Standard Apalachicola best management practices as outlined in the 'City of Apalachicola Guide to Specific Storm water Best Management Practices' highlight the use of detention ponds and vegetated swales. These traditional methods are not always applicable on a small residential scale- and are not applicable to this current site.

PROPOSAL:

Please review landscape plans (by We Love Land Studio, Inc) and architecture plans (by ERC Construction, llc.) to follow.

Introduction to the site specific underground storm water infiltration system included in plans:
We are proposing a storm water infiltration system that will capture the storm water from the proposed carport/shed, clean it, store it, and allow it to infiltrate back into the soil on site to recharge the groundwater aquifer. This system, when installed, will improve water quality and reduce runoff. Since the existing site is sloped, stormwater runoff are increased. We can capture and treat more water with the structure in place than without. **It will also take pressure off of the city's current storm water system and reduce the outflow of water volume, and pollutants, to the surrounding waterways.** This system benefits everyone; the homeowner, the city, and the bay.

**A note to the board:* The proposed system is considered a storm water best management practice throughout the country and in environmentally delicate areas adjacent to waterways here in Florida. (Please see attached NDS case study with design packet.) We believe the city can benefit tremendously through the responsible use of this practice. Whether implemented to retrofit existing sites, or utilized with new construction, it has the ability to retain, treat, and infiltrate the storm water produced on most sites.

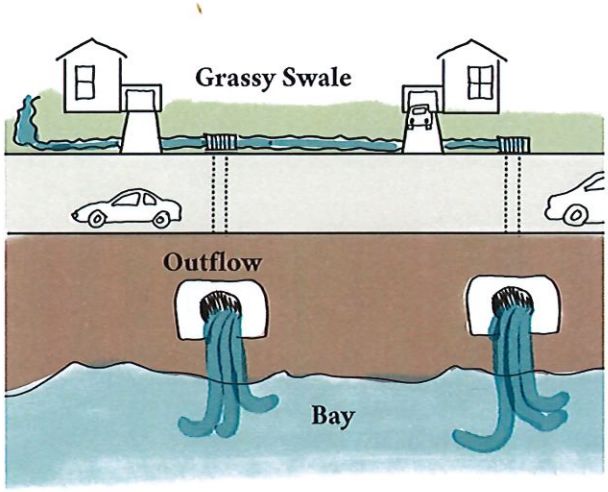
"Of primary importance to minimizing the effects of stormwater on water quality is the First Flush. This term describes the washing action that stormwater has on accumulated pollutants in a watershed. In the early stages of runoff the land surfaces, especially the impervious surfaces like streets and parking areas, are flushed clean by the stormwater. This creates a shock load of pollutants that are flushed into the nearby coastal waters.

Studies in Florida have determined that the first one inch of runoff generally carries 90% of the pollution from a storm. Treatment of the first flush is the key to proper stormwater management." - City of Apalachicola 'Guide to Site Specific Stormwater Best Management Practices' - Page 4

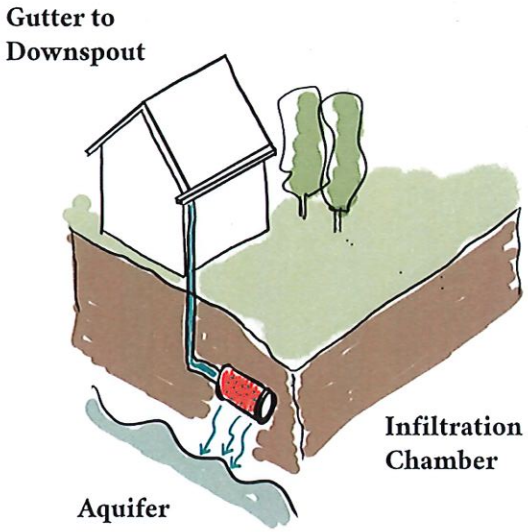
Not only does this system most effectively treat the 'first flush', it gives residents more flexibility within their property while simultaneously reducing the strain on the current city storm water drainage system and will reduce the contaminants entering the bay. Our goal with this document is to illustrate the benefits of the proposed system, so the city can find a responsible way to include it in the future overall city strategy of stormwater best management practices.

Thank you for your time and consideration.

