The original documents are located in Box 4, folder "Cross Florida Canal - Evaluation of Transportation Economics" of the Norman Ross Files, 1974-75 at the Gerald R. Ford Presidential Library.

File

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:
DAEN-CWP-E

3 April 1975

Mr. Norman E. Ross, Jr.
Staff Assistant
Domestic Council Staff
Old Executive Office Building
Washington, D.C. 20500

Dear Mr. Ross:

I am inclosing for your information a copy of the Executive Summary of the Interim Report of the A. T. Kearney Co., entitled "An Evaluation of the Transportation Economics of the Cross Florida Barge Canal."

Sincerely yours,

for V. L. RATHBURN
Colonel, Corps of Engineers
Assistant Director of Civil Works,
Atlantic

1 Incl
As stated

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Department of the Army
Jacksonville District,
Corps of Engineers

Interim Report

An Evaluation of the Transportation Economics of the Cross Florida Barge Canal

Volume I - Executive Summary

March 1975

Kearney: Management Consultants

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS

INTERIM REPORT

AN EVALUATION OF THE TRANSPORTATION ECONOMICS OF THE CROSS FLORIDA BARGE CANAL

VOLUME I - EXECUTIVE SUMMARY

PREFACE

INTERIM REPORT

The purpose of this Interim Report Executive Summary is to provide an easily readable summary of the major study results of Kearney's project to evaluate the transportation economics of the Cross Florida Barge Canal. The full documentation and details of the project activity and results are contained in Kearney's project report (Volume II) and supporting appendices.

Kearney gratefully acknowledges the cooperation of the many shippers and receivers, waterway operators, port operators, associations, and other interested parties who provided the information required to conduct a professional, objective study. We would also like to thank the Corps' personnel of the Jacksonville District, South Atlantic Division, Office of the Chief of Engineers, and Rivers and Harbors Board for their cooperation and assistance throughout the course of the study.

