



DENUZZIO HOPKINS PORTER & ASSOCIATES

September 24, 2010

Mrs. Charlotte Hanson
Association Board Member
Sugarhill Homeowners Association
Jensen Beach, FL 34957

RE: Sugarhill Development Drainage Analysis and Recommendation—Project Report

Mrs. Hanson

Attached is our report concerning the Sugarhill Community surface water management system. Our study has included research of the existing development design, interviews with state and local officials concerning the history of its operation, on site inspection of mechanical and earthen structures and a review of the water management design calculation used to develop the system.

Findings generally indicate that the system was properly designed when the permit was issued in 1978. The pre and post development drainage calculations were properly developed and the design which resulted is capable of managing the surface water drainage requirements for this community. It is therefore not recommended that modifications to the existing permit be made at this time. Should a modification be necessary in the future this would be based on the facts of the inadequacy of the system to operate after the shortcomings which it possesses now are alleviated.

The system as it now exists while still functional, does not operate as efficiently as intended. There are numerous locations where scrub brush chokes out swales and ditches. There are culverts that are more than half filled with sand and dirt and the network of swales are not graded consistently to allow a continuous flow of surface water towards. Essentially, the network of swales and ditches is constricted by a series of small dikes and ridges which are the result of a lack of periodic maintenance on the overall surface water management system.

Regarding the supposed possibility of backflow of surface water from the Savannahs to the Sugarhill community, there is documented water level evidence to indicate that this can have happened. There is also physical evidence after inspection of the flapper valve at the discharge pipe to the Savannahs that this probably on occasion has happened.

It is recommended that basic upkeep of the surface water management system be performed and replacement of worn devices in the system be accomplished. Should after performing these basic hygiene steps on the surface water management system there still be issues with backflow and insufficient drainage, a review of the permit issued with an eye towards modification should be undertaken.

Sincerely,

George Hopkins, PE

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Fort Pierce, FL 34950
Phone: 772 882 8417
Fax: 888 584 8599
E-mail: George@hp-fl.net

DENUZZIO HOPKINS PORTER & ASSOCIATES

SUGAR HILL
SURFACE WATER MANAGEMENT SYSTEM
SYSTEM REVIEW

September 24, 2010

Executive Summary

The Sugarhill Homeowners Association contracted Denuzzio Hopkins & Associates to review the surface water management system used by the community. The purpose being to determine the system's fitness for providing community surface water management, and to recommend modifications should analysis indicate they be required.

The review indicated the surface water management system was calculated and constructed to meet the needs of the community with respect to the management of surface water as required under the design parameters of the South Florida Water Management District (SFWMD). However, in the 30 yrs since commissioning, lack of maintenance has resulted in deterioration of the design characteristics of the system. The decay has led to occasions of standing water in the community caused by both backflow from the Savannah's State Preserve and large rainfall events allowed to stand in the community.

Recommendations to restore the design characteristics of the system include replacement of backflow prevention valves, removal of scrub brush and undergrowth throughout the system and regrading of lengths of ditches and detention areas to improve storm water transport.

In determination of these, research of the history of the community based on complaint actions made to Martin County Engineering and SFWMD by the residents of Sugar Hill was carried out. Research of the history of the water levels of the Savannahs Preserve was also done. Additionally, a review of the Survey made in 2009 for the community was used along with field review and analysis of the storm water system to develop recommendations.

Section I

Sugarhill Surface Water Management System Concept and Design

The Surface Water Management System operating in Sugarhill was approved by SFWMD and issued August 10, 1978. The system was designed to manage surface water for a community of 100 acres and designed for individual residence lots numbering up to 99 homes. The original breakout of the use of the community land in Sugarhill is as shown:

Total Area:	100 Acres
Residential Development	97 Acres
Water Management area	9.5 Acres
Finished Floor areas	6.8 Acres
Other Impervious areas	12.6 Acres
Pervious Areas	68.1 Acres
Commercial Development	3.0 Acres
Water Management Area	.0 Acres
Finished Floor Area	0.4 Acres
Other Impervious Area	1.1 Acres
Pervious Area	1.5 Acres

The system was designed to include a 9.5 acre retention area with a control elevation of 12.5 feet ngvd and store runoff vertically from elevation 12.5 feet ngvd. The 80.7 acre residential area (97.0 acres minus the 9.5 water management area and 6.8 acre finished floor area) would store runoff linearly from elevation 12.5 feet ngvd to elevation 65.0 feet ngvd. The 2.6 acre commercial area (3.0 acres minus 0.4 acres finished floor area) stores runoff linearly from elevation 16.0 feet ngvd to elevation 19.0 feet ngvd.