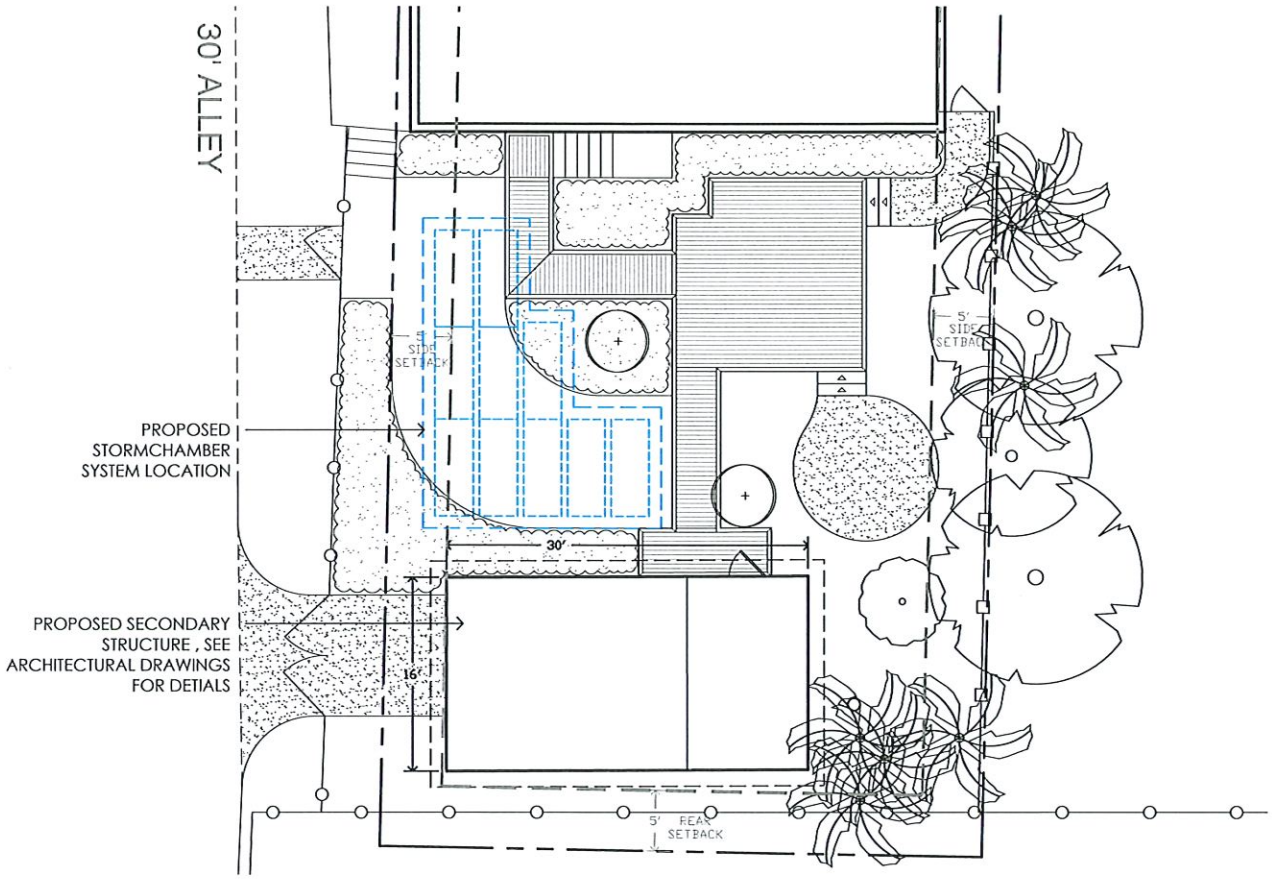
SYSTEMS COMPARISON:



Current stormwater trajectory flows mostly above ground, or in pipes throughtout the city, before being expelled into the waterways. This process puts a majority of the 'first flush' directly into the bay. A small portion of this water recharges the aquifer through infiltration.



Underground infiltration chamber storm water system captures the water and treats the 'first flush' naturally before recharging the aquifer localized and on-site.



LANDSCAPE DESIGN- DESIGN CONCEPT & STORMWATER CALCULATIONS:

DESIGN CONCEPT-

The goal of the Stormwater Best Management Practice at work for this project is to ensure the proposed secondary structure (16' x 30') does not have a negative stormwater impact on the site. The structure has a metal roof, one open side (for vehicular access facing the alley) with screening on one sides, provides a covered parking space and an elevated enclosed storage area (approximately 10'x16'). The storm water best management practice concept utilized, employs the use of underground storm water chambers that are designed and specified to capture the precipitation that falls on the new metal roof. Water Quality will be addressed by the proposed storm water chamber system. It is designed to treat the initial 1" of storm water runoff from the roof (610 SF)by filtering out and sediment and contaminants. The entirety of the storm water that is captured will infiltrate out from the system into the surrounding soil. This system has the capacity to treat the total storm water volume from a 2 yr (or 1" of rain for a 24 hr) storm event (or flood attenuation).

STORM WATER CALCULATIONS-

WATER QUALITY VOLUME CALCULATIONS:

610SF	=	Drainage Area (Square Feet / SF) -	Total Area of Metal Roof w/ 4:12 roof pitch and 1'-4" overhang
1"	=	Rainfall Depth (Inches / in.) -	Typical amount of Rainfall treated to ensure water quality in a 2yr. Storm event
50.83CF	=	Required Volume (Cubic Feet / CF) -	Generated from 1" of rainfall on Drainage Area

GEOTECHNICAL DATA UTILIZED FOR STORMWATER CALCULATIONS:

50.88CF	=	Required Water Quality
Soil Group	=	A
7.45	=	Ksat Design Rate - Inches per Hour (or design infiltration rate with a safety factor of 2 applied)

*The Ksat design rate above is based on findings from a geotechinical report prepared by Magnum Engineering from site specific testing performed on April 16th 2024 with a infiltration rate of 14.9 in/hr with a typical safety factor of 2 (x.5) applied.

2 YEAR / 24 HOUR STORM DATA:

6.00"	=	Rainfall depth occurring in a 24 hour period
0.25"	=	Rainfall depth occurring per hour during storm event

*Data from the Soil Conservation Services Historic rainfall data, a 2 year 24 hour storm event is the design standard for stormwater infiltration systems

FLOOD ATTENUATION CALCULATIONS:

Required Flood Attenuation Volume	=	Rainfall Volume x Time Duration x Cubic Foot Conversion x Total Proposed Stormwater Drainage Area (Metal Roof Area)
305CF	=	.25 inches per hour x 24 hours x 610 Square Feet

SUMMARY OF REQUIRED STORMWATER VOLUMES TO BE TREATED:

50.88CF	=	Water Quality Treatment
305CF	=	Flood Attenuation Volume

NDS STORMCHAMBER CAPACITY SUMMARY:

420.42 CF = Installed System Storage Capacity, see attached NDS StormChamber documents for further details.
*The capacity of the system is approximately 138% larger than required, to adjust for the seasonable high water table and ensure adequate treatment capacity.

