Special Publication SJ98-SP9

Phase 1	Review & Reconnaissance	JANUARY 1993
Phase 2	Survey, Part 1	MARCH 1994
Phase 3	Survey, Part 2, and Hydraulics & Hydrology	OCTOBER 1995
Phase 3	Hydraulics & Hydrology Addendum	SEPTEMBER 1996

ECONLOCKHATCHEE RIVER
ORANGE AND SEMINOLE COUNTIES, FLORIDA

FLOODPLAIN MANAGEMENT STUDY

SECTION 22
ASSISTANCE TO STATES

Econlockhatchee River - Section 22

Phase I Review & Reconnaissance

Phase I involved a technical analysis to review the flood plain management report, Econlockhatchee River Study (February 1990), prepared by Savannah District, and, the Flood Insurance Study of Orange County, Florida, dated June 1, 1981. Study results determined elevation differences between the two reports could be attributed to a number of factors. These included: differences in Manning's "n" roughness coefficients, bridge replacements, and changes in land use and rainfall data. Based on the findings and results, a restudy was recommended. With newer data, this study would emulate the basin's hydrologic response to climatic changes and its associated damages. This Phase was initiated August 1992 and completed January 1993.

Phase II Survey, Part 1

The Phase II work consisted primarily of reviewing survey data and gathering field information. Cross-section data was reviewed for 5 bridges to help determine the extent of survey work required in the basin. Contractor established 10 new monuments (2 at each bridge). Differential levels and Geodetic Positioning Station sessions were using local existing horizontal and vertical control. It was determined that additional topographic data was needed to adequately determine the basin's hydrology. The work was initiated October 1993 and completed March 1994.

Phase III Survey, Part 2, and Hydraulics & Hydrology

The Phase III work consisted primarily of gathering field information and performing hydrologic and hydraulic analyses of existing conditions. Surveys of Econlockhatchee River cross sections were completed and provided to the Corps on January 13, 1995. Phase III was initiated June 1994 and completed October 1995.

Phase III Hydraulics & Hydrology Addendum

Phase III involved incorporating the St. Johns River Water Management District revised rainfall analysis/distribution into the existing conditions and re-running the HEC 1&2 models. The results of the HEC-1 analyses produced a series of revised storm flows, which were utilized as input into the HEC-2 model. These peak flows were larger than the original (October 1995) peak flows, which resulted in higher stages along both rivers. Revised results and flood profiles are discussed and compared with previous studies. This work was initiated October 1995 and completed September 1996.

ECONLOCKHATCHEE RIVER STUDY
SEMINOLE AND ORANGE COUNTIES, FLORIDA

PREPARED FOR
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

US Army Corps
of Engineers
Jacksonville District

JANUARY 1993

ECONLOCKHATCHEE RIVER STUDY

AUTHORITY

The following report was undertaken in accordance with the provisions of Section 22, Public Law 93-251. This public law authorizes the Chief of Engineers to cooperate with States in the preparation of plans for development, utilization, and conservation of water and related land resources of drainage basins located within the boundaries of the State.

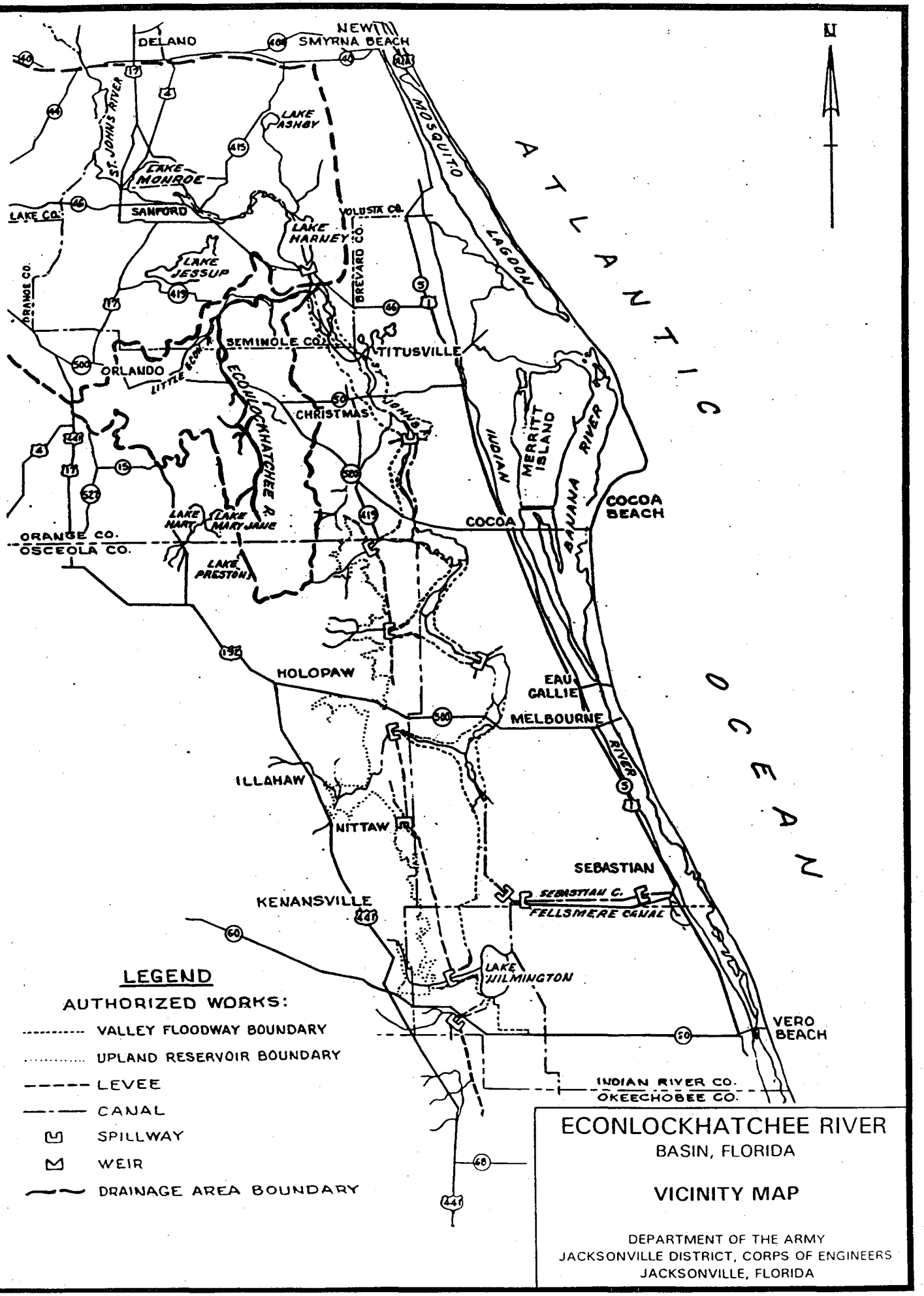
PURPOSE AND SCOPE

The purpose of this report is to review the floodplain information included in the Flood Insurance Study of Orange County, Florida dated June 1, 1981 and the Econlockhatchee River Study(February 1990) which was accomplished under the provisions of Section 22, Public Law 93-251 and to determine if a significant difference exists in the 100-year flood elevations. The Federal Emergency Management Agency has adopted the 100-year flood as the base flood for purposes of floodplain management measures. The determination of the 100-year flood elevation could be useful in preventing unwise development in the floodplain. The FINDINGS section of this report details how the 100-year flood elevations were determined in the aforementioned reports. The RESULTS section compares the 100-year elevation at several locations along the Econlockhatchee River. The RESULTS section also provides possible explanations to account for the differences in the 100-year flood elevations.

STUDY AREA DESCRIPTION

The Econlockhatchee River basin encompasses 275 square miles in central Florida. The basin is located in a transitional zone between temperate and subtropical climates. The river flows northerly paralleling the St. Johns River until after its confluence with the Little Econlockhatchee River in Seminole County as shown in Figure 1. The Econlockhatchee River turns easterly approximately four and one half miles north of the Orange-Seminole County line and flows into the St. Johns River immediately downstream from Puzzle Lake. Photos 1 to 5 show some of the features of the Econlockhatchee River Basin.

Seminole County is one of Florida's smaller counties based on its 1990 population of 287,529. Its proximity to Orange County with Disney World and other major attractions is changing Seminole County from an agricultural region to a cluster of small urban centers. The average annual rainfall for Seminole County is



ECONLOCKHATCHEE RIVER
BASIN, FLORIDA

VICINITY MAP

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

Photo 1. Downstream View of Primary Flow at SR-13 Bridge

Photo 2. Upstream View of Primary Flow at SR-13 Bridge

Photo 3. Downstream View of Secondary Flow at SR-13 Bridge

Photo 4. Upstream View of Secondary Flow at SR-13 Bridge

Photo 5. Upstream view of the Econlockhatchee at SR-50 Bridge

50.51 inches, most of which occurs in the June-October rainy season. The average temperatures for January and August are 61.6 and 82 degrees, respectively.

Once noted almost entirely as a citrus center, Orange County has been transformed in the past two decades into a highly urbanized area. The transformation is due to the large tourist attractions that has located in the area, particularly Walt Disney World. The average annual rainfall for Orange County is 52.35 inches. The average temperatures for January and August is 60.7 and 82 degrees, respectively.

The study area has experienced rapid and continuous growth. Population projections indicate that the Orlando area is one of the fastest growing areas in Florida. For example, from 1970-1980, the city of Orlando had a 29.7 percent increase in population, and the city of Sanford had a 33.2 percent increase in population. As the population increases, there is a greater demand for residential and industrial sites. Unless properly regulated, some of these sites may be located in the floodplain and may be vulnerable to serious flood damage. New developments in the floodplain, if unregulated, could be so constructed as to restrict the flow of water and thus increase flood heights and damages upstream.

