UPDATED CAPACITY ANALYSIS REPORT
OF THE
MARCO ISLAND
WASTEWATER SYSTEM
IN
COLLIER COUNTY, FLORIDA

GMS. NO. 5211P-00304

FDEP Permit: DO11-221557 Expires: 06/28/98

Prepared For:

SOUTHERN STATES UTILITIES, INC.
1000 COLOR PLACE
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Prepared By:

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DECEMBER 1994

HAI #94-396.00

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FOR THE

UPDATED CAPACITY ANALYSIS REPORT

OF THE

MARCO ISLAND UTILITIES WASTEWATER SYSTEM

Permittee: Southern States Utilities, Inc.
1000 Color Place
Apopka, Florida 32703
1-407-880-0058

Contact Person: Rafael A. Terrero, P.E.
Environmental Services Manager

Southern States Utilities, Inc. has read and understands the information contained in this report and believes it is true and correct to the best of their knowledge. Southern States Utilities, Inc. is fully aware of and intends to comply with the recommendations and schedules included in this report.

_____

Rafael A. Terrero, P.E.
Environmental Services Manager

_____

Date

Yes	No	N/A	
			8. For each recommended expansion, include a detailed schedule showing dates for:
___	___	X	a. Planning [17-600.405(6)],
___	___	X	b. Design [17-600.405(6)],
___	___	X	c. Submittal of the Construction Permit Application [17-600.405(6)],
___	___	X	d. Start of Construction [17-600.405(6)],
___	___	X	e. Placing the New or Expanded Facilities into Operation [17-600.405(6)], and
___	___	X	f. Submittal of the Operation Permit Application [17-600.405(6)].
X	___	___	9. Updates the flow-related and loading information contained in the preliminary design report submitted as part of the most recent permit application [17-600.405(6)].
X	___	___	10. Is signed by the permittee, and signed and sealed by a professional engineer registered in Florida [17-600.405(7)].

B. If the report documents that the permitted capacity will be equaled or exceeded within the next:

Yes	No	N/A	
___	X	___	1. Five years, does the report include a statement, signed and sealed by a professional engineer registered in Florida, that planning and preliminary design of the necessary expansion have been initiated [17-600.405(8) (a)]?
___	X	___	2. Four years, does the report include a statement, signed and sealed by a professional engineer registered in Florida, that plans and specifications for the necessary expansion are being prepared [17-600.405(8) (b)]?

Yes	No	N/A	
___	X	___	3. Three years, has the permittee submitted a complete construction permit application to the Department [17-600.405(8) (b)]? If not, note that the application must be submitted within 30 days of submittal of the capacity analysis report, for such a facility.
___	X	___	4. Six months, has the permittee submitted to the Department an application for an operation permit for the expanded facility, required to be submitted no later than the submittal of the capacity analysis report [17-600.405(8) (d)]?

C. If any of the answers to Questions 11 through 14 is no, the permittee may request an adjusted schedule. The adjusted schedule should be based on design and construction schedules, population growth rates, flow projections, and the timing of new connections to the sewerage system, so that adequate capacity always will be available at the wastewater facility.

Yes	No	N/A	
___	___	X	1. Has the permittee requested an adjusted schedule [17-600.405(9)]?
___	___	X	2. Has this request been approved by the Secretary or the Secretary's designee [17-600.405(9)]?

SECTION 1

SECTION 1
INTRODUCTION

1.1 OBJECTIVE

This "Updated" Capacity Analysis Report is prepared in accordance with Chapter 17-600, *Domestic Wastewater Facilities,* of the Florida Administrative Code (FAC), specifically, Section 17-600.405, *Planning for Wastewater Facilities Expansion.* The "Initial" Capacity Analysis Report for the Marco Island Wastewater Treatment Facility (WWTF) was submitted to the Department in October 1992.

The information contained in this updated report represents the findings of Hartman & Associates, Inc. (HAI) in regard to the Southern States Utilities, Inc. (SSU) Marco Island WWTF. The objective of this report is to provide SSU with the necessary information for timely planning, design and construction of the facilities necessary for proper treatment and disposal of wastewater. In addition, this report will evaluate the existing treatment methods and equipment utilized at the Marco Island WWTF and compare these facilities and their respective capacities with the requirements for Class I Reliability as defined by the United States Environmental Protection Agency (USEPA) Manual MCD-05, entitled *Design Criteria of Mechanical, Electrical, and Fluid System and Component Reliability.*

This report details and summarizes the results of the updated capacity analysis investigation, concludes as to the capability of the individual treatment components to meet the FAC criteria and provides for planning and recommendations for future treatment and disposal expansions.

1.2 BACKGROUND

Prior to 1989, the Deltona Corporation developed the areas of Marco Island. In addition, the Deltona Corporation constructed and operated an extensive wastewater utility system. In July of 1989, Southern States Utilities, Inc. (SSU) purchased the wastewater facilities for the Marco Island service area. Since that time, numerous capital expansion projects, necessary to adequately serve the existing and growing customer base, have been undertaken.

The Marco Island wastewater system is located in Southwest Collier County, Florida as shown in Figure 1-1. The Marco Island wastewater treatment plant is located in Section 8, Township 52 South, Range 26 East at 100 Windward Drive. This area was transferred to SSU Services, Inc. via a FPSC Order. The actual wastewater service area encompasses a larger area than the FPSC certificated service area since wholesale wastewater service is provided by Collier County Utilities and North Marco Utilities. These utilities also operate wastewater collection systems on the island. The remainder of the island is served by individual on-site septic tank systems.

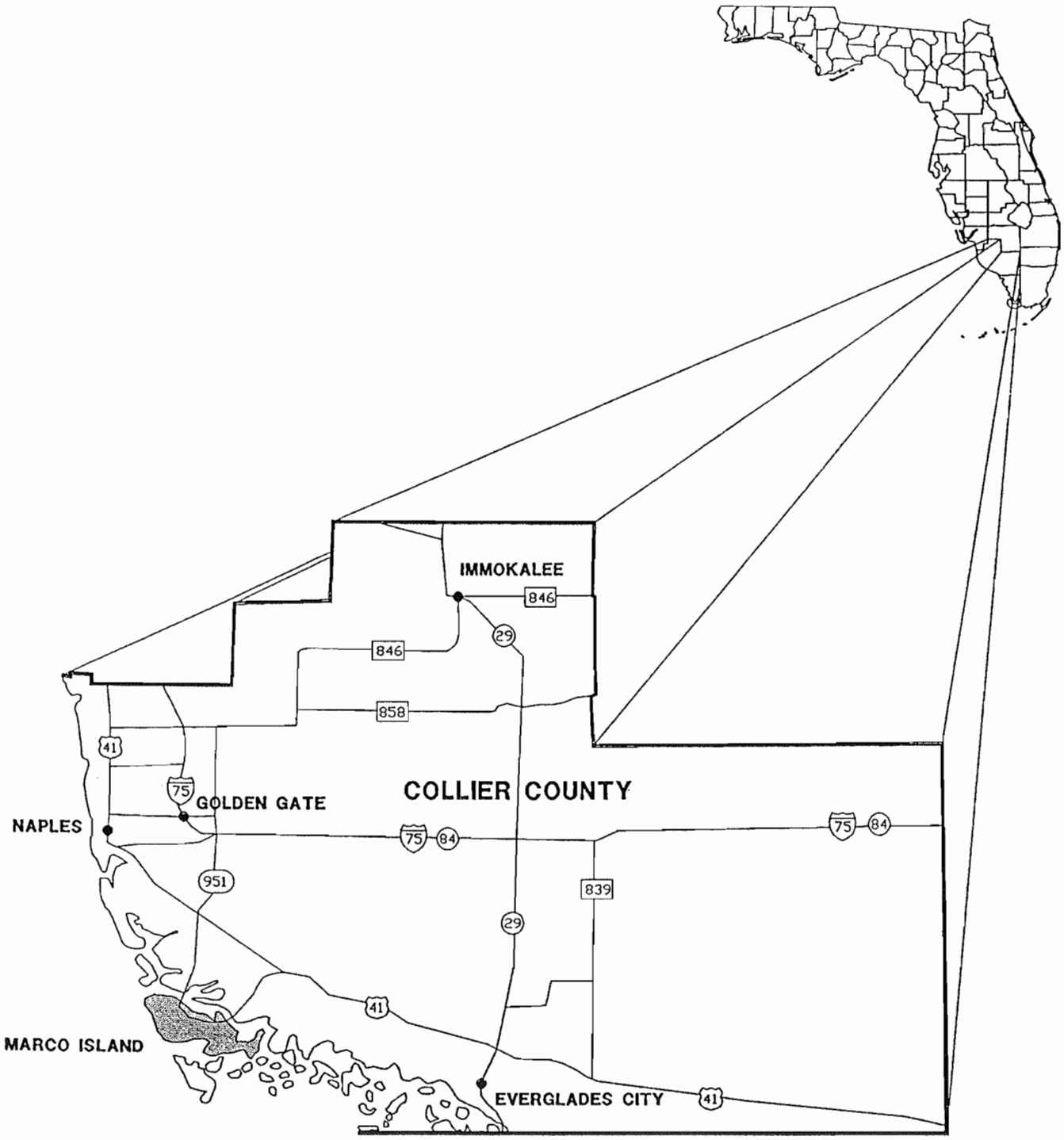
1.3 SCOPE OF SERVICES

The purpose of this report is to provide SSU with the information necessary to provide timely planning, design, permitting and construction of their wastewater facilities necessary to provide proper treatment and effluent disposal of domestic wastewater, as well as the management, treatment and disposal of domestic wastewater residuals. The scope of service has been developed to meet all the requirements of Rule 17-600.405, FAC. In addition, this report was developed to evaluate the unit wastewater treatment processes and the Class I reliability of the Marco Island WWTF. Summarized herein are the tasks for the study:

- Service Area Description. Evaluate the geographic extent and land use characteristics (i.e., development type, number of units, etc.) of the certificated wastewater service area for the Marco Island WWTF.

- Historical Wastewater Characteristics: A minimum of 10-years worth of historical wastewater influent flows to the Marco Island WWTF will be analyzed to determine the trends in average and maximum daily influent flows, as well as seasonal flow variations. The monthly average daily influent flows for the most recent 12-month period will be determined.

- In addition, three-month average daily flow (TMADF) and annual average daily flows (AADF) for the past 10 years will be developed and analyzed. All influent, effluent and wastewater residuals analytical data will be analyzed to determine averages, maximum and trends, as well as compliance with existing regulatory requirements.



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LOCATION MAP

FIGURE 1-1

- Facility Description. The existing WWTF will be evaluated to determine compliance with Class I requirements, as well as describe the efficiency of the facilities and any deficiencies noted. This will include a site visit, unit processes description and operational criteria with respect to the permitted capacities for treatment, residuals and effluent disposal/reuse systems.

- Flow Projections. Local population growth rates, development projections, service commitments, and other projections will be utilized to develop a projected population growth over a 10-year period. Utilizing a designated flow rate per equivalent residential unit (ERU), flow projections will be determined for this 10-year period. Utilizing these flow projections, the estimated time until the permitted capacities are reached (wastewater treatment, residuals and effluent disposal/reuse capacities) will be determined.

- Expansion Recommendations. The recommendations are based on the review of the historical data and projected wastewater flow expansion recommendations for the wastewater and residuals treatment and management processes, which will be categorized by unit process, and effluent disposal or reuse requirements. A schedule will then be developed that will identify planning, design, permitting, start of construction, duration of construction and facility start-up.

- Final Report. Ten (10) copies of the final report containing the above information will be furnished to SSU.

SECTION 2

SECTION 2
EXISTING CONDITIONS

2.1 GENERAL

A description of the existing treatment facilities at the Marco Island WWTF is provided in this section. The service area for the Marco Island wastewater system is illustrated in Figure 2-1. In addition, this section will summarize the past ten (10) years of historical wastewater flows and flow characteristics. The treatment facility is currently permitted as a 3.5 MGD contact-stabilization wastewater treatment facility. Figure 2-2 illustrates the existing facilities at the Marco Island WWTF.