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS

INTERIM REPORT

AN EVALUATION OF THE TRANSPORTATION ECONOMICS OF THE CROSS FLORIDA BARGE CANAL

VOLUME I - EXECUTIVE SUMMARY

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS

INTERIM REPORT

AN EVALUATION OF THE TRANSPORTATION ECONOMICS OF THE CROSS FLORIDA BARGE CANAL

VOLUME I - EXECUTIVE SUMMARY

BACKGROUND OF CFBC PROJECT

(a) Project Description

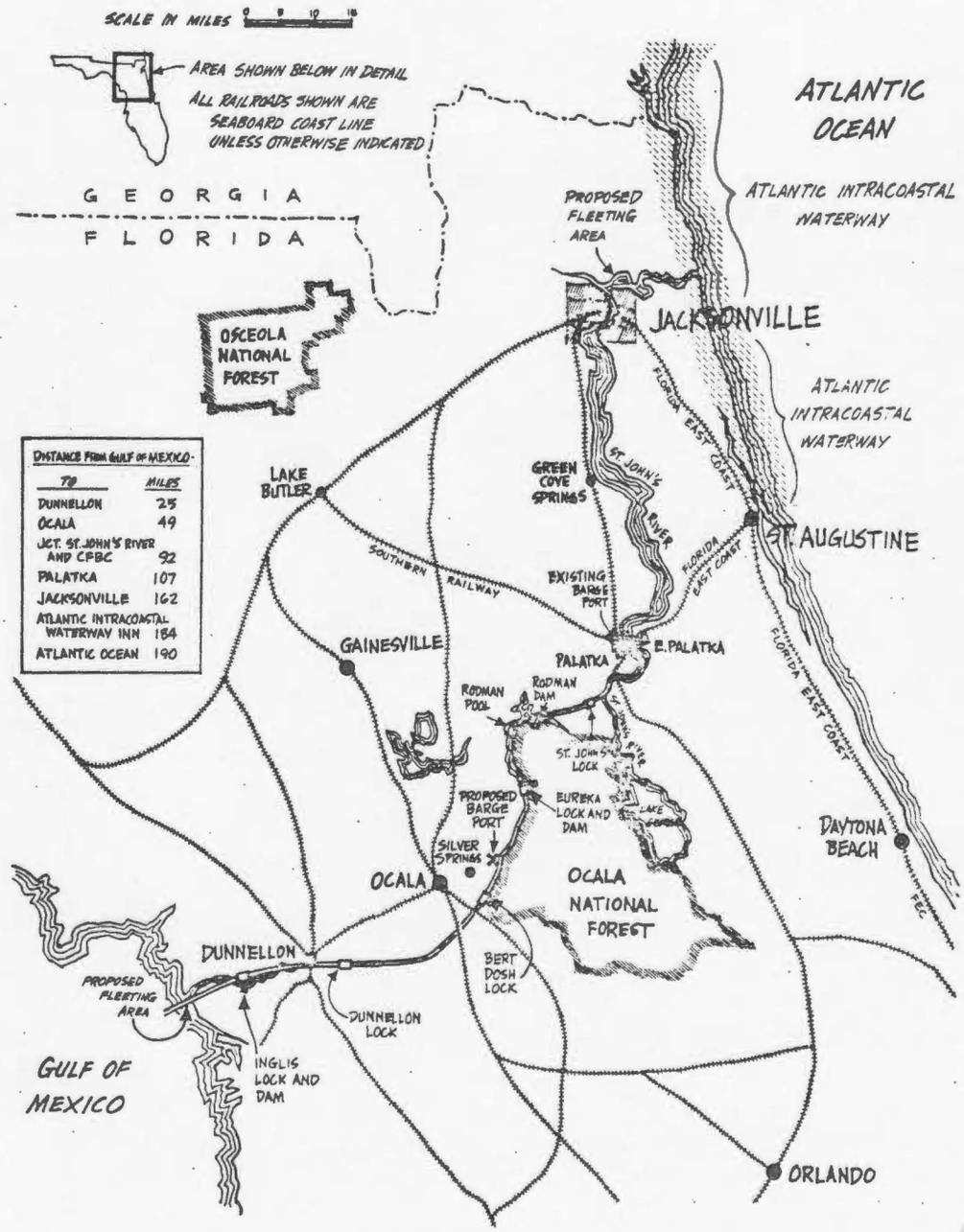
The Cross Florida Barge Canal (CFBC) is a high-level lock barge canal which will permit the transit of boats and barges across the natural ground elevation of Florida. The Canal, when completed, together with the St. John's River will link the deep water navigation of the Gulf of Mexico to the Atlantic Intracoastal Waterway (AIWW) system and the Atlantic Ocean.(1)

As can be seen by reviewing the map on the following page, the CFBC crosses Florida starting in the west near Yankeetown, passes through Dunnellon and proceeds across Florida just south of Ocala. Then its course turns north along the border of the Ocala National Forest, passes just east of Eureka, and connects with St. John's River south of Palatka.

(1) The Gulf Intracoastal Waterway (GIWW) would also connect to the CFBC if the GIWW link between St. Marks and Tampa Bay is completed in the future.

Figure 1

The Cross Florida Barge Canal Route



The CFBC is approximately 107 miles long. To cross Florida east to west through the Canal would total about 185 miles including the St. John's River section. This represents a savings of 360 miles compared to the existing Okeechobee Waterway and a savings of 610 miles compared to the Gulf route around Key West.

The Canal itself is a 150-foot wide waterway with five locks which are 84 feet wide and 600 feet long. It is partially completed (as noted on the map). Completed structures include three locks, three dams, four highway bridges, and one railroad bridge. In addition to transportation facilities, the Canal would also have recreational facilities.