PRIOR STUDIES AND REPORTS

Numerous reports which analyzed the drainage characteristics of the Econlockhatchee basin have been prepared. The primary reports applicable to this study are as follows:

a. U.S. Army Corps of Engineers, Plan of Survey Econlockhatchee River, Florida, Jacksonville District, Corps of Engineers, December 1964.

b. Department of the Army, Survey-Review Report on Central and Southern Florida Project, Econlockhatchee River, Florida, Jacksonville District, Corps of Engineers, May 29, 1973.

c. Federal Emergency Management Agency, Flood Insurance Study - Orange County, Florida, Community Number - 120179, June 1, 1981.

d. Ghioto, Singhofen and Associates Inc., Floodplain Study of the Econlockhatchee Rivers, Final Report for the Anden Group of Florida, October 1985.

e. Federal Emergency Management Agency, Flood Insurance Study - Seminole County, Florida, Community Number - 120289, January 16, 1987.

f. Federal Emergency Management Agency, Flood Insurance Study - Orange County, Florida, Community Number - 120179, December 5, 1989.

g. U.S. Army Corps of Engineers, Econlockhatchee River Study, February 1990.

FINDINGS

The Flood Insurance Study of Orange County, Florida, was published by the Federal Emergency Management Agency(FEMA) on June 1, 1981. The study was accomplished by the Jacksonville District of the U.S. Army Corps of Engineers. The Econlockhatchee River Study(February 1990), was also prepared by the Jacksonville District, U.S. Army Corps of Engineers for the St. Johns River Water Management District under the provision of Section 22, Public Law 93-251.

Since FEMA published the Flood Insurance Study of Orange County, Florida dated June 1, 1981, two additional flood insurance studies of Orange County have been prepared. These flood insurance studies are dated August 5, 1986 and December 5, 1989. The 1986 and 1989 flood insurance studies were revisions to the Flood Insurance Study of Orange County, Florida dated June 1, 1981. The scope of the 1986 flood insurance study incorporated the results of revised and new hydrologic and hydraulic analyses for the entire Little Econlockhatchee River watershed. Also, the Shingle Creek flood plain was revised to include the effects of the Sand Lake Road bridge reconstruction. The scope of the 1989 flood insurance study incorporated the base flood reductions for the Little Econlockhatchee River, Park Manor Outfall Canal, and Lake Phillips. In addition to the flood insurance studies for Orange County, FEMA also published the Flood Insurance Study - Seminole County, Florida, Community Number - 120289, January 16, 1987.

Each of the flood insurance studies for Orange County was reviewed to determine if there had been any changes in the flood profiles. The Flood Insurance Study of Orange County dated June 1, 1981, as well as the other flood insurance studies, stated that the 100-year flood profile and the 1960 flood of record(35-year flood) were abstracted from the Survey Review Report on the Econlockhatchee River Florida(May 29, 1973). The 10-, 50-, and 500-year water surface elevations were interpolated from probability plots of the 35-year and 100-year water surface elevations at various locations along the river. The 10-, 50-, 100-, and 500-year flood profiles of the Econlockhatchee River are shown on panel 03P in the June 1, 1981 flood insurance study of Orange County. So, in actuality, there was not any new hydrology and hydraulic analyses performed for the Econlockhatchee River in the flood insurance studies.

Since the hydraulic information for the Flood Insurance Study of Orange County was obtained from the Survey Review Report on the Econlockhatchee River (May 29, 1973), it was necessary to review the methodology used in determining the 100-year flood elevation in the latter report. The survey review report defined the intermediate regional flood as the flood having an occurrence frequency of once in 100 years. This 100-year flood consists of the existing channel conditions in 1965 and expected 2020 basin development. The flood insurance study and the survey review report did not contain a section which explained how the water surface elevations were derived.

Because of the lack of available hydraulic data, the validity of the water surface elevation contained in the 1973 survey review report, and thus the 1981 flood insurance study, could not be determined.

HEC1 and HEC2 computer programs were used to model the hydrologic and hydraulic conditions in the Econlockhatchee basin for the Econlockhatchee River Study(February 1990). The cross-sectional information downstream of the SR-13 Bridge(Snow Hill Road) was obtained exclusively from U.S. Geological Survey(USGS) 7.5 minute quadrangle sheets. While survey data was available for the channel upstream of SR-13, USGS quadrangle sheets were used to extend survey information to compensate for survey shortfalls. The Mannings n-values used in this study were 0.045 in the channel and 0.165 in the overbanks.

By using the PLOT2 capability of HEC-2, each cross-section used in the Econlockhatchee River Study was examined. There did not appear to be any abrupt changes between cross sections. However, there was an approximate 5000-foot difference between the measured distance of the Econlockhatchee River and the distance determined in the X1 cards of the HEC2 input file. The exact cross-sectional location could not be determined nor could the information in the GR cards be validated because of this HEC2 input error. The comment cards in the input file contained the cross-section numbers for several bridges in the Econlockhatchee River Basin. Bridge modelling for the Bee-Line Expressway, SR 528, was verified against as-built drawings dated August 1967.

RESULTS

Table 1 shows the 100-year flood elevations contained in the 1981 Flood Insurance Study (which were abstracted from the 1973 survey review report) and the 1990 study of the Econlockhatchee River. Figure 2 shows the location of the Econlockhatchee study area, including the features listed in Table 1.

TABLE 1

100-YEAR-FLOOD ELEVATIONS
(in feet)

LOCATION	ELEVATION 1990 REPORT	ELEVATION Flood Insurance Studies	ELEVATION DIFFERENCE
Snow Hill Road	22.15	23.00	1.45
SR 419	30.47	33.00	2.53
Confluence w/Little Econ	30.90	33.00	2.10
SR 420	40.81	42.00	1.19
SR 50	43.61	44.00	0.39
SR 528	53.13	60.00	6.87

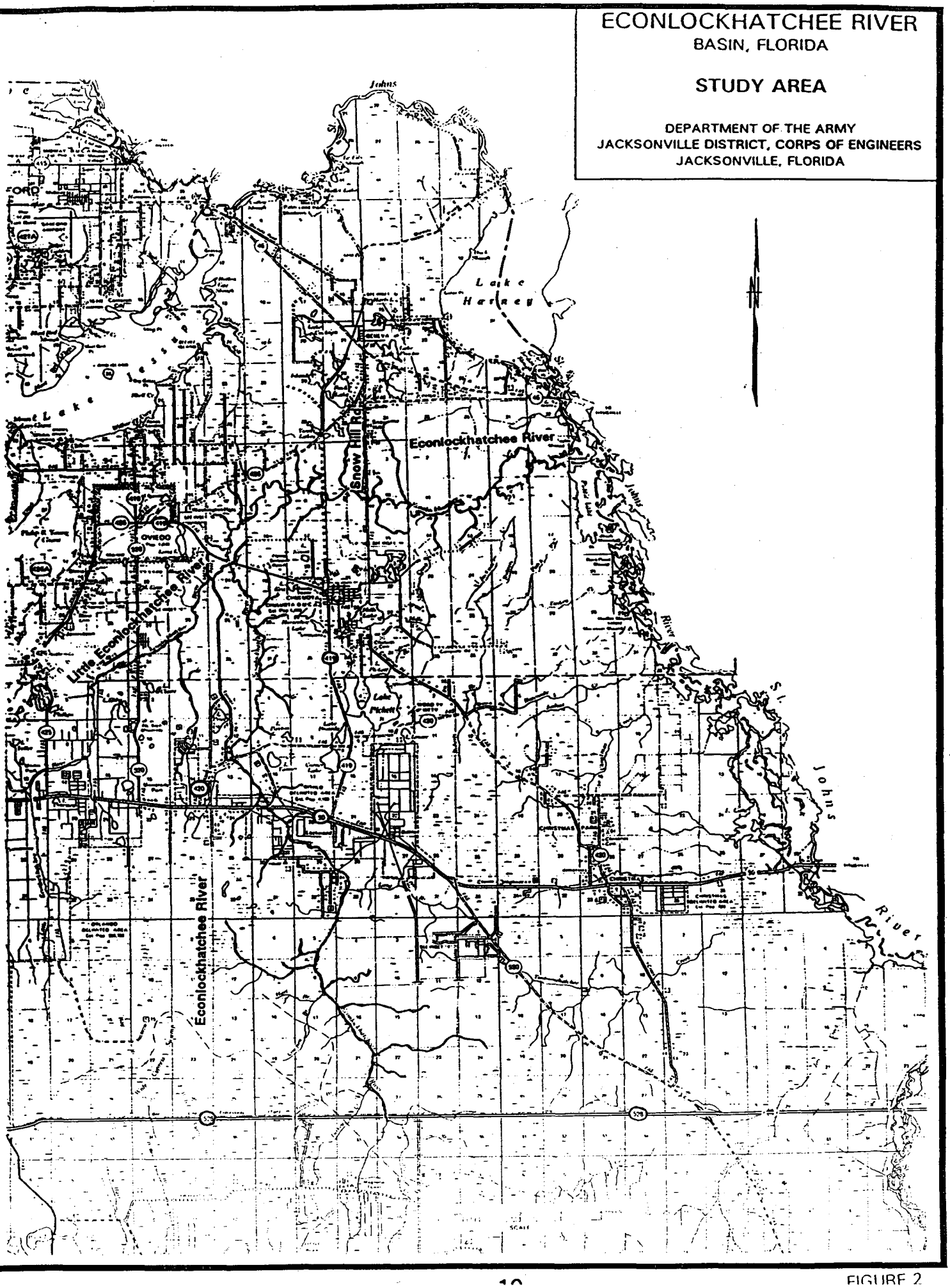

ECONLOCKHATCHEE RIVER
BASIN, FLORIDA
STUDY AREA
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA
Lake Harney
Econlockhatchee River
Snow Hill Rd
Little Econlockhatchee River
Econlockhatchee River
Econlockhatchee River
St Johns River
St Johns River
Lake Pickett
N

FIGURE 2

The elevation differences shown in Table 1 could be attributed to the following:

1. Both analyses used U.S.G.S quadrangles sheets in whole or in part for cross sectional information. Errors from interpolation may have increased through the use of the quadrangle sheets. Information from quadrangle sheets can be used to make estimates, but the information is not advisable for use in accurate bridge modelling.

2. The Manning's roughness coefficient, n-value, is a significant parameter in determining backwater effects. A small difference in this coefficient can result in a significant change in the water surface elevation. The n-values used in the Econlockhatchee River Study(February 1990) were 0.048 in the channel and 0.165 in the overbanks. While the flood insurance studies did not include a hydraulic analysis for the Econlockhatchee River, it did include analyses for other streams in Orange and Seminole Counties. The average roughness coefficients used to model the main channel and overbank areas in the Orange County flood insurance studies were 0.030 and 0.150, and the coefficients used in the Seminole County flood insurance study were 0.015 and 0.120.

