

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.

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

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PUBLIC NOTICE

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



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, Ilc.) 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.

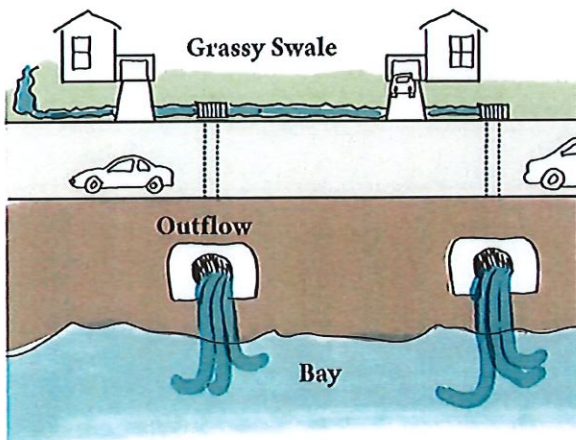
"Of primary importance to minimizing the effects of stormwater on water quality is the First Flush. This term describes the washing action that stormwater has on accumulated pollutants in a watershed. In the early stages of runoff the land surfaces, especially the impervious surfaces like streets and 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.

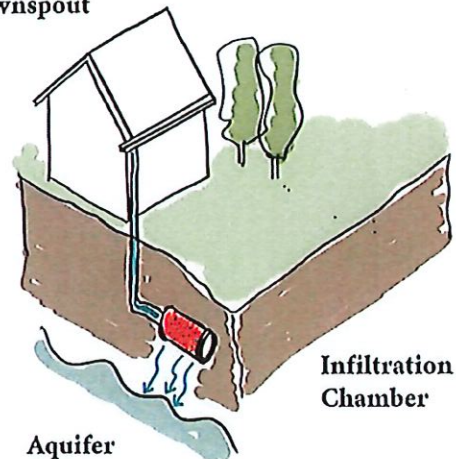
Thank you for your time and consideration.

SYSTEMS COMPARISON:



Current stormwater trajectory flows mostly above ground, or in pipes throughout 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.

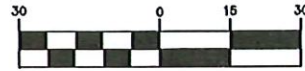
Gutter to
Downspout



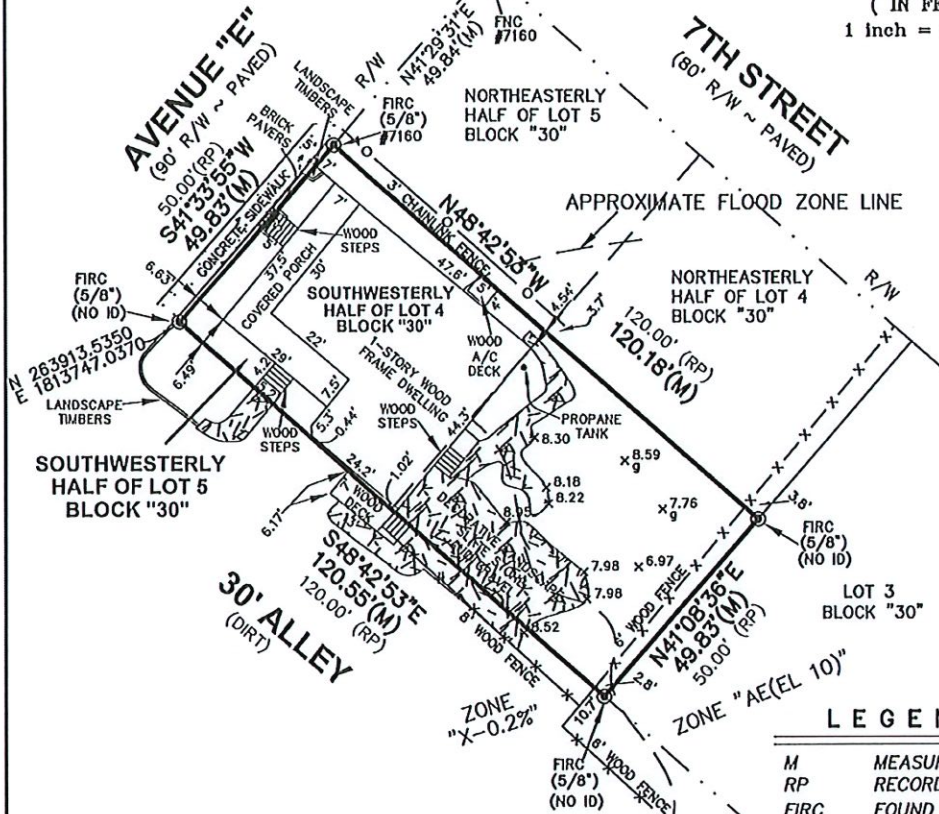
Underground infiltration chamber storm water system captures the water and treats the 'first flush' naturally before recharging the aquifer localized and on-site.

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

GRAPHIC SCALE



(IN FEET)
 1 inch = 30 ft.



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 certify 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

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
—X—	NOT TO SCALE
△	POINT NOT SET OR FOUND

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: 1200B9 0526F, index date: February 05, 2014, Franklin County, Florida.



THURMAN RODDENBERRY & ASSOCIATES, INC

PROFESSIONAL SURVEYORS AND MAPPERS
 P.O. BOX 100 • 125 SHELDON STREET • SOPCHOPPY, FLORIDA 32358
 PHONE NUMBER: 850-932-3335 FAX NUMBER: 850-932-1113
 LB # 1119

DATE: 02/14/24	DRAWN BY: BD	N.B.682 PG.17	COUNTY: FRANKLIN
FILE: 05430.0WG	DATE OF LAST FIELD WORK: 02/13/24	CHECKED BY: AW	JOB NUMBER: 05-430

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.



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.

PROJECT SUMMARY

PROJECT TYPE	PROPERTY
Infiltration	Residence

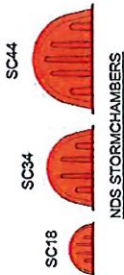
STAKEHOLDERS
SiteOne
Mills Design Group
Tom Anthony Construction

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 Design Worx Services Utilized:

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

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 F2822 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. SEDIMENT TRAP MANUFACTURED WITH HIGH MOLECULAR WEIGHT, HIGH DENSITY POLYETHYLENE.
7. NON-WOVEN POLYPROPYLENE FILTER FABRIC TMG-40ZNNV BY TMAPS OR APPROVED EQUAL.
8. WOVEN POLYPROPYLENE FILTER FABRIC 300FTM 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.

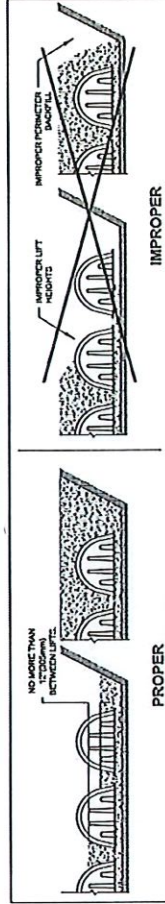
REQUIREMENTS FOR CONSTRUCTION EQUIPMENT

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 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.
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. COMPACTION 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 WITH 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 5-8 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

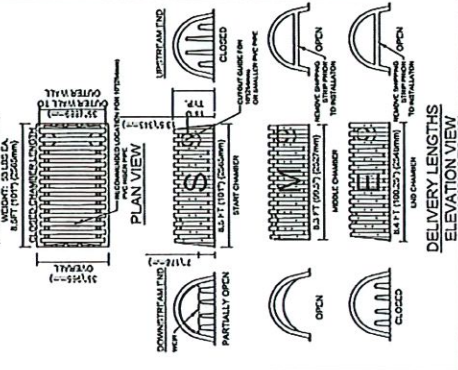
PROJECT # 4691 - 4692
DATE: 3/20/24
DRAWN BY: JRM