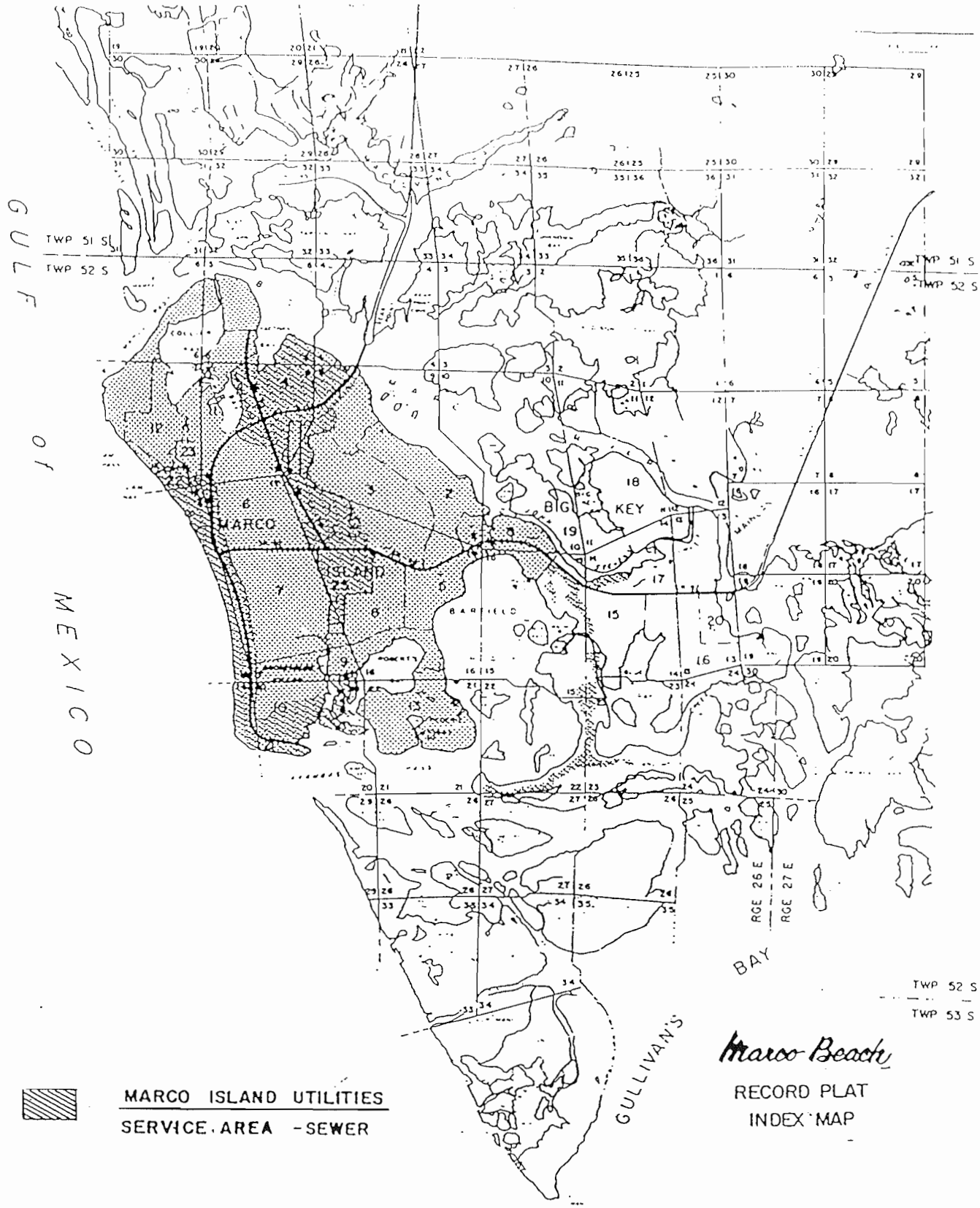
2.2 DESCRIPTION OF FACILITIES

2.2.1 Treatment

The Marco Island WWTF is currently fed from lift stations in the collection and transmission system which are manifolded into the plant's pretreatment structure. The pretreatment structure receives the entire plant flow prior to splitting between the two (2) separate treatment trains. The pretreatment structure is a dual channel structure with one (1) channel containing a 6.0 MGD rated automatic mechanical bar screen and a manual bar screen. The other channel is for standby or emergency use only.

From the pretreatment structure, the raw sewage can be routed to either flow equalization tank No. 1 or No. 2. The raw flow is split to each of the equalization basins based on the settings of manual weir gates at the end of the structure. Flow equalization basin No. 1 has a volume of 250,000 gallons and flow equalization basin No. 2 has a volume of 500,000 gallons. The raw equalized flow from tank No. 2 is then pumped at a constant rate to flow equalization tank No. 1. The total flow equalization volume provides over 21 percent of storage volume for the design average daily flow rate of 3.5 MGD (Maximum Month).

The Marco Island WWTF is divided into two (2) parallel treatment trains. The first train is a 2.5 MGD contact stabilization process treatment system. The second train is the 1.0 MGD contact stabilization package structure.



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MARCO ISLAND SERVICE AREA MAP

FIGURE 2-1

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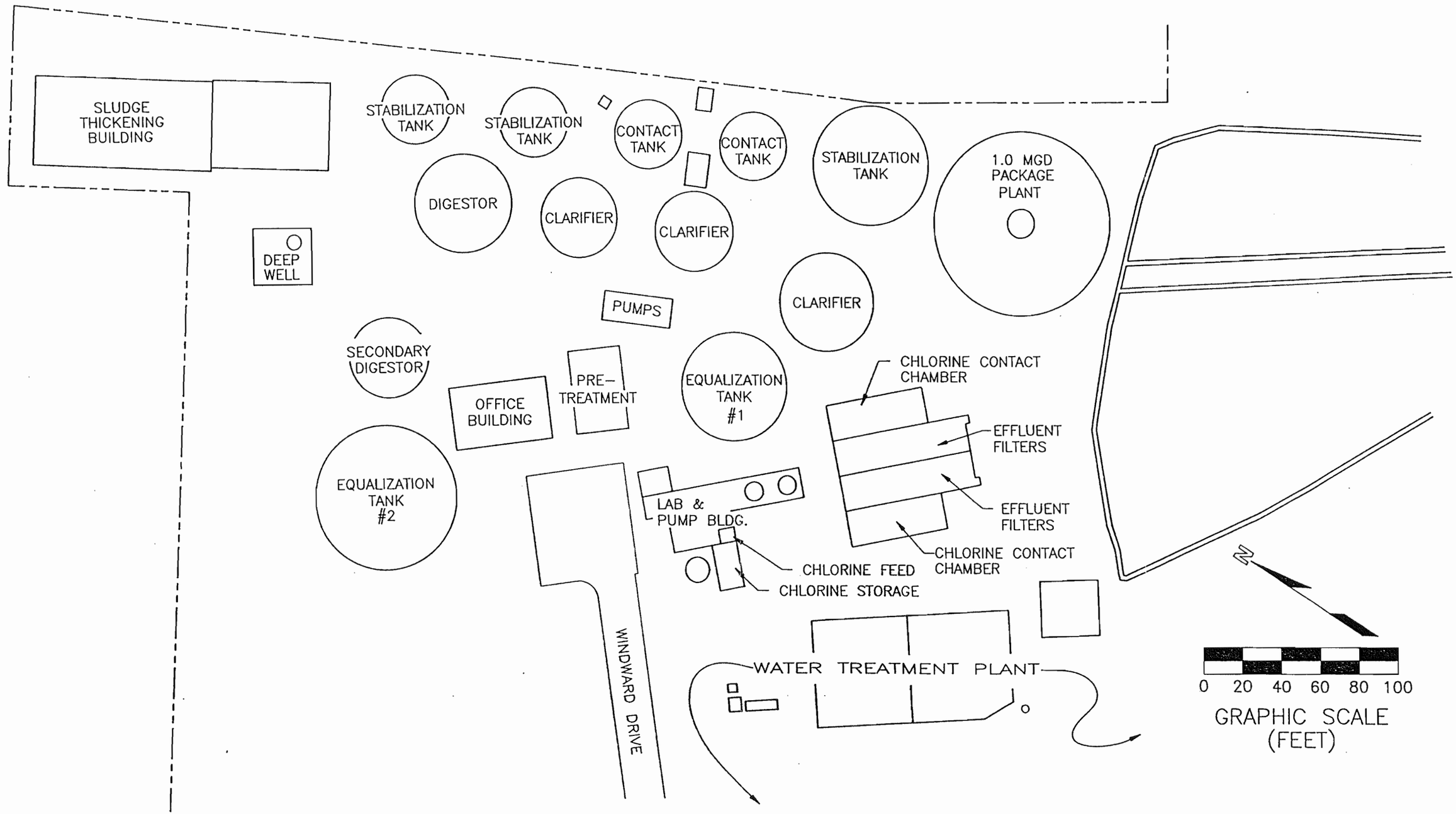

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SOUTHERN STATES UTILITIES, INC.
MARCO ISLAND WASTEWATER TREATMENT PLANT

FIGURE 2-2

The first treatment train is a 2.5 MGD contact-stabilization process facility consisting of two (2) contact tanks and three (3) stabilization tanks. The raw flow from the equalization basins is split equally between the two (2) contact tanks. Each contact tank is a circular concrete structure with a volume of 100,970 gallons. Mixed liquor suspended solids (MLSS) from the stabilization tanks are pumped back to the head of the contact tanks and mixed with the raw sewage. The MLSS is aerated and mixed by use of a surface mechanical aeration system. A diffused aeration system has been installed to supplement the air flow requirements during peak mass loading period.

The MLSS from the contact tanks is recombined into a clarifier splitter box. In the splitter box, the MLSS can be distributed to one or all of the three (3) clarifiers. There are two (2) clarifiers with diameters of 40 feet and side water depths of 10 feet. The third clarifier has a diameter of 50 feet and a side water depth of 12 feet.

The settled solids from the clarifier are pumped to the one of the three (3) stabilization basins. Two (2) of the basins each have a volume of 100,970 gallons and the third tank has a volume of 296,730 gallons. The stabilization tanks are also aerated by a surface mechanical air system and a diffused aeration system has also been installed to supplement the air flow requirement during peak mass loading period.

The clarified effluent from the two (2) separate treatment trains are blended and flow to the filtration unit. The filtration unit consists of two (2) traveling bridge type filters rated each at 2.5 MGD. Each filter has approximately 864 square feet of surface area. The design overflow rate for the filtration units is 2.11 gpm/sf. The filtered effluent is split into one of the two (2) chlorine contact chambers. The chlorine contact basins are designed to provide 15 minutes of contact time at peak flow. The chlorinated effluent is discharged into the on-site effluent wet well.

The second treatment train is a 1.0 MGD contact-stabilization package plant consisting of one (1) contact tank section and one (1) stabilization tank section, one (1) internal clarifier and one (1) aerobic digester section. Raw sewage is pumped from equalization basin No. 2 to the contact tank. The contact tank section has a working volume of 125,306 gallons. Mixed liquor suspended solids (MLSS) from the stabilization tanks is pumped back to the contact tanks and mixed with the raw sewage. The mixture is aerated by use of a submerged diffused aeration system.

The MLSS from the contact tank flows into the internal clarifier for solids separation. The clarifier has a diameter of 50 feet, a sidewater depth of 11.5 feet and a total volume of 169,200 gallons. The clarifier has a design overflow rate of 794 gpd/sf at peak flow (1.56 MGD). The clarified effluent flows to the previously mentioned traveling bridge filters and the settled solids are pumped into the stabilization tank section of the structure for further treatment. The stabilization tank has a working volume of 250,231 gallons and provides 6 hours of hydraulic retention time at the design flow (1.0 MGD).

Table 2-1 summarizes the design criteria for the existing facilities at the Marco Island WWTF.

2.2.2 Effluent Disposal

The Marco Island WWTF has a 3.5 MGD effluent disposal system consisting of slow-rate public-access irrigation, rapid-rate ground water recharge and deep well injection.

The plant currently provides public access level reclaimed (reuse) water to two (2) golf courses, for median strip irrigation and to reuse on a public school grounds. Since adequate capacity is available utilizing other disposal sites and methods, these sites are only used on an "as-requested" basis. It is assumed that each spray irrigation site will use less than 2-inches per week. The rapid-rate disposal site consists of three (3) percolation pond cells which have a total design capacity of 3.5 MGD ADF.

The Marco Island WWTF has a deep injection well (DIW) system. This system was also designed for disposal of the reject water (brine) from the Marco Island R.O. WTP. The deep well has approximately 5.7 MGD of capacity. Of the total capacity, 2.1 MGD is set aside for disposal of reject water (brine) from the adjacent Marco Island R.O. WTP and the remaining 3.6 MGD is for alternate effluent disposal for the WWTF.