RECOVERY TIME CALCULATIONS:

Total Recovery Time (Hours)	=	Installed System Depth (Inches) / Infiltration rate (Inches per Hour)
3.22 HRs	=	24" / 7.45" per Hour (as per infiltration rate data provided by USDA Websoil Survey)

0' 5' 10'

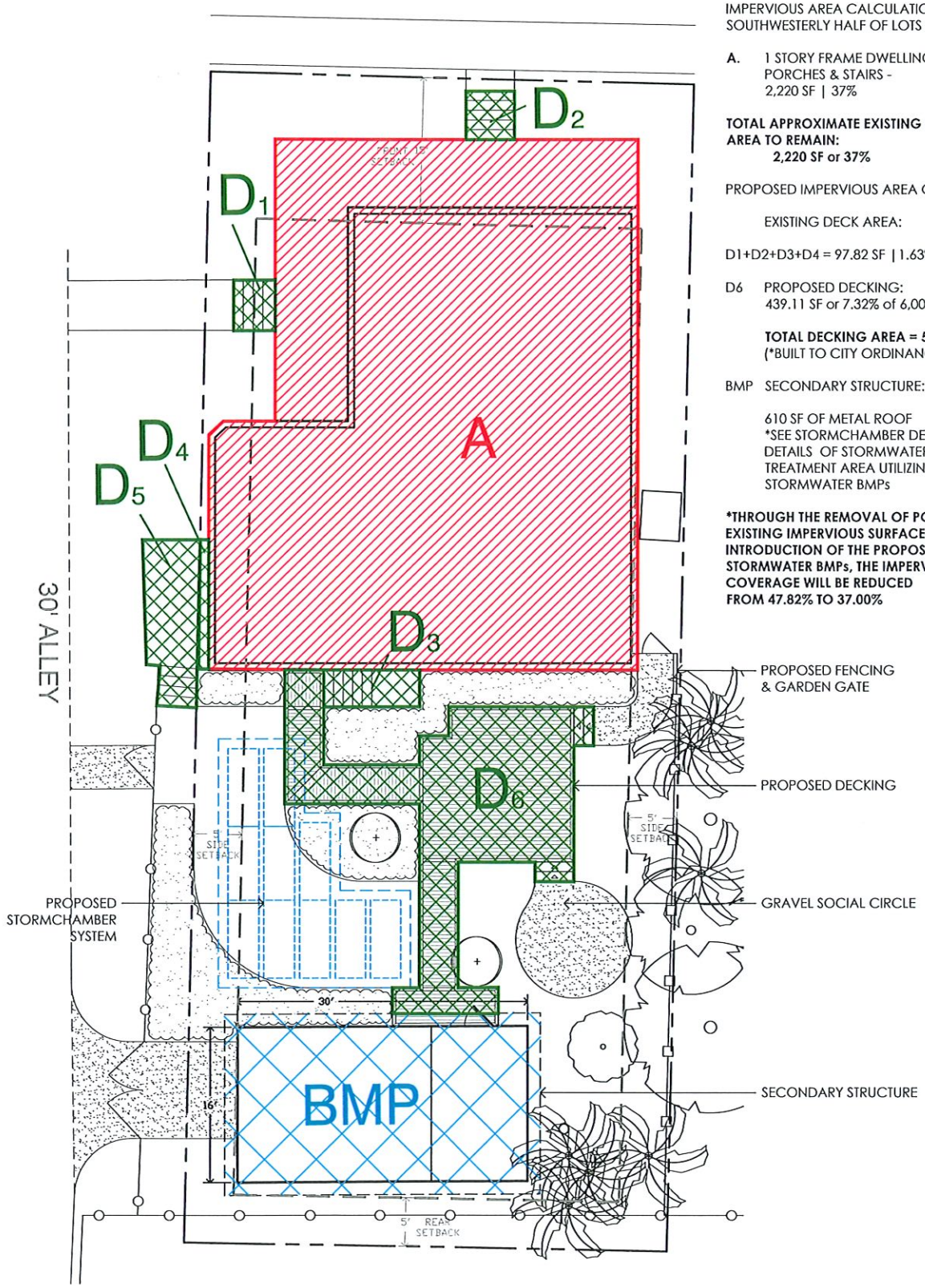
APRIL 25, 2024

CURRY RESIDENCE | PROPOSED CONDITIONS | STORM WATER CHAMBER SYSTEM LAYOUT

WE LOVE LAND STUDIO, INC.

AVENUE "E" / HWY 98

(90' R/W ~PAVED)



IMPERVIOUS AREA CALCULATIONS:
SOUTHWESTERLY HALF OF LOTS 4&5 BLOCK "30"

A. 1 STORY FRAME DWELLING, PORCHES & STAIRS - 2,220 SF | 37%

TOTAL APPROXIMATE EXISTING IMPERVIOUS AREA TO REMAIN:
2,220 SF or 37%

PROPOSED IMPERVIOUS AREA CALCULATIONS:

EXISTING DECK AREA:

D1+D2+D3+D4 = 97.82 SF | 1.63%

D6 PROPOSED DECKING:
439.11 SF or 7.32% of 6,000 SF

TOTAL DECKING AREA = 536.93 | 9%
(*BUILT TO CITY ORDINANCE 23-05)

BMP SECONDARY STRUCTURE:

610 SF OF METAL ROOF
*SEE STORMCHAMBER DESIGN FOR DETAILS OF STORMWATER TREATMENT AREA UTILIZING STORMWATER BMPs

***THROUGH THE REMOVAL OF PORTIONS OF THE EXISTING IMPERVIOUS SURFACES AND THE INTRODUCTION OF THE PROPOSED STORMWATER BMPs, THE IMPERVIOUS SITE COVERAGE WILL BE REDUCED FROM 47.82% TO 37.00%**