(b) Prior Studies

The CFBC was subject to a number of benefit-cost studies prior to the beginning of construction. Each of these studies resulted in a favorable benefit-cost ratio. The key studies were:

1. "Economic Restudy of the Cross Florida Barge Canal" 10 January 1958 by the Jacksonville District, Corps of Engineers.

2. "Economic Evaluation Report of the Cross Florida Barge Canal" 13 March 1962 by the Jacksonville District, Corps of Engineers.

3. "Potential Traffic and Transportation Cost Saving of Cross Florida Barge Canal" March 1962 by Arthur D. Little, Inc.

4. "Cross Florida Barge Canal Chief of Engineers' Evaluation" June 1962 by the Office of the Chief of Engineers.

The objectives of these prior studies included evaluations of the transportation benefits of the CFBC on a similar basis to that conducted in this study. The results of these studies are briefly compared with Kearney's study at the end of this volume.

(c) Current Project Status

The Cross Florida Barge Canal project was authorized by Public Law 675, 77th Congress, dated 23 July 1942. After completion and review of a number of favorable benefit-cost studies, appropriations were provided by Congress for construction. Work commenced in 1964 and continued until President Nixon, citing potentially serious environmental damage, ordered a halt to construction in January, 1971.

After termination of construction, Congress in Public Law 92-405 appropriated funds for the Corps to prepare an Environmental Impact Statement on the project. However, those funds were impounded by the Office of Management and

Budget.

Litigation had been in progress since enactment of the referenced law. On 31 January 1974, Judge Harvey M. Johnsen, Senior Circuit Judge of the Eighth Circuit, sitting by designation, United States District Court, ruled in part that the Director of the Office of Management and Budget is directed to release and make available the funds appropriated by Congress for use by the Corps of Engineers to prepare or have prepared for it a detailed and complete Environmental Impact Study of the project with the inclusion therein of all environmental and other factors requisite to determination of appropriate action to be taken on the project. Judge Johnsen also stated in part..."Among other things, I am not able to see how such an EIS properly could escape having a current cost/benefit evaluation made of the whole project." The Judge's ruling provided the impetus for the current transportation economics restudy.

STUDY
INTRODUCTION

(a) Objectives and Scope of the Study

The objective of this study is to estimate the average annual transportation benefits that would accrue to the CFBC over a project life from 1985 to 2035. The estimates constructed are in accordance with the established policies,

procedures, and regulations of the Corps of Engineers for conducting transportation economics studies and using methodologies to develop the benefit estimates.

The scope of the Interim Report is restricted to the estimation of basic CFBC transportation benefits. Possible completion of the GIWW, transloading or port facilities at the west end, and other enhancements are not included in the scope of this Interim Report. Measures which may be required to effectively deal with environmental management of the impact of the CFBC which might impair navigation have not been considered in this Interim Report. This would include, for example, a periodic draw down of a magnitude that would be sufficient to affect navigation.

Further, the scope of the study does not include estimation of construction costs, environmental impacts and costs, secondary economic benefits and costs; or recreational, land enhancement, and flood control benefits. The scope does not include independent study of the future pattern of development of commodity markets or industries as a basis for identifying possible traffic potential. No traffic estimates independent of those identified through the traffic survey were included in the benefit base for the Interim Report.

(b) Approach

The approach taken to conduct the study was to:

1. Identify potential traffic for the CFBC through shipper and receiver interviews.

2. Construct waterway rates for movements through the CFBC to approximate current market.

3. Perform a comparative rate analysis for all identified traffic. This analysis included all rate elements for a complete logistics comparison of the differential shipper costs between the CFBC movement and the most effective alternate means of transportation. Each movement was individually analyzed based on its specific characteristics. Unit benefits were estimated. Movements with disbenefits were excluded from further analysis.

4. Forecast tonnage based on OBERS[1] projections, the nature of the market and the specific characteristics of each movement.