2.2.3 Sludge Management System

WAS from the 2.5 MGD treatment train is discharged into Digester No. 1. The sludge in Digester No. 1 is aerated by a floating mechanical aerator and decanted by a series of pipes in the tank sidewall. The sludge is then periodically pumped to Digester No. 3 for further stabilization. Digester No. 3 is located within the 1.0 MGD package WWTF and uses diffused air to provide the oxygen for stabilization of the WAS from the 1.0 MGD treatment unit and to further stabilize

TABLE 2-1

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

DESIGN SUMMARY

Preliminary Treatment	
Screening	Bar Rack
Type	Mechanical/Manual
Number of Units	1/1
Capacity (MGD) each	6.0/6.0
Treatment System #1 (2.5 MGD)	
Type	Contact-Stabilization
Number of Units	
Contact	Two (2)
Stabilization	Three (3)
Total Volume (gallons)	
Contact	201,940
Stabilization	498,670
Aeration	Surface Mechanical/Diffused Air
Type	
Number of Units	Five (5)
BHP Each	15
Clarifiers	
Type	Circular
Number of Units	Three (3)
Water Depth (ft.)	10/10/12
Total Surface Area (sq.ft.)	3,220
Total Volume (gal.)	385,025
Settling Aids	Polymer Feed System
Treatment System #2 (1.0 MGD)	
Type	Contact-Stabilization
Number of Units	
Contact	One (1)
Stabilization	One (1)
Total Volume (gallons)	
Contact	125,306
Stabilization	250,231

TABLE 2-1 (Continued)

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

DESIGN SUMMARY

Treatment System #2 1.0 MGD (Continued)	
Aeration	Submerged Coarse
Type	Bubble Diffusers
Number of Blower Units	Three (3)
BHP Each	150
Clarifiers	
Type	Circular
Number of Units	One (1)
Water Depth (ft.)	12.5
Total Surface Area (sq.ft.)	1,963
Total Volume (gal.)	306,350
Sand Filters	
Type	Traveling Bridge
Number of Units	Two (2)
Bed Dimensions Each (area)	864 sq. ft.
Chlorination Facilities	
Max. Usage Rate, lbs/day	
Chlorinators	
Cylinder Type	1 Ton
Cylinder Number - On-line	2
Spare	2
Chlorine Contact Tank	
Number of Units	Two (2)
Total Volume (gallons)	91,800
Aerobic Digester	
Number of Units	Three (3)
Total Volume (Gallons)	562,591
Thickening	1 Gravity Belt

the sludge from Digester No. 1. This basin is decanted by a swing pipe which airlifts the supernatant back to the stabilization basin of the treatment unit. Periodically, sludge is withdrawn from this digester, combined with polymer and thickened with a two (2) meter gravity belt thickener. The thickened residuals are then pumped to Digester No. 2 for further digestion prior to being hauled.

2.3 HISTORICAL WASTEWATER CHARACTERISTICS

2.3.1 Historical Flow

The purpose of this sub-section is to review and analyze the historical recorded wastewater flows at the Marco Island WWTF for at least the past ten (10) years. The monthly operating report (MOR's) for the facility are the source of this historical information utilized for this study. The average monthly flows to the facility, for the period of January 1984 to August 1994, are illustrated in Figure 2-3 and listed in Table A-1 in Appendix A. From this data, the historical flow variations were calculated to determine flow trends and peaking ratios. The AADF recorded at the Marco Island WWTF has ranged from 0.935 MGD in 1984 to 2.294 MGD in 1990. The recent AADF values for the past few years have been less than 2.0 MGD. A summary of the AADF values for the period of 1984 to 1994 are listed in Table 2-2 and illustrated in Figure 2-4.

A substantial amount of the service area for the Marco Island WWTF can be classified as a resort area. It has been noted by the SSU staff that there is a seasonal fluctuation in occupation of the existing residential units during a calendar year. Therefore, it is very important to the design of a WWTF and to the annual monitoring of flow variations to the facility to evaluate and calculate the seasonal flow characteristics. Typically, wastewater treatment facilities are designed to accommodate annual average daily flows. In the case of the Marco Island WWTF, seasonal variations in plant flow dictate the capacity of the plant. The historical monthly flow records were utilized to determine the peak seasonal flow characteristics to determine a limiting peak flow factor for the rated capacity of the facility.

Table 2-3 lists historical maximum three month average daily flow (MTMADF) values for the evaluation period. The annual average daily flow values are also listed in this table to indicate how the MTMADF ratios were calculated. As listed in Table 2-3, the MTMADF ratio ranged from 1.33 to 1.15 times the AADF values.

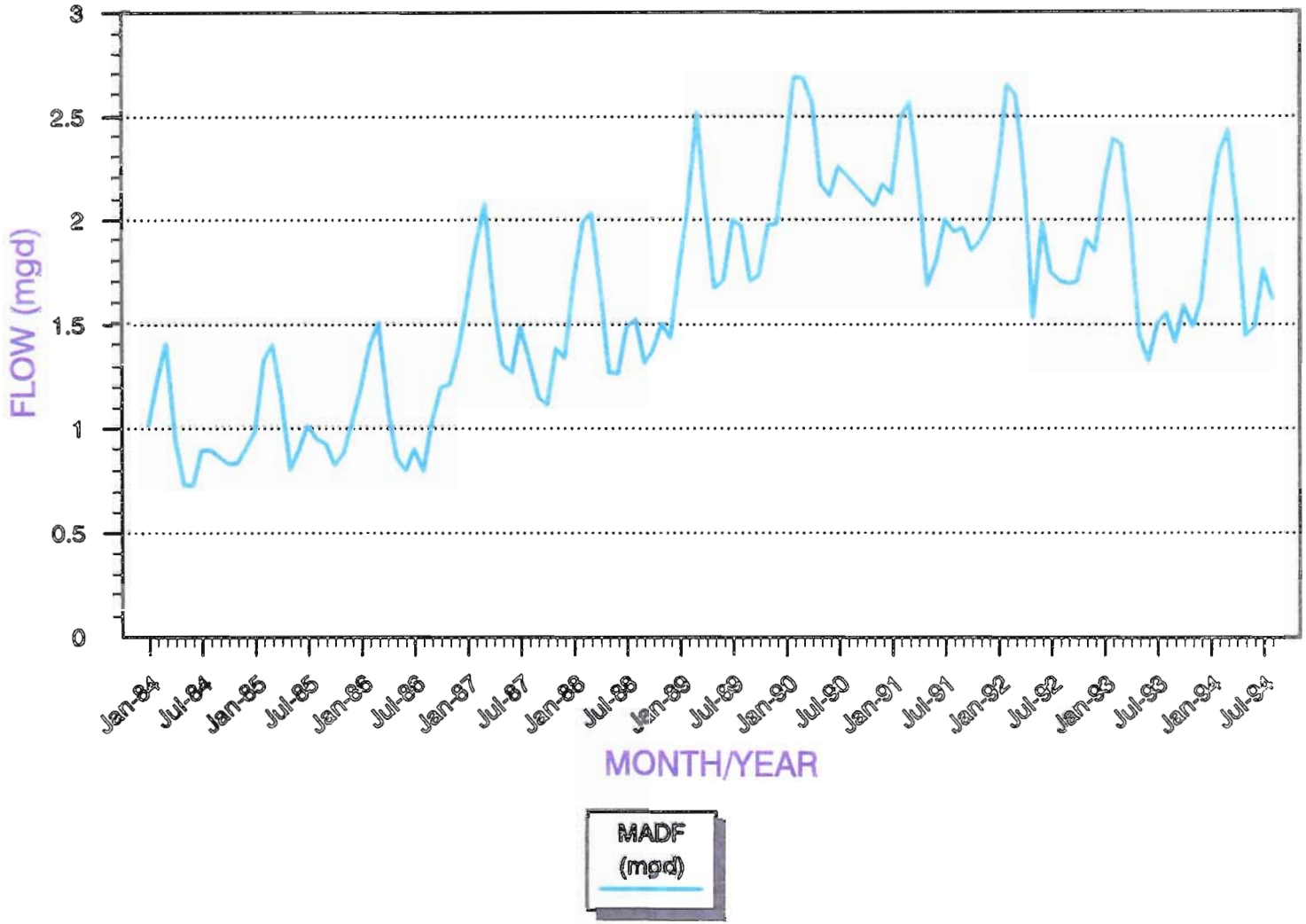

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FIGURE 2-3

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MARCO ISLAND WWTP
MONTHLY AVERAGE DAILY FLOWS

TABLE 2-2

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

HISTORICAL ANNUAL AVERAGE DAILY FLOWS

Year	Annual ADF (MGD)
1984	0.935
1985	1.009
1986	1.109
1987	1.459
1988	1.545
1989	1.931
1990	2.294
1991	2.038
1992	1.985
1993	1.735
1994[(1)]	1.895

Note: (1) Data from January 1994 through August 1994.

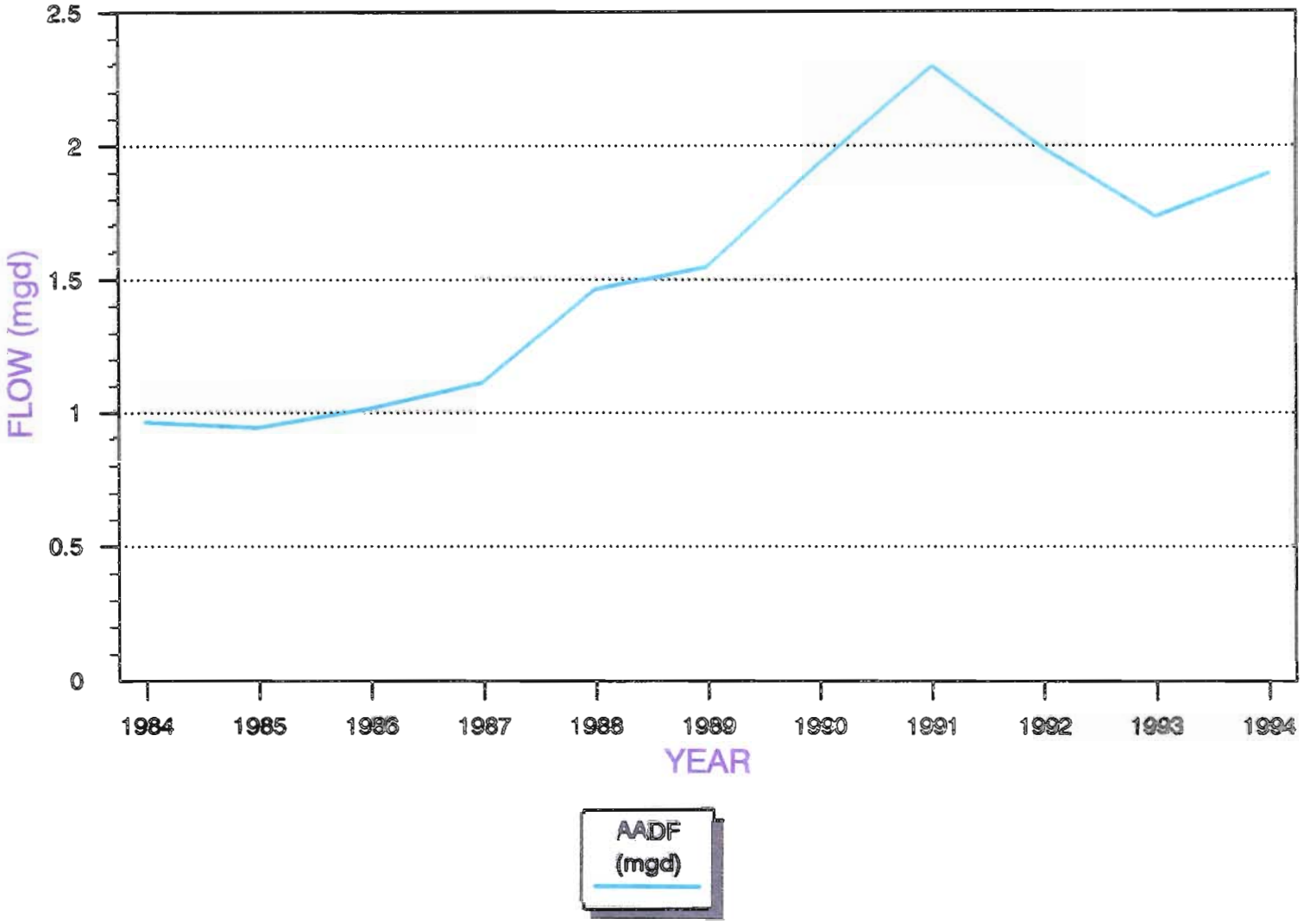

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FIGURE 2-4

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MARCO ISLAND WWTP
ANNUAL AVERAGE DAILY FLOW

TABLE 2-3

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

HISTORICAL MAXIMUM THREE MONTH VARIATION IN WASTEWATER FLOWS

Year	Annual ADF (MGD)	Maximum 3-Month ADF (MGD)	Ratio MTMADF to AADF
1984	0.935	1.218	1.30
1985	1.009	1.288	1.28
1986	1.109	1.400	1.26
1987	1.459	1.857	1.27
1988	1.545	1.904	1.23
1989	1.931	2.214	1.15
1990	2.294	2.648	1.15
1991	2.038	2.410	1.18
1992	1.985	2.503	1.26
1993	1.735	2.306	1.33
1994	1.895	2.264	1.20
Average:			1.24
Maximum:			1.33

Table 2-4 lists historical maximum month average daily flow (MMADF) values for the evaluation period. The annual average daily flow values are also listed in this table to indicate how the MMADF ratios were calculated. As listed in Table 2-4, the MMADF ratio ranged from 1.50 to 1.17 times the AADF values. These values are also illustrated in Figure 2-5. As noticed in this table, the MMADF ratios are significantly higher than the MTMADF ratios. In addition, these values are also much higher than an acceptable ratio above the AADF to maintain the plant design capacity based on an annual average daily flow basis.