3. Old Cheney Highway bridge has been replaced with a newer bridge, SR 50 bridge, and placed further downstream. Since construction of the new SR-50 bridge, the bridge deck of the Old Cheney Highway has been removed. However, the 1980 USGS quadrangle sheets show a bridge crossing at the Old Cheney Highway Bridge. It is possible that the Survey Review Report dated May 1973 preceded construction of the SR-50 bridge and preceded removal of the Old Cheney Highway Bridge. Construction of a new bridge will affect the flood elevations to some extent.

4. The basin characteristics have probably changed since the original survey review report dated May 29, 1973. The study area is one of the fastest growing areas in the state of Florida. During the decade of 1970-1980, Orange and Seminole Counties had an average population increase of 31.5%. Development in the study area has also increased since publishing of the survey review report which would cause a change in the runoff characteristics and in the roughness coefficient.

5. The 1973 survey review report preceded the use of HEC2, and the backup hydraulic data could not be found. The HEC-2 input file for the 1990 report had an input error. Therefore, accuracy of the water surface elevations for these reports could not be determined.

6. The 100-year flood in the 1973 Survey Review Report was defined as the existing channel conditions in 1965 and expected 2020 basin development. It is possible that the 2020 basin development is lower than expected which may lower the water surface elevations accordingly.

7. There were also minor differences in the rainfall data used in the two reports. Comparison of the rainfall data for the two reports are shown below in Table 2:

TABLE 2

RAINFALL DATA COMPARISON
(in inches)

FREQUENCY EVENTS

DURATION	10 YEAR	100 YEAR	500 YEAR
24hrs	6.6 **7.5**	11.3 **10.9**	16.4 **12.7**
48hrs	7.1 **7.9**	11.7 **11.7**	16.8 **16.8**
96hrs	8.2 **8.2**	12.9 **12.9**	17.8 **17.3**

***Rainfall data shown in Flood Insurance Study dated June 1, 1981**
***Rainfall data shown in Econlockhatchee River Study dated February 1990**

8. In addition to the results in the preceding paragraphs, Seminole County has plans to begin a bridge widening project for the SR 419 Bridge which crosses the Econlockhatchee River. The plans for this project have been received by the Jacksonville District, U.S. Army Corps of Engineers. Also, Seminole County has designs for widening Snow Hill Road Bridge. However, this bridge has not been scheduled for construction. These bridge construction projects may have a significant impact on the hydraulic capacity of the Econlockhatchee River Basin and should be analyzed in any future studies.

RECOMMENDATIONS

Based on the findings and results, a restudy of the Econlockhatchee River basin is recommended. The purpose of the study would be to gather topographic, hydrologic, hydraulic, and socio-economic data. This information would be used to emulate the basin's hydrologic response to climatic changes and its associated damages. The study will also include modelling of the Seminole County bridge improvement for SR 419. The study will determine flood profiles and floodway boundaries for the Econlockhatchee River basin. The results from this restudy can assist in effective regulatory permitting and assessment of management plans.

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

March 14, 1994

Planning Division
Flood Control and Flood
Plain Management Section

Dr. Charles Tai
Division of Engineering
Department of Surface Water Programs
St. Johns River Water Management District
P.O. Box 1429
Palatka, Florida 32178-1429

Dear Dr. Tai:

This letter is to inform you of the completion of Phase 2 of the Econlockhatchee River Study which was undertaken in accordance with the provisions of Section 22, Public Law 93-251. The fieldwork for this phase consisted of reviewing cross section data at the following bridge locations: Snow Hill Road, S.R. 419, S.R. 420, S.R. 50, and S.R. 528 (Bee Line Expressway). The purpose of the fieldwork was to assist in determining the extent of survey work which may be required in the basin.

The Government contractor was successful in establishing ten new monuments at the five bridge sites (two monuments per bridge site). In addition, differential levels and Geodetic Positioning Station sessions were run using local existing horizontal and vertical control. Data analyses performed by our staff indicated that the most recent survey could not be used to verify the 1985 data due to the different methodologies used to establish vertical control. Based on the field work and data analysis, additional topographic data is needed to adequately determine the basin's hydrologic response. Our staffs are currently working on the Letter of Agreement to provide for the collection of topographical data and performance of hydraulic analyses. I look forward to our continued partnership.

Sincerely,

A. J. Salem
Chief, Planning Division

SURVEY ENGINEERING REPORT
CONTRACT NO. DACW17-93-D-0028
SURVEY NO. 93-451
VERTICAL CONTROL VERIFICATION SURVEY
ECONLOCKHATCHEE RIVER
THE JOHNSON-McADAMS FIRM, P. A.

A. GENERAL. This delivery order consisted of setting ten new monuments at five bridge sites (two monuments per site) as indicated on the quads provided by the Corps of Engineers. In addition, differential levels and GPS sessions were run using local existing horizontal and vertical control monuments . The project is located on the Econlockhatchee River near Orlando, Florida.

B. METHODOLOGY.

1. The survey was performed by a 4-man survey crew between the dates of 11 November 1993 and 22 November 1993. Five new pairs of monuments were set at five bridge locations (designated "A" thru "E") as directed by the Corps. Initial existing control reconnaissance was performed for both leveling and GPS work and elevation verification levels were run for vertical control monuments. Differential levels were run from existing vertical control monuments to the ten new monuments.

The new pair of monuments at site "B" were both set on the east side of the bridge due to current construction. At site "C", the new monuments were set approximately 2000 feet from the bridge due to a narrow road shoulder in the area as well as poor GPS visibility in the immediate area of the bridge. Monuments at other sites were set in accordance to the scope of work and verbal agreements between field personnel and Corps of Engineers personnel.

Initially, six GPS sessions was planned for this project. However a seventh session was performed from additional control to improve the results of the survey.

Three Trimble 4000 ST and one Trimble 4000 SE receivers were used on this project. For data collected with the 4000 SE model receiver, a dome antenna was used, therefore no antenna correction should be applied when processing.

C. DATA SUBMISSION. The GPS data is provided on a 3-1/2" HD unix formatted disk. Also included in this submittal is a field book containing level differentials and monument descriptions for the newly set monuments as well as GPS data logging sheets.

D. CONTRACTOR INFORMATION. This work was performed by The Johnson-McAdams Firm, P. A. of Greenwood, Mississippi (Contract No. DACW17-93-D-0028) under the direction of Mr. Ed Johnson, PE, RLS, President and Mr. Larry Anderton, RLS, Field Supervisor. Inquiries pertaining to this project can be made to Mr. Anderton at 601-455-4943 (Fax Number 601-455-3381).

ECONLOCKHATCHEE RIVER
ORANGE AND SEMINOLE COUNTIES, FLORIDA

SECTION 22 STUDY

FLOODPLAIN MANAGEMENT STUDY

JACKSONVILLE DISTRICT
U. S. ARMY CORPS OF ENGINEERS

OCTOBER 1995

Section 22 - Econlockhatchee River Phase III

AUTHORITY

The following report was undertaken in accordance with the provisions of Section 22, Public Law 93-251. This public law authorizes the Chief of Engineers to cooperate with the States in preparation of plans for development, utilization, and conservation of water and related land resources of drainage basins located within the boundaries of the State.

INTRODUCTION

The Econlockhatchee River Basin encompasses about 275 square miles and is located to the east of Orlando in central Florida. The river flows through Seminole and Orange Counties. The basin is shown in Figure 1. The river follows a northerly water course parallel to the St Johns River until it turns east and confluences with the St. Johns River downstream of the Puzzle Lake area.

Seminole County is one of Florida's smaller counties based on its 1990 population of over 287,000. Seminole County is under development pressures which are changing the area from an agricultural region to small urban towns and residential areas. Close proximity to Orange County with Disney World and other major attractions are responsible for much of the changes. The June-October rainy season produces an average annual rainfall in Seminole County of about 50.51 inches. Average temperatures for January and August are 61.6 and 82 degrees, respectively.

Once almost entirely a citrus farming area, Orange County has been transformed in the past two decades into a highly urbanized area. The conversion of lands has been accelerated by construciton of large tourist attractions such as Walt Disney World. Average annual rainfall for Orange County is 52.35 inches. Average temperatures for January and August is 60.7 and 82 degrees, respectively.

The study area has experienced rapid and continuous growth. Population projections indicate that the Orlando area is one of the fastest growing areas in Florida. As the population increases, there is a greater demand for residential and industrial sites. Development has increased population growth to over 30% in the nearby cities of Orlando and Sanford. If new development in the flood plain is not restricted the flow of water could increase flood heights and damages upstream.

PREVIOUS REPORTS

Analyses of the existing conditions of the river were performed by the U.S. Army Corps of Engineers, Savannah District in 1990. Updated survey data was obtained in November 1994 in order to check the results of that study. The U.S. Army Corps of Engineers, Jacksonville District reevaluated previously compiled HEC-1 and HEC-2 models that were produced for the existing conditions flood stages of the 10-, 25-, 50-, and 100-year storm events.

FINDINGS

Existing Conditions. The existing conditions analyses was performed in 1990 and was based on 1985 surveys provided by the St. Johns River Water Management District (SJRWMD). Since 1985, the Lockwood Rd. Bridge on the Little Econlockhatchee River, a main tributary into the Econlockhatchee River, has been replaced along with the CR 419 Bridge on the Econlockhatchee River. Furthermore, the Snow Hill Rd. Bridge is scheduled to be replaced in 1995, according to the Seminole County, Engineering Division. Surveys were received by the Jacksonville District showing the updated bridge deck and low chord elevations, however, the bridge pier information was omitted. In order to obtain the missing data, surveys were furnished by the SJRWMD and the Seminole County, Engineering Division.

HYDROLOGIC MODELING

Analyses. The hydrologic re-analyses performed for the existing conditions were based on the HEC-1 models and maps furnished by the SJRWMD and Savannah District. A review was made of the monthly rainfall at the Orlando rain gage from 1900 to 1987. This data was processed in a manner that would provide an index of monthly groundwater levels. An analysis revealed that in that vicinity the 1960 groundwater was at a 50 year high in contrast to the 1979 period where the groundwater was the lowest in the 87 year range. That yielded a large difference in runoff when using the same rainfall amount. The original HEC-1 models were calibrated to the 1960 event except for the portion from the confluence of Turkey Creek and the Econlockhatchee River to the upstream sub-basins, which were calibrated to the 1979 event at the gage at Magnolia Ranch. The hydrology from the confluence of Turkey Creek and the Econlockhatchee River and upstream was recomputed and remodelled.