5. Calculate annual equivalent benefits for alternate discount rates.

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(1) OBERS Projections, Economic Activity in the U.S. by Economic Area, Water Resources Region and Subarea, State, and SMSA and Non-SMSA Portions of the Areas, Historical and Projected--1929-2020, U.S. Department of Commerce and the U.S. Department of Agriculture, Washington, D.C. 1974.

(c) Information Sources

The study utilized two primary information sources:

1. Published Information. This included prior U.S. Army Corps of Engineers studies, other data on the CFBC project, reports on industries and markets, rate information and other published data and information.

2. Interview Information. Shippers, receivers, associations and government agencies were contacted. Waterway and port operators, and other interested parties were interviewed to obtain study information and data. Confidential and sensitive information from individual firms was obtained under U.S. Army Corps of Engineers regulation ER360-2-103.(2)

(2) EL360-2-103 provides policy and guidelines for the gathering, use, and release of information used in the Corps of Engineers Civil Works investigations and reports.

A summary of the number of interview contacts made with organizations is shown in the table below.

Table 1

Summary of Study Contacts

Category	Number of Interviews
Association and Government Agencies	16
Industrial Shippers and Receivers	442
Consulting Engineers and Contractors	9
Shipbuilding and Ship Repairing	17
Transportation Companies	19
Ports and Storage Facilities	21
Other Interested Organizations	19
Total	543

Source: A. T. Kearney, Inc.

(d) Report Structure

In order to fully document the results of the study for the Corps (including confidential information) and for interested public parties, a report structure was developed to provide for different levels of readership and interest and to protect confidential information. This reporting structure is shown on the following page.

Volume I - Executive Summary

Volume II - Project Report

Appendix A - Analysis of Traffic Flow Data

Appendix B - Constructed Waterway Rate Methodology

Appendix C - Stone, Sand, and Gravel (Confidential)

Appendix D - Basic Metal Products (Confidential)

Appendix E - Mining Industry Products (Confidential)

Appendix F - Fabricated Metal Products (Confidential)

Appendix G - Chemical Products (Confidential)

Appendix H - Paper and Paper Products (Confidential)

Appendix I - Forecast and Benefit Calculation for Individual Movements in Benefit Base (Confidential)

Appendix J - Detailed Comparison to Prior Cross Florida Barge Canal Studies (Confidential)

POTENTIAL CFBC COMMODITY TRAFFIC

The purpose of this section is to identify and analyze traffic which has the potential to be routed through the CFBC.

(a) Susceptible Waterway Traffic

Key factors influencing modal choice are related to characteristics of the movement. The most important factors are: length of haul, value per ton, materials handling methods, time sensitivity, capacity requirements, and total

annual point-to-point tonnage. Generally, the lower the value, the less time sensitivity, and the higher the point-to-point tonnage the more likely movement will be by water. Inherent competitive strengths of water transportation are low line haul costs and high capacity.

Since waterways are not geographically pervasive, the location of the shipper and receiver plays an important role in the competitive viability of water transportation. Movements where both the origin and destination are on the water highly favor water transportation of commodities which meet the above criteria. Where the origin and/or destination are not on the water, comparative modal economics may favor land transportation. Generally, the further either the origin or destination are from the water the less likely the transportation economics will favor water transport. Where land legs are required to complete a total movement, both the land leg line haul cost and, more importantly, the high cost of transshipment rapidly reduces the competitive low line haul cost and high capacity advantages of barge operators.

In order to initially identify potential commodity traffic for the CFBC, Kearney utilized a multimodal traffic flow data base which categorized traffic by commodities which have proven to be historically most susceptible to

waterway transportation.(1) Detailed traffic flow data were grouped by Bureau of Economic Analysis Regions (BEARs)(2) into broader regions reflecting major potential origin and destination areas in relation to the CFBC. BEAR to BEAR traffic flow which had little or no potential for utilizing the CFBC were excluded from consideration. The methodology used to identify this traffic appears in "Appendix A - Analysis of Traffic Flow Data." Based on the results of this screening for initial traffic, Kearney developed an interview program to identify specific shippers and receivers with potential movements through the CFBC. The results of this traffic survey are briefly reviewed by commodity groupings in the following paragraphs.