*TOTAL PROPERTY AREA LOT CALCULATIONS:
BLOCK 30 SOUTHWESTERLY HALF OF LOTS 4&5
APPX. 50' x 120' = 6,000 SF

TOTAL AREA = 6,000 SF

0' 5' 10'

APRIL 25, 2024

PROPOSED CONDITIONS | IMPERVIOUS COVERAGE CALCULATIONS

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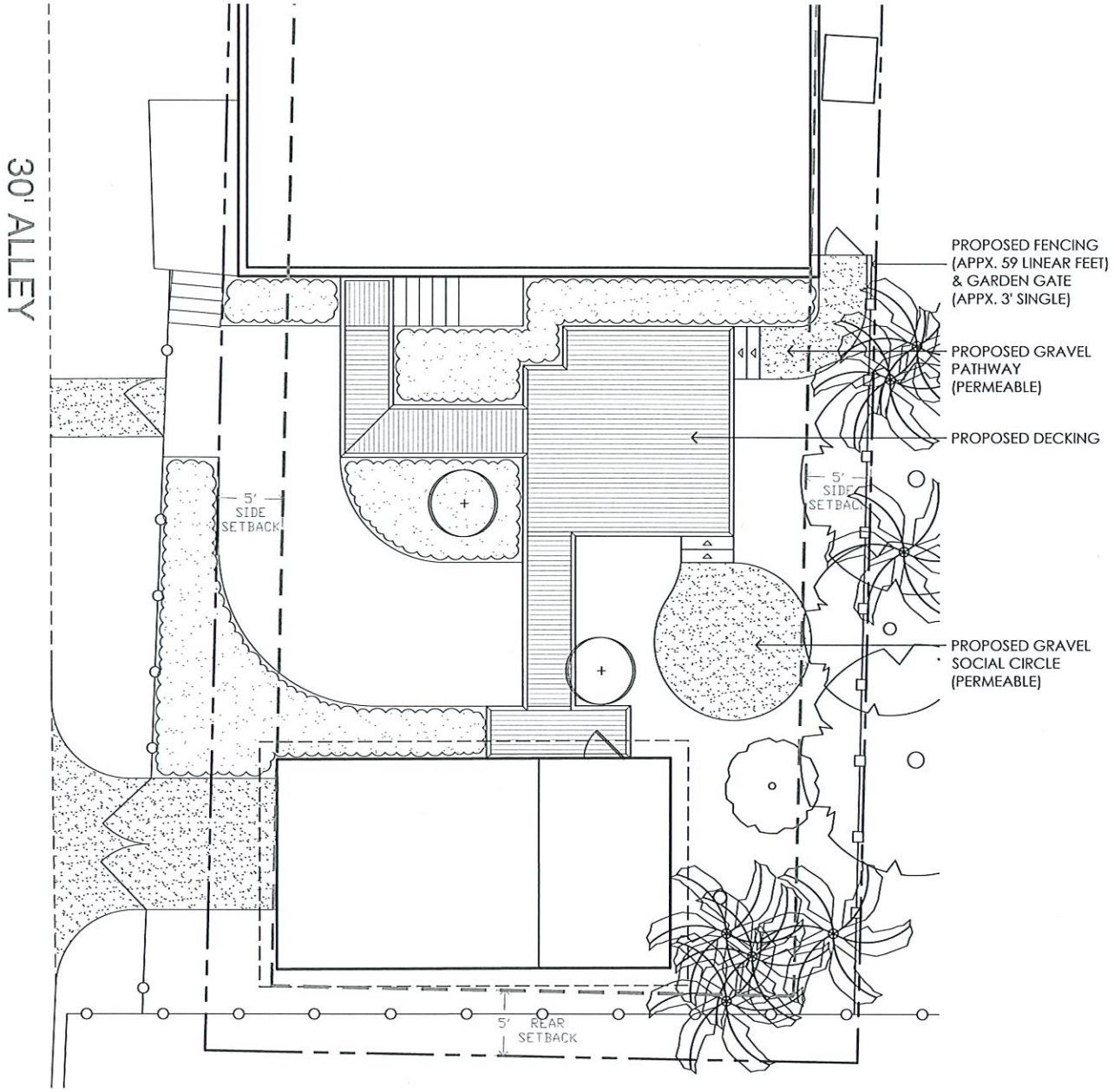
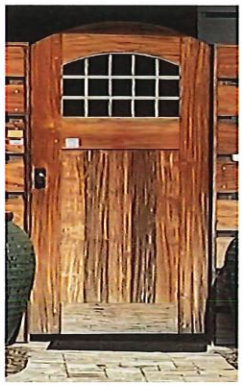


EXISTING FENCING
(PROPOSED WOODEN FENCE TO MATCH EXISTING)



PROPOSED GARDEN GATE
(REFERENCE PHOTO FOR GATE STYLING,
MATERIALS TO MATCH EXISTING)

0' 4' 8'