STORMCHAMBER®
NDS Design Work

NDS STORMCHAMBER SYSTEM DETAILS
NDS SPECIALIST: 571-521-9538

CHAMBER PART	HEIGHT (ft)	WIDTH (ft)	LENGTH (ft)	VOLUME (cu ft)	INSTALLER	CHAMBER INSTALLED PROJECT	LENGTH (ft)	VOLUME (cu ft)
START	28.00	18.00	25.00	12600	SC-1820	44.51(1.31)	44.51(1.31)	44.51(1.31)
MIDDLE	28.00	18.00	25.00	12600	SC-1820	23.63(0.68)	23.63(0.68)	23.63(0.68)
END	28.00	18.00	25.00	12600	SC-1820	44.51(1.31)	44.51(1.31)	44.51(1.31)
CLOSED	28.00	18.00	25.00	12600	SC-1820	23.63(0.68)	23.63(0.68)	23.63(0.68)
ETIMOVON ABOVE AND BELOW CHAMBER, ETIMOVON CHAMBER SPINACH, 1" (25mm) POLYURETHANE STYROFOAM INSULATION						68.81(1.92)	68.81(1.92)	68.81(1.92)

SC-1820 DIMENSIONS

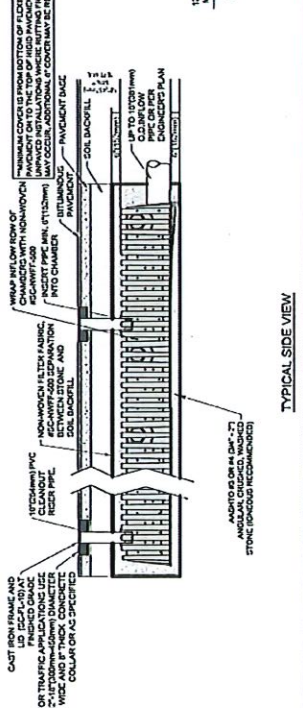
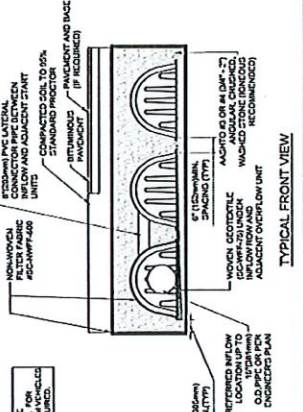
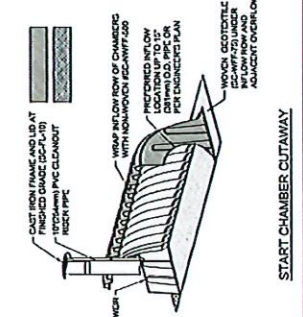
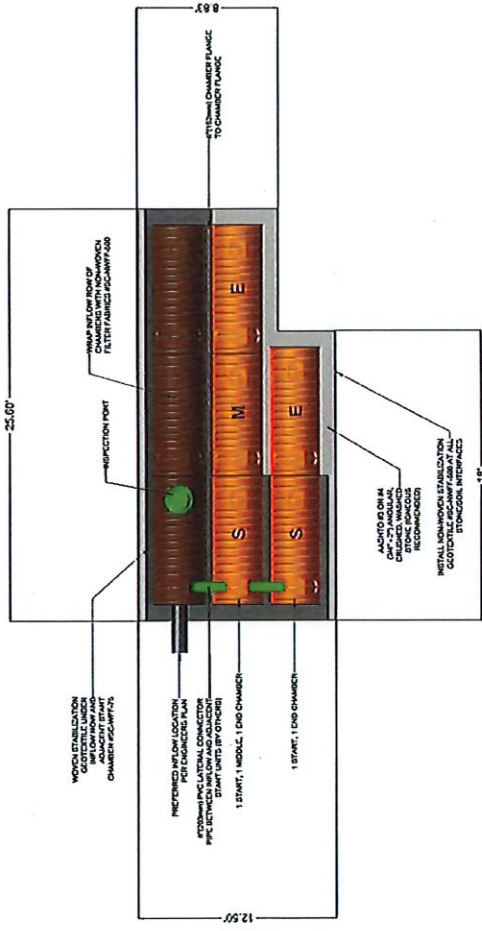


- NOTES:**
- START CHAMBERS CLOSED AT THE SDC PORTAL ONE
 - END CHAMBERS CLOSED AT THE SDC PORTAL TWO
 - ALL CHAMBERS TO BE INSTALLED WITH START CHAMBER
 - ALL CHAMBERS TO BE INSTALLED WITH END CHAMBER
 - ALL CHAMBERS TO BE INSTALLED WITH SDC PORTAL ONE
 - ALL CHAMBERS TO BE INSTALLED WITH SDC PORTAL TWO
 - OVER THE LAST RB OF THE PREVIOUS CHAMBER WITH SPACING.

MATERIAL LIST

DESCRIPTION	STOCK CODE	QTY	UNITS
CHAMBERS AND ACCESSORIES:			
START CHAMBER	SC-1820-01	3	EACH
MIDDLE CHAMBER	SC-1820-02	2	EACH
END CHAMBER	SC-1820-03	3	EACH
CLOSED CHAMBER	SC-1820-04	NA	EACH
ETIMOVON CHAMBER	SC-1820-05	NA	EACH
NONWOOLCH GEOTEXTILE	SC-1820-06	1	ROLLS
WOLCH STABILIZATION GEOTEXTILE	SC-1820-07	1	ROLLS
3/4" X 1/4" HOPE PIPE FOR EDIMOVON	SC-1820-08	NA	EACH
10" CAST IRON FRAME AND LID	SC-1820-09	1	EACH
MATERIALS BY OTHERS:			
10" (254mm) DIAMETER REGR PIPE	OTHERS	1	EACH
8" (203mm) LATERAL CONNECTOR PIPE	OTHERS	2	EACH
1/2" (12.7mm) PLATE EXCAVATION (NO BUILDING FACTOR)	OTHERS	27	CU YD
STONE BACKFILL	OTHERS	29	CU YD
1 1/2" (38.1mm) W/UT NUT AND BOLT	OTHERS	8	EACH
IMPERVIOUS LINER	OTHERS	NA	CU YD
4" PERFORATED UNDERDRAIN	OTHERS	NA	LF

PLAN VIEW



NDS STORMCHAMBER SYSTEM DETAILS
NDS SPECIALIST: 271-621-4038



PROJECT # 4692
DATE: 3/20/20
DRAWN BY: ARI
REVISION:

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

SYSTEM DETAILS

INSPECTION AND MAINTENANCE OF STORMCHAMBER SEDIMENTTRAP ROW

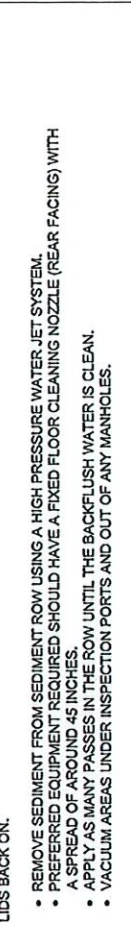
STORMCHAMBER™ WITH SEDIMENTTRAP™ ROW IS DESIGNED FOR EASE OF INSPECTION AND REDUCED LONG-TERM MAINTENANCE COST MONITORING T.S.S. BUILDUP IN A SEDIMENTTRAP™ CAN BE DONE WITHOUT THE NEED FOR A THIRD PARTY AS THE TRAP SITS DIRECTLY BELOW THE OBSERVATION PORT. A CAMERA WITH LIGHT AND/OR LONG MEASURING STICK 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 RUNNING OFF 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 SEDIMENTTRAP OR CHAMBER BOTTOM.