Table 2-5 lists historical maximum day average daily flow (MDADF) values for the evaluation period. The annual average daily flow values are also listed in this table to indicate how the MDADF ratios were calculated. As listed in Table 2-5, the MDADF ratio ranged from 2.10 to 1.49 times the AADF values.

2.3.2 Plant Performance

The plant performance is evaluated based on the results of the removal of the specific parameters addressed in the FDEP Operating Permit. Figures 2-6 and 2-7 illustrate the effluent BOD_5 and TSS values for the past ten (10) years, respectively. Since the 1.0 MGD expansion to 3.5 MGD has been placed on-line, the Marco Island WWTF has met all effluent requirements for BOD_5 and TSS. Table 2-6 lists monthly BOD_5 and TSS effluent quality for January 1992 to September 1994. In accordance with Chapter 17-600.500, the parameters and minimum sampling schedule for the Marco Island WWTF are listed in Table 2-7.

2.4 DESIGN SUMMARY

Based on the data for the existing facilities and the historical average influent flow characteristics, the revised design parameters for the existing facilities are presented in Table 2-8. These flow values are recommended based on the ratios calculated from the historical flow data. Peak factors were calculated based on these historical ratios to estimate current design flow parameters. These factors are recommended maximum flow factors and not direct averages of historical data. Since the maximum monthly ratios were determined to be the limiting constraint for the design of the facilities, the plant design flow will be set on a maximum month basis. As noted in Table 2-6, since the WWTP is permitted for 3.50 MGD, the maximum month design flow value will be set at 3.50 MGD. From this value, the historical peak ratios or seasonal peaking factors were utilized to calculate the other design flow values.

TABLE 2-4

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

HISTORICAL MAXIMUM MONTH VARIATION IN WASTEWATER FLOWS

Year	Annual ADF (MGD)	Maximum Monthly ADF (MGD)	Ratio MMADF to AADF
1984	0.935	1.405	1.50
1985	1.009	1.401	1.39
1986	1.109	1.506	1.36
1987	1.459	2.076	1.42
1988	1.545	2.034	1.32
1989	1.931	2.518	1.30
1990	2.294	2.689	1.17
1991	2.038	2.567	1.26
1992	1.988	2.648	1.33
1993	1.732	2.396	1.38
1994	1.895	2.438	1.29
Average:			1.34
Maximum:			1.50

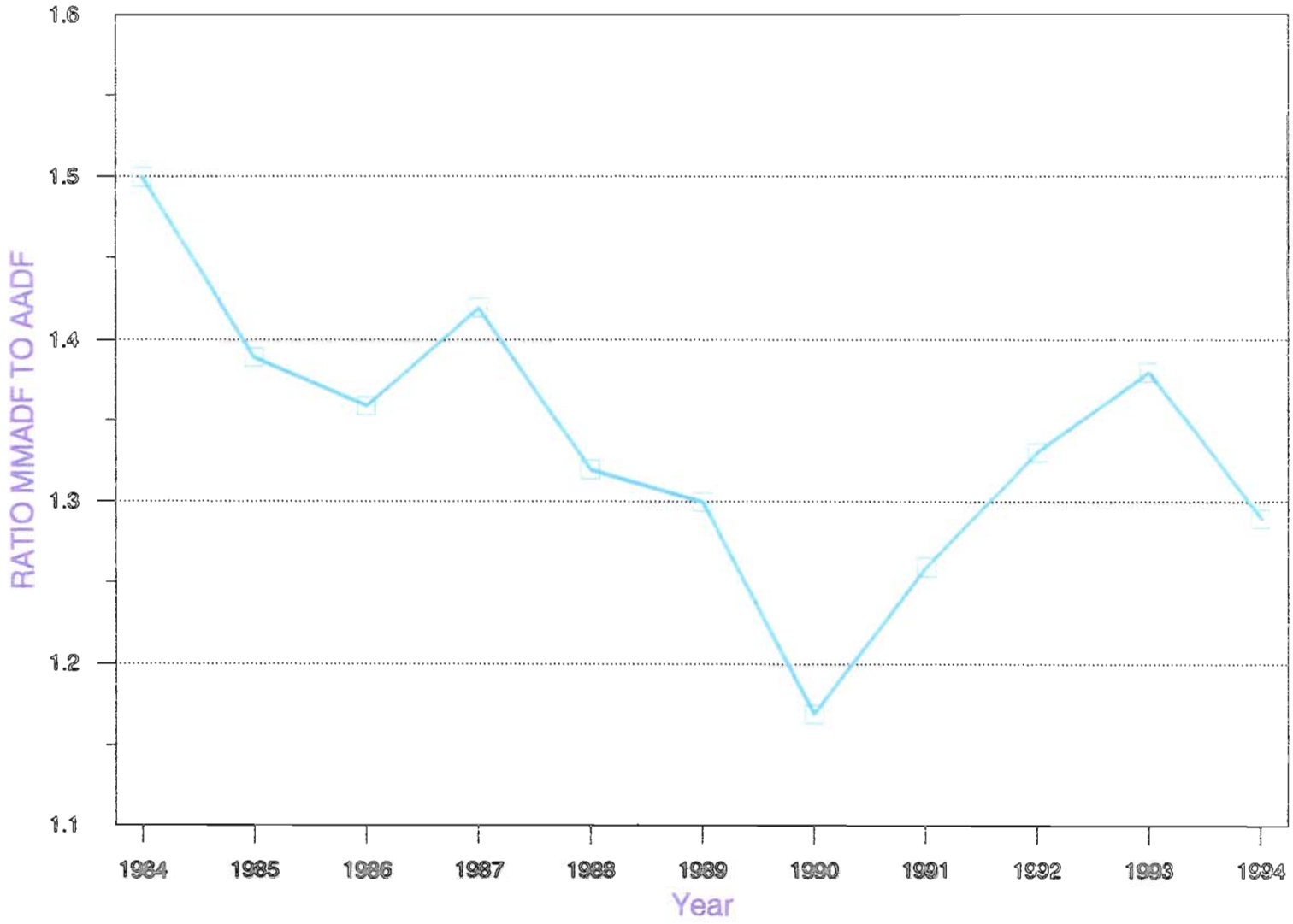

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FIGURE 2-5

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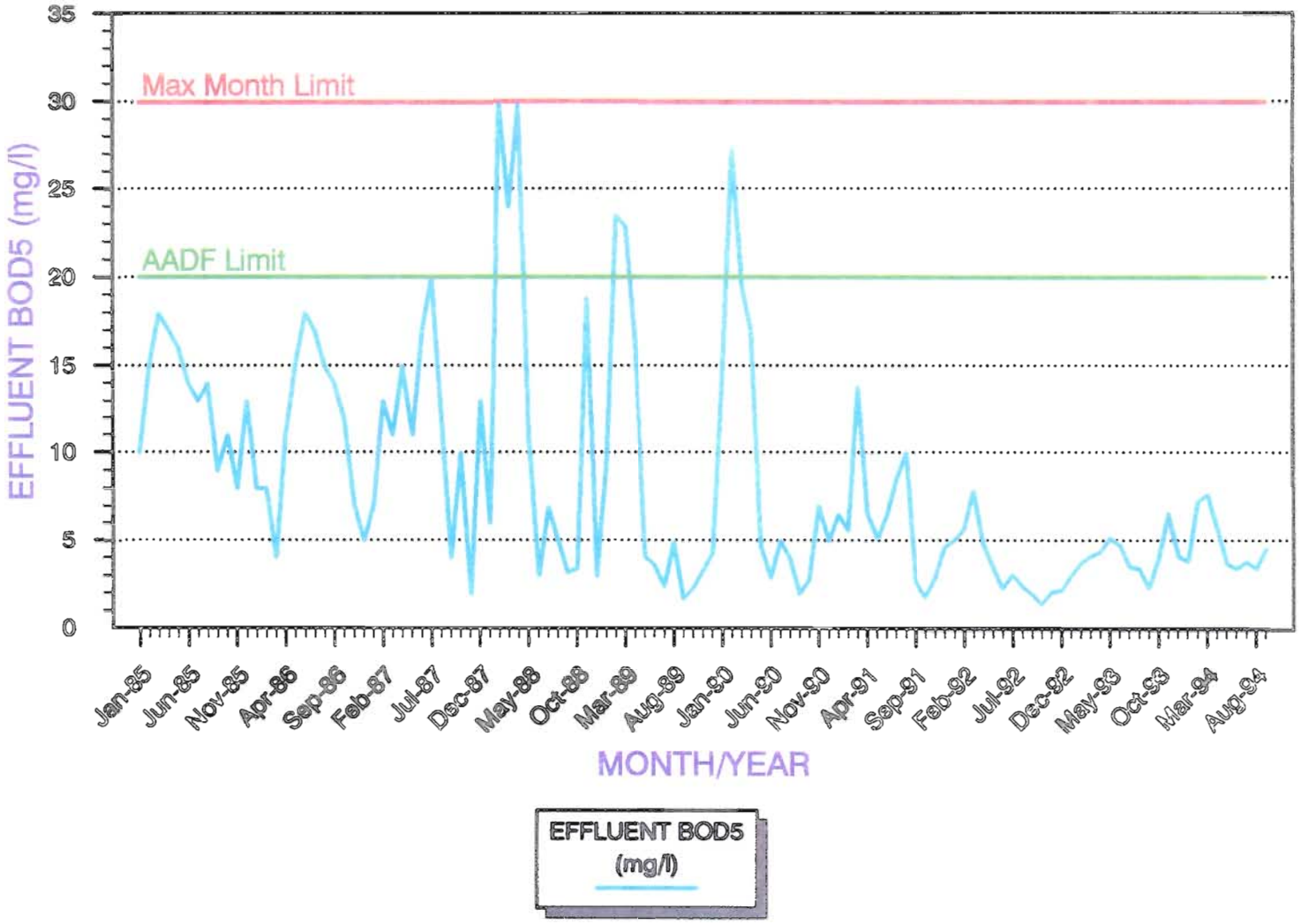
MARCO ISLAND WWTF
MMADF TO AADF RATIO

TABLE 2-5

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

HISTORICAL MAXIMUM DAY VARIATION IN WASTEWATER FLOWS

Year	Annual Average Daily Flow (AADF)	Maximum Day	Ratio Maximum Day to AADF
1984	0.935	1.704	1.82
1985	1.009	1.884	1.87
1986	1.109	2.264	2.04
1987	1.459	2.735	1.87
1988	1.545	2.297	1.49
1989	1.931	3.021	1.56
1990	2.294	3.555	1.55
1991	2.038	3.208	1.57
1992	1.985	4.168	2.10
1993	1.735	2.692	1.55
1994	1.895	2.870	1.51
Average:			1.72
Maximum:			2.10