The hydrologic model was recalibrated for the upstream portion of the original HEC-2 model, which was based on the hydrologic model calibration used by Savannah District. The Jacksonville District recalibrated the hydrology model to reflect the antecedent ground water levels in 1960 and 1979. The hydraulic HEC-2 model of

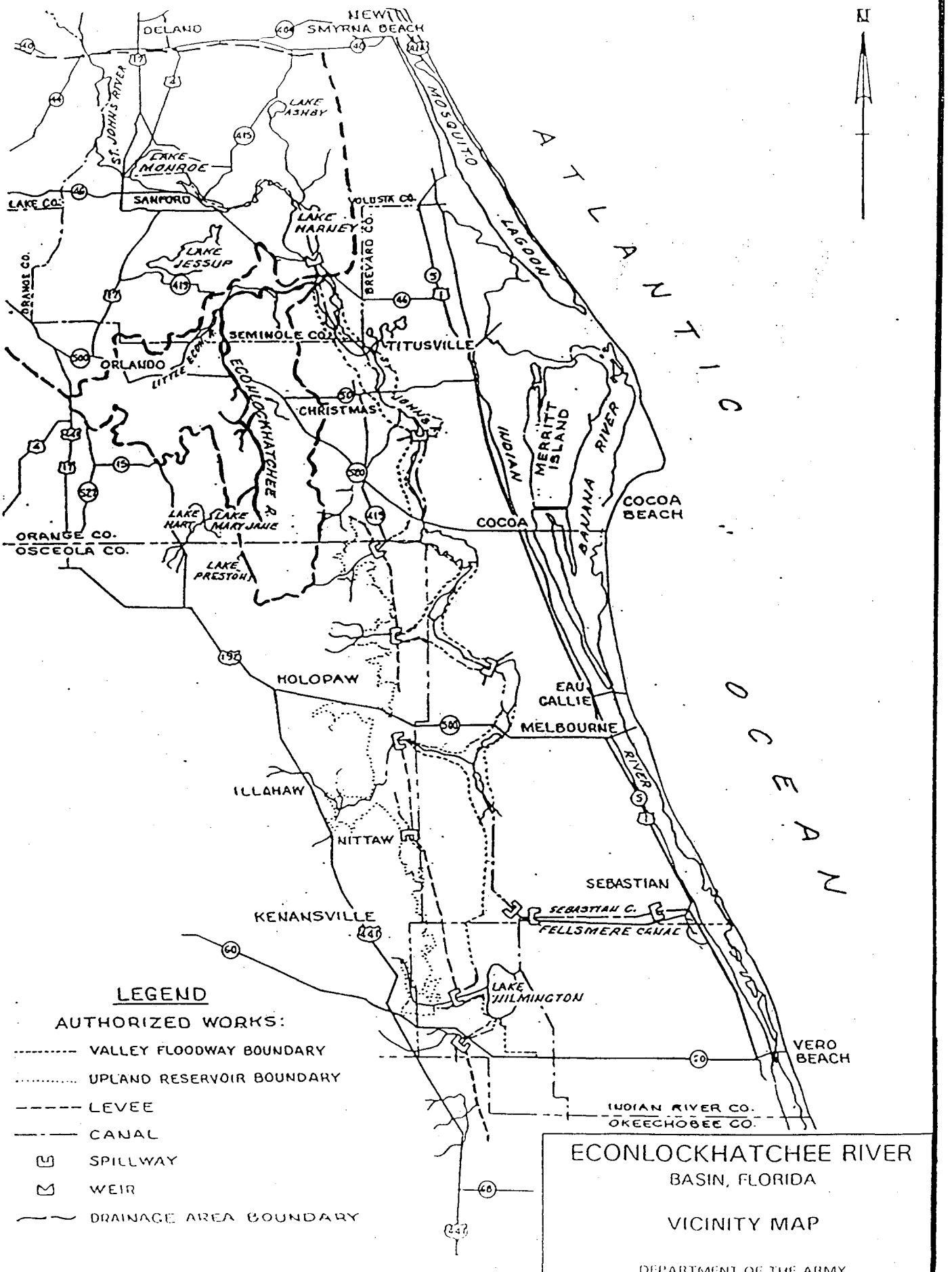
the 1990 study was expanded to include current bridge data. The revised model incorporated all of the updates along with amended data from the revised HEC-1 analyses.

Channel Roughness. The channel roughness values of 0.048 in the channel and 0.165 on the overbanks were used to reflect roughness values for the channel cross sections downstream of the Snow Hill Rd. Bridge to the St. Johns River. After a site visit to the area, the channel overbank roughness values for the channel upstream of Snow Hill road were increased to 0.21 and within the channel the roughness varied from 0.09 to 0.27 depending on the vegetation density and channel width. These channel roughness values were calibrated from field surveys, which yielded a flow reading of 2,630 cfs at USGS Chuluota gage and a water surface elevation of 53.55 feet at S.R. 528 on July 27, 1995.

RESULTS

The results of the existing conditions HEC-2 model are shown in Table I and reveal that the Jacksonville District's model was mostly consistent with the FEMA water surface elevations, as compared to Savannah District's flood stages for the 100 year event. There was a 3 to 4 foot difference in the water surface elevations at S.R. 50. According to Jacksonville Districts Flood Control Section this discrepancy may be attributed to the building of a new bridge at S.R. 50, which may have proceeded the May 29, 1973 Survey Report of the Central and Southern Florida Project on the Econlockhatchee River, from which the FEMA flood stages were based on.

The flood stages produced by the 1995 HEC-2 model are shown in Table II, which cites the water surface elevations for the different storm frequencies along the Econlockhatchee River and the Little Econlockhatchee River. A plot of the cross section locations are displayed in Figure 2. Plates 1 and 2 show water surface profiles of various storm flows on the Econlockhatchee and Little Econlockhatchee Rivers, respectively.

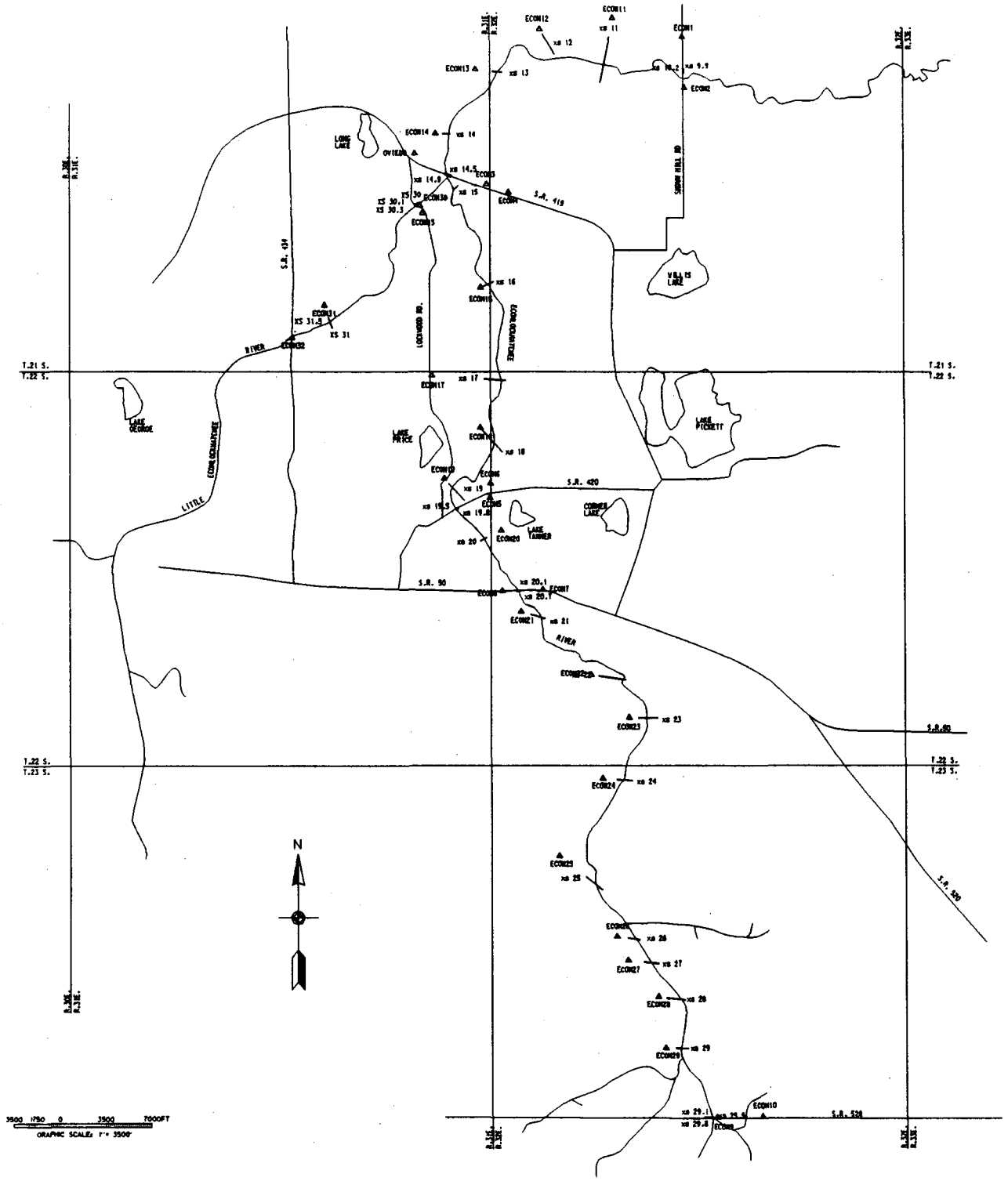


ECONLOCKHATCHEE RIVER BASIN, FLORIDA

VICINITY MAP

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FIGURE 1



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

ECONLOCKHATCHEE RIVER

EXISTING CONDITIONS

DWG. NO.		SIZE	DWG. NO.
DATED:			
SCALE: AS SHOWN	DATED: OCTOBER, 1984		

FIGURE 2

Table I

Section 22 – Econlockhatchee River Phase III

100 Year Flood Stage Comparison

Location		1995 HEC-2 Model	1990 HEC-2 Model		* FEMA	
X-Section	Description	W.S. Elev. (ft)	W.S. Elev. (ft)	** Difference (ft)	W.S. Elev. (ft)	** Difference (ft)
10.1	Snow Hill Rd. Bridge	22.64	22.56	0.08	23	-0.36
14.8	CR 419 Bridge	29.4	30.47	-1.07	33	-3.6
19.7	SR 420 Bridge	39.64	40.81	-1.17	42	-2.36
20.6	SR 50 Bridge	43.73	43.61	0.12	44	-0.27
29.5	SR 528 Bridge	55.51	53.13	2.38	60	-4.49
-14.9	Confluence with Little Econlockhatchee	29.37	30.9	-1.53	33	-3.63