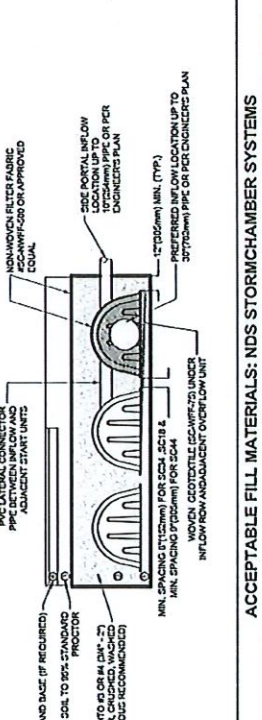
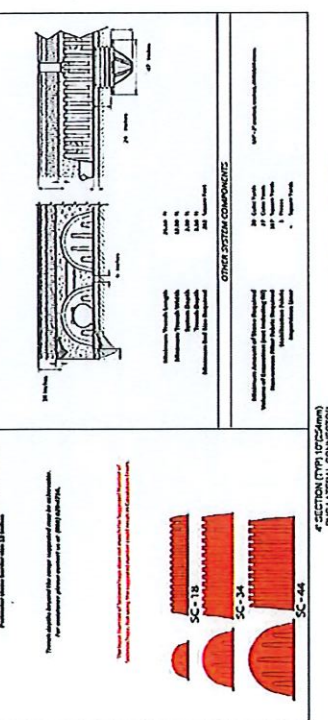
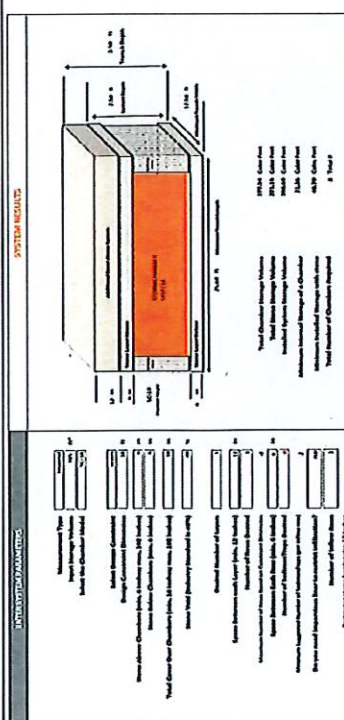
- 1: MAINTENANCE WITH SEDIMENTTRAP - VACUUM TRUCK METHOD**
- REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILD-UP IN THE SEDIMENTTRAP. IF SEDIMENT BUILD-UP IN THE SEDIMENTTRAP IS WITHIN 6 INCHES FROM THE TOP OF THE SEDIMENTTRAP OR CHAMBER BOTTOM THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILD-UP IS LESS THAN 6 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 SEDIMENTTRAP (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 SEDIMENTTRAP - 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 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 SEDIMENTTRAP USING VACUUM TRUCK

MAINTENANCE WITHOUT SEDIMENTTRAP USING WATER JET



ACCEPTABLE FILL MATERIALS: NDS STORMCHAMBER SYSTEMS

MATERIAL LOCATION	DESCRIPTION	ASBESTOS MATERIAL CLASSIFICATION	COMPACTION/STABILITY REQUIREMENT
4	FILL MATERIAL FOR LAYER 2 STARTS FROM THE TOP OF THE 3" LAYER TO THE BOTTOM OF GRADE ABOVE. NOTE THAT PAVEMENT SUBGRADE MAY BE PART OF THIS LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS OR PER ENGINEERS PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	PREPARE FOR ENGINEERS PLANS. PAVED INSTALLATIONS MAY HAVE PREPARATION REQUIREMENTS.
3	FILL MATERIAL FOR LAYER 3 STARTS FROM THE TOP OF THE 2" LAYER TO THE BOTTOM OF THE 3" LAYER. NOTE THAT PAVEMENT SUBGRADE MAY BE A PART OF THIS LAYER.	A6H20 M45 OR A6H20 M43 OR A6H20 M42 OR A6H20 M41 OR A6H20 M40 OR A6H20 M39 OR A6H20 M38 OR A6H20 M37 OR A6H20 M36 OR A6H20 M35 OR A6H20 M34 OR A6H20 M33 OR A6H20 M32 OR A6H20 M31 OR A6H20 M30 OR A6H20 M29 OR A6H20 M28 OR A6H20 M27 OR A6H20 M26 OR A6H20 M25 OR A6H20 M24 OR A6H20 M23 OR A6H20 M22 OR A6H20 M21 OR A6H20 M20 OR A6H20 M19 OR A6H20 M18 OR A6H20 M17 OR A6H20 M16 OR A6H20 M15 OR A6H20 M14 OR A6H20 M13 OR A6H20 M12 OR A6H20 M11 OR A6H20 M10 OR A6H20 M9 OR A6H20 M8 OR A6H20 M7 OR A6H20 M6 OR A6H20 M5 OR A6H20 M4 OR A6H20 M3 OR A6H20 M2 OR A6H20 M1 OR A6H20 M0	BEGIN COMPACTION AFTER 12" (305mm) OF A6H20 M45 OR A6H20 M43 OR A6H20 M42 OR A6H20 M41 OR A6H20 M40 OR A6H20 M39 OR A6H20 M38 OR A6H20 M37 OR A6H20 M36 OR A6H20 M35 OR A6H20 M34 OR A6H20 M33 OR A6H20 M32 OR A6H20 M31 OR A6H20 M30 OR A6H20 M29 OR A6H20 M28 OR A6H20 M27 OR A6H20 M26 OR A6H20 M25 OR A6H20 M24 OR A6H20 M23 OR A6H20 M22 OR A6H20 M21 OR A6H20 M20 OR A6H20 M19 OR A6H20 M18 OR A6H20 M17 OR A6H20 M16 OR A6H20 M15 OR A6H20 M14 OR A6H20 M13 OR A6H20 M12 OR A6H20 M11 OR A6H20 M10 OR A6H20 M9 OR A6H20 M8 OR A6H20 M7 OR A6H20 M6 OR A6H20 M5 OR A6H20 M4 OR A6H20 M3 OR A6H20 M2 OR A6H20 M1 OR A6H20 M0
2	ENDEMENT STONE CARROUSING (MINIMUM 2" TO 3" INCH (50-75mm) STONE (2" LAYERS TO THE 3" LAYER ABOVE).	A6H20 M3 - R4	90% T99.
1	PAVEMENT STONE (MINIMUM 2" TO 3" INCH (50-75mm) STONE (2" LAYERS TO THE 3" LAYER ABOVE).	A6H20 M3 - R4	PAVEMENT STONE (MINIMUM 2" TO 3" INCH (50-75mm) STONE (2" LAYERS TO THE 3" LAYER ABOVE).

PROJECT NAME : 92 AVENUE E - SYSTEM #2

PROJECT LOCATION : APALACHICOLA, FL

PROJECT # 4692

DATE: 3/20/2024
DRAWN BY: ANH
REVISION:

STORMCHAMBER®

NDS Design Work

NDS STORMCHAMBER SYSTEM DETAILS

NDS SPECIALIST: 374-524-6638

AVENUE "E" / HWY 98

(90' R/W ~PAVED)