The primary design characteristic of the surface water management system is a 20 foot wide continuous grassed berm with a top elevation of 16.0 feet through which an outfall pipe extends from the swale on the retention side of the berm to the existing pond area on the Savannas side of the berm. A flap gate on the Savannas end is designed to prevent drainage of the Savannas to the south into Sugarhill.

A control Structure on the south end provides the retention requirements of the permit. An 8 inch bleeder pipe at elevation 12.5 feet drains the retention area back down to normal level after the storm.

The surface water management system is to be maintained by the residents of Sugarhill.

The general design of the surface water management system is that when water elevations in the surface water management system reach 12.5 feet the system discharge, after having been collected

throughout the community from roadside swales and transported by graded swales and ditches to a retention lake, they are then discharged into the Savannah's Preserve through a flapper gate at the north end of the system. Should elevations reach 13.5 feet surface water is additionally discharged into the Martin County surface water management system ditches on the south end of Sugarhill.

The South Florida Water Management District (SFWMD) surface water management permit for Sugarhill calls for minimum elevations within the community as follows:

No development of lands below 15 feet msl and that a natural undisturbed 25 foot buffer zone separate all lots from the Savannahs water areas.

Minimum road grade elevations of 16.0 feet msl

Minimum finished floor elevations of 17.5 feet msl

The surface water management permit required that the system designed be capable of management of waters resulting from both a 10 yr storm (elevation of 14.4 feet msl) for elevations of minimum grade of 16 feet msl and for a 100 yr storm (elevation 16.3 feet msl) for minimum finished floor elevations of 17.5 feet msl.

As designed the surface water management system was capable of managing the collection and transport of surface water in amounts indicated through a series of swales, berms and discharge points in the community.

Section II

Practical Operation of the Sugarhill Surface Water Management System

As designed, the Sugarhill Surface Water management system is functional, and capable of servicing the community's objectives to store and remove surface water generated from rainfall events. The primary driving force used to transport the collected surface waters is gravity feed of these waters through a series of swales and ditches which are connected by under road culverts and catch basins that ultimately feed to a 9.5 acre retention lake at the south end of the community.

The actual operation of the Sugarhill Surface Water Management System, apart from design has though been noted to on occasion be lacking in capability to transport surface waters collected and also at times of high water in the Savannah Preserve to receive surface water backflow from there into the surface water management system for Sugarhill. Neither situation per design nor desirable.

There are on record several complaints by residents of the community to both Martin County Engineering and SFWMD concerning the functionality of the surface water management system in Sugarhill. The issues have dealt largely with standing water in resident's yards and appeared to be resulting from swales and ditches failing to transport surface water which had been collected during rainfall events. It was supposed by residents that this water could also be coming from backflow from the Savannah Preserve and resulting in if not the actual filling of swales and transport ditches throughout the community with standing water then certainly contributing to an artificially high level of water in the surface water management system for Sugarhill that would lead to rainfall events being unable to be transported via the systems swales and ditches to the systems retention lake as the original design envisioned.

There have over the past 10 yrs been several hurricane events that have caused both the Savannah Preserve and the Sugarhill Surface Water Management system to be stressed to their capacity limits for holding water. The combination of the two has led to residents being dissatisfied with their surface water management system during these occasions and inquiring as to the viability of the design intent as well as the functionality of the system's operation.

It is however noted that day to day rainfall events are managed adequately by the surface water management system when the Savannah Preserve water level is kept relatively low so not to intrude into the Sugarhill Surface water management system.

Section III

Present Conditions

Sugarhill Surface Water Management System

The Sugarhill community is approximately 30 yrs old. As such the vegetation in the community is mature and has prospered and expanded since the communities development. During this time the natural vegetation has encroached upon the systems of swales and ditches that exist to transport surface water to the community's retention lake. While it is speculative to conclude the precise extent that this over growth has led to a reduction in the pace of transport of surface water to the retention lake from the community it is safe to say that this overgrowth was not the original design of the engineers that developed this system and that this overgrowth intrudes on the systems capability to perform as designed as a water transport system.