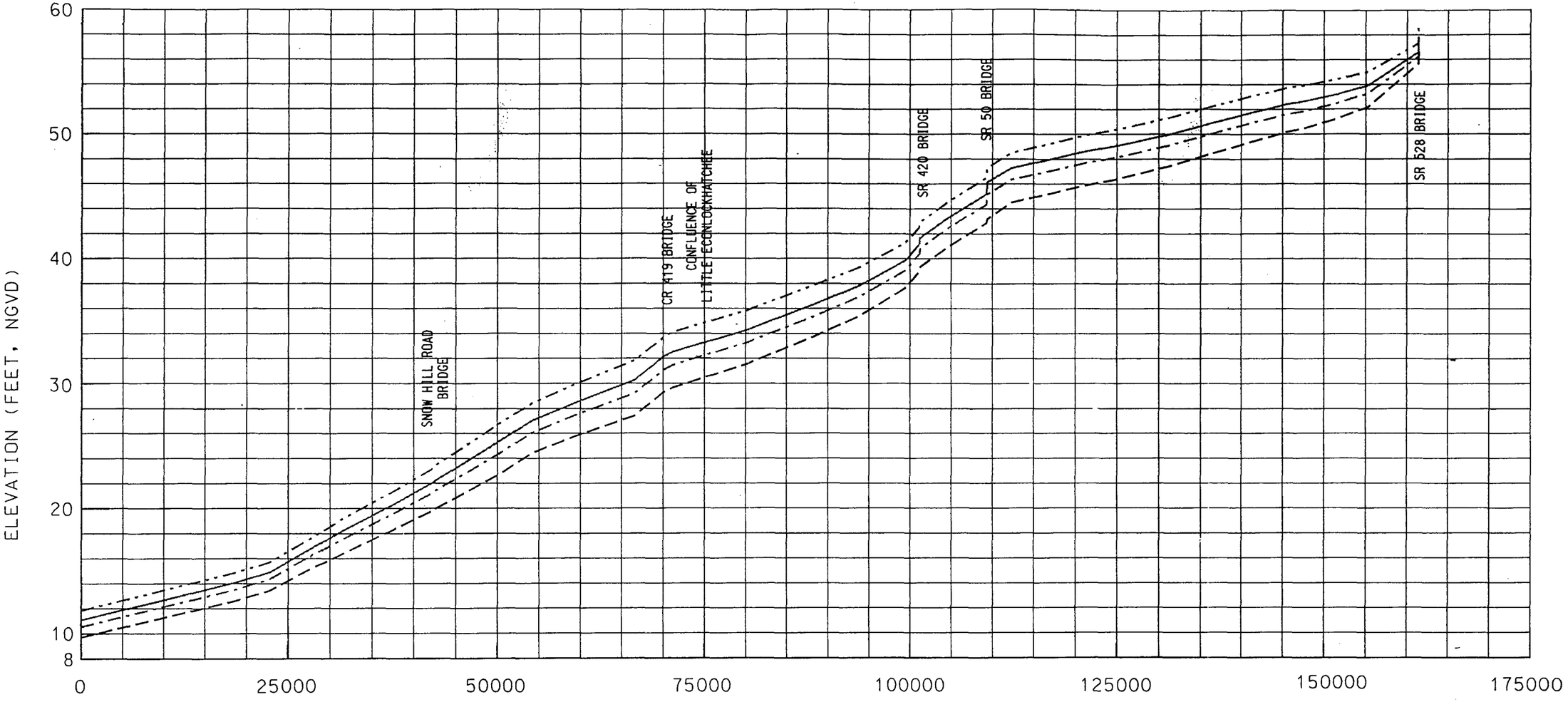
* NOTE: These flood stages where published from the Flood Insurance Study of Orange County, Florida.

** NOTE: The difference is between the flood stage and the 1995 HEC-2 Model Stage. Minus (-) indicates the 1995 HEC-2 model is lower.

Table II
Section 22 - Econlockhatchee River Phase III
Hydraulic Data Table for Existing Conditions

	10 Year Event				25 Year Event				50 Year Event				100 Year Event			
* X-Section	Flow (cfs)	Velocity (fps)	W.S. Elev. (ft)	Depth (ft)	Flow (cfs)	Velocity (fps)	W.S. Elev. (ft)	Depth (ft)	Flow (cfs)	Velocity (fps)	W.S. Elev. (ft)	Depth (ft)	Flow (cfs)	Velocity (fps)	W.S. Elev. (ft)	Depth (ft)
9.2	9344	1.76	9.71	9.41	11986	1.88	10.56	10.26	13672	1.95	11.08	10.78	16487	2.06	11.86	11.56
9.3	9344	1.6	12.66	11.96	11986	1.73	13.58	12.88	13672	1.8	14.11	13.41	16487	1.9	14.93	14.23
9.4	9344	2.99	13.46	12.46	11986	3.07	14.39	13.39	13672	3.12	14.92	13.92	16487	3.18	15.73	14.73
9.5	9344	2.82	15.29	13.99	11986	3.23	16.3	15	13672	3.47	16.87	15.57	16487	3.81	17.72	16.42
9.6	9424	2.7	15.73	14.43	12117	3.09	16.83	15.53	13824	3.29	17.45	16.15	16623	3.59	18.36	17.06
9.7	9424	3.29	16.37	14.87	12117	3.55	17.55	16.05	13824	3.71	18.21	16.71	16623	3.95	19.19	17.69
9.8	9424	2.78	18.52	16.62	12117	3.05	19.82	17.92	13824	3.19	20.54	18.64	16623	3.4	21.6	19.7
9.9	8722	1.99	19.33	18.97	11052	2.27	20.71	20.35	12561	2.44	21.49	21.13	15044	2.72	22.62	22.26
10	8722	2.12	19.33	18.97	11052	2.42	20.71	20.35	12561	2.6	21.48	21.12	15044	2.89	22.61	22.25
10.1	8722	2.11	19.34	18.98	11052	2.42	20.73	20.37	12561	2.6	21.5	21.14	15044	2.89	22.64	22.28
10.2	8722	1.98	19.36	19	11052	2.27	20.74	20.38	12561	2.44	21.52	21.16	15044	2.71	22.66	22.3
11	8505	2.17	20.69	17.29	10741	2.34	22.19	18.79	12182	2.46	23.05	19.65	14552	2.64	24.32	20.92
12	8505	3.19	22.02	22.32	10741	3.24	23.42	23.72	12182	3.29	24.25	24.55	14552	3.4	25.49	25.79
13	8505	1.23	22.76	23.24	10741	1.41	24.23	24.71	12182	1.52	25.08	25.56	14552	1.67	26.37	26.85
14	8429	4.76	23.28	17	10632	4.82	24.86	18.58	12058	4.88	25.76	19.48	14384	5	27.11	20.83
14.5	8429	3.87	25.69	18.36	10632	4.24	27.13	19.8	12058	4.47	27.98	20.65	14384	4.8	29.26	21.93
14.6	8429	3.85	25.72	18.39	10632	4.23	27.16	19.83	12058	4.45	28.02	20.69	14384	4.78	29.3	21.97
14.7	8429	3.68	25.75	18.42	10632	3.99	27.2	19.87	12058	4.16	28.06	20.73	14384	4.43	29.36	22.03
14.8	8429	3.67	25.78	18.45	10632	3.98	27.24	19.91	12058	4.15	28.1	20.77	14384	4.42	29.4	22.07
14.9	8429	3.83	25.77	18.44	10632	4.21	27.23	19.9	12058	4.43	28.08	20.75	14384	4.76	29.37	22.04
15	6929	2.36	26.26	17.75	8508	2.46	27.73	19.22	9426	2.5	28.61	20.1	11159	2.62	29.92	21.41
16	6929	3.03	28.39	23.89	8508	3.17	29.77	25.27	9426	3.22	30.57	26.07	11159	3.36	31.86	27.36
17	6868	3.19	30.8	19.72	8430	3.31	32.11	21.03	9335	3.37	32.84	21.76	11048	3.49	34.09	23.01
18	6802	2.78	32.67	13.28	8342	2.9	33.89	14.5	9231	2.96	34.57	15.18	10923	3.08	35.75	16.36
19	6802	3.83	35.18	16.14	8342	4.01	36.28	17.24	9231	4.09	36.89	17.85	10923	4.24	37.99	18.95
19.5	6802	6.1	36.59	15.29	8342	6.74	37.68	16.38	9231	7.06	38.28	16.98	10923	7.64	39.36	18.06
19.6	6802	5.59	36.68	15.38	8342	6.51	37.76	16.46	9231	7.21	38.32	17.02	10923	8.53	39.33	18.03
19.7	6802	5.55	36.76	15.46	8342	6.51	37.93	16.63	9231	7.21	38.53	17.23	10923	8.51	39.64	18.34
19.8	6802	6.01	36.73	15.43	8342	6.58	37.94	16.64	9231	6.88	38.59	17.29	10923	7.34	39.82	18.52
20	6778	2.41	38.21	18.53	8304	2.57	39.5	19.82	9182	2.65	40.19	20.51	10860	2.79	41.47	21.79
20.1	6778	5.77	39.88	16.13	8304	6.19	41.18	17.43	9182	6.41	41.87	18.12	10860	6.79	43.12	19.37
20.2	6778	5.54	39.95	16.2	8304	5.86	41.26	17.51	9182	6.03	41.96	18.21	10860	6.31	43.24	19.49
20.3	6778	5.47	40.06	16.31	8304	5.79	41.38	17.63	9182	5.96	42.08	18.33	10860	6.24	43.36	19.61
20.4	6778	5.67	40.06	16.31	8304	6.08	41.37	17.62	9182	6.3	42.07	18.32	10860	6.68	43.34	19.59
20.5	6778	5.4	40.14	16.39	8304	5.73	41.47	17.72	9182	5.9	42.18	18.43	10860	6.61	43.41	19.66
20.6	6778	5.29	40.32	16.57	8304	5.62	41.66	17.91	9182	5.79	42.37	18.62	10860	6.61	43.73	19.98
20.7	6362	5.17	40.31	16.56	7779	5.55	41.65	17.9	8588	5.74	42.36	18.61	10153	5.86	43.82	20.07
21	6362	1.94	41.58	16.88	7779	2.08	42.93	18.23	8588	2.15	43.66	18.96	10153	2.27	45.06	20.36
22	6362	1.95	42.86	17.6	7779	2.07	44.2	18.94	8588	2.13	44.92	19.66	10153	2.23	46.3	21.04
23	4869	2.13	43.45	10.27	5935	2.18	44.77	11.59	6552	2.21	45.47	12.29	7721	2.25	46.82	13.64
24	4869	2.04	44.57	12.88	5935	2.15	45.8	14.11	6552	2.2	46.47	14.78	7721	2.29	47.74	16.05
25	4869	2.4	46.69	15.75	5935	2.49	47.8	16.86	6552	2.53	48.42	17.48	7721	2.61	49.58	18.64
26	2926	1.51	47.9	10.23	3522	1.56	48.93	11.26	3861	1.58	49.51	11.84	4512	1.62	50.59	12.92
27	2926	1.93	48.33	9.97	3522	1.96	49.31	10.95	3861	1.97	49.86	11.5	4512	1.99	50.91	12.55
28	2480	1.84	49.3	9.6	2972	1.83	50.15	10.45	3249	1.82	50.64	10.94	3784	1.8	51.59	11.89
29	2480	2.66	50.58	11.67	2972	2.69	51.28	12.37	3249	2.68	51.68	12.77	3784	2.64	52.49	13.58
29.5	1681	2.47	54.23	4.6	2062	2.68	54.72	5.09	2320	2.82	55.01	5.38	2755	3.01	55.51	5.88
29.6	1681	2.52	54.24	4.61	2062	2.73	54.74	5.11	2320	2.87	55.02	5.39	2755	3.07	55.52	5.89
29.7	1681	2.45	54.36	4.73	2062	2.66	54.85	5.22	2320	2.8	55.14	5.51	2755	3	55.64	6.01
29.8	1681	2.38	54.37	4.74	2062	2.58	54.87	5.24	2320	2.72	55.16	5.53	2755	2.92	55.66	6.03
-14.9	1681	0.77	25.77	18.43	2062	0.82	27.23	19.89	2320	0.85	28.08	20.74	2755	0.91	29.37	22.03
30	3631	2.76	26	12.38	4815	3.18	27.46	13.84	2320	1.44	28.19	14.57	7044	3.89	29.61	15.99
30.1	3631	2.83	26.01	12.39	4815	3.26	27.46	13.84	2320	1.47	28.19	14.57	7044	3.99	29.6	15.98
30.2	3631	2.8	26.06	12.44	4815	3.22	27.52	13.9	2320	1.46	28.2	14.58	7044	3.94	29.69	16.07
30.3	3631	2.74	26.07	12.45	4815	3.16	27.53	13.91	2320	1.43	28.2	14.58	7044	3.87	29.7	16.08
31	3631	3.27	31.98	13.58	4815	3.47	33.6	15.2	2320	2.64	30.2	11.8	7044	3.73	36.06	17.66
31.5	3631	3.54	33.86	9.91	4815	3.94	35.4	11.45	2320	2.98	31.82	7.87	7044	4.62	37.75	13.8