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

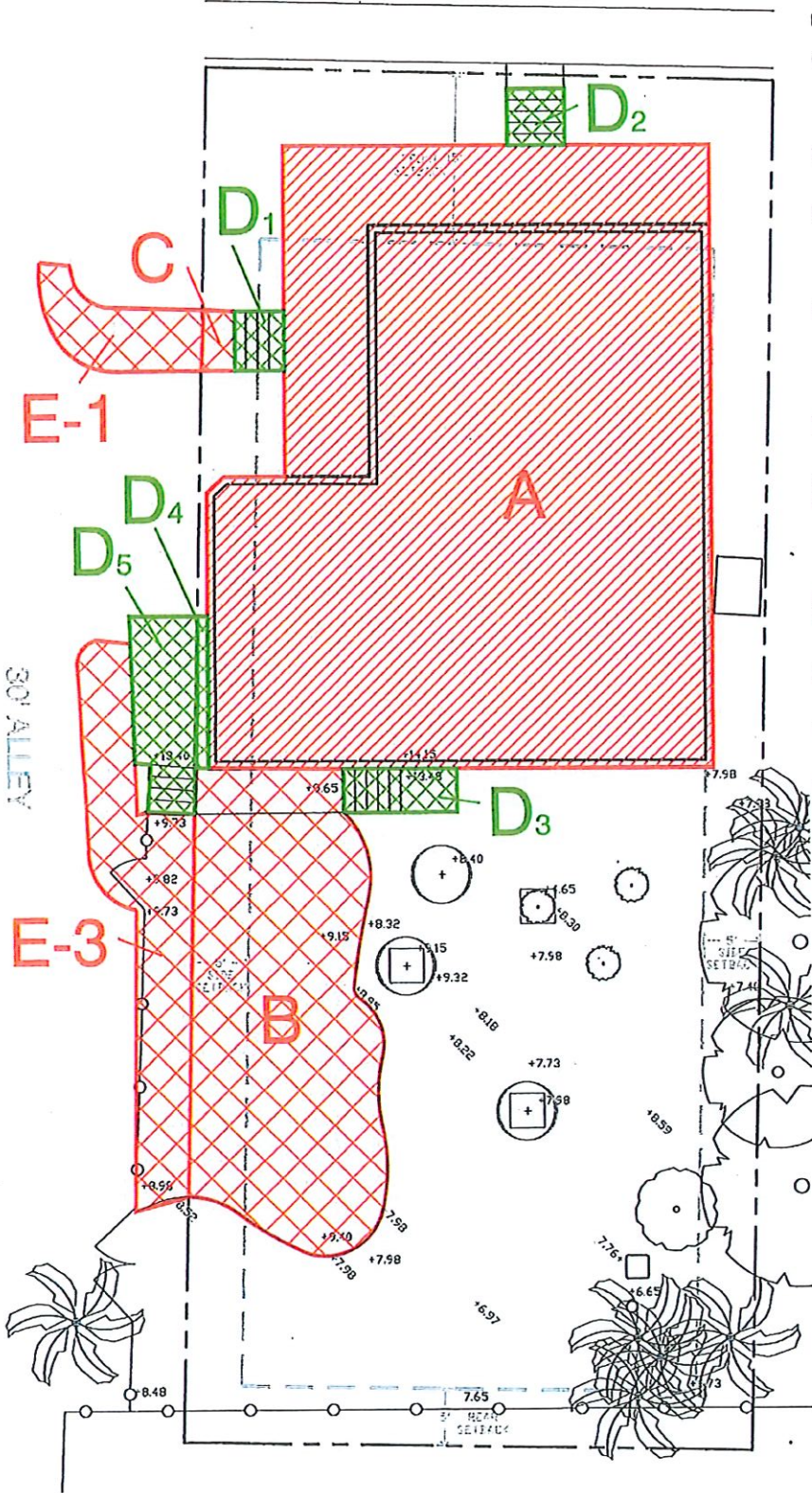
E-2 DECORATIVE STONE PAVING
265 SF

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

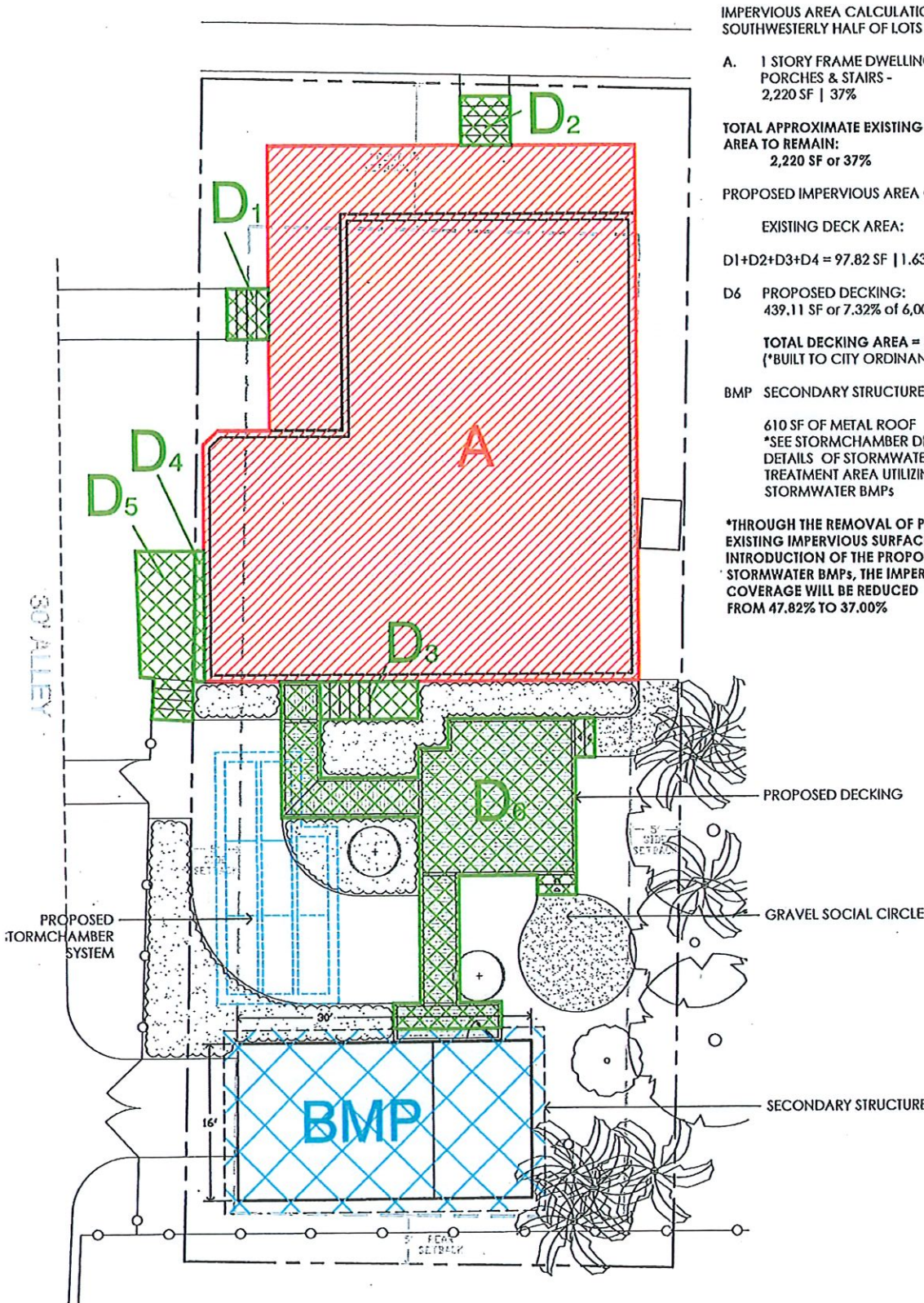
*TOTAL PROPERTY AREA LOT CALCULATIONS:
BLOCK 30 SOUTHWESTERLY HALF OF LOTS 4&5
APPX. 50' x 120' = 6,000 SF

TOTAL AREA = 6,000 SF



AVENUE "E" / HWY 98

(60' 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:

