AVALON BEACH ESTATES

STORMWATER MANAGEMENT PLAN
WALTON COUNTY, FLORIDA

August 20, 1993

OWNER: SWH Developers
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Contact Person: Timm Shores

ENGINEER: Gustin, Cothern & Tucker, Inc.
121 Hart Street
Niceville, Florida 32578
Project Engineer: James L. Barton, P.E.

I. PROJECT DATA

A.	Total Project Area	=	32.46 Acres (1,413,921 SF)
B.	Project Area North of County Road 2378	=	30.39 Acres (1,323,874 SF)
C.	Project Area South of County Road 2378	=	2.07 Acres (90,047 SF)
D.	Project Drainage Area	=	30.49 Acres
E.	Total Wetlands within Project	=	0 Acres

F. Site Description: Light density of scrub oaks, sand pines and undergrowth. Highly permeable beach sand overlaid by a thin layer of topsoil. No groundwater encountered at a depth of 6 feet.

G. Existing Site Runoff Coefficient: 0.10
H. Project Type: 129 Lot Single Family Residential Subdivision
I. Proposed Impervious Surface Area: 491,112 SF
J. Developed Site Runoff Coefficient: 0.45

II. PRE-DEVELOPMENT CONDITIONS

The project site is located on County Road 2378 (Old Highway 98) approximately ½ mile east of the Walton County/Okaloosa County line. The site contains a total of 32.46 acres and is covered by a light density of scrub oaks and sand pines. The project soil consists primarily of highly permeable beach sand overlaid by a thin layer of topsoil. No groundwater was detected at a depth of 5 feet in the soil borings.

The project site is relatively flat with a slight fall to the north. Very little runoff is produced under pre-development conditions due to the soil permeability, existing rainfall percolates into the ground.

III. POST-DEVELOPMENT CONDITIONS

The proposed project will consist of 129 single family residential lots, served by a main roadway and a series of cul-de-sacs. The total length of proposed roads is approximately 4,920 feet. Roadways will be constructed with 6" of sand/clay base and 1½" of Type S III asphaltic concrete, and will be bound by 12" concrete flat curbs. A divided roadway with 8' medians and concrete curb and gutter is proposed at the project entrance.

The proposed stormwater management facility will consist of grassed roadway swales. The swales have been sized to retain and percolate stormwater runoff from the critical duration, 25 year storm.

The proposed streets and swales will be within public rights-of-way, and will be placed within the county maintenance system after the warranty period.

IV. IMPACT OF PROJECT ON EXISTING CONDITIONS

A. CHANGES IN WATER QUALITY

This project will have no effect on the quality of the receiving waters since all stormwater will be percolated into the site and the pollutants will be cleaned by infiltration through the soil.

B. CHANGES IN GROUNDWATER LEVELS

No changes are anticipated because all stormwater will return to the ground through the roadway swales.

C. CHANGES IN FLOODING ON AND OFF SITE

Due to the location of the project, soil permeability and the swale system proposed, there will be no flooding problems on or off the site.

D. IMPACT ON WETLANDS

There are no wetlands in the vicinity of this project.

E. IMPACT ON VEGETATION

The vegetation will be removed within the building pads and roadway areas. Re-vegetation will consists of grassing of the roadway swales.

V. ADDENDA

Construction Plans
Stormwater Calculations

James L. Barton, P.E.

8/20/93
Date

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Stormwater Calculations
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I Site Data:

A) Areas

1) Project Area North of County Road 2378 = 1,323,874 SF.
= 30.392 ac

2) Project Area South of County Road 2378 = 90,047 SF
≈ 2.07 ac

3) TOTAL Project Area = 1,413,921 SF
= 32.46 ac

4) 129 Single Family Residential Lots

B) Impervious Surface

1) Roadways & Curb = 140,158 SF.

2) Tennis Court & Pool = 20,714 SF.

3) Houses (assume 2,000 SF) = 129 (2000 ft²)
= 258,000 SF

4) Driveway (assume 14'x40') = (560 ft²)(129)
= 72,240 ft²

James L Barker
8/19/93

TOTAL Impervious Area = 491,112 ft²

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c) Weighted Runoff Coeff. (wt. "C")

Weight "C" computation based on north site area. Impervious areas are for development on north side

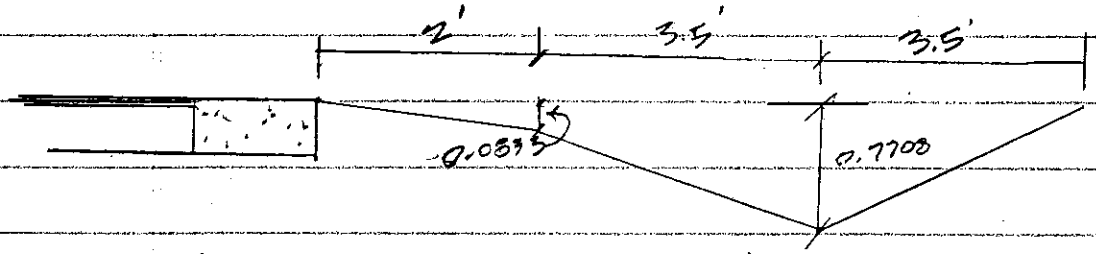
Use "C" = 0.15 grassed areas
"C" = 0.95 impervious areas

$$\text{Wt "C"} = \frac{491,112(.95) + 832,762(.15)}{1,323,874}$$

$$= 0.45$$

II Compute Storage Volume Provided by swale.