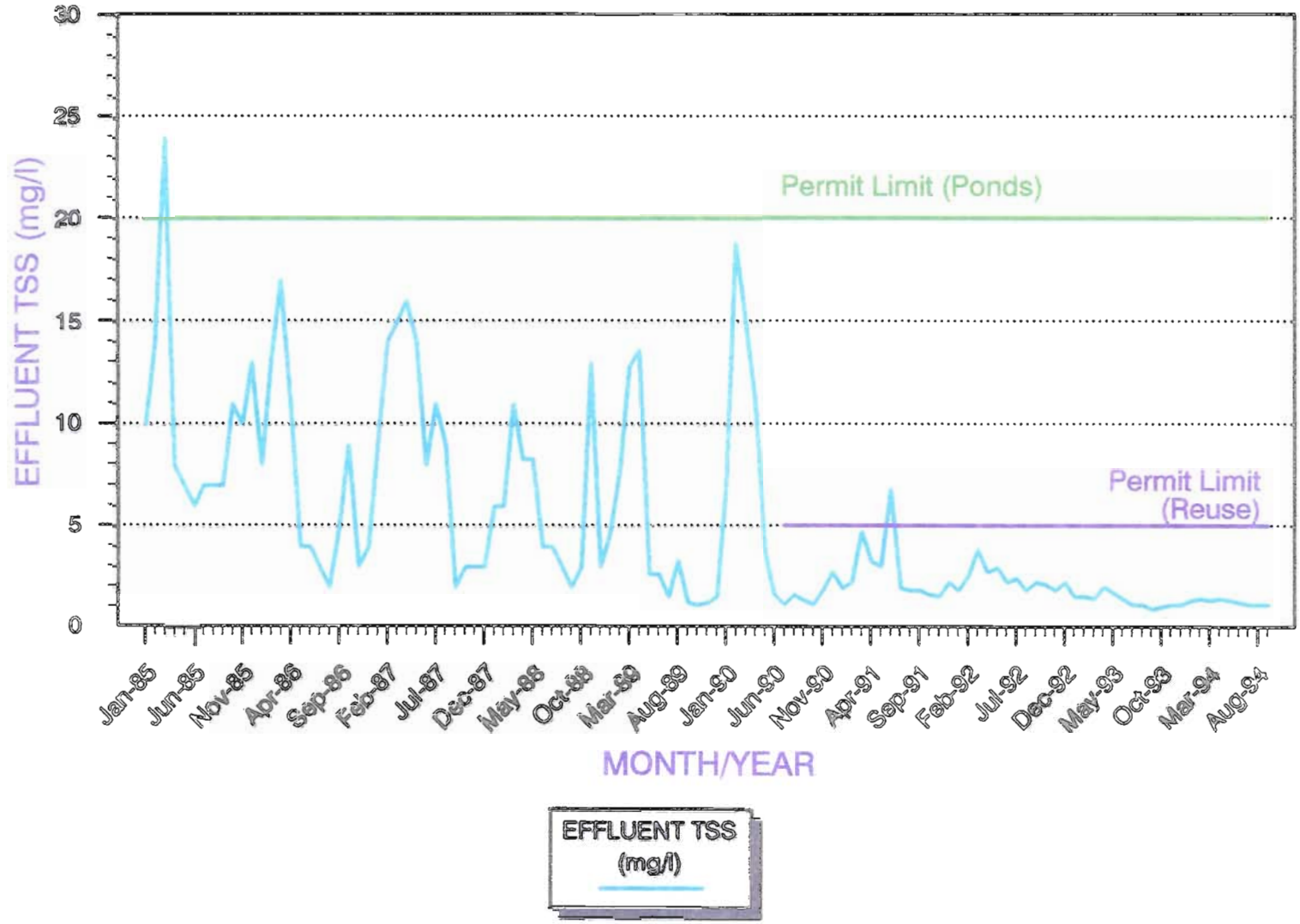


92-231.00\FL-738

FIGURE 2-6

HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants
201 EAST PINE STREET – SUITE 1000 – ORLANDO, FL 32801
TELEPHONE (407) 839-3955 – FAX (407) 839-3790

MARCO ISLAND WWTF
EFFLUENT BOD_5 CONCENTRATION



92-231.00\FL-739

FIGURE 2-7

HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants
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MARCO ISLAND WWTF
EFFLUENT TSS CONCENTRATION

TABLE 2-6

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
EFFLUENT QUALITY SUMMARY
JANUARY 1992 - SEPTEMBER 1994

Month/Year	Flow (MG)	BOD_5 (mg/l)	TSS (mg/l)
January, 1992		5.0	1.8
February, 1992		5.6	2.5
March, 1992		7.8	3.8
April, 1992		4.8	2.7
May, 1992		3.5	2.9
June, 1992		2.2	2.2
July, 1992		3.1	2.4
August, 1992		2.4	1.8
September, 1992		2.0	2.2
October, 1992	0.83	1.4	2.1
November, 1992	1.0	2.1	1.8
December, 1992		2.2	2.2
January, 1993		3.0	1.5
February, 1993		3.7	1.5
March, 1993		4.1	1.4
April, 1993		4.3	2.0
May, 1993		5.1	1.7
June, 1993	19.615	4.7	1.4
July, 1993	16.213	3.5	1.1
August, 1993	15.970	3.4	1.1
September, 1993	0	2.3	0.9
October, 1993	8.194	4.0	1.0
November, 1993	5.873	6.5	1.1
December, 1993	20.710	4.1	1.1
January, 1994	22.079	3.8	1.3
February, 1994	15.403	7.2	1.4
March, 1994	23.311	7.6	1.3
April, 1994	21.180	5.7	1.4
May, 1994	28.356	3.7	1.3
June, 1994	18.752	3.4	1.2
July, 1994	5.857	3.8	1.1
August, 1994	5.742	3.4	1.1
September, 1994	5.637	4.5	1.1

TABLE 2-7

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
PARAMETERS AND MINIMUM SAMPLING SCHEDULE

Parameter	Frequency	Sample Type
Flow	Daily 7/wk	Recording Flowmeter Totalizer
pH	Daily 7/wk	Grab
Chlorine Residual (Disinfection)	Continuous	Recording
TSS:		
Influent	Weekly	16 hr Flow Proportioned Composite
Effluent 610 Part III	Daily 7/wk	Grab
Ponds/AFS	Weekly	16 hr Flow Proportioned Composite
$CBOD_5$:		
Influent	Weekly	16 hr Flow Proportioned Composite
Effluent	Weekly	16 hr Flow Proportioned Composite
Fecal Coliform Effluent	Daily 7/wk	Grab

TABLE 2-8

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

DESIGN FLOW CHARACTERISTICS

Parameter	Design Value
I. Flow	
A. Annual Average Daily Flow	2.50 MGD
B. Maximum Three-Month Average Daily Flow	3.25 MGD
C. Maximum Month	3.50 MGD
D. Maximum Daily Flow	4.50 MGD
E. Peak Hourly Flow	6.25 MGD
II. Flow Characteristics (Influent)[1]	
A. BOD_5	220 mg/l
B. TSS	220 mg/l
III. Flow Characteristics (Effluent)[2][3]	
A. BOD_5	20 mg/l (Annual Average)
B. TSS (Percolation Ponds)	20 mg/l (Annual Average)
C. TSS (Reuse)	5.0 mg/l (Maximum Any Time)

Notes: (1) Estimated Design Value (not required).
(2) Permit limits (required for effluent disposal).
(3) All flow characteristic values are assumed as an annual average, except for the TSS limit for reuse.

The maximum monthly values listed in Table 2-4, indicate that the consistent maximum ratio for MMADF to AADF is approximately 1.40. Therefore, this value was used to calculate the design AADF value of 2.50 MGD. The maximum three month ADF values listed in Table 2-3 indicate that the consistent maximum ratio for MTMADF to AADF is approximately 1.30. Therefore, this value was used to calculate the design MTMADF value of 3.25 MGD. The maximum day of ADF values listed in Table 2-5 indicate that the consistent maximum ratio for MMADF to AADF is approximately 1.80. Therefore, this value was used to calculate the design MDADF value of 4.50 MGD. Since actual data is not available, the peak hour peaking factor was simply estimated at 2.50 times the AADF. This peak hour peaking factor only affects the design capacity of the pretreatment structure, since flow equalization facilities are provided.

2.5 REGULATORY REQUIREMENTS

On June 28, 1993, the Florida Department of Environmental Protection (FDEP) issued the Marco Island WWTF operating permit No. DO11-221557, which has an expiration date of June 28, 1998. The Marco Island WWTF is permitted to operate a 3.5 MGD contact stabilization process treatment facility. The Marco Island WWTF is a Class I reliability facility with reclaimed water following a high level disinfection. Reuse water is provided to public golf courses (spray irrigation), three (3) rapid-rate recharge percolation ponds, median strip irrigation and irrigation at Tommy Barfield Elementary School. Provisions are available for polymer addition and a back-up system Class I injection well for effluent disposal.

The primary rules which apply to this facility are Chapters 17-600, 17-610 and 17-640, FAC. Summarized in below are the regulatory requirements for these facilities.

Chapter 17-600, Domestic Wastewater Facilities, FAC, specifically governs the permitting and design of domestic wastewater treatment facilities. In addition, included in Chapter 17-600, FAC, are the treatment requirements for varying degrees of effluent disposal (e.g., non-public access, public access, etc.). In summary, the purpose of 17-600, FAC, is to provide minimum design wastewater treatment and disinfection standards, and where appropriate, shall be used in conjunction with other Department rules relating to the design, and operation and maintenance (O & M) of domestic wastewater treatment facilities.

Chapter 17-610, Reuse of Reclaimed Water and Land Application, FAC, sets the treatment criteria for effluent disposal on non-restricted and restricted public access effluent disposal sites.

In summary, the following are required by the FDEP for non-restricted public access effluent disposal sites:

- Public Access Site Requirements

1. Meet secondary treatment with high level disinfection. Therefore, the effluent shall contain less than 5.0 mg/l of TSS.

2. Filtration shall be provided for TSS control.

3. Provide chemical feed facilities to aid in TSS removal. Chemical feed systems may be idle if the TSS limitation is being achieved without chemical addition.

4. Facility reliability shall have a minimum Class I per USEPA Manual, MCD-05.

5. Provide continuous on-line monitoring for turbidity before application of disinfectant.

6. Facility shall have an approved operating protocol designed to ensure that the high-level disinfection criteria will be met before the reclaimed water is released to the system.

7. Substandard reclaimed water shall either be stored for subsequent treatment or shall be discharged to another permitted disposal system.

8. Substandard storage required of a volume equal to flow of the treatment plant or the average daily permitted flow of the reclaimed water reuse system, whichever is less.

9. Provisions for recirculating the reject water to other parts of the treatment plant shall be incorporated into the design.

In addition to the above listed requirements, wet weather storage must also be provided when discharging to an irrigation system. Wet weather storage is for effluent storage when the weather conditions prohibit application of treated effluent on turf areas. The minimum FDEP accepted volume of wet weather storage is generally three (3) days average daily flow. However, a mass balance must prove that the requirement is less than three (3) days. The mass balance considers factors such as application rate, evaporation and precipitation in determining wet weather storage. Typically, considering these factors, the storage requirement can be as great as 12 days.

Chapter 17-640, Domestic Wastewater Residuals, FAC, basically revised the old Chapter 17-7, FAC, to fall in line with the previous USEPA 40 Code of Federal Regulations (CFR) 503. The recent revision to 40CFR Part 503 eliminated the Class C level of sludge stabilization. Even though 17-640, FAC has not been revised yet to reflect the State's position, all facilities still must comply with the federal rule. In addition, under Chapter 17-640, FAC, permitting, accountability for ultimate disposal of sludge and maintaining a plan for land application of sludge, which identifies specific application sites and proposed application rates, has been shifted to the generator of the sludge. In other words, under this rule, when applying for a construction or operating permit, the permittee will be required to submit an Agricultural Use Plan as a component of the permit application. The Agricultural Use Plan for the Marco Island WWTF was recently submitted to FDEP. Furthermore, Chapter 17-640, FAC, more specifically defines stabilization standards for land application of sludge. There are two (2) classes in the existing regulations for pathogen control:

- Processes Significantly Reduce Pathogens (PSRP).
- Processes to Further Reduce Pathogens (PFRP).

Basically, this section identifies four (4) classes of sludge stabilization:

- Class AA - Processes which meet or exceed PFRP as defined in 40 CFR 257 and meets the requirements for metal content defined in Section 17-600.850(2).
- Class A - Processes which meet or exceed PFRP as defined in 40 CFR 257.
- Class B - Processes that are identified as PSRP, but not PFRP, as defined in 40 CFR 257.

- Class C - Processes that are identified as PSRP, but the design or operational characteristics do not meet the minimum requirements of 40 CFR 257.

Chapter 17-640, FAC also establishes the disposal site restrictions for the four (4) classes of stabilized sludge. As expected, the lesser the degree of stabilization, the more restrictions on the site in terms of public access, growing and harvesting. This section also identifies the setback distance criteria associated with the degree of stabilization.

Class A and Class AA will not be discussed with regard to the Marco Island WWTF, since PFRP is not a cost-effective sludge management alternative for this facility, primarily due to its size. However, as presently designed, this facility can meet either of the requirements for a Class B or C degree of stabilization. Summarized below are the restrictions for both Class B and C stabilized sludges.