$D1+D2+D3+D4 = 97.82 \text{ SF} | 1.63\%$

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%

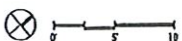
PROPOSED DECKING

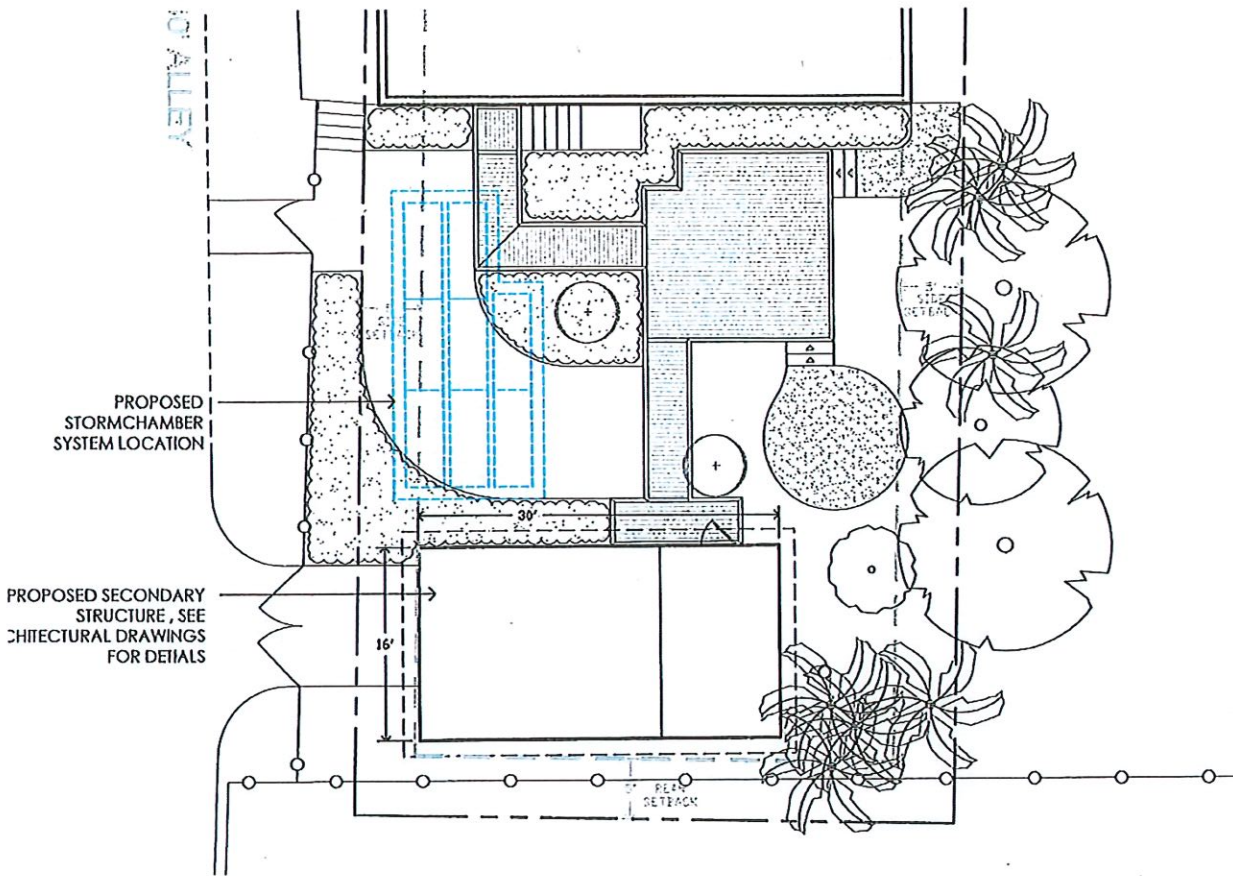
GRAVEL SOCIAL CIRCLE

SECONDARY STRUCTURE

*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





LANDSCAPE DESIGN- DESIGN CONCEPT & STORMWATER CALCULATIONS:

DESIGN CONCEPT-

➤ goal of the Storm water Best Management Practice of 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.
 ➤ 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 10x16').
 ➤ 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 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 firming and conglom'nants. 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).

STORMWATER 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)
305CF	=	.25 inches per hour x 24 hours x 610 Square Feet

SUMMARY OF REQUIRED STORMWATER VOLUMES TO BE TREATED:

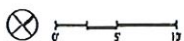
50.88CF	=	Water Quality Treatment
305CF	=	Flood Attenuation Volume

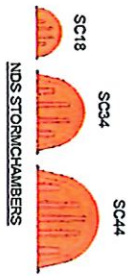
NDS STORMCHAMBER CAPACITY SUMMARY:

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)





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 6.95 FT WIDE X 44 INCHES TALL
5. MINIMUM COVER FOR SC18 AND SC34 IS 18 INCHES. MINIMUM COVER FOR SC44 IS 22 INCHES.
6. SEDIMENTTRAP MANUFACTURED WITH HIGH MOLECULAR WEIGHT, HIGH DENSITY POLYETHYLENE
7. NONWOVEN POLYPROPYLENE FILTER FABRIC TIG-40ZINNG BY TAPG 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

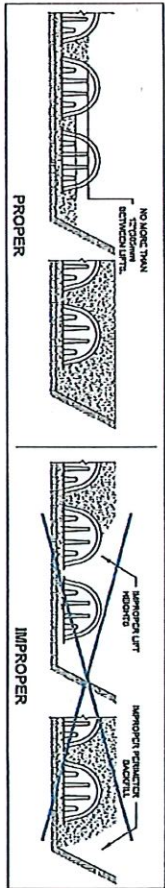
REQUIREMENTS FOR CONSTRUCTION EQUIPMENT

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. FINCH FOR SC18 AND SC34 AND 12-INCH FOR SC44, 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 571-521-4538 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. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
9. 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.

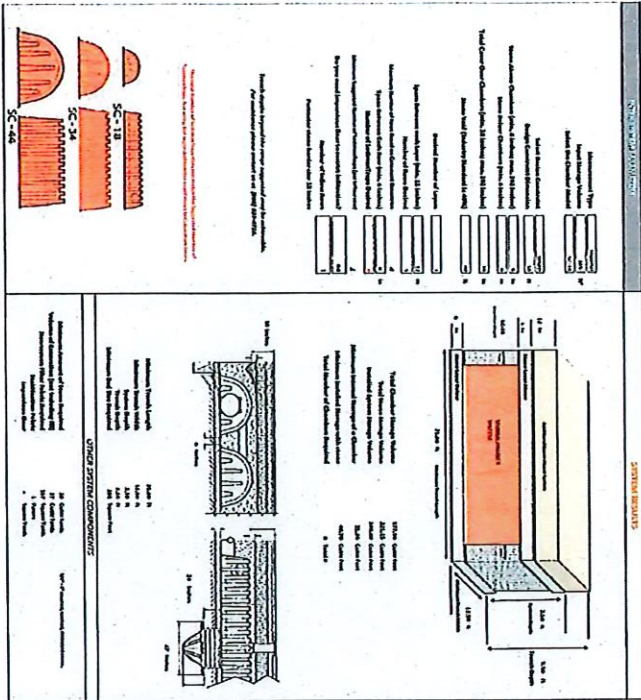
BACKFILL METHODS



PROJECT NAME : 92 AVENUE E
PROJECT LOCATION : APALACHICOLA, FL

PROJECT # 4691 - 4692	DATE: 2/20/24	DESIGNER: JACOB
	ISSUED: 2/20/24	REVISION: 01

STORMCHAMBER Design MOX
NDS STORMCHAMBER SYSTEM DETAILS
NDS SPECIALIST: 571-521-4538



ACCEPTABLE FILL MATERIALS: NDS STORMCHAMBER SYSTEMS

MATERIAL LOCATION	DESCRIPTION	ASPHALT MATERIAL CLASSIFICATION	CONSTRUCTION REQUIREMENT
1. FILL MATERIAL FOR LAYER 1 (TOP OF THE 7\"/>			

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

PROJECT # 4892
 DATE: 08/27/2018

STORMCHAMBER®
 NDS Design Work

NDS STORMCHAMBER SYSTEM DETAILS
 NDS SPECIALIST: 671-451-6255

INSPECTION AND MAINTENANCE OF STORMCHAMBER SEDIMENTTRAP ROW

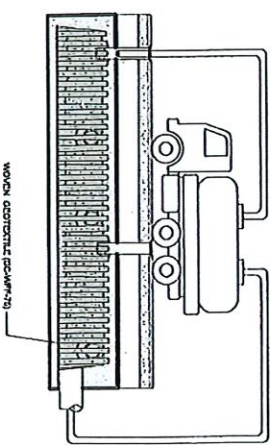
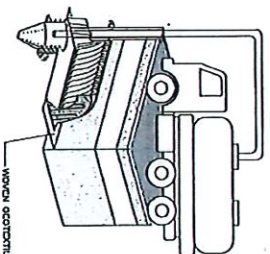
INSPECTION AND MAINTENANCE OF STORMCHAMBER SEDIMENTTRAP ROW IS DESIGNED FOR EASE OF INSPECTION AND REDUCED LONG-TERM MAINTENANCE COST MONITORING T.S.S. BUILDUP IN A SEDIMENTTRAP CAN BE DONE WITHOUT THE NEED FOR A THIRD PARTY AS THE TRAP SITS DIRECTLY BELOW THE OBSERVATION PORT. A CAMERA WITH LIGHT AND/OR 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 RAINOFF 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 SEDIMENTTRAP OR CHAMBER BOTTOM.

- 1: MAINTENANCE WITH SEDIMENTTRAP - VACUUM TRUCK METHOD**
 REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILDUP IN THE SEDIMENTTRAPS. IF SEDIMENT BUILDUP IN THE SEDIMENTTRAP IS WITHIN 6 INCHES FROM THE TOP OF THE SEDIMENTTRAP OR CHAMBER BOTTOM THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILDUP IS LESS THAN 6 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 SEDIMENTTRAP (TYP. 7'-10 FEET BELOW FINISHED GRADE).
 • REMOVE SEDIMENT USING VACUUM TRUCK/EQUIPMENT UNTIL NO FURTHER SEDIMENT IS BEING REMOVED.
 • INSPECT SEDIMENT BUILDUP AGAIN TO ENSURE PROPER CLEANOUT.