A) Typical Section Swale = 7,667 L.F



$$\text{X-sectional area} = \frac{2(0.0833)}{2} + \frac{(0.0833 + 0.7708)(3.5)}{2} + \frac{(0.7708)(3.5)}{2}$$

$$= (0.0833) + (1.4948) + (1.349)$$

$$= 2.93 \text{ ft}^2$$

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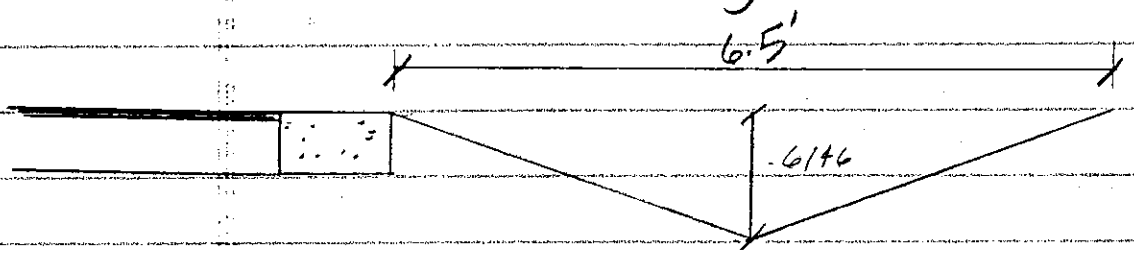
Volume from Typ. Sectional Swales = 7,667(2.93)

= 22,464 ft³

Surface Area = 7,667'(9')

= 69,003 ft²

B) Entrance Roadway Section - 889 L.F.



X-sectional area = $\frac{(6.5)(.6146)}{2}$

= 2.0 ft²

Volume from Entrance Roadway Swale = 889(2.0 ft²)

= 1,778 ft³

Surface Area = 6.5'(889')

= 5779 ft²

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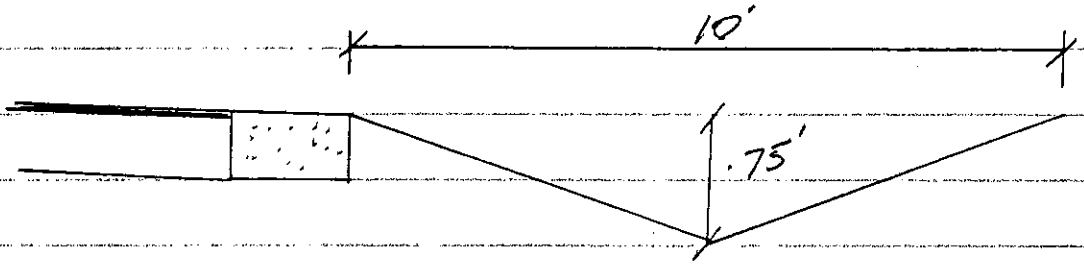
C) Cul-de-sac Swale Section - 1,668 LF



X-sectional Area = $\frac{10(.75)}{2}$

= 3.75 ft²

Volume from Cul-de-Sac Swales = 1,668'(3.75)

= 6,255 ft³

Surface Area = 10'(1668)

= 16,680 ft²

D) Total Swale Vol Provided = 22,464 ft³

1,778 ft³

6,255 ft³

30,497 ft³

E) Total Surface Area =

69,003 ft²

5,779 "

16,680 "

91,462 ft²

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III Compute Storage Volume Required for 25 year Storm

A) $Q_{runoff} = CiA$

$= (0.45)(30.392)(i)$

$= 13.68\,i$

B) $Q_{infiltrated} = (\text{Surface Area})(\text{Infiltration Rate})$

use infiltration rate = ½"/min

or 6.94×10^{-4} ft/sec

$Q_{infiltrated} = 91,462(6.94 \times 10^{-4})$

$= 63.52$ cfs

C) Required Volume $= (Q_{runoff} - Q_{inf})(t_c \times 60)$

$= [13.68i - 63.52]\,t_c \times 60$

Duration t_c (min)	Intensity i (in/hr)	Total Rainfall (in)	Volume Required (ft^3)
8	8.4	1.12	24,668
10	8.0	1.33	27,552
15	7.1	1.78	30,247 ←
20	6.4	2.13	28,838
30	5.4	2.70	18,634
40	4.6	3.07	—

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The worst case for the 25 year storm requires a storage volume of 30,247 ft³ which is less than the 30,497 ft³ provided. The critical duration results in 1.78 inches of rainfall.

IV Compute time of Recovery for Swales (Based on recovery rate of 6"/hr.)

$$\text{Recovery Time} = \frac{\text{Storage Volume}}{\text{Recovery Rate (Surface Area)}}$$

$$= \frac{30,497\ ft^3}{(.5''/Hr)(91,462\ ft^2)}$$

$$= 0.67\ Hrs$$

V Conclusion

The roadside swales provide sufficient volume to ensure that post-development stormwater conditions approximate pre-development conditions and have sufficient volume to retain and percolate over one-inch of rainfall.