Secondarily, the system of swales, ditches, culverts and catch basins were designed with the single intent of moving water from the community to the retention lake. To do this there is a requirement that the swales and ditches be graded such that water transports regularly. And while collecting in swales and residing to obtain proper water quality is a design feature of the system, this same surface water remaining resident due to undulations in swale bottom levels which result in ponding areas is not.

In terms of discharge of surface water from the Sugarhill community to either the Preserve or in excessive rainfall events to the Martin County surface water system the design is sound. Water from the system's retention lake is able to be efficiently conveyed to the Savannah Preserve and discharged when water levels in the community reach greater than 12.5 feet ngvd. This aspect of discharge is sound and appears to be able to function adequately.

However, it is noted that the engineers that designed the discharge system to the Preserve were concerned during the design that there could be the eventuality of water from the Preserve back draining into the Sugarhill Surface Water Management System through the discharge pipe for the Sugarhill surface water management system that was in fact intended to allow discharge from the Sugarhill system to the Preserve. Correspondences circa 1980 indicate this concern was real and that this back flow drainage had been observed to occur. As a result of this, it was determined the course of action to be followed would be to set a flapper gate valve on the discharge end of the culvert that passed through the surface water management system berm that permitted discharge from the Sugarhill Surface Water Management System into the Preserve so that backflow from the Preserve into the Sugarhill Surface Water Management System could not occur.

While sound in principal and in engineering conclusion, it is noted that a flapper gate valve is a mechanical device and as such is in need of routine maintenance and upkeep. The valve on the discharge to the Preserve appears to be quite old, rusted, does not seal and quite likely could be the same valve placed at that location in or around the 1980's discussion on this issue. Having inspected the valve and its mechanism, it is clearly obvious to even a casual observer that this valve, while properly

specified when purchased is in a state of repair that it is not water tight and will not prevent back flow from the preserve.

Further, review of rainfall and water level records for the Preserve from 2004 to present indicate that the Preserve has on several occasions had water levels above the 12.5 foot ngvd necessary for backflow into the Sugarhill Community Surface Water Management System to take place. Summary graphs of each year from 2004 to present are included in this report for further analysis, but however the interpretation may lead, it is apparent that there is a need to maintain a water tight seal on the discharge to the preserve to prevent backflow, and that presently there is not one.