APRIL 25, 2024

CURRY RESIDENCE | PROPOSED CONDITIONS | MATERIALS

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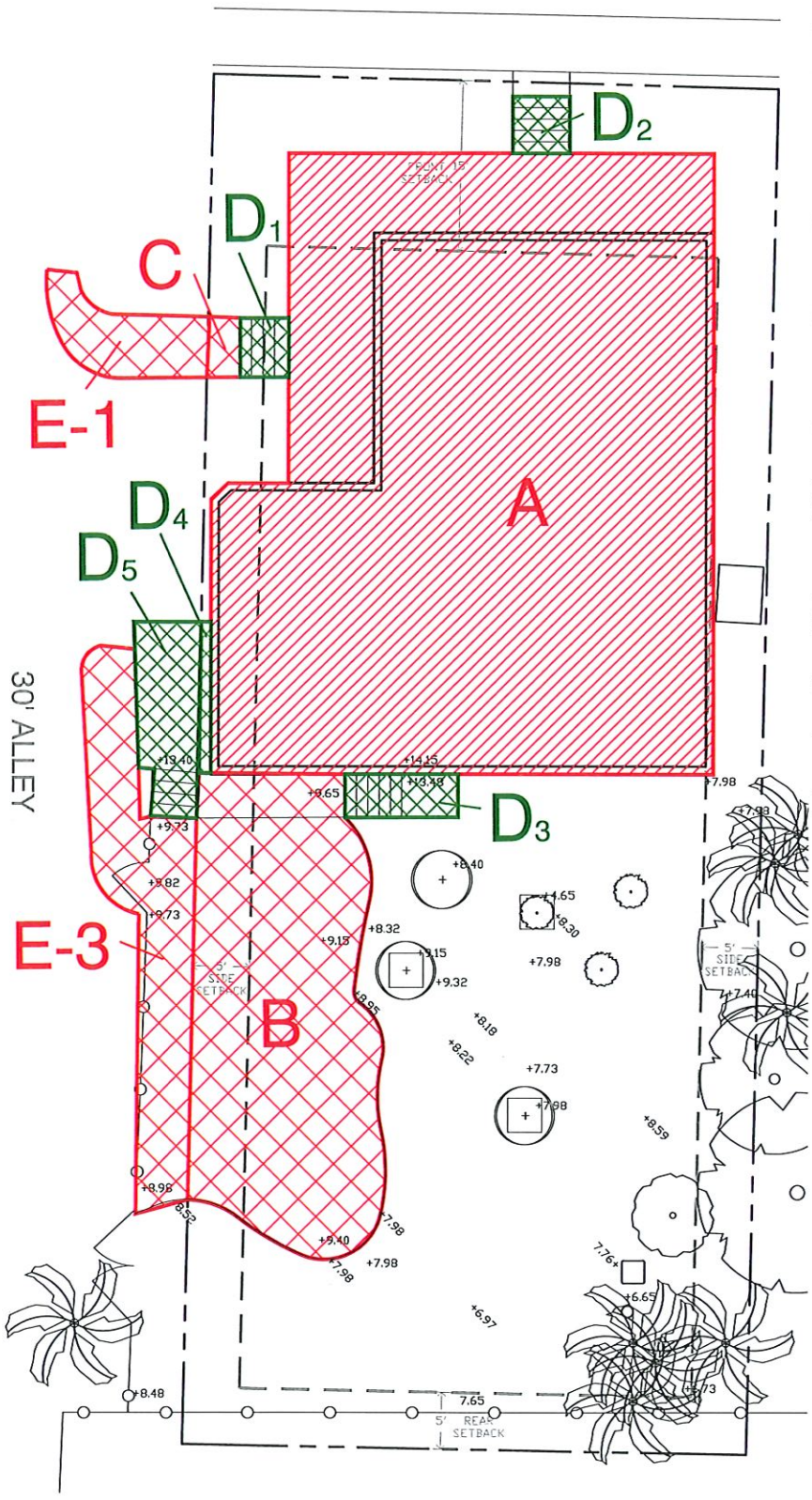

EXISTING IMPERVIOUS
AREA CALCULATIONS:
SOUTHWESTERLY HALF OF LOTS 4&5 BLOCK "30"

A. 1 STORY FRAME DWELLING, PORCHES & STAIRS - 2,220 SF | 37%

DECORATIVE SLATE STONE -

B. 634.79 SF | 10.58%

C. 14.97 SF | 00.25%

TOTAL DECORATIVE SLATE STONE AREA : 649.76 SF | 10.83%

TOTAL EXISTING IMPERVIOUS AREA: 2,869.76 SF | 47.83%

EXISTING IMPERVIOUS AREA TO BE REMOVED: 649.76 SF | 10.83% (AREAS B & C)

EXISTING DECK AREA:

D1+D2+D3+D4 = 97.82 SF | 1.63% (10% MAX.)

*ALL EXISTING DECK WILL BE INSPECTED AND ADJUSTED (IF NECESSARY) TO HAVE A 1/8" GAP BETWEEN BOARDS

TOTAL IMPERVIOUS AREA TO REMAIN: 2,220 SF | 37%

DECK AREA LOCATED IN CITY R.O.W. :
D5 WOODEN PORCH & STAIRS
89.66 SF
*AREA E-2 IS DECK & PART OF A HISTORIC STRUCTURE

IMPERVIOUS AREAS IN CITY R.O.W.:
E-1 DECORATIVE STONE PATH
81.2 SF

E-2 DECORATIVE STONE PAVING
265 SF

TOTAL EXISTING IMPERVIOUS AREA IN R.O.W. :
346.2 SF

TOTAL EXISTING IMPERVIOUS AREA IN R.O.W. TO BE REMOVED: (E-1 & E-3)
346.2 SF

*TOTAL PROPERTY AREA LOT CALCULATIONS:
BLOCK 30 SOUTHWESTERLY HALF OF LOTS 4&5
APPX. 50' x 120' = 6,000 SF

TOTAL AREA = 6,000 SF

0' 5' 10'

APRIL 25, 2024

EXISTING CONDITIONS | IMPERVIOUS COVERAGE CALCULATIONS

WE LOVE LAND STUDIO, INC.