- Class B - Application is limited to sod farms, pasture land, forest, highway shoulders and medians (limited access highways or roadways where public access is limited) and plant nursery use. Root crops, fruit and vegetables which come in contact with the soil shall not be grown on sludge application sites within 18 months of the last application. Root crops, fruits and vegetables which do not come in contact with the soil shall not be harvested within 30 days of the last application. Pasture vegetation shall not be cut or used for grazing by livestock for 30 days following the last application. Public access shall be restricted from the site for 12 months. Setbacks include 300 feet from a building occupied by the general public and 100 feet if the sludge is injected into the ground.

- Class C - Must meet the same requirements as a Class B sludge. However, root crops, fruits and vegetables which do not touch the ground cannot be harvested within 60 days following the last application, and the setback from a building occupied by the general public is now 500 feet, rather than 300 feet.

Based on the most recent information, it is apparent that the Class C sludge treatment process will be deleted from Chapter 17-640, FAC since it has been deleted from 40 CFR Part 503. Whether the Class C sludge treatment processes are deleted from Chapter 17-640, FAC soon, the existing facilities will still be required to meet the pathogen reduction levels for at least Class B sludge

treatment processes which is presently proposed to be 2,000,000 fecal coliform colonies per gram of sludge.

SECTION 3

SECTION 3
ASSESSMENT OF CAPACITY

3.1 GENERAL

The following section will review the existing design criteria, design parameters and historical raw influent wastewater characteristics for the Marco Island WWTF. This data will be used to evaluate and assess the unit process components of this facility. A summary of these design operation parameters is illustrated in Table 3-1.

3.2 TREATMENT UNITS

3.2.1 Pretreatment

The pretreatment facilities, as noted in Section 2, consist of one (1) pretreatment structure and two (2) circular concrete flow equalization basins. The pretreatment structure must be designed to handle the peak hour influent flow. Based on the design criteria provided by SSU, the pretreatment structure was sized for a peak capacity of 6.0 MGD. The estimated peak hour flow to the plant at the design flow of 3.50 MGD maximum month is approximately 6.25 MGD. Even though the estimated design peak hour flow to the structure is higher than the structure's design capacity, the difference is only 4 percent and the peak hour flow is estimated based on an assumed peak hour factor. Flow equalization basins are designed to reduce the peak hour flow rate to the process units downstream of the equalization basin. Under normal conditions, the peak hour flow rate can be reduced to the average daily flow rate. However, on an overall annual basis, the peak flow can only be reduced to the maximum day rate at the lowest. Therefore, the downstream peaking factor is reduced to 1.80 times the average daily flow or equal to the maximum daily flow of 4.50 MGD.

3.2.2 System No. 1 - 2.50 MGD Contact Stabilization WWTF

Contact - Stabilization

The contact-stabilization facilities, as noted in Section 2, consist of two (2) 100,970 gallon contact basins and three (3) 166,223 gallon stabilization basins. At the design flow of 2.50 MGD, the contact basins provide approximately 1.9 hours of hydraulic retention time, and the

TABLE 3-1

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

DESIGN OPERATING PARAMETER SUMMARY

Component	Design Criteria	3.5 MGD
Contact (hrs)	1.0-3.0	2.3
Stabilization (hrs)	3.0-8.0	5.1
Clarification[1]		
Peak Overflow Rate (gpd/SF)	1,200	543
Peak Solids Loading Rate (lbs/d/SF)	50	18.1
Filtration	Avg. = 2.0	
OFR (gpm/SF)	Pk. = 5.0	2.8
Chlorination	Avg. = 30	37.8
Tr (min)	Pk. = 15	24.2
Sludge Stabilization[2] SRT (d)	40	20.2

Notes: (1) Assume 100% RAW Flow Rate and a MLSS - 2,000 mg/L.
(2) Class B sludge per Chapter 17-640, FAC, and USEPA 40 CFR, Part 257 and 503.

Tr = hydraulic residence time.

stabilization basins provide approximately 4.78 hours of hydraulic retention time. The typical design parameter for a contact basin is between 1.0 to 3.0 hours of hydraulic retention time, and between 3.0 to 8.0 hours of hydraulic retention time for a stabilization basin. Assuming a design parameter for a contact basin's hydraulic retention time of 2 hours, a stabilization basin's hydraulic retention time of 5 hours and the existing volume, the process has an assessed capacity of approximately 2.5 MGD-ADF.

Clarification

The existing clarification facilities for System No. 1, as noted in Section 2, consist of three (3) clarifiers. Two (2) clarifiers have a diameter of 40 feet, a sidewater depth of 10 feet. The third clarifier has a diameter of 50 feet, and a sidewater depth of 12 feet. At the design flow of 2.50 MGD, the basin provides approximately 5.4 hours of hydraulic retention time. At the design average daily flow rate of 2.50 MGD, the clarifier provides a surface loading rate of approximately 558 gpd/sf. At the design peak flow rate of 4.5 MGD, the clarifier provides a surface loading rate of approximately 1,000 gpd/sf. The typical design surface loading rate for a clarifier for a contact stabilization process is approximately 1,200 gpd/sf. Assuming a design parameter for clarifier surface loading rate of 1,200 gpd/sf and the existing surface area, the unit has an assessed capacity of 3.0 MGD-ADF.

3.2.3 System No. 2 - 1.0 MGD Contact Stabilization WWTF

Contact - Stabilization

The contact-stabilization facilities, as noted in Section 2, consist of one (1) 125,306 gallon contact basin and one (1) 250,231 gallon stabilization basin. At the design flow of 1.0 MGD, the contact basin provides approximately 3.0 hours of hydraulic retention time, and the stabilization basin provides approximately 6.0 hours of hydraulic retention time. The typical design parameter for a contact basin is between 1.0 to 3.0 hours of hydraulic retention time, and between 3.0 to 8.0 hours of hydraulic retention time for a stabilization basin. Assuming a design parameter for a contact basin's hydraulic retention time of 2.0 hours, a stabilization basin's hydraulic retention time of 5.5 hours and the existing volume, the process has an assessed capacity of 1.1 MGD-ADF.

Clarification

The existing clarification facilities for System No. 2, as noted in Section 2, consist of one (1) clarifier. The clarifier has a diameter of 50 feet, a sidewater depth of 12.5 feet. At the design flow of 1.0 MGD, the basin provides approximately 7.3 hours of hydraulic retention time. At the design average daily flow rate of 1.0 MGD, the clarifier provides a surface loading rate of approximately 509 gpd/sf. At the design peak flow rate of 1.8 MGD, the clarifier provides a surface loading rate of approximately 917 gpd/sf. The typical design surface loading rate for a clarifier for a contact stabilization process is approximately 1,200 gpd/sf. Assuming a design parameter for clarifier surface loading rate of 1,200 gpd/sf and the existing surface area, the unit has an assessed capacity of 1.3 MGD-ADF.

3.2.4 Filtration

The existing filtration facilities, as noted in Section 2, consist of two (2) traveling bridge type filters. The filters each have a surface area of 864 sf. At the design flow of 3.5 MGD, the filters provide a surface loading rate of approximately 2.8 gpm/sf. The typical design parameter for a filter surface loading rate is approximately 2 to 3 gpm/sf at average flow rate conditions and 5 to 6 gpm/sf at peak conditions. Assuming a design parameter for the filtration units of 5 gpm/sf at peak flow and the existing surface areas, the units have an assessed capacity of 7.00 MGD-ADF.

3.2.5 Disinfection

The existing disinfection facilities, as noted in Section 2, consist of one (1) dual train chlorine contact chambers (CCC). Each basin or train has a volume of 45,900 gallons. At the design peak flow rate of 4.50 MGD, the chlorine basin provides a contact time of approximately 30.0 minutes. The typical design parameter for contact time in a chlorine contact chamber is 15 minutes at peak flow conditions. Assuming a design parameter for the ccc units of 15 minutes and the existing total volume of 91,800 gallons, the unit has an assessed capacity of 7.00 MGD-ADF.

3.2.6 Residuals Stabilization

The existing sludge stabilization facilities for the Marco Island WWTF site, as described in Section 2, consist of three (3) aerobic digesters. The volume of the first digester is 205,620 gallons, the second

digester has a volume of 225,028 gallons and the third digester has a volume of 131,943 gallons. The sludge production for this facility was based on the following assumptions:

Design Influent Flow:	3.50 MGD
Design $CBOD_5$ Removal:	200 mg/l
Design Sludge Yield:	0.85 #TSS/#$CBOD_5$ removed

Therefore, the waste solids production at the design flow from the Marco Island WWTF is estimated at 4,962.3 lbs/day. At a WAS concentration of 0.90 percent solids from the clarifier, the wasting rate is approximately 66,111 gpd to the aerobic digesters. At this rate and utilizing the existing total digester volume of 562,591 gallons, the aerobic digesters would provide approximately eight (8) days of retention time. However, this time can be increased with the ability to decant. Both aerobic digester No. 1 and digester No. 3 have the capabilities to decant. It is assumed that the digester contents are decanted and the solids are increased from 0.90 percent to 1.5 percent. As stated previously, the sludge is pumped from digester No. 3 to the thickener, then pumped to digester No. 2 for further stabilization. It is assumed that the thickened sludge concentration is 4.0 percent solids to digester No. 2. Based on this method of operation, the aerobic digesters provide approximately 20.02 days of solids retention time. Assuming a design parameter for the aerobic sludge digestion time of 40 days and the existing digester volumes, the stabilization facilities for the Marco Island WWTF has an assessed capacity of 1.77 MGD.

3.2.7 Effluent Disposal

The Marco Island WWTF has two (2) effluent disposal alternatives of which each has a capacity of 3.50 MGD. The facility also produces reclaimed water which is disposed of in addition to the other alternatives. Since the reclaimed water use is on an "as-needed" basis and the deep well is to be used for back-up only, the assessed effluent disposal capacity of 3.50 MGD.

SECTION 4

SECTION 4

PROJECTED CONDITIONS

4.1 INTRODUCTION

This section will present the historical data, projected population, and flow demand for the Marco Island wastewater system to determine trends and calculate accurate projections. The data consists of historical population data provided by the Collier County Planning Department and historical plant flow and flow characteristics data as listed on the monthly operating reports (MOR) submitted to FDEP.

4.2 POPULATION PROJECTIONS

Historical population data was obtained from the Collier County Planning Department and from a previous HAI water and wastewater Master Plan for Marco Island. This data was utilized to evaluate the historical growth treads and calculated projected growth in the service area. Table 4-1 lists the historical population data for Collier County from 1930 to 1994. The data listed in Table 4-1 is presented only to evaluate percent increase in growth in this area of the State. Table 4-2 lists the historical population data for Marco Island from 1988 to 1994. The data from these tables was derived from historical data provided by the Collier County Planning Department. Based on the data from these tables, the Marco Island population is approximately 7.1 percent of the total Collier County population. Table 4-3 lists the historical population data for the entire service area from 1984 to 1993. This data was provided from historical Annual Reports for the utility and listed in the 1990 Master Plan prepared by HAI.