Section IV

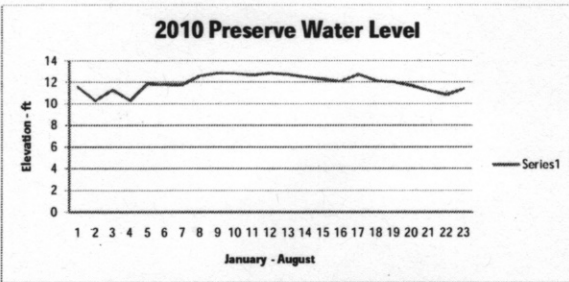
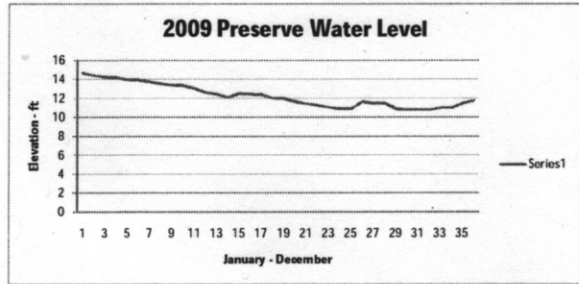
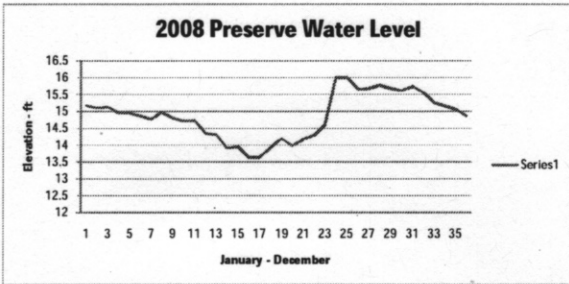
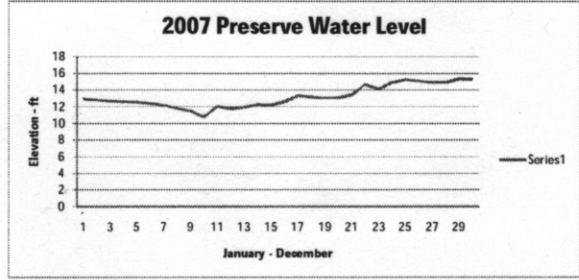
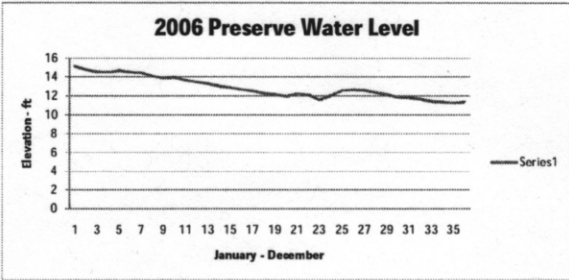
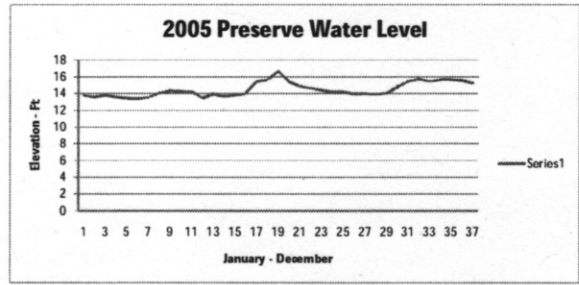
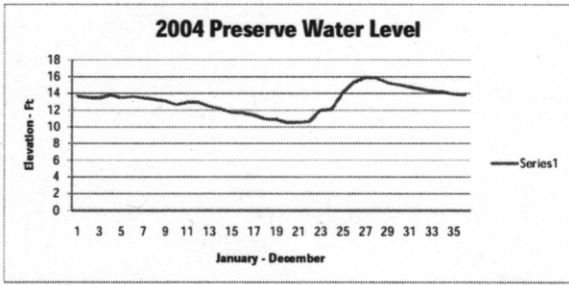
Sugarhill Community Surface Water Management System Recommendations

Based on the investigation of the Sugarhill Surface Water Management System the following facts have been established and the following recommendations are made.

1. The surface water management system as designed functions adequately for 10 yr and 100 yr storms that would lead to water levels up to 16.3 feet per its design assumptions. This meets the requirements of the SFWMD and it is not recommended that the system be fundamentally redesigned or permit modifications sought.
2. The surface water management system as sits this day is in need of routine maintenance in order to function in a manner that befits its designer's and SFWMD's intent when built.
3. A construction manager should see to the restoration of the system to original design and maintain it there after by following the specific steps noted:
 - a. All brush and growth now flourishing in the swales and ditches and alongside the berms that make up the Sugarhill surface water management system should be removed and replaced with well maintainable grasses typical to the community.
 - b. Grades for swales and ditches should be made consistent throughout the surface water management system to eliminate standing water occurring in locations throughout the community
 - c. Mechanical devices used to prevent backflow of water from the Preserve into the community surface water management system should be replaced with suitable devices that operate properly and prevent this backflow.
 - d. Sand and fill that has accumulated in culverts and catch basins throughout the surface water management system should be removed and deteriorated culverts should be replaced with up to date devices.
4. The Sugarhill Homeowners Association should develop a surface water management sub-committee or manager to ensure that the following activities are accomplished on a scheduled basis:
 - a. A schedule of routine maintenance of the surface water management system should be established, annual reviews should be made of the earthen and mechanical devices with recommendations for system readiness being provided to the home owners association.

DONE
2019

- b. A photographic record of the annual reviews should be maintained electronically to review the trend of the maintenance of the surface water management system.
 - c. An annual review of the water levels of the Preserve should be kept for the benefit of the residents so a correlation between residential complaints and Preserve water level can be maintained and acted upon should untoward discharges occur.
 - d. A bi-weekly record of water level in the community's retention pond should be maintained to review against the water levels in the Preserve.
5. A record of complaints by homeowners should be maintained by the community home owners association with respect to the surface water management system and homeowners should work through the homeowners association when contacting either SFWMD or Martin County Engineering to request answers to questions regarding the system.
 6. After completion of the regrading of the swales, ditches and berms, an asbuilt survey should be performed to provide a present status of the surface water management system.
 7. A rain gage should be obtained with the capability to record rainfall events so that data can be maintained concerning the operation of the system to support any requirements for future redesign.
 8. The Homeowners association should define for residents the obligations of either the residents in particular or the homeowners association to maintain easement areas clear of underbrush and physical obstructions that might impeded the operation of the surface water management system.