MAGNUM ENGINEERING INC

GEOTECHNICAL ENGINEERING CONSULTANTS

GEOTECHNICAL ENGINEERING REPORT

92 AVENUE E
APALACHICOLA, FLORIDA

PREPARED FOR:

MR. DREW ROBERTSON, PG
GEOFLORA GROUP
P.O. Box 55
APALACHICOLA, FL 32323

429 FLORIDA AVENUE
LYNN HAVEN, FLORIDA 32444
TELEPHONE (850) 258.0994

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING
CONSULTANTS

April 22, 2024

Mr. Drew Robertson, P.G.
GeoFlora Group
P.O. Box 55
Apalachicola, Florida 32323

SUBJECT: 92 Avenue E - Geotechnical Services for Stormwater
Apalachicola, Florida
MEI Project No. M124-120-847

Dear Mr. Robertson:

This letter forwards the results of our Geotechnical services for the subject site in Apalachicola, Florida. The purpose of this exploration was to evaluate the subsurface conditions present in the proposed stormwater management area.

Project Description and Scope of Services

The subject site is located at 92 Avenue E in Apalachicola, Florida. At the time of our investigation, the site was developed with an existing single-family residence with associated parking, flowers beds, and surficial grasses. The area of the proposed stormwater management area was easily accessible.

Our exploration consisted of One (1) 5-feet deep hand auger boring and one (1) Double Ring Infiltrometer Test (DRI). Upon completion of our field testing, the samples were brought back to the office for lab testing, visual inspection, classification and analysis by our engineering staff.

If any of the above information is incorrect, please inform Magnum Engineering, Inc. so that we can review and update our recommendations, as needed.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous materials in the air, surface water(s), soil, or groundwater on or in the vicinity of the subject site.

Subsurface Conditions

Figure #1 shows the Boring Location Plan and Figure #2 shows the Log of Boring for HA-1. The test location was identified in the field using the provided site plan, a measuring wheel, and estimating right angles with reference to existing landmarks. Therefore, the test location should be considered approximate.

The auger boring generally encountered graded aggregate base and clayey fine sands from the existing ground surface to roughly 0.5 feet below existing grade underlain by slightly silty fine sands to the boring termination depth of 5-feet below existing grade.

The above subsurface descriptions are of a generalized nature, provided to highlight the major soil strata encountered. The Logs of Borings should be reviewed for specific subsurface conditions at each boring location. The stratifications shown on the Logs of Boring represent the subsurface conditions at the actual boring locations only, and variations in the subsurface conditions can and may occur between boring locations and should therefore be expected. The stratifications represent the approximate boundary between subsurface materials, and the transitions between strata may be gradual. Please refer to the attached logs of borings presented as Figure #2 for a more detailed description of the soils encountered.

Groundwater Conditions

At the time of our exploration (April 16, 2024), groundwater was encountered at 2.8 feet below existing grade, which was during a period of normal seasonal rainfall. By definition, the normal seasonal high groundwater table elevation is the highest level of the saturated zone in the soil during a year with normal rainfall. The procedure used in estimating the seasonal high groundwater table is based on adjusting the existing groundwater table encountered upward or downward, taking into consideration factors such as antecedent rainfall, redoximorphic features (identifying soil mottling) and vegetative indicators. **We have estimated the seasonal high groundwater table the boring location. Please refer to Table #1 below for groundwater data.**

TABLE #1

Location	Groundwater Depth Below Existing Grade	Estimated Seasonal High Groundwater Depth Below Existing Grade
HA-1	2.8 feet	2.0 feet

Large fluctuations are possible under severe weather conditions. We recommend that the Contractor verify the actual groundwater levels at the time of construction to determine potential impacts groundwater will have on construction procedures.

Double Ring Infiltrometer Test

One (1) Double Ring Infiltrometer test was performed in the field in general accordance with the procedures outlined in ASTM D-3385, ``Infiltration Rate of Soils in Field using Double Ring Infiltrometers". Testing consisted of initially clearing all surface vegetation and topsoil from within the test area. The Infiltration test was performed roughly 1.0 feet below the existing ground surface at location DRI-1. The outer ring, which is approximately 24 inches in diameter, was then driven to a depth of 6 inches below the exposed ground surface. The inner ring, approximately 12 inches in diameter, was then centrally located within the outer ring and driven to a depth of 2 inches. The two rings were then simultaneously filled with water to a height of 4 inches above the exposed ground surface test soils. The water level was maintained at this height throughout the test period, with the required amount of water added to maintain this level in both rings recorded at time intervals of 5 minutes.

The infiltration rate for the inner ring and the annular space between the rings is determined by dividing (a) the water volume used (within each specific area) during the stabilized flow period of the test, by (b) the specific area and (c) the time interval. Infiltration rates are generally converted to units of inches per hour. The infiltration rate for the inner ring, if different than the infiltration rate of the annular area between the rings, according to ASTM, should be used as the infiltration rate for the soils.

INFILTRATION DATA

LOCATION	ORIENTATION	TEST DEPTH (feet)	SUSTAINED INFILTRATION RATE (in/hr)
DRI-1	$K_{V\ (unsaturated)}$	1.0	14.9*

***Note: The above infiltration rate has not been factored and is up to the designer to apply an appropriate factor of safety.**

We recommend using a transformation ratio of 1 horizontal to 1 vertical (i.e. the estimated ratio of horizontal to vertical permeability).