The population data provided by the Collier County Planning Department indicates that the permanent population for Marco Island is nearly half of the seasonal population estimated by other sources. The Collier County data also indicates that the Marco Island area will increase in permanent population by approximately 6.53 percent for the next five (5) years (1994-1998) and 5.54 percent for the following five (5) years (1998-2002). Table 4-4 lists the Marco Island permanent population projections as provided by the Collier County Planning Department. The values listed in Table 4-4 are for Marco Island only and do not include seasonal increases. Table 4-5 lists the total Marco Island WWTP Service Area population projections as provided in a previous HAI Master Plan. These values include seasonal population estimates. This table also

TABLE 4-1

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

COLLIER COUNTY HISTORICAL POPULATION DATA[1]

Year	Historical Population Data	Percent Growth
1930	2,883	
1940	5,102	77.0
1950	5,488	27.2
1960	15,753	142.8
1970	38,040	141.5
1980	85,971	126.0
1981	91,090	6.0
1982	98,094	7.7
1983	102,520	4.5
1984	109,219	6.5
1985	115,221	5.5
1986	120,695	4.8
1987	126,631	4.9
1988	134,401	6.1
1989	144,721	7.7
1990	152,099	5.1
1991	161,600	6.2
1992	168,514	4.3
1993	174,664	3.6
1994	186,641	6.9

(1) Data provided by Collier County Planning Department

TABLE 4-2

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

MARCO ISLAND HISTORICAL PERMANENT POPULATION DATA(1)

Year	Historical Population Data	Percent Growth
1988	10,093	
1989	10,909	8.1
1990	10,932	0.2
1991	11,508	5.3
1992	11,693	1.6
1993	11,875	1.6
1994	12,483	5.1

(1) Data provided by Collier County Planning Department

TABLE 4-3

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
WASTEWATER SERVICE AREA POPULATION RECORDS

Year	Single-Family Units		Multi-Family Units		Total Units	Total Population	Percent Growth
	No.	Pop.	No.	Pop.			
1984	1,072	2,894	7,526	16,557	8,598	19,452	
1985	1,083	2,924	8,065	17,743	9,148	20,667	6.25
1986	1,109	2,994	8,389	18,456	9,498	21,450	3.79
1987	1,232	3,326	8,518	18,740	9,750	22,066	2.87
1988	1,613	4,335	8,682	19,100	10,295	23,456	6.30
1989	1,633	4,409	8,889	19,556	10,522	23,965	2.17
1990	1,742	4,704	9,224	20,294	10,966	24,997	4.31
1991	1,871	5,052	9,476	20,846	11,347	25,899	3.61
1992	2,000	5,401	9,727	21,399	11,727	26,800	3.48
1993	2,129	5,749	9,978	21,952	12,107	27,701	3.36

TABLE 4-4

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

MARCO ISLAND POPULATION PROJECTIONS[1]

Year	Projected Population	Persons Per Household[2]	Projected Percent Growth
1994	12,483	2.1	
1995	13,347	2.1	6.92
1996	14,258	2.1	6.83
1997	15,168	2.1	6.38
1998	16,078	2.1	5.99
1999	16,988	2.1	5.66
2000	17,898	2.1	5.36
2001	18,921	2.1	5.72
2002	19,945	2.1	5.41
2003	20,969	2.1	5.13
2004	21,992	2.1	4.88
2005	23,016	2.1	4.66
2006	24,158	2.1	4.96
2007	25,300	2.1	4.73
2008	26,441	2.1	4.51
2009	27,658	2.1	4.60
2010	28,752	2.1	3.86

(1) Data provided by Collier County Planning Department.

(2) The number of persons per household was determined from information obtained from a study prepared by University of Florida, Bureau of Economic and Business Research, 1990. Average annual growth ratios were as follows:

1994-1998	6.53%
1998-2002	5.54%
2002-2006	4.91%
2006-2010	4.42%

TABLE 4-5

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
WASTEWATER SERVICE AREA POPULATION ESTIMATES[1]

Year	Single-Family Units		Multi-Family Units		Total Units	Total Population
	No.	Pop.	No.	Pop.		
1994	2,258	6,098	10,229	22,505	12,487	28,603
1995	2,388	6,446	10,481	23,058	12,869	29,504
1996	2,517	6,795	10,732	23,611	13,249	30,405
1997	2,646	7,143	10,983	24,163	13,629	31,307
1998	2,775	7,492	11,235	24,716	14,010	32,208
1999	2,904	7,841	11,486	25,269	14,390	33,110
2000	3,033	8,489	11,737	25,822	14,770	34,011
2001	3,162	8,538	11,988	26,375	15,150	34,912
2002	3,291	8,886	12,240	26,927	15,531	35,814
2003	3,420	9,235	12,491	27,480	15,911	36,715
2004	3,549	9,583	12,742	28,033	16,291	37,616
2005	3,678	9,932	12,994	28,586	16,672	38,518
2006	3,808	10,280	13,245	29,139	17,053	39,419
2007	3,937	10,629	13,496	23,691	17,433	40,320
2008	4,066	10,977	13,747	30,244	17,813	41,221
2009	4,195	11,326	13,999	30,797	18,194	42,123
2010	4,324	11,675	14,250	31,350	18,574	43,025

Note: (1) Data obtained from 1990 Master Plan prepared by Hartman & Associates, Inc.

includes the estimated number of projected single-family and multi-family units. A review of the existing service area concludes that the areas served by central sewer are near build-out. The areas with some potential growth are areas currently served by septic systems. It appears that the Master Plan population estimates best reflect the growth of potential "sewered" customers. The County's projections are based on the population of the whole island, not just the sewered areas.

4.3 FLOW PROJECTIONS

Based on the analysis of the previous subsection on historical population projections, it is possible to determine the projected wastewater flows for the Marco Island system. Section 17-600.405(6), FAC, requires the wastewater "....flow projects...for a least the next 10 years." be made. These projections will determine the adequacy of the existing facilities and the necessary capacity and hence expansion of the wastewater treatment facilities to meet these flow projections.

The projected wastewater demands are what determines the capital improvement program and establish the timing of these improvements in order to meet the customer's needs and maintain the level of service requirements.

Utilizing 100 gallons per day per capita or per person (gpd/CAP), the AADF and MMADF projections were calculated for the next ten (10) years and are shown in Table 4-6. These flow projections are based on historical data as listed in Table A-2 in Appendix A. This method suggests that the flow will not exceed the plant design capacity until after 2001. Figure 4-1 illustrates projections for the next ten (10) years based on population.

A second method for estimating the wastewater flow projections to the Marco Island WWTF was based on utilizing a linear regression analysis of the historical flow records. The regression data was used to estimate sewage flow projections by linear extrapolation. Figure 4-2 shows a plot of the flow projections to the year 2004. Table 4-7 lists the projected wastewater flows based on historical records.

TABLE 4-6

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

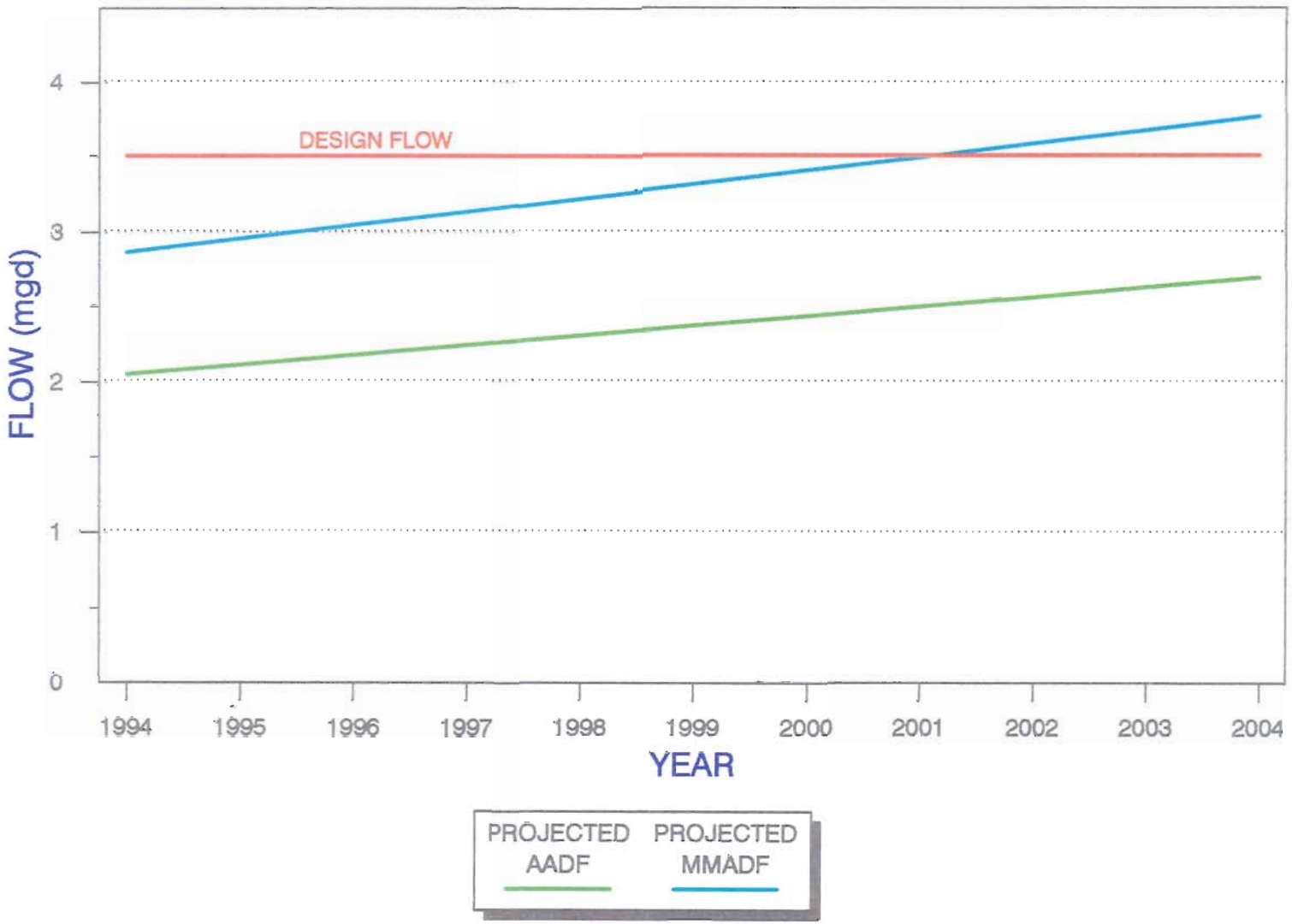
POPULATION BASED FLOW PROJECTIONS
1994-2004

Year	Projected Population[1]	Projected MMADF[2]	Projected AADF[3]
1995	29,504	2.950	2.107
1996	30,405	3.041	2.172
1997	31,307	3.131	2.236
1998	32,208	3.221	2.301
1999	33,110	3.311	2.365
2000	34,011	3.401	2.429
2001	34,912	3.491	2.494
2002	35,814	3.581	2.558
2003	36,715	3.672	2.623
2004	37,616	3.762	2.687

Notes: (1) Based on historical data from 1990 Master Plan prepared by Hartman & Associates, Inc.

(2) Based on a historical flow index of 100 gpd/ERC.

(3) Based on historical MMADF to AADF ratio of 1.40.

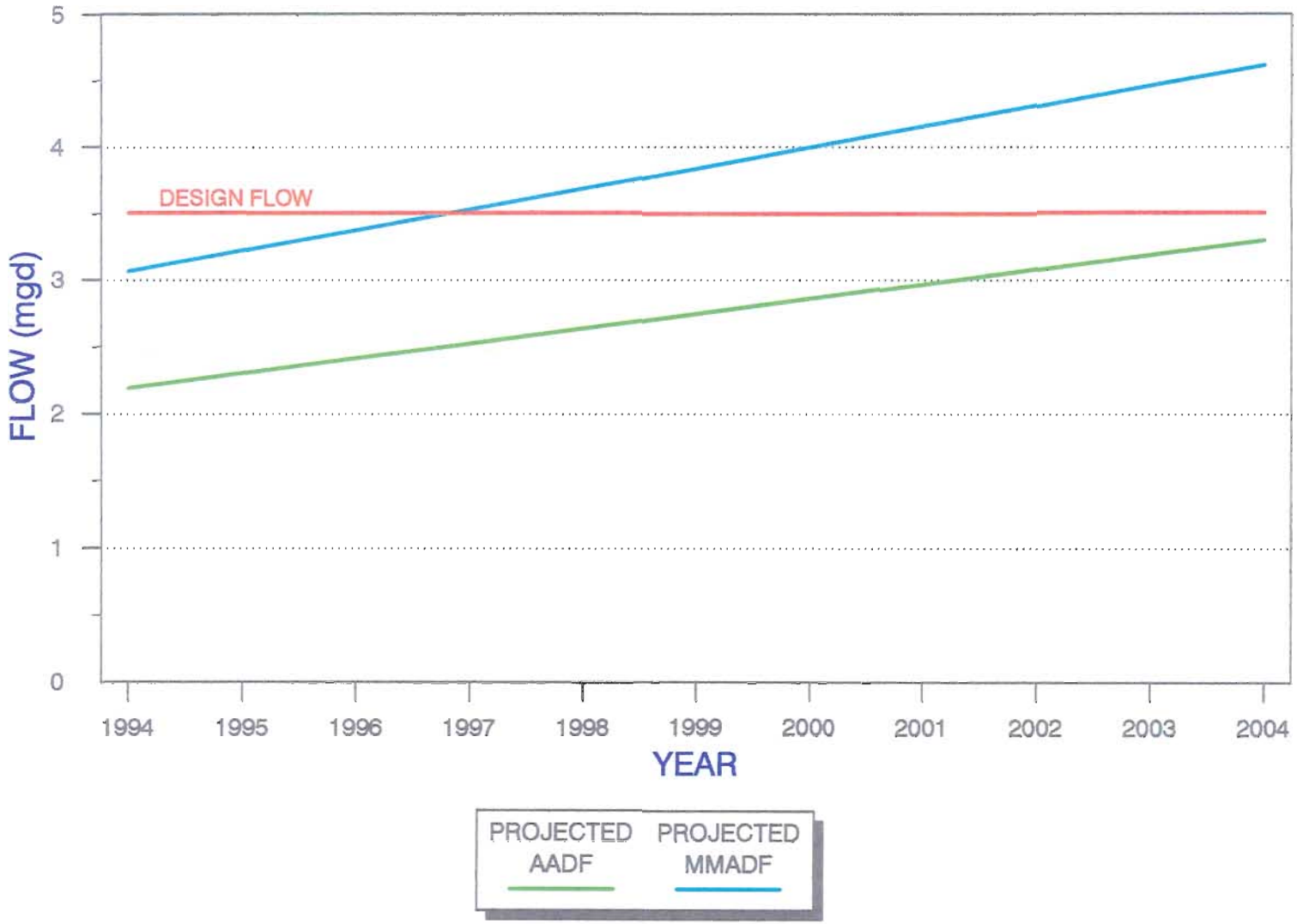


94-369.00\FL-740

FIGURE 4-1

HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants
201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801
TELEPHONE (407) 839-3955 - FAX (407) 839-3790