South Florida
Water Management District

SURFACE WATER MANAGEMENT PERMIT NO. 43-00111-S

(NON-ASSIGNABLE)

DATE ISSUED: August 10, 1978

AUTHORIZING: CONSTRUCTION AND OPERATION OF A WATER MANAGEMENT SYSTEM
SERVING 100 ACRES OF RESIDENTIAL LANDS BY ROADSIDE SWALES
AND A RETENTION LAKE DISCHARGING INTO THE SAVANNAHS.

LOCATED IN: MARTIN COUNTY, SECTION 16, 21 TWP. 37S RGE. 41E

ISSUED TO:
J. Robert Norman
(Sugar Hill)
P. O. Box 6168
New Orleans, Louisiana 70174

This Permit is issued pursuant to Application for Permit No. 05158-B dated May 12, 19 78. Permittee agrees to hold and save the South Florida Water Management District and its successors harmless from any and all damages, claims, or liabilities which may arise by reason of the construction, operation, maintenance, or use of any work or structure involved in the Permit. Said application, including all plans and specifications attached thereto, is by reference made a part hereof.

This Permit may be revoked or modified at anytime pursuant to the appropriate provisions of Chapter 373, Florida Statutes.

This Permit does not convey to Permittee any property rights or privileges other than those specified herein, nor relieve the Permittee from complying with any law, regulation, or requirement affecting the rights of other bodies or agencies. All structures and works installed by Permittee hereunder shall remain the property of the Permittee.

Within thirty (30) days after the completion of the construction of any work or structure relative to this permit, the Permittee shall file with the District a written statement of completion on the appropriate form provided by the Board.

SPECIAL CONDITIONS ARE AS FOLLOWS:

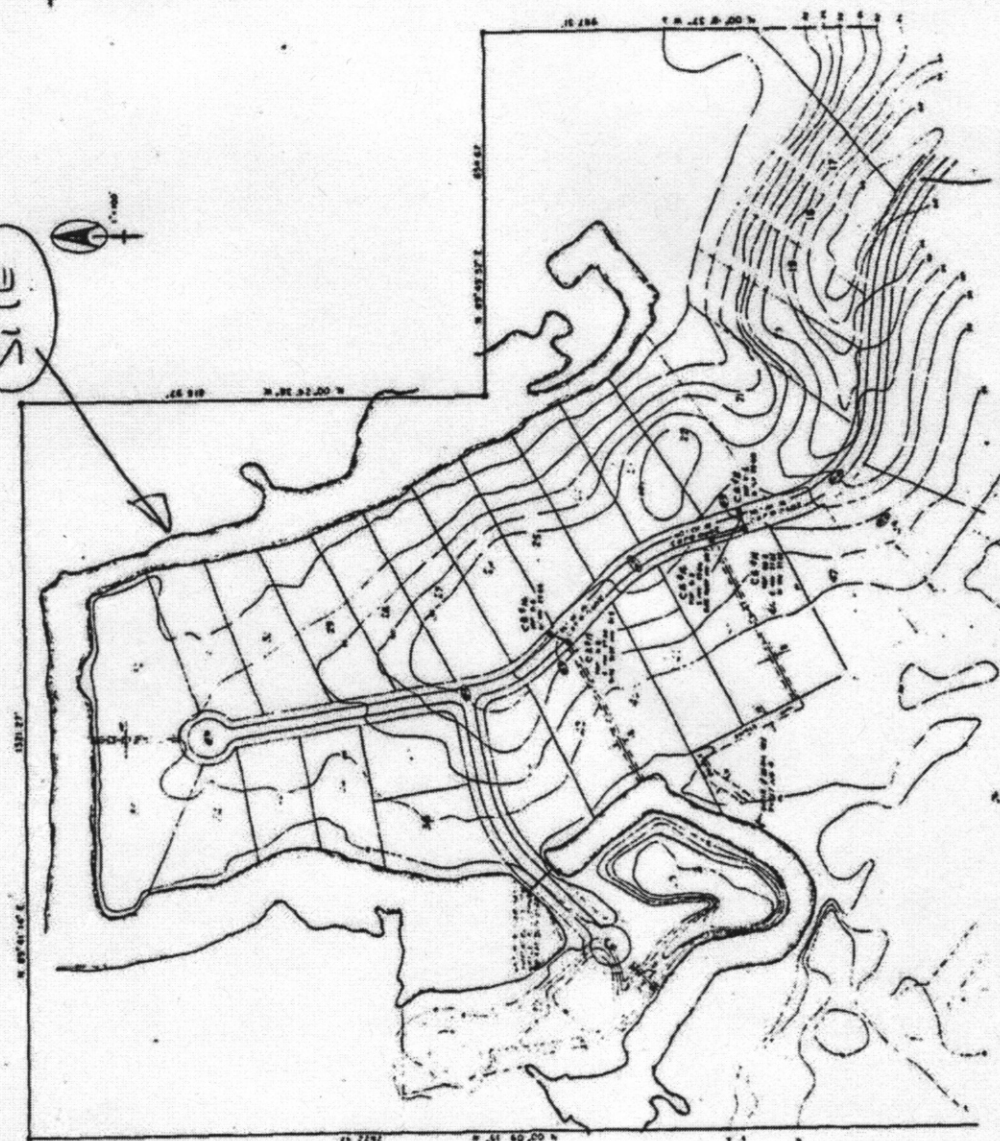
SPECIAL CONDITIONS ON ATTACHED SHEETS ARE A PART OF THIS DOCUMENT.