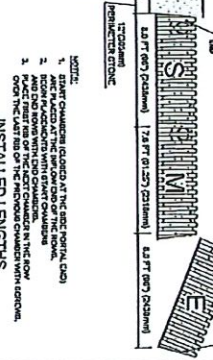
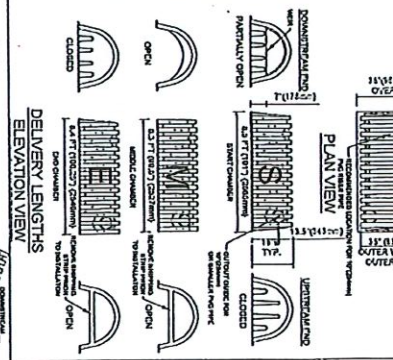
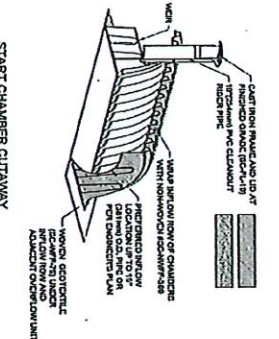
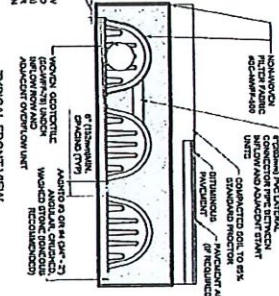
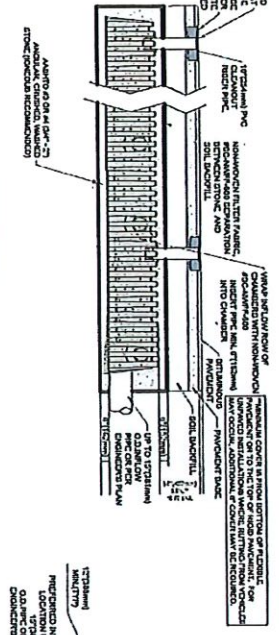
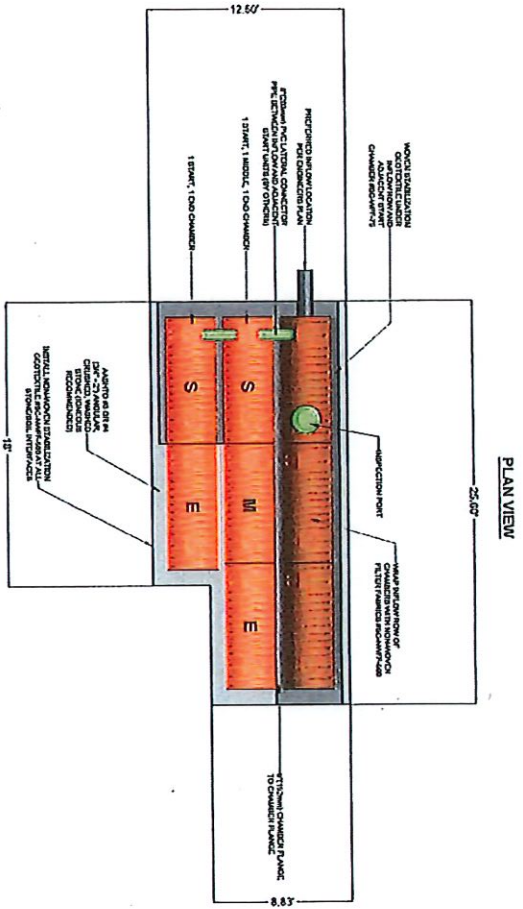
- 2: MAINTENANCE WITHOUT SEDIMENTTRAP - WATER JET METHOD**
 REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILDUP ON THE UNDERLYING WOVEN FABRIC UNDER THE CHAMBERS. IF SEDIMENT BUILDUP ON THE BOTTOM IS GREATER THAN 3 INCHES THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILDUP 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 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 SEDIMENTTRAPS USING VACUUM TRUCK

MAINTENANCE WITHOUT SEDIMENTTRAPS USING WATER JET

CHAMBER PART	HEIGHT	WIDTH	ACTUAL LENGTH	INSTALLS	CHAMBER VOLUME	INSTALLED STORAGE VOLUME
START	18" (457mm)	60" (1524mm)	125' (3810mm)	226	226.00	44,411 cu ft
MIDDLE	18" (457mm)	60" (1524mm)	61.27' (1877mm)	226	226.00	44,711 cu ft
END	18" (457mm)	60" (1524mm)	61.27' (1877mm)	226	226.00	44,711 cu ft
CLOSED	18" (457mm)	60" (1524mm)	100.00' (30480mm)	226	226.00	44,711 cu ft
START	18" (457mm)	60" (1524mm)	125' (3810mm)	226	226.00	44,411 cu ft



MATERIAL LIST

DESCRIPTION	MATERIAL	QTY	UNITS
CHAMBER AND ACCESSORIES	STYCO CODE	3	EA
START CHAMBER	SC-1220-00	1	EA
MIDDLE CHAMBER	SC-1220-01	1	EA
END CHAMBER	SC-1220-02	1	EA
CLOSED CHAMBER	SC-1220-03	1	EA
NON-CORROSION ADVANTAGE	SC-1220-04	1	EA
PROTECTIVE NON-SHAFTING	SC-1220-05	1	EA
1" DIA. TYPICAL	SC-1220-06	1	EA
VERTICAL CHAMBER	SC-1220-07	1	EA
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NON-CORROSION ADVANTAGE	SC-1220-09	1	EA
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VERTICAL CHAMBER	SC-1220-12	1	EA
START CHAMBER CUTAWAY	SC-1220-13	1	EA
NON-CORROSION ADVANTAGE	SC-1220-14	1	EA
PROTECTIVE NON-SHAFTING	SC-1220-15	1	EA
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VERTICAL CHAMBER	SC-1220-17	1	EA
START CHAMBER CUTAWAY	SC-1220-18	1	EA
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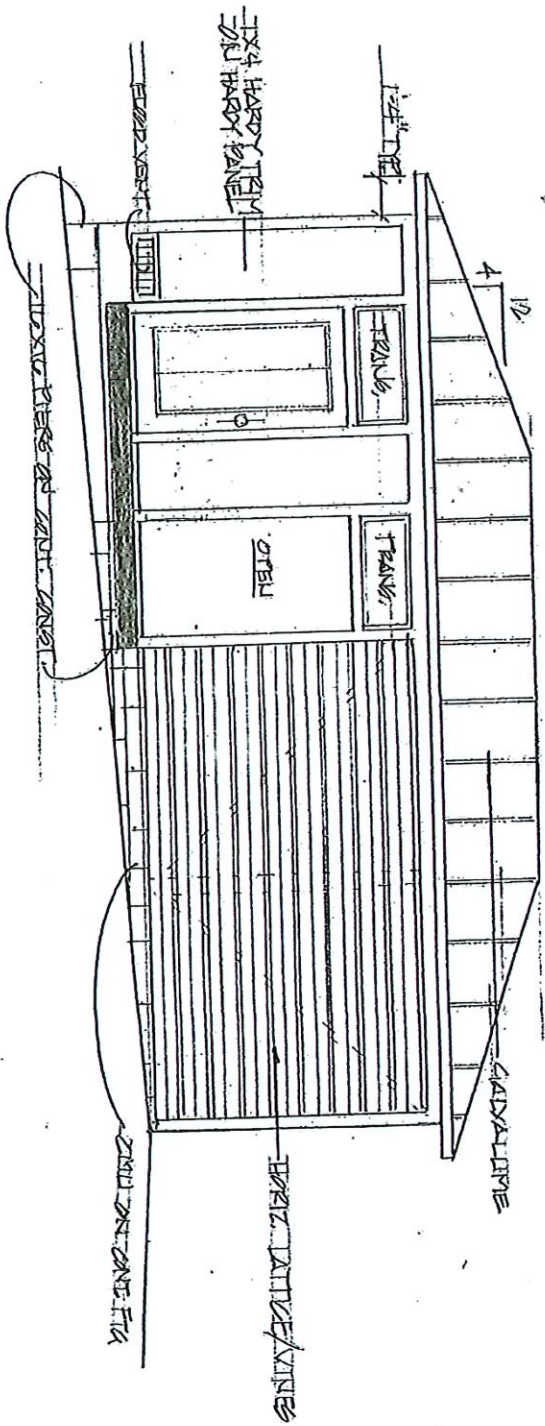
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 PROJECT LOCATION : APALACHICOLA, FL