MARCO ISLAND WWTF
WASTEWATER FLOW PROJECTIONS
BASED ON ERC'S



94-369.00\FL-741

FIGURE 4-2

HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants
201 EAST FINE STREET - SUITE 1000 - ORLANDO, FL 32801
TELEPHONE (407) 839-3955 - FAX (407) 839-3790

MARCO ISLAND WWTF
WASTEWATER FLOW PROJECTIONS
BASED ON HISTORICAL DATA

TABLE 4-7

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY

HISTORICAL FLOW BASED FLOW PROJECTIONS[1]
1994-2004

Year	Projected AADF (MGD)	Projected MMADF (MGD)
1995	2.298	3.217
1996	2.409	3.373
1997	2.521	3.529
1998	2.632	3.685
1999	2.743	3.840
2000	2.854	3.996
2001	2.966	4.152
2002	3.077	4.308
2003	3.188	4.463
2004	3.299	4.619

Note: (1) Based on historical flow.
(2) Based on 1.4 maximum month peaking factor.

SECTION 5

SECTION 5

SUMMARY

5.1 CONCLUSIONS

The results of the study indicate that the Marco Island WWTF has continued to consistently meet the permit requirements since the initial capacity analysis was submitted to the Department in 1992. In addition, the revised flow projections, as described in Section 4, estimate that the maximum month average daily flow to the facility will not exceed the permitted capacity until the year 2001.

It was also concluded that the only process component not currently projected to meet the regulatory requirements for the period of the permit is the sludge stabilization process. However, the rules and requirements for aerobically digested sludge are based on performance more than on direct hydraulic retention time criteria. Therefore, SSU can possible comply with the rules and requirements of 40 CFR, Part 503, with the existing facilities and with the current average daily flows.

5.2 RECOMMENDATIONS

Based on the results of the projections in the previous section, the estimates utilizing historical flow are higher than the projections utilizing population projections. Flow projections based on historical flow estimate the plant flow exceeding capacity in 1997. These projections appear to be too high given the current 1994 AADF of 1.895 MGD. It was rated in the Initial Capacity Analysis Report, that SSU believes that the wastewater flow projections based on the population projection method are more accurate estimates of future conditions in the service area. Projections utilizing population in the initial capacity analysis report proved to be more accurate estimates of plant flow following our review of the historical flow since the development of the previous report. From the data provided in Table 2-4, it is evident that the peak month factor is continually much higher than the average annual daily flow. The maximum month ADF value is consistently 30 to 40 percent higher than the AADF. Therefore, the Marco Island WWTP must be able to treat 1.40 times the projected AADF. Since the current rating of the facilities is 3.5 MGD, this must be considered the maximum month flow (MMF) capability and considered only a 2.5 MGD facility for annual average daily flows (AADF).

SECTION 6

SECTION 6

STATEMENT FROM ENGINEER

Based on the review of the recent wastewater facility operations data, the Marco Island WWTF appears to be capable of treating the wastewater flows projected over the period of the current operating permit up to 3.50 MGD MMADF. As stated earlier in this report, this is also equivalent to 2.500 MGD AADF. It is understood that the plant capacity is 3.50 MGD according to the current permitted effluent disposal capacity.

At the current ADF or approximately 1.90 MGD, the Marco Island WWTF does not meet quite the 40 day solids retention time in the digester. However, the rules for aerobic digestion are performance based. Therefore, through sampling and testing of the aerobically digested sludge, the Marco Island WWTF can possibly demonstrate compliance with the rules. Testing for pathogens is recommended to meet compliance with the 503 Regulations. Due to site limitations, the most feasible method of meeting the 503 Regulations without testing for pathogens is to convert the existing sludge aerobic digestion facilities to lime stabilization facilities.

It is estimated based on growth projections provided by SSU, that the facility capacity (3.50 MGD maximum monthly average daily flow) will not be exceeded for approximately seven (7) years. Since this report is required to be annually updated, the flow projections will also be analyzed periodically to closely track the growth. Based on this conclusion, Chapter 17-600.405, FAC requires the Owner to initiate planning for expansion of the facilities. Table 6-1 lists a preliminary schedule to meet the requirements of Chapter 17-600.405, FAC.

TABLE 6-1

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITIES

PRELIMINARY SCHEDULE FOR COMPLIANCE

YEAR	
1996	Initiate planning for expansion of facilities.
1997	Initiate design documents for expansion or rerating of facilities.
1998	Submit FDEP Construction Permit for expansion or rerating of facilities.
1999	Start construction of expanded facilities.
2000	Complete expansion construction.
2001	Place expanded facilities on-line.

APPENDIX A

APPENDIX A

HISTORICAL FLOW DATA

TABLE A-1

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
HISTORICAL FLOW DATA
JANUARY 1984 - AUGUST 1994

Month/Year	Average Daily Flow (MGD)		
	1-Month	3-Month Running	Maximum Day
1984			
January	1.013	0.927	1.293
February	1.236	1.057	1.516
March	1.405	1.218	1.704
April	0.938	1.193	1.104
May	0.725	1.023	0.983
June	0.724	0.796	0.968
July	0.887	0.779	1.057
August	0.887	0.833	1.126
September	0.854	0.876	1.376
October	0.825	0.855	1.278
November	0.828	0.836	1.035
December	0.894	0.849	1.493
1985			
January	0.974	0.899	1.412
February	1.323	1.064	1.695
March	1.401	1.233	1.583
April	1.141	1.288	1.577
May	0.797	1.133	1.020
June	0.893	0.944	1.630
July	1.008	0.899	1.884
August	0.939	0.947	1.246
September	0.918	0.955	1.276
October	0.820	0.892	1.162
November	0.873	0.870	0.997
December	1.022	0.905	1.818
1986			
January	1.198	1.301	1.539
February	1.392	1.204	1.606
March	1.506	1.365	1.930
April	1.099	1.332	1.650

TABLE A-1 (Continued)

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
HISTORICAL FLOW DATA
JANUARY 1984 - AUGUST 1994

Month/Year	Average Daily Flow (MGD)		
	1-Month	3-Month Running	Maximum Day
May	0.853	1.153	1.174
June	0.793	0.915	1.041
July	0.891	0.846	1.225
August	0.791	0.825	1.050
September	1.018	0.900	1.364
October	1.192	1.000	1.500
November	1.208	1.139	1.400
December	1.372	1.257	2.264
1987			
January	1.621	1.400	2.021
February	1.874	1.622	2.248
March	2.076	1.857	2.358
April	1.593	1.848	2.347
May	1.303	1.657	2.735
June	1.264	1.387	2.318
July	1.487	1.351	2.485
August	1.323	1.358	1.863
September	1.143	1.318	1.514
October	1.108	1.191	1.353
November	1.382	1.211	2.595
December	1.332	1.274	1.932
1988			
January	1.697	1.470	1.932
February	1.980	1.670	2.297
March	2.034	1.904	2.176
April	1.682	1.899	2.277
May	0.696	1.660	1.127
June	1.261	1.402	1.380
July	1.482	1.336	2.017
August	1.523	1.422	2.019
September	1.310	1.438	1.644
October	1.371	1.401	1.540
November	1.504	1.395	1.817
December	1.434	1.437	2.025

TABLE A-1 (Continued)

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
HISTORICAL FLOW DATA
JANUARY 1984 - AUGUST 1994

Month/Year	Average Daily Flow (MGD)		
	1-Month	3-Month Running	Maximum Day
1989			
January	1.793	1.577	2.171
February	2.078	1.768	2.494
March	2.518	2.130	3.021
April	2.045	2.214	2.553
May	1.670	2.078	2.048
June	1.711	1.809	2.154
July	1.998	1.793	2.686
August	1.971	1.894	2.664
September	1.705	1.891	2.158
October	1.731	1.802	1.937
November	1.973	1.803	2.464
December	1.978	1.894	2.880
1990			
January	2.321	2.091	2.692
February	2.689	2.329	3.027
March	2.683	2.564	2.985
April	2.573	2.648	3.506
May	2.171	2.476	3.555
June	2.111	2.285	2.536
July	2.257	2.180	2.711
August	2.210	2.193	2.642
September	2.163	2.210	2.801
October	2.113	2.162	2.828
November	2.067	2.114	2.267
December	2.170	2.117	2.532
1991			
January	2.123	2.120	2.405
February	2.487	2.260	2.966
March	2.567	2.392	2.842
April	2.177	2.410	2.636
May	1.683	2.142	2.105
June	1.795	1.885	2.590
July	2.000	1.826	2.750

TABLE A-1 (Continued)

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
HISTORICAL FLOW DATA
JANUARY 1984 - AUGUST 1994

Month/Year	Average Daily Flow (MGD)		
	1-Month	3-Month Running	Maximum Day
August	1.940	1.912	2.252
September	1.960	1.967	3.208
October	1.850	1.917	2.133
November	1.900	1.903	2.182
December	1.980	1.910	2.995
1992			
January	2.253	2.044	2.654
February	2.648	2.294	3.233
March	2.608	2.503	3.008
April	2.167	2.474	2.503
May	1.533	2.103	1.720
June	1.990	1.897	4.168
July	1.753	1.759	2.290
August	1.710	1.818	2.065
September	1.697	1.720	1.988
October	1.709	1.705	2.115
November	1.907	1.771	2.151
December	1.850	1.822	2.679
1993			
January	2.159	1.972	2.531
February	2.396	2.135	2.692
March	2.362	2.306	2.674
April	1.969	2.242	2.620
May	1.451	1.927	1.783
June	1.327	1.582	1.505
July	1.509	1.429	1.780
August	1.557	1.464	2.662
September	1.417	1.494	1.909
October	1.592	1.522	2.226
November	1.492	1.490	1.815
December	1.617	1.557	2.280
1994			
January	2.034	1.704	2.334
February	2.321	1.991	2.648

TABLE A-1 (Continued)

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
HISTORICAL FLOW DATA
JANUARY 1984 - AUGUST 1994

Month/Year	Average Daily Flow (MGD)		
	1-Month	3-Month Running	Maximum Day
March	2.438	2.264	2.870
April	2.028	2.262	2.571
May	1.450	1.972	1.775
June	1.492	1.657	2.188
July	1.767	1.570	2.328
August	1.627	1.629	2.574

TABLE A-2

SOUTHERN STATES UTILITIES, INC.
UPDATED CAPACITY ANALYSIS REPORT
MARCO ISLAND WASTEWATER TREATMENT FACILITY
HISTORICAL DATA

Year	Actual (AADF)	Actual (MMADF)	ERC's	Ratio AADF to ERC's	Ratio MMADF to AADF
1983	0.935	1.516			1.587
1984	0.935	1.405	8,598	108.7	1.503
1985	1.009	1.401	9,148	110.3	1.389
1986	1.109	1.506	9,498	116.8	1.358
1987	1.459	2.076	9,750	149.6	1.423
1988	1.545	2.034	10,295	150.1	1.317
1989	1.931	2.518	10,522	183.5	1.304
1990	2.294	2.689	10,966	209.2	1.172
1991	2.038	2.567	11,347	180.0	1.260
1992	1.988	2.648	11,727	170.0	1.332
1993	1.732	2.396	12,107	143.1	1.383
1994	1.895	2.438	12,487	151.8	1.287
AVERAGE				152.0	1.359583