* Cross section locations are shown in Figure 2.



LEGEND

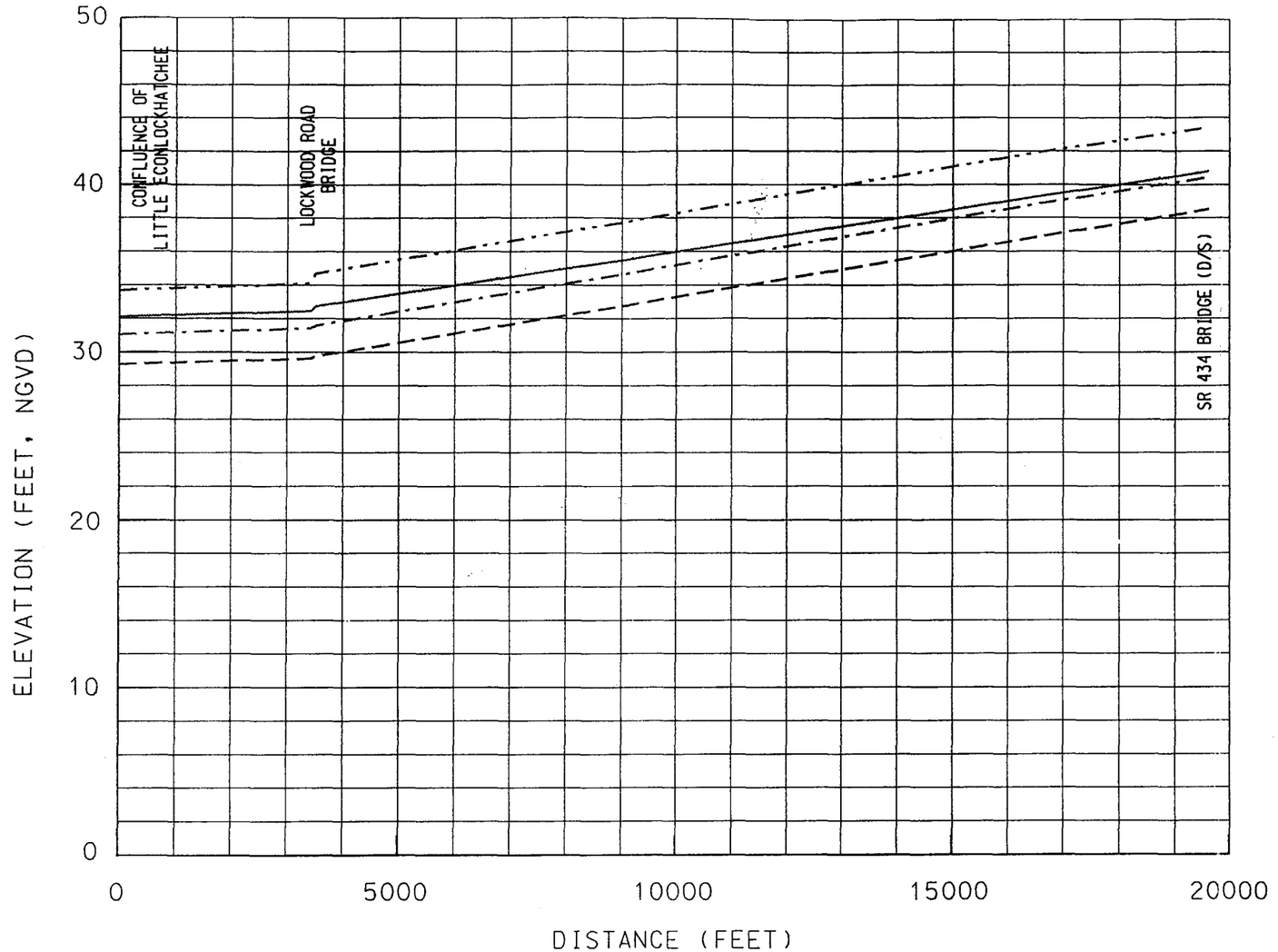
- 10 YEAR WATER SURFACE ELEVATION
- 25 YEAR WATER SURFACE ELEVATION
- 50 YEAR WATER SURFACE ELEVATION
- 100 YEAR WATER SURFACE ELEVATION

ECONLOCKHATCHEE RIVER RESTUDY
ORLANDO, FLORIDA

HYDRAULIC PROFILE FOR
ECONLOCKHATCHEE RIVER
EXISTING CONDITIONS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

PLATE 1



LEGEND

- 10 YEAR WATER SURFACE ELEVATION
- 25 YEAR WATER SURFACE ELEVATION
- 50 YEAR WATER SURFACE ELEVATION
- 100 YEAR WATER SURFACE ELEVATION

ECONLOCKHATCHEE RIVER RESTUDY
ORLANDO, FLORIDA

HYDRAULIC PROFILE FOR
LITTLE ECONLOCKHATCHEE RIVER
EXISTING CONDITIONS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

PLATE 2

ADDENDUM
ECONLOCKHATCHEE RIVER STUDY
SEMINOLE AND ORANGE COUNTIES, FLORIDA

PREPARED FOR
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

US Army Corps
of Engineers
Jacksonville District

SEPTEMBER 1996

ADDENDUM

INTRODUCTION

The HEC-1 and HEC-2 models for the Econlockhatchee and Little Econlockhatchee rivers were submitted to the St Johns River Water Management District (SJRWMD) for review. A revised rainfall analysis was generated by SJRWMD and incorporated into those original existing conditions models.

HYDROLOGY

Table A shows the rainfall frequency distribution, which was generated by SJRWMD. The HEC-1 existing conditions models incorporated the revised rainfall data into the hydrologic modelling of the Econlockhatchee and Little Econlockhatchee rivers. The results of the HEC-1 analyses produced a series of revised storm flows, which were utilized as input into the HEC-2 model.

HYDRAULICS

The revised peak flows from the HEC-1 analysis were incorporated into the HEC-2 existing conditions model for the Econlockhatchee and Little Econlockhatchee rivers. These peak flows were larger than the original peak flows, which resulted in higher stages along both rivers.