ENVIRONMENTAL RESOURCE PERMITTING (ERP) DESIGN PARAMETERS

DESCRIPTION	LOCATION	DESIGN PARAMTER
SUSTAINED INFILTRATION RATE (K_{VU})	DRI-1	14.9 IN/HR*
TEST DEPTH	DRI-1	1.0 feet
FILLABLE POROSITY	DRI-1	30%
DEPTH TO EXISTING GROUNDWATER TABLE	DRI-1	2.8 FT BELOW EXISTING GRADE
DEPTH TO ESTIMATED SEASONAL HIGH GROUNDWATER TABLE	DRI-1	2.0 FT BELOW EXISTING GRADE

* The above infiltration rate has not been factored and it is up to the designer to apply an appropriate factor of safety.

Warranty and Limitations of Study

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. Magnum Engineering, Inc. is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

We wish to point out that a geotechnical study is inherently limited in that the engineering recommendations are developed from information obtained from test borings that only depict subsurface conditions at the specific locations, times and depth shown on the logs. Soil conditions at other locations may differ from those encountered in the test borings, and the passage of time may cause the soils conditions to change from those described in this report.

This report is intended for use by the designers of this project. While we have no objections to it being provided for review by parties to this project, it is not a specification document and is not to be used as a part of the specifications. If desired, we can assist in the development of specifications for this project based upon our exploration.

The nature and extent of variation and change in the subsurface conditions at the site may not become evident until the course of construction. Construction monitoring by the geotechnical engineer or his representative is therefore considered necessary to verify the subsurface conditions. If significant variations or changes are in evidence, it may be necessary to reevaluate the recommendations in this report.

Furthermore, if the project characteristics are altered significantly from those discussed in this report, if the project information contained in this report is incorrect or if additional information becomes available, a review must be made by this office to determine if any modifications in the recommendations will be necessary.

We hope this letter provides sufficient information for the present. If you have any questions or comments, please feel free to call.

Sincerely,

MAGNUM ENGINEERING. INC.

JAMES T. VICKERS, P.E.
Sr. Geotechnical Engineer
Florida Registration # 56813

JAMES T. VICKERS LICENSE No. 56813 STATE OF FLORIDA PROFESSIONAL ENGINEER

This item has been digitally signed and sealed by James T. Vickers, P.E. on 4/22/2024

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies

Attachments: Figure #1 – Boring Location Plan
Figure #2 – Log of Boring
Appendix (A) – Double Ring Infiltrometer Test Results

James T. Vickers
Digitally signed by James T. Vickers
Date: 2024.04.22 08:05:37 -05'00'

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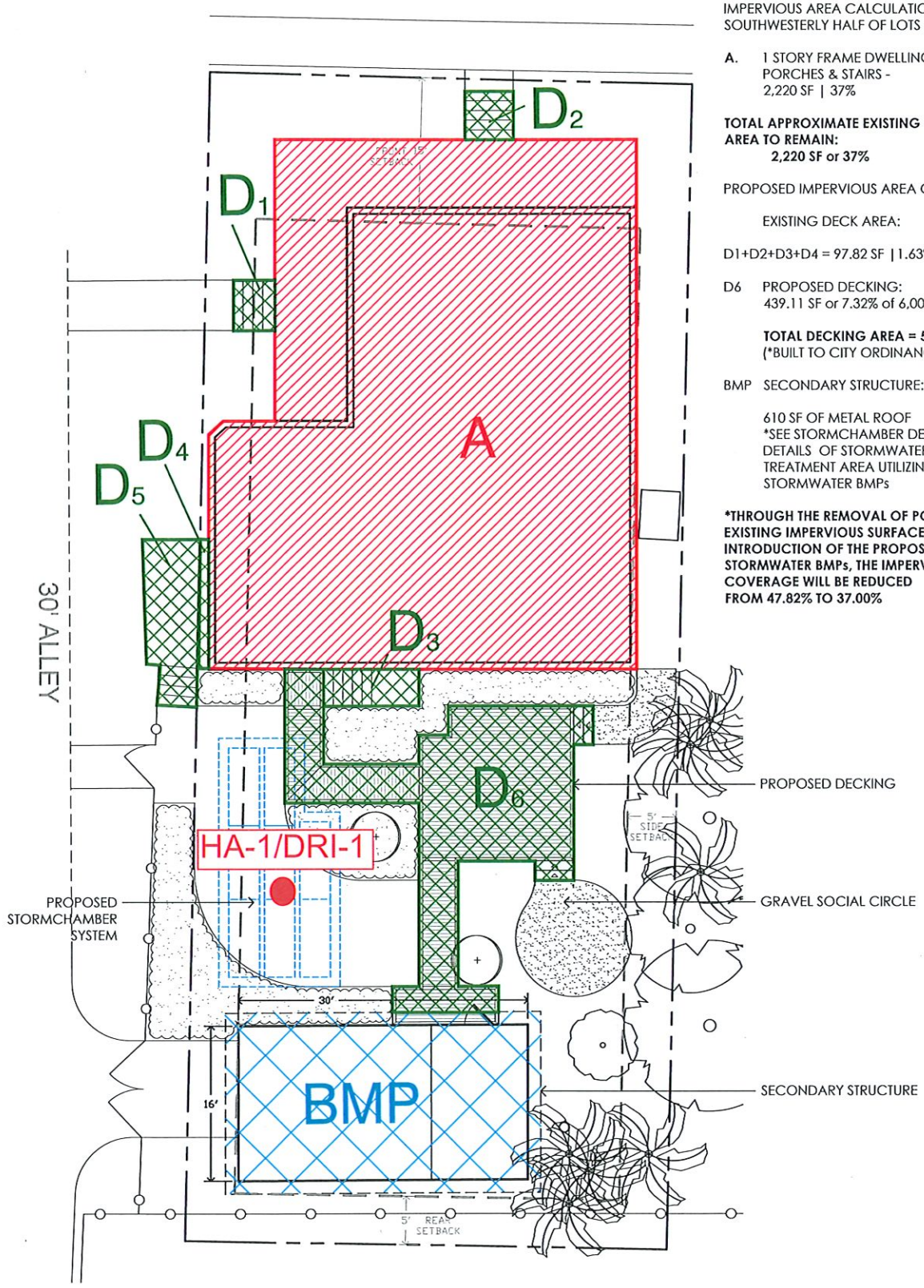
GEOTECHNICAL ENGINEERING
CONSULTANTS