PROJECT # 4692
 DATE: 2/20/20
 DRAWN BY: JAM

STORMCHAMBER®
 NDS Design Work

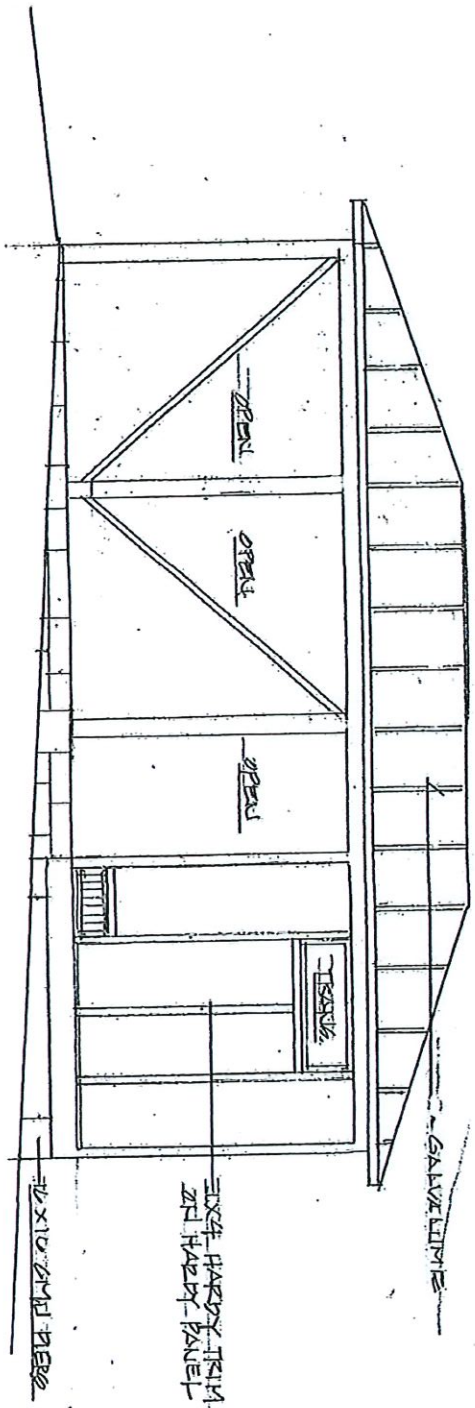
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REVISIONS
 NO. 1
 DATE



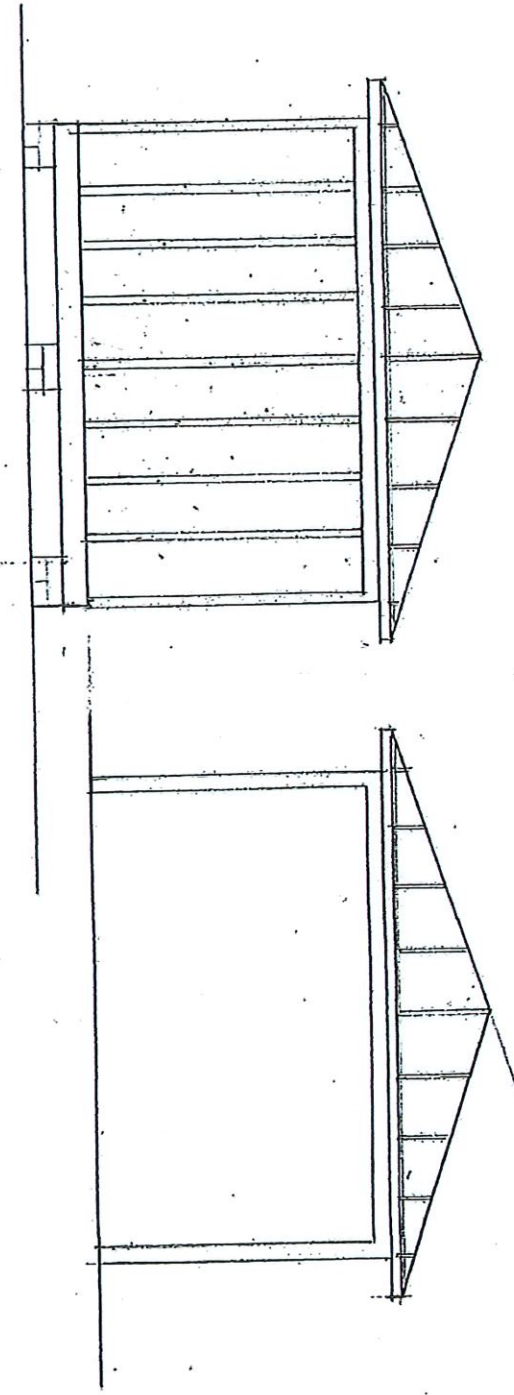
North Elevation

1/4" = 1'-0"



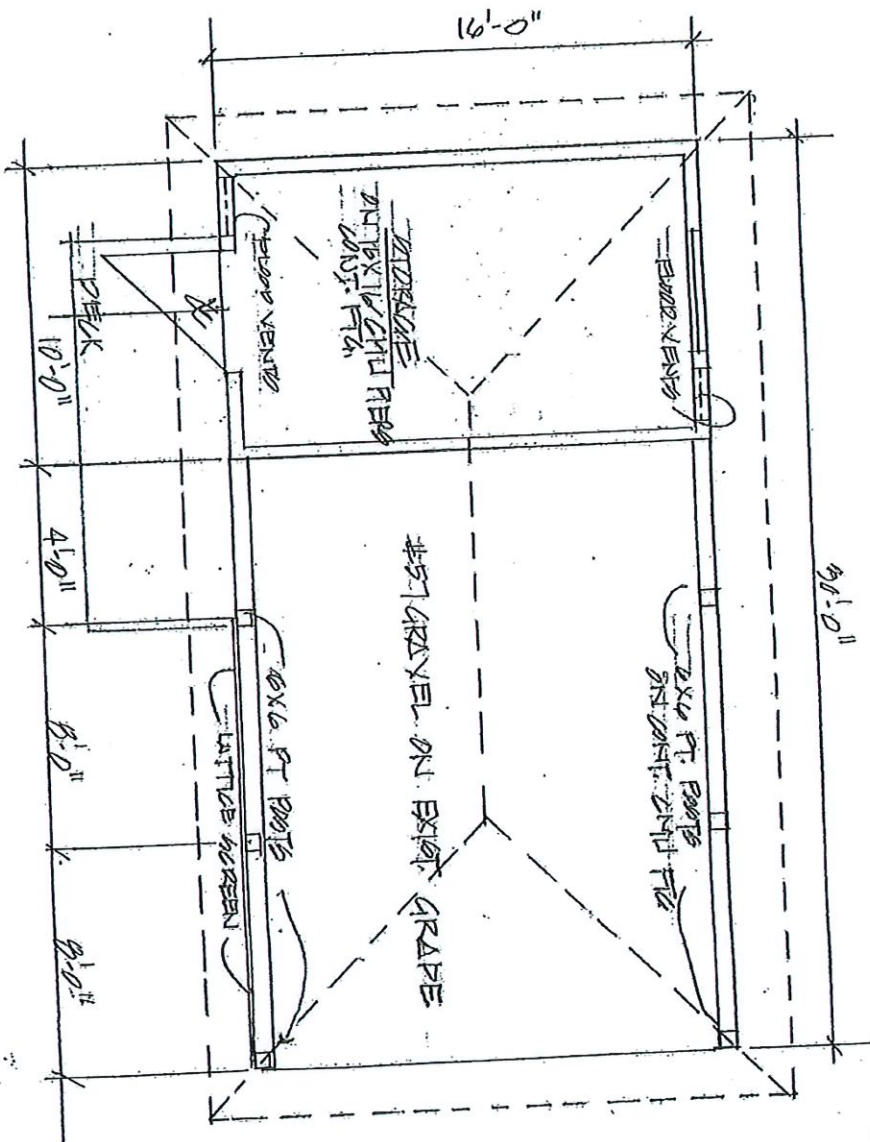
South Elevation.