(b) Key Commodity Potential

Five key commodity categories represent over 80% of the CFBC tonnage and benefits which were generated through the traffic survey.(3)

(1) This data base is discussed in "Executive Summary - Domestic Waterborne Shipping Market Analysis" U.S. Department of Commerce, Maritime Administration, 1974.
(2) Regions as defined by the Bureau of Economic Analysis, U.S. Department of Commerce hereinafter referred to as BEARs.
(3) That is, traffic which resulted in positive benefits.

1. Basic Metal Products. The basic metal products category includes both raw materials and ores and finished products of the metal producing industries. Transportation costs are significant factors in raw material use patterns, plant location and final product markets in this industry. Approximately 65% to 70% of the nation's steel industry is located in the industrial complex surrounding the Great Lakes ports. However, there are a number of integrated steel mills throughout the Southeast. Shipments of raw materials and finished products from these plants as well as shipments of specialized products through the inland waterway system represent potential movements for the CFBC.

Using OBERS forecasts of production and shipments for this category related to potential CFBC movements, traffic flows are expected to increase at an average annual rate of approximately 2.0% to 2.5% per year between 1973[1] and 2035. Movements falling in the basic metal products category represent significant tonnage and benefits for the CFBC.

2. Chemicals and Chemical Products. Chemicals represent a major potential for the CFBC. This category includes both industrial and agricultural chemicals encompassing petrochemicals as well as other chemical substances.

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[1] OBERS projections were used to forecast tonnages (beginning in the years 1973 to 1985) to 1985, the base year of the CFBC.

Much of the domestic chemical industry is based along the Gulf Coast and the Atlantic Coast. Thus, there is significant potential for through traffic on the CFBC.

Chemical products require special water transportation equipment. There is intensive rail/barge competition for all chemical movements due to its being a high-rated manufactured product. The potential movements include interplant transfers as part of the industry manufacturing processes and final shipments to industrial users.

The chemical and chemical products industries are growing rapidly. OBERS forecasts related to this traffic indicate an average annual increase of 3.9%. These products represent significant tonnage and benefits for the CFBC based on the movements developed from the traffic survey conducted.

3. Fabricated Metal Products. Electric power generating equipment and industrial package boilers were the only products in the fabricated metal product category which had favorable rates for movement on the CFBC.

Electric power generating equipment is sold primarily to utilities. Potential CFBC moves of electric power generating equipment center around three nuclear components which are: atomic reactors, reactor vessel internals and steam generators. Size characteristics of these components dictate water shipment whenever possible. All nuclear

equipment manufacturers' plants are located west of the CFBC. Therefore, all units to be shipped to the Atlantic Coast represent potential traffic for the CFBC.

Principal markets for industrial package boilers are the chemical, petrochemical and paper industries. Location of plants of these industries are primarily west of the area served by the CFBC. Approximately one-half of industrial package boiler unit production is in plants which efficiently feed into ports on the Atlantic Coast. Here also size characteristics dictate water shipment whenever possible. Therefore, approximately one-half of the industrial package boilers manufactured represent potential for the CFBC.

According to the Federal Power Commission and OBERS projections, the market for nuclear equipment and industrial package boilers is growing at approximately 3.0% to 3.5% annually. This indicates a growing traffic tonnage and benefits for the CFBC.

4. Stone, Sand and Gravel. Transportation economics of stone, sand and gravel are favorable to water transportation when origin and destination points are on or close to the water. Transportation costs are a major factor in defining markets. If origin and destination are on the water, rarely is land transportation the least cost alternative.