ISSUANCE RECOMMENDED:

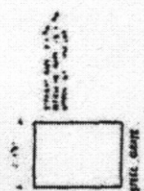
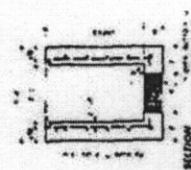
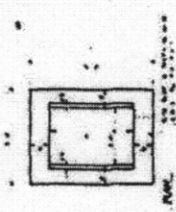
SCANNED

1. THE MINIMUM ROAD GRADE ELEVATION SHALL BE +16.0' MSL.
2. THE MINIMUM FINISHED FLOOR ELEVATION SHALL BE +17.5' MSL.
- ★ 3. THE LOTS SHALL BE DEED RESTRICTED TO INSURE THAT NO ALTERATION OR DEVELOPMENT BELOW THE 15 FOOT MSL CONTOUR WILL OCCUR AND THAT A 25 FOOT NATURAL UNDISTURBED BUFFER ZONE WILL SEPERATE ALL LOTS FROM THE SAVANNAH MARSHLANDS.
4. OPERATION OF THE SYSTEM WILL BE BY THE SUGAR HILL HOMEOWNERS' ASSOCIATION.
5. A MEASURE SHALL BE TAKEN TO PREVENT EROSION FROM OCCURRING IN THE SIDE LOT SWALES BY THE USE OF DITCH CHECKS OR OTHER SUITABLE MEANS.
6. PRIOR TO ANY CONSTRUCTION OR COMMITMENTS TO CONSTRUCT, A SURVEYED AND RECORDED DEVELOPMENT LIMIT LINE SATISFACTORY TO THE DISTRICT SHALL BE ESTABLISHED FOR PURPOSED OF DEFINING THE EXACT LIMIT OF THE SAVANNAH MARSHLANDS AND ASSOCIATED 25 FOOT BUFFER ZONE.

SITE



N.E. SUGARHILL AVE.



TYPICAL OPEN BOTTOM INLET

FIG 2

SUGARHILL

A Residential Subdivision Jensen Beach, Fla.

ENGINEER ARCHITECTURE & ASSOCIATES, INC.

PROJECT NO. 3

DRAINAGE PLAN

DATE

SCALE

★ Water Management Advisory Board have agreed that there will be no alteration or development on lands below 15 feet msl and that a 25 foot natural undisturbed buffer zone will separate all lots from the Savannahs water areas. Since the Savannahs wetlands will be protected by these conditions, no significant adverse environmental impact should result from this proposed development. ✓

E. Land Use Information

The project is zoned R-2. (Minimum 7400 Ft.² lots) The proposed use is ½ acre and 1 acre lots. This seems consistent with the R-2 zoning ordinance.