$\frac{1}{4}'' = 1'-0''$



East and West Elevations

1/4"=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 1/8 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 housetrailleurs.

- (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

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from the Department of
Economic Opportunity.

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Betsy Webb, Administrator, City of
Apalachicola

Apalachicola City Commission

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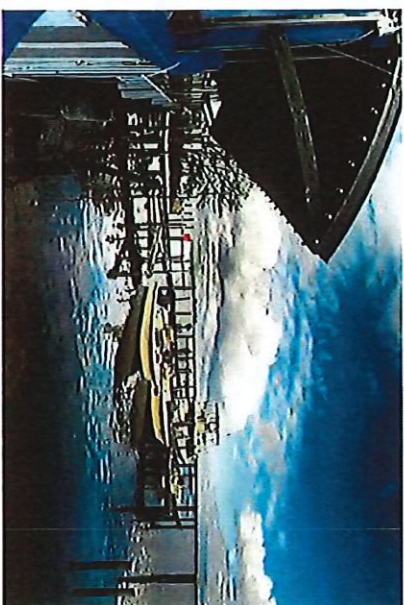
Lee Marchman, Florida Department of Environmental Protection

Michael Baerman, Northwest Florida Water Management District

Rebecca Jettan, Mark Yelland, Florida Department of Economic Opportunity

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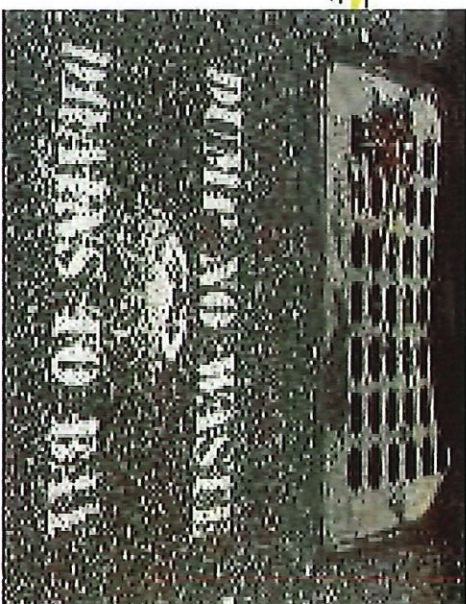
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THE BIG PICTURE

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.

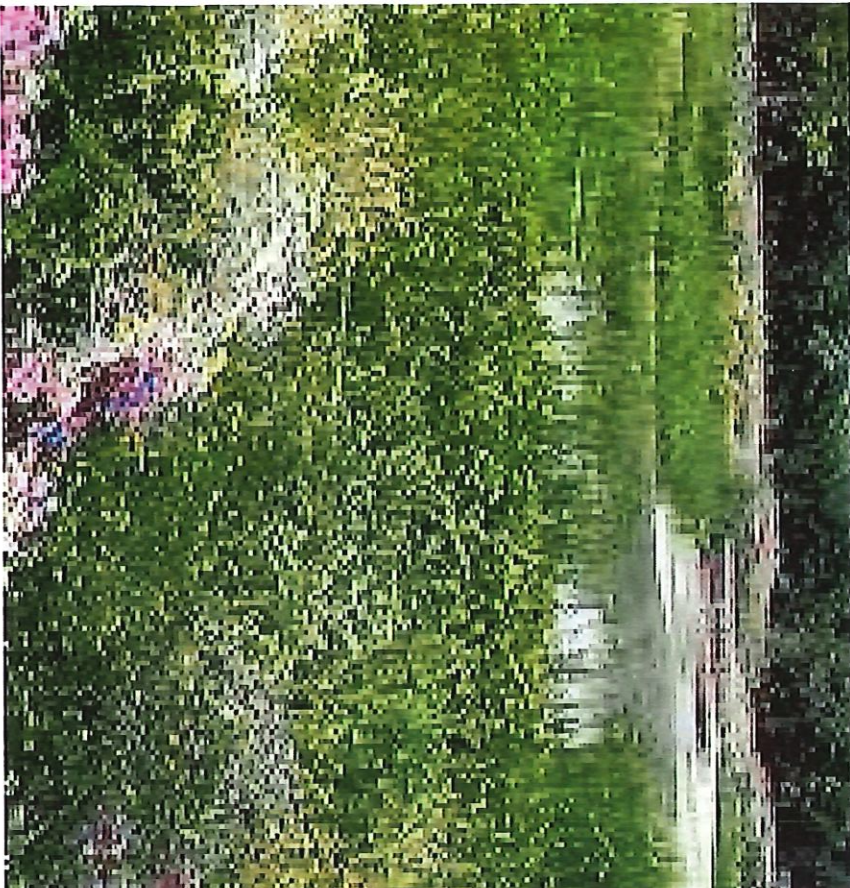
STRUCTURAL DETENTION BMPs - PONDS

In areas with slowly percolating soils, high water tables and flat terrain, permanently wet detention systems and wetland treatment 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.



LID is an approach to land development (or redevelopment) 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 roofpops, 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.

Apalachicola

Stormwater Management

Low Impact Development (LID)

Green Infrastructure

City of Apalachicola



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.

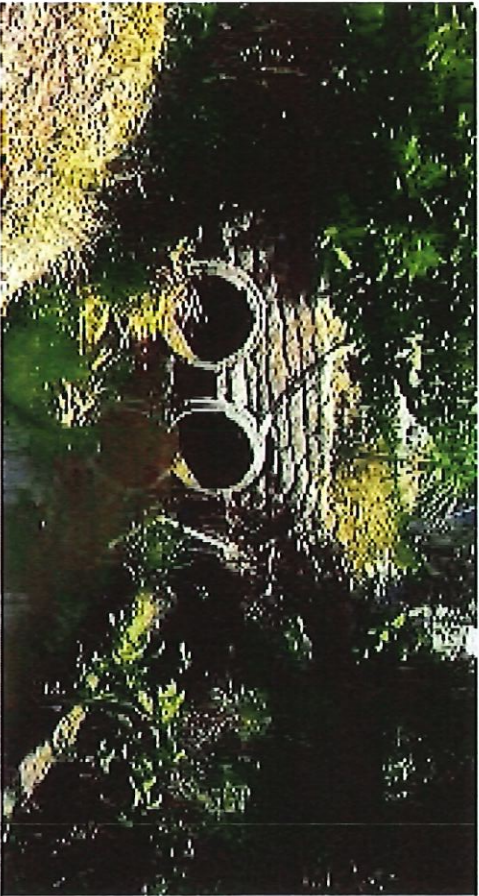
THE FIRST FLUSH

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, retention 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.

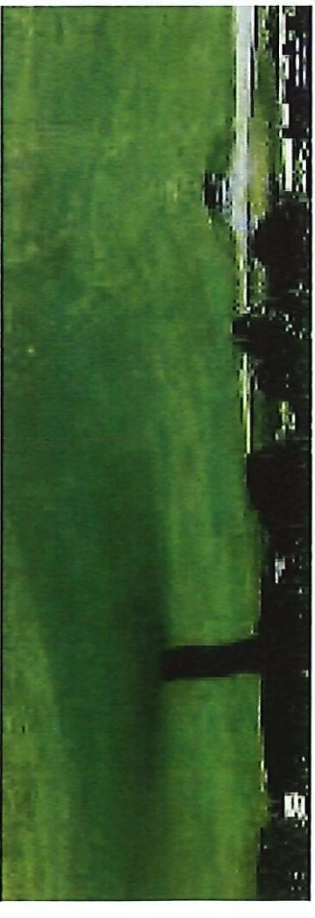
GRASSED SWALES

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.

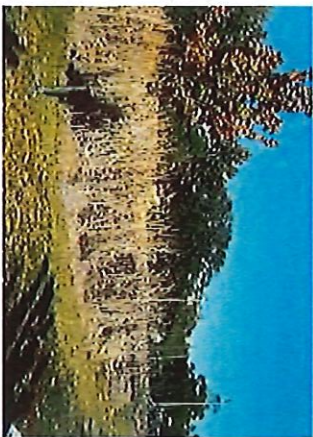


VEGETATION IS IMPORTANT TO STORMWATER MANAGEMENT

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 seak 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 Appalachian 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-detection 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 retain, 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.