Florida is a major producer of stone, sand and gravel products. The principal products which offer potential for the CFBC are crushed stone and dolomite (ag-lime). The principal application in Florida for crushed stone is in construction and the principal application for dolomite is in agriculture.

Florida historically has consumed its crushed stone production and imported both low and high grade crushed stone from other states. Dolomite is exported to other states. There are numerous limestone deposits along the proposed route of the CFBC.

Crushed stone offers potential for the CFBC in terms of shipment to destinations in Florida and for through movements. Dolomite offers excellent backhaul potential for contract moves in terms of its exportation to a variety of non-Florida markets.

Production and consumption of crushed stone is projected to grow at the same rate as population. OBERS projections indicated a rate of 0.9% annually. Crushed stone represents significant tonnage and benefits for the CFBC.

5. Mining Industry Products. Bulk mined products which are produced in close proximity to waterways are highly susceptible to barge transportation. Products identified in the traffic survey include phosphate rock, kaolin clay, and

fuller's earth.

Phosphate rock is used primarily as a raw material for fertilizers, detergents, plating, and animal feed supplements. Fertilizer accounts for in excess of 80% of total phosphate rock consumption. Fertilizer plants tend to be located near phosphate rock deposits to minimize transportation costs. Florida is the major domestic phosphate rock producing state representing over 70% of total production in 1973. Other important phosphate rock production states are North Carolina, Tennessee, and Idaho. Domestic demand for phosphate rock is projected to increase in conjunction with agricultural production through the year 2035. Based on OBERS data, the projected rate is 4.0% annually. Export shipments have been increasing rapidly because of the recent quadrupling of the world price. Production is expected to increase in North Carolina and possibly in Florida and Georgia areas not currently mined.

Kaolin clay is used in the manufacture of a large number of products including paper, rubber, plastics, paint and fertilizers. The clay movements identified in the traffic survey were primarily in support of requirements of the paper processing industry. OBERS projections indicate an annual growth rate of 7.9% for this market. The traffic survey also identified several movements of fuller's earth associated with final product distribution.

Mining industry product movements as developed by traffic survey represent significant tonnage and benefits for the CFBC.

(c) Other Traffic Potential

Other commodity groups contributing to the benefits for the CFBC include paper and paper products, grain and grain products, and forestry products.

Paper and paper products are moved throughout the inland waterway system and represented a significant potential in the original CFBC benefit studies. A large number of movements were identified as potential moves from the traffic survey. However, due to changes in rail rates and high handling costs at ports, most of these moves did not generate any benefits. A minor amount of tonnage and benefits did result from the traffic survey.

Grain and grain products represent major tonnage for the inland waterway system. There is a cattle feeding industry in Florida which could potentially utilize grain shipped via the CFBC for distribution. However, the current organization of the industry is such that no specific shipper or receiver could be identified that would handle this tonnage. A minor amount of grain products were identified

from the traffic survey and are included in the tonnage and benefit base for the CFBC.

Forestry products are a potential for waterway transportation (where it is available) and fit the requirements for movement of the industry. In Florida, the forestry industry primarily provides pulp and pulpwood for the paper products industry. The traffic survey did not identify any potential for this type of movement. However, a small amount of tonnage and benefits were associated with a stumpwood movement which was identified in the traffic survey.

(d) Key Commodity Potential (Without Evaluated Benefits)

Transportation economics of coal and petroleum products are highly favorable to water transportation. In addition, there is good reason to believe that the potential for these products moving on the CFBC is significant. However, an intensive traffic survey with respect to these products did not identify any specific shippers or receivers with plans for shipments which could utilize the CFBC.

1. Coal. Approximately 20% of coal ton-miles are shipped via water. Major coal users are utilities (70%), primary metals (18%) and industrial (10%). Primary sources of coal are the Ohio Valley, Alabama and the Western States.