RESULTS OF REVISED ANALYSIS

The results of the revised existing conditions HEC-2 model are shown in Table I. Those results revealed that the revised model was relalitively consistent with the FEMA water surface elevations, as compared to previously compiled flood stages for the 100 year event. There was a 4.5 to 5 ft. difference in the water surface elevations at S.R. 50. This discrepancy may be attributed to the building of a new bridge at S.R. 50, which may have proceeded the May 29, 1973 Survey Report of the Central and Southern Florida Project on the Econlockhatchee River, from which the FEMA flood stages were based on.

The flood stages produced by the 1996 HEC-2 model are shown in Table II, which cites the water surface elevations for the different storm frequencies along the Econlockhatchee River and the Little Econlockhatchee River. Plates 1 and 2 show flood stages for various storm flows along the Econlockhatchee River and Little Econlockhatchee River, respectively.

Table A

Econlockhatchee Basin
Point rainfall depth in inches

Annual Probability	Duration							
	1–hr.	2–hr.	3–hr.	6–hr.	12–hr.	24–hr.	2–day	4–day
10%	2.90	3.90	4.10	5.20	6.30	6.90	8.30	9.40
4%	3.40	4.20	4.80	6.00	7.30	8.75	10.30	11.60
2%	3.40	4.42	4.97	6.26	7.64	9.44	11.45	13.27
1%	4.00	5.20	5.90	7.40	9.00	11.80	13.90	15.50
.02%	4.60	5.70	6.80	8.60	10.40	12.70	16.80	17.80

Table I

Section 22 - Econlockhatchee River Phase III

100 Year Flood Stage Comparison

Location		*** 1996 HEC-2 Model	1990 HEC-2 Model		* FEMA	
X-Section	Description	W.S. Elev. (ft)	W.S. Elev. (ft)	** Difference (ft)	W.S. Elev. (ft)	** Difference (ft)
10.2	Snow Hill Rd. Bridge	25.01	22.56	2.45	23	2.01
14.9	CR 419 Bridge	35.81	30.47	5.34	33	2.81
19.8	SR 420 Bridge	44.4	40.81	3.59	42	2.4
20.7	SR 50 Bridge	48.58	43.61	4.97	44	4.58
29.8	SR 528 Bridge	60.15	53.13	7.02	60	0.15
-14.9	Confluence with Little Econlockhatchee	35.81	30.9	4.91	33	2.81

* NOTE: These flood stages where published from the Flood Insurance Study of Orange County, Florida.

** NOTE: The difference is between the flood stage and the 1996 HEC-2 Model Stage. Minus (-) indicates the 1996 HEC-2 model is lower.

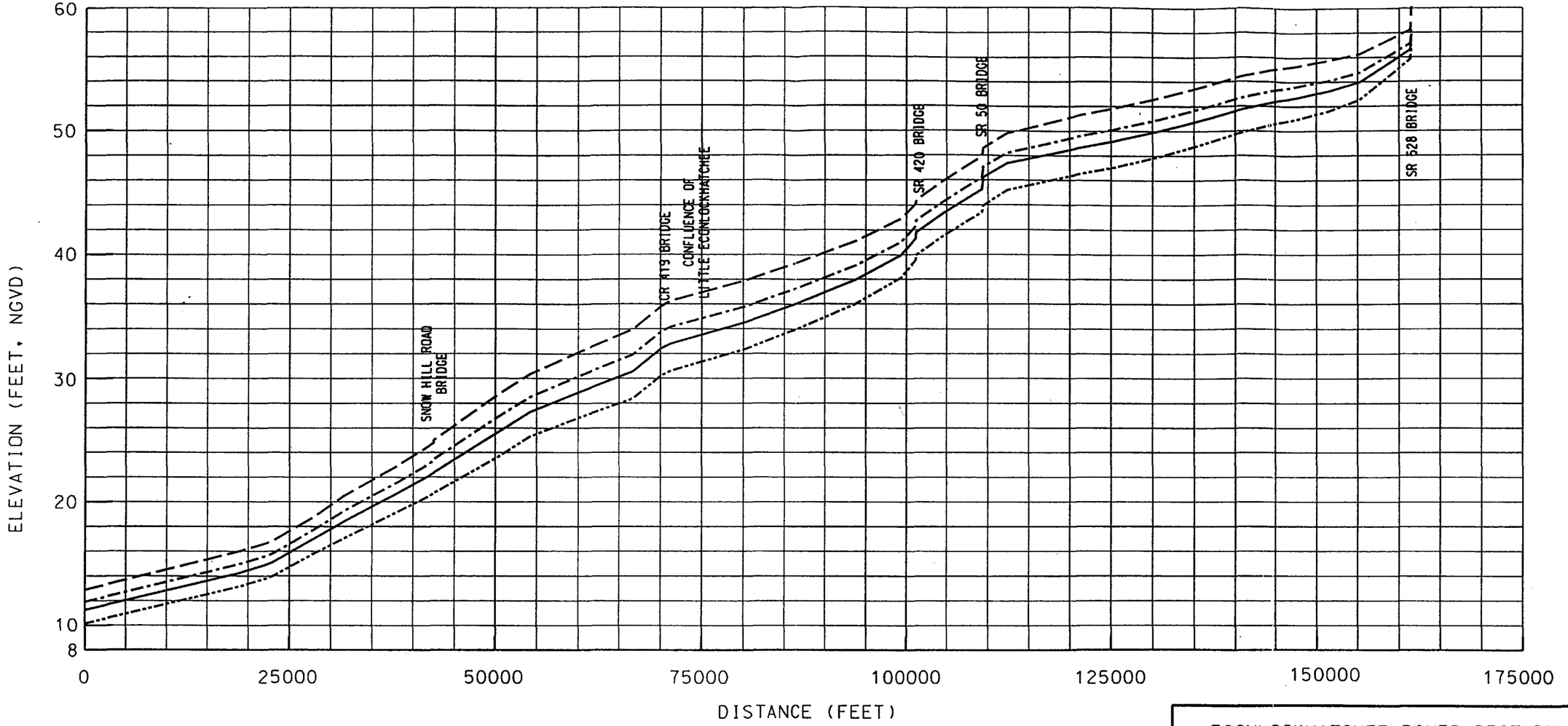
*** NOTE: This model use the rainfall provided by the St. Johns River Water Management District.

Table II
Section 22 - Econlockhatchee River Phase III
Hydraulic Data Table for Existing Conditions