BORING LOCATION PLAN

FIGURE # 1

AVENUE "E" / HWY 98

(90' R/W ~PAVED)



IMPERVIOUS AREA CALCULATIONS:
SOUTHWESTERLY HALF OF LOTS 4&5 BLOCK "30"

A. 1 STORY FRAME DWELLING, PORCHES & STAIRS - 2,220 SF | 37%

TOTAL APPROXIMATE EXISTING IMPERVIOUS AREA TO REMAIN:
2,220 SF or 37%

PROPOSED IMPERVIOUS AREA CALCULATIONS:

EXISTING DECK AREA:

D1+D2+D3+D4 = 97.82 SF | 1.63%

D6 PROPOSED DECKING:
439.11 SF or 7.32% of 6,000 SF

TOTAL DECKING AREA = 536.93 | 9%
(*BUILT TO CITY ORDINANCE 23-05)

BMP SECONDARY STRUCTURE:

610 SF OF METAL ROOF
*SEE STORMCHAMBER DESIGN FOR DETAILS OF STORMWATER TREATMENT AREA UTILIZING STORMWATER BMPs

***THROUGH THE REMOVAL OF PORTIONS OF THE EXISTING IMPERVIOUS SURFACES AND THE INTRODUCTION OF THE PROPOSED STORMWATER BMPs, THE IMPERVIOUS SITE COVERAGE WILL BE REDUCED FROM 47.82% TO 37.00%**

*TOTAL PROPERTY AREA LOT CALCULATIONS:
BLOCK 30 SOUTHWESTERLY HALF OF LOTS 4&5
APPX. 50' x 120' = 6,000 SF

TOTAL AREA = 6,000 SF

0' 5' 10'

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PROPOSED CONDITIONS | IMPERVIOUS COVERAGE CALCULATIONS

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LOG OF BORING

FIGURE # 2

Magnum Engineering, Inc.
429 Florida Avenue
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-1

CLIENT GeoFlora Group
PROJECT NAME 92 Avenue E
PROJECT NUMBER M124-120-847
PROJECT LOCATION Apalachicola, Florida
DATE STARTED 4/16/24 **COMPLETED** 4/16/24
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR _____
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 2.8 ft
LOGGED BY B. Vickers **CHECKED BY** J. Vickers
▼ **ESTIMATED SEASONAL HIGH GWT** 2.0 ft
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Graded Aggregate Base with Clayey SAND	AU									
1		Dark Gray Slightly Silty Fine SAND (SP-SM)										
2		▼ Gray Slightly Silty Fine SAND (SP-SM)										
3		▽										
4		Dark Gray Slightly Silty Fine SAND (SP-SM)										
5		Boring Termination Depth at 5.0 feet.										

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Double Ring Infiltrometer Test Results

Appendix (A)

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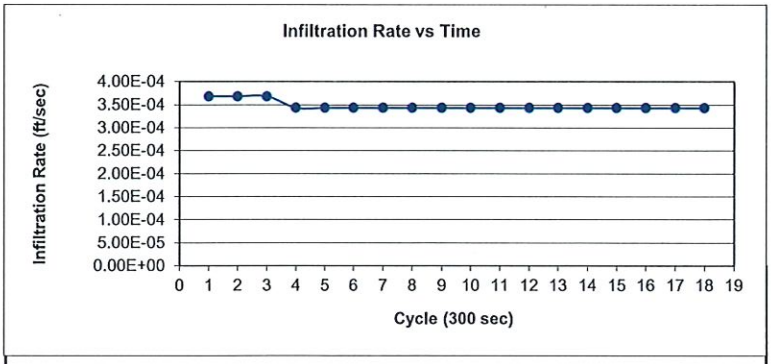
Double-Ring Field Infiltration Test

Test Location:	DRI-1	
Project Name:	92 Avenue E	
Project Location:	Apalachicola, Floroida	
Test Depth:	1.0 ft	
Depth to GWT:	2.8 ft	
Inner Ring Diameter:	12 in	0.3048 m
Outer Ring Diameter:	24 in	0.6096 m
Pre-Saturation	30 min	
Area Outer Ring:	3.1416 ft^2	0.00202683 m^2
Area Inner Ring:	0.7854 ft^2	0.00050671 m^2
Net Outer Ring Area:	2.3562 ft^2	0.00152013 m^2

	Inner Ring		
Cycle	ElapTime (sec)	Vol Used (in^3)	Infiltration Rate (ft/sec)
1	300	150	3.68E-04
2	300	150	3.68E-04
3	300	150	3.68E-04
4	300	140	3.44E-04
5	300	140	3.44E-04
6	300	140	3.44E-04
7	300	140	3.44E-04
8	300	140	3.44E-04
9	300	140	3.44E-04
10	300	140	3.44E-04
11	300	140	3.44E-04
12	300	140	3.44E-04
13	300	140	3.44E-04
14	300	140	3.44E-04
15	300	140	3.44E-04
16	300	140	3.44E-04
17	300	140	3.44E-04
18	300	140	3.44E-04
Results	Sustained Rate	142	3.48E-04



Infiltration Rate: **1.05E-02 cm/sec** **14.9 in/hr**

APPENDIX A