F. Water Supply and Wastewater Treatment

Potable water will be provided by individual wells. Wastewater treatment will be by individual septic tanks.

G. System Operation

Operation and maintenance of the water management system will be the responsibility of the Sugar Hill Homeowners Association.

CONCLUSIONS

1. The drainage system as designed should be adequate to protect the roads from the 10 year storm if the minimum grade elevation is +16.0' msl.
2. The drainage system should offer adequate protection from the 100 year storm if the minimum finished floor elevation is +17.5' msl.
3. The drainage system as designed should be adequate to prevent any adverse water quantity impact to the receiving body.



MARTIN COUNTY
BOARD OF COUNTY COMMISSIONERS
2401 S.E. MONTEREY ROAD • STUART, FL 34996

RECEIVED
JAN 30 2006

January 25, 2006

Telephone: 772-288-5658
Fax: 772-221-1466
Email: pdulom@martin.fl.us

MSLSC

DOUG SMITH
Commissioner, District 1

SUSAN L. VALLIERE
Commissioner, District 2

LEE WEBERMAN
Commissioner, District 3

SARAH HEARD
Commissioner, District 4

MICHAEL DITERLIZZI
Commissioner, District 5

DUNCAN BALLANTYNE
County Administrator

STEPHEN FRY
County Attorney

Ralph Witzig, President
Sugarhill Property Owners Association
P.O. Box 0443
Jensen Beach, FL, 34958

Through conversations and a meeting with one of the Sugarhill Property Owners Association board members, it has come to the attention of the Engineering Department that Sugarhill is interested in modifying their South Florida Water Management District (SFWMD) surface water management system permit.

The premise for the proposed SFWMD permit modification is that the water level in the Savannahs Preserve stages to heights considerably higher than the Sugarhill stormwater control structures for significant periods of time. The Sugarhill stormwater system includes a drainage control structure within the subdivision with a bleed down elevation of 12.5 and a second outfall at 13.5 elevation discharging to the NE Jensen Beach Blvd. drainage system. The second outfall connecting to the Jensen Beach Blvd. drainage system is within an easement granted to Martin County through private property and connecting to the Florida Department Of Transportation (FDOT), Jensen Beach Blvd. drainage system. You have proposed to lower the control elevation of the outfall (s).

The Martin County Engineering Department does not object to the Sugarhill Property Owners Association pursuing a permit modification to the existing SFWMD permit issued to Sugarhill. Once a SFWMD permit modification is granted to Sugarhill, the Engineering Department will likely, have no objection to the Sugarhill Property Owners Association replacing the existing outfall contained within the easement granted to Martin County.

The SFWMD permit modification, project design, required permits from all other government agencies, notice to impacted private concerns and construction of the outfall modifications would be the responsibility of the Sugarhill Property Owners Association.

If you need further information regarding this matter, please contact this office at 288-5658.

Sincerely,

Don Donaldson, P.E.
Engineering Director/County Engineer

DGD/MG/pd

Cc: Honorable Members of the Board of County Commissioners
Duncan Ballantyne, County Administrator
Dan Hudson, Deputy County Administrator
Jim Sherman, Assistant County Administrator
✓ Don Loving, Senior Regulatory Supervisor, SFWMD