* X-Section	10 Year Event				25 Year Event				50 Year Event				100 Year Event			
	Flow (cfs)	Velocity (fps)	W.S. Elev. (ft)	Depth (ft)	Flow (cfs)	Velocity (fps)	W.S. Elev. (ft)	Depth (ft)	Flow (cfs)	Velocity (fps)	W.S. Elev. (ft)	Depth (ft)	Flow (cfs)	Velocity (fps)	W.S. Elev. (ft)	Depth (ft)
9.2	10692	1.83	10.14	9.84	14133	1.96	11.22	10.92	16589	2.06	11.89	11.89	20586	2.2	12.88	12.58
9.3	10692	1.67	13.14	12.44	14133	1.82	14.25	13.55	16589	1.91	14.96	14.96	20586	2.02	15.99	15.29
9.4	10692	3.03	13.94	12.94	14133	3.13	15.06	14.06	16589	3.18	15.76	15.76	20586	3.27	16.79	15.79
9.5	10692	3.04	15.82	14.52	14133	3.53	17.02	15.72	16589	3.82	17.75	17.75	20586	4.24	18.8	17.5
9.6	10864	2.93	16.32	15.02	14305	3.35	17.6	16.3	16721	3.6	18.39	18.39	20750	3.96	19.52	18.22
9.7	10864	3.44	17.01	15.51	14305	3.76	18.38	16.88	16721	3.96	19.22	19.22	20750	4.28	20.43	18.93
9.8	10864	2.93	19.23	17.33	14305	3.23	20.73	18.83	16721	3.4	21.63	21.63	20750	3.65	22.96	21.06
9.9	9917	2.04	20.68	20.32	12995	2.39	22.34	21.98	15155	2.61	23.33	23.33	18750	2.94	24.77	24.41
10	9917	2.17	20.69	20.33	12995	2.54	22.34	21.98	15155	2.79	23.34	23.34	18750	3.24	24.77	24.41
10.1	9917	2.17	20.73	20.37	12995	2.53	22.4	22.04	15155	2.79	23.44	23.44	18750	3.18	24.97	24.61
10.2	9917	2.03	20.75	20.39	12995	2.38	22.42	22.06	15155	2.59	23.48	23.48	18750	2.9	25.01	24.65
11	9618	1.6	23.63	20.23	12570	1.78	25.62	22.22	14619	1.89	26.86	26.86	18038	2.07	28.67	25.27
12	9618	2.28	25.28	25.58	12570	2.41	27.25	27.55	14619	2.49	28.49	28.49	18038	2.64	30.32	30.62
13	9618	1.03	26.87	27.35	12570	1.18	28.94	29.42	14619	1.27	30.23	30.23	18038	1.41	32.17	32.65
14	9532	2.44	28.36	22.08	12444	2.57	30.54	24.26	14469	2.65	31.9	31.9	17825	2.79	33.93	27.65
14.5	9532	2.52	30.13	22.8	12444	2.81	32.3	24.97	14469	2.99	33.66	33.66	17825	3.26	35.71	28.38
14.6	9532	2.51	30.16	22.83	12444	2.8	32.34	25.01	14469	2.98	33.69	33.69	17825	3.25	35.74	28.41
14.7	9532	2.26	30.18	22.85	12444	2.47	32.36	25.03	14469	2.6	33.72	33.72	17825	2.78	35.77	28.44
14.8	9532	2.25	30.21	22.88	12444	2.46	32.4	25.07	14469	2.59	33.76	33.76	17825	2.78	35.82	28.49
14.9	9532	2.5	30.21	22.88	12444	2.79	32.39	25.06	14469	2.97	33.76	33.76	17825	3.24	35.81	28.48
15	7488	1.39	30.6	22.09	9550	1.48	32.8	24.29	10782	1.52	34.17	34.17	13153	1.62	36.24	27.73
16	7488	1.75	32.41	27.91	9550	1.84	34.55	30.05	10782	1.87	35.84	35.84	13153	1.96	37.91	33.41
17	7416	1.81	34.46	23.38	9451	1.89	36.5	25.42	10662	1.92	37.71	37.71	13005	2.01	39.74	28.66
18	7335	1.62	36	16.61	9341	1.71	37.95	18.56	10530	1.75	39.1	39.1	12840	1.84	41.07	21.68
19	7335	2.19	38.14	19.1	9341	2.29	39.95	20.91	10530	2.34	41.01	41.01	12840	2.43	42.9	23.86
19.5	7335	3.99	39.56	18.26	9341	4.2	41.3	20	10530	4.22	42.3	42.3	12840	4.23	44.09	22.79
19.6	7335	4.51	39.58	18.28	9341	4.92	41.33	20.03	10530	4.39	42.34	42.34	12840	3.76	44.15	22.85
19.7	7335	4.46	39.88	18.58	9341	4.44	41.74	20.44	10530	4.05	42.72	42.72	12840	3.61	44.39	23.09
19.8	7335	3.84	39.95	18.65	9341	3.97	41.79	20.49	10530	4.02	42.74	42.74	12840	4.09	44.4	23.1
20	7296	1.57	41.41	21.73	9283	1.69	43.25	23.57	10457	1.77	44.19	44.19	12744	1.9	45.86	26.18
20.1	7296	3.51	43.38	19.63	9283	3.79	45.24	21.49	10457	3.88	46.21	46.21	12744	3.98	47.9	24.15
20.2	7296	3.13	43.41	19.66	9283	4.17	45.25	21.5	10457	4.04	46.23	46.23	12744	3.71	47.95	24.2
20.3	7296	3.4	43.53	19.78	9283	3.93	45.64	21.89	10457	3.81	46.57	46.57	12744	3.57	48.2	24.45
20.4	7296	3.45	43.57	19.82	9283	3.63	45.71	21.96	10457	3.72	46.62	46.62	12744	3.85	48.23	24.48
20.5	7296	3.41	43.6	19.85	9283	3.85	45.72	21.97	10457	3.67	46.65	46.65	12744	3.36	48.28	24.53
20.6	7296	3.41	43.89	20.14	9283	3.56	46.17	22.42	10457	3.43	47.02	47.02	12744	3.2	48.56	24.81
20.7	6822	3.03	43.93	20.18	8671	2.93	46.22	22.47	9742	3	47.06	47.06	11885	3.12	48.58	24.83
21	6822	1.51	45.19	20.49	8671	1.64	47.35	22.65	9742	1.74	48.22	48.22	11885	1.93	49.79	25.09
22	6822	1.15	46.57	21.31	8671	1.23	48.71	23.45	9742	1.3	49.64	49.64	11885	1.41	51.34	26.08
23	5234	0.89	47.06	13.88	6630	0.93	49.18	16	7447	0.97	50.12	50.12	9054	1.04	51.84	18.66
24	5234	0.89	47.92	16.23	6630	0.95	49.97	18.28	7447	0.99	50.92	50.92	9054	1.07	52.64	20.95
25	5234	1.06	49.73	18.79	6630	1.1	51.63	20.69	7447	1.13	52.58	52.58	9054	1.2	54.31	23.37
26	3117	0.61	50.66	12.99	3894	0.63	52.46	14.79	4347	0.65	53.38	53.38	5258	0.68	55.08	17.41
27	3117	0.76	50.95	12.59	3894	0.77	52.71	14.35	4347	0.78	53.62	53.62	5258	0.81	55.3	16.94
28	2638	0.71	51.59	11.89	3276	0.69	53.22	13.52	3658	0.69	54.09	54.09	4435	0.7	55.72	16.02
29	2638	1.12	52.53	13.62	3276	1.06	53.95	15.04	3658	1.04	54.74	54.74	4435	1.02	56.27	17.36
29.1	2638	1.18	55.81	6.22	3276	1.21	56.6	7.01	3658	1.22	57.12	57.12	4435	1.21	58.23	8.64
29.5	1849	1.84	55.83	6.2	2379	2.04	56.61	6.98	2731	2.14	57.11	57.11	3319	2.21	58.22	8.59
29.6	1849	1.8	55.99	6.36	2379	2	56.77	7.14	2731	2.11	57.28	57.28	3319	2.17	58.37	8.74
29.7	1849	1.52	56.92	7.29	2379	1.69	57.79	8.16	2731	1.79	58.33	58.33	3319	2.16	60.03	10.4
29.8	1849	1.48	56.99	7.36	2379	1.66	57.87	8.24	2731	1.76	58.42	58.42	3319	1.72	60.15	10.52
-14.9	9532	2.5	30.21	22.87	12444	2.79	32.39	25.05	14469	2.97	33.76	33.76	17825	3.24	35.81	28.47
30	3830	1.79	32	18.38	5384	2.12	34.35	20.73	6393	2.22	35.77	35.77	8393	2.42	37.92	24.3
30.1	3830	1.83	32.01	18.39	5384	2.36	34.35	20.73	6393	2.24	35.79	35.79	8393	2.16	37.96	24.34
30.2	3830	1.82	32.09	18.47	5384	2.22	34.68	21.06	6393	2.12	36.11	36.11	8393	2.08	38.22	24.6
30.3	3830	1.78	32.1	18.48	5384	2.06	34.7	21.08	6393	2.15	36.12	36.12	8393	2.36	38.22	24.6
31	3830	1.36	37.58	19.18	5384	1.45	40.16	21.76	6393	1.52	41.55	41.55	8393	1.66	43.87	25.47
31.5	3830	2.08	39.1	15.15	5384	2.24	41.57	17.62	6393	2.31	42.93	42.93	8393	2.43	45.24	21.29

* Cross section locations are shown in Figure 2.

Note: Rainfall was computed by the ST. Johns River Water Management District



LEGEND

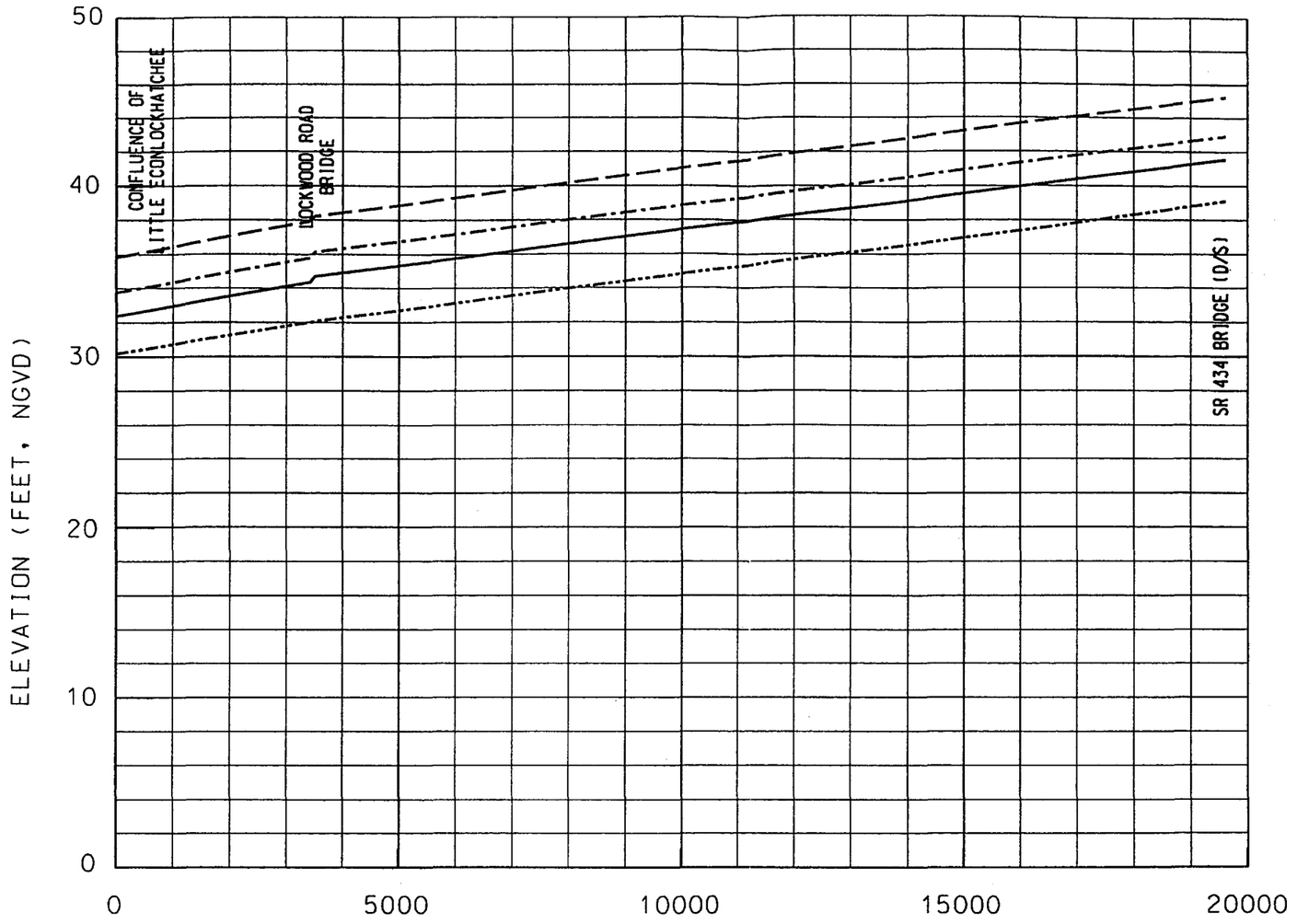
- 10 YEAR WATER SURFACE ELEVATION
- 25 YEAR WATER SURFACE ELEVATION
- 50 YEAR WATER SURFACE ELEVATION
- 100 YEAR WATER SURFACE ELEVATION

ECONLOCKHATCHEE RIVER RESTUDY
ORLANDO, FLORIDA

HYDRAULIC PROFILE FOR
ECONLOCKHATCHEE RIVER
EXISTING CONDITIONS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

PLATE 1



LEGEND

10 YEAR WATER SURFACE ELEVATION

25 YEAR WATER SURFACE ELEVATION

50 YEAR WATER SURFACE ELEVATION

100 YEAR WATER SURFACE ELEVATION

ECONLOCKHATCHEE RIVER RESTUDY
ORLANDO, FLORIDA

HYDRAULIC PROFILE FOR
LITTLE ECONLOCKHATCHEE RIVER
EXISTING CONDITIONS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

PLATE 2