Location of coal sources appears to indicate

potential coal movements from the primary source regions to the Florida East Coast and the South Atlantic East Coast. All major utilities and primary metals producers in these areas were contacted. Twelve of the largest fifteen coal companies as well as smaller firms located with possible potential movements were interviewed. However, no present or potential coal moves were identified. The primary reason for this was that no utilities in the above regions are presently using coal-firing equipment. Furthermore, area utilities express a preference to avoid using coal-firing equipment in the future due to environmental pressures. No major heavy steel production plants are geographically located in relation to coal fields such that potential traffic for the CFBC would develop.

The projected oil shortages may cause the Federal government to provide incentives to induce utilities to use coal-firing equipment. If this occurs, potential coal traffic could move in a pattern which would use the CFBC. One new Florida East Coast plant would utilize about 1.5 to 2.0 million tons of coal a year. Kearney believes that it is likely that some utilities will use coal-firing equipment due to energy considerations in the future and that significant potential traffic will develop for the CFBC.

2. Petroleum. The Florida petroleum market can

be segmented into markets for light distillates and heavy distillates. Light distillates are presently shipped by tanker and pipeline. A gas pipeline which crosses central Florida north to south is presently being converted for use to transport light distillates. On this basis, no potential for the CFBC exists. Heavy distillates typically reach Florida by tanker or ocean barge. The pattern is their direct delivery to major markets with private truck fleets.

All major petroleum companies were contacted in the traffic survey. No potential moves for the CFBC were identified. Moves could materialize if a residual fuel distribution operation or a deep water port are constructed in areas served by the CFBC or if oil is found off the Florida Coasts. If these major developments do not occur, only a small potential for the CFBC is likely. This potential would be limited to deliveries along the proposed canal route and cross traffic due to ownership and product differences.

(e) Other Products

All other products which have significant traffic on the inland waterway system were identified and a search conducted for possible CFBC traffic. Included in this search were durable products, lumber, canned fruits and vegetables,

nonferrous primary metals, metal ores, and raw and refined sugar. However, no present or potential moves were identified in the traffic survey.

(f) Boat Transits

The CFBC offers potential benefits in terms of nonbarge traffic. Two potential nonbarge moves were identified, yacht transits and shrimp boat transits. Benefits would be derived from yacht transits for delivery in terms of cost savings relative to rail shipment and time and fuel savings relative to the use of the Okeechobee Waterway. Shrimp boats would gain time and fuel savings compared to present routings around the Florida Keys.

CFBC OPERATIONS SCENARIO

This section describes the operating patterns which Kearney believes would typify commercial waterway operations on the CFBC.

(a) Constraints and Operating Patterns

If traffic volume is sufficient, past experience indicates waterway operators will tend to exploit the full capability of a waterway for low cost operation. This is particularly true because of the highly competitive nature of the market for barge transportation.

Primary waterway characteristics which form significant constraints on barge operations are channel depth and width, angle of river or channel bends, and lock sizes and capacity. The governing constraints for CFBC are shown in the table below:

Table 2

Cross Florida Barge Canal
Constraint Parameters

Parameter	Waterway Characteristic
Channel Depth	Dependable 12 feet
Channel Width	150 feet
Tow Width	55 feet (rule for 150-foot waterway)
Lock Sizes	84 feet by 600 feet
Lock Capacity	36 lockages per 24 hours
Bends	1,200-foot turning capability

Source: U.S. Army Corps of Engineers.

Based on the above constraints, the maximum tow size which can operate through the CFBC (without excessive barge handling and navigation difficulty) is a five-barge tow.(1) For rate analysis purposes, Kearney utilized an average tow size of 4.5 barges powered by a 1,200-horsepower towboat.(2)

Barge ports for commodity loading and unloading are currently available at Palatka and Jacksonville on the St.

(1) Based on the standard (jumbo) barge of 195 feet x 35 feet.

(2) The viability of the tow size was determined by considering the tonnage forecast for movement on the CFBC as well as the constraints.