TELEPHONE
772-288-5400

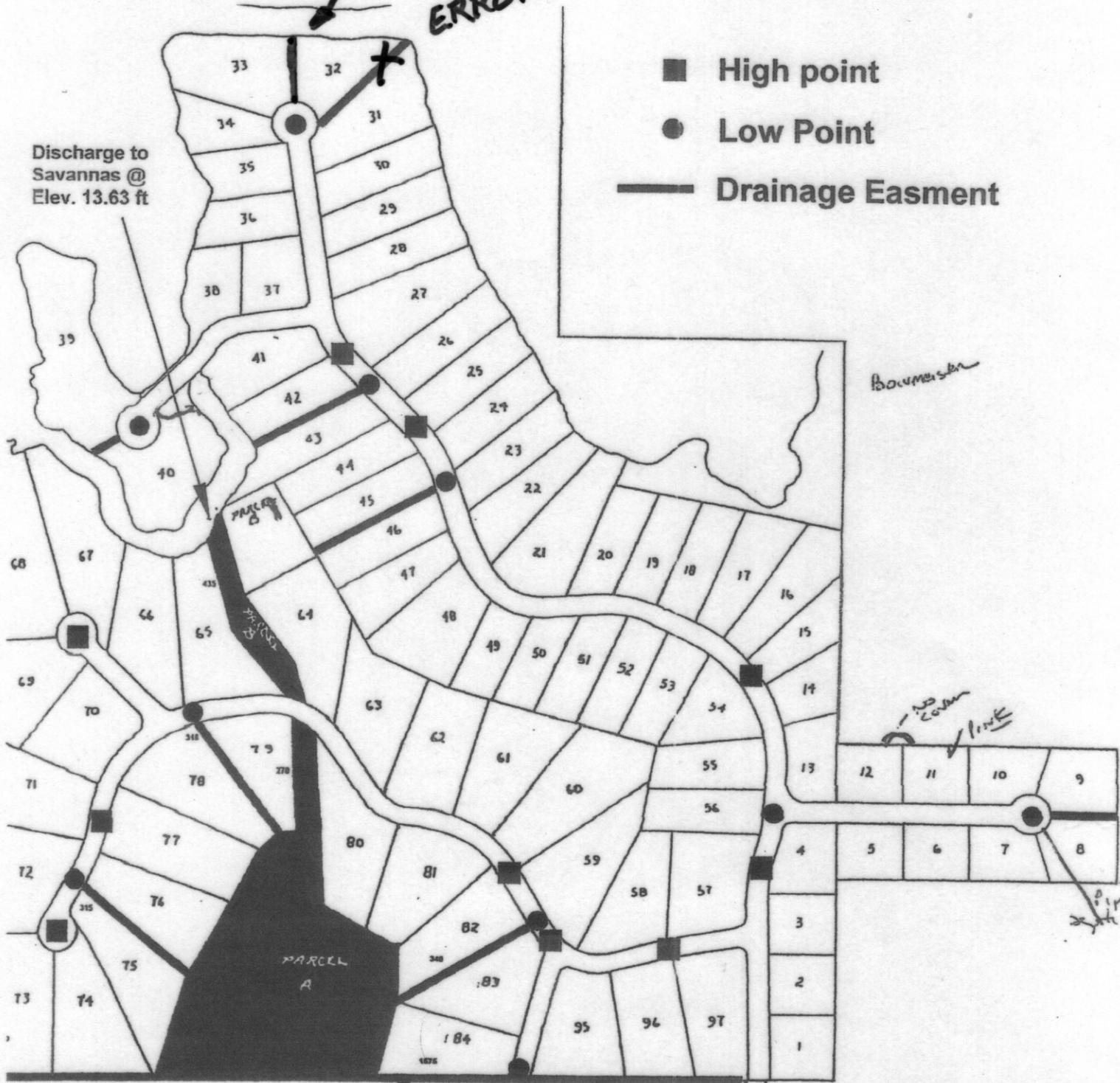
WEB ADDRESS
<http://www.martin.fl.us>

SCANNED

CORRECT
ERROR

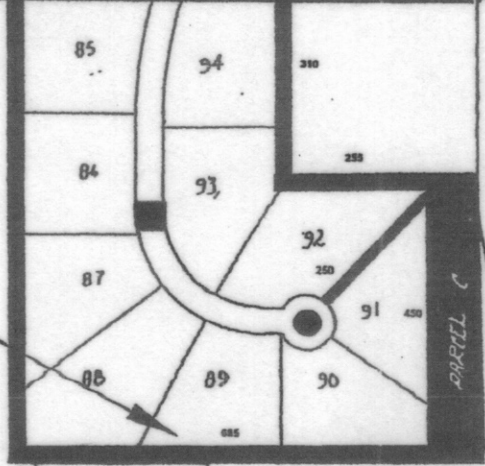
- High point
- Low Point
- Drainage Easment

Discharge to
Savannas @
Elev. 13.63 ft



Excess outfall to
Jensen Beach Blvd.
Invert Elev. 13.50 ft

Total vegetated ditches = 3,950 ft
Total ditches = 6,430 ft



asmet

Wide black lines are underground drainage pipe segment locations.

Black rectangles are concrete drainage boxes with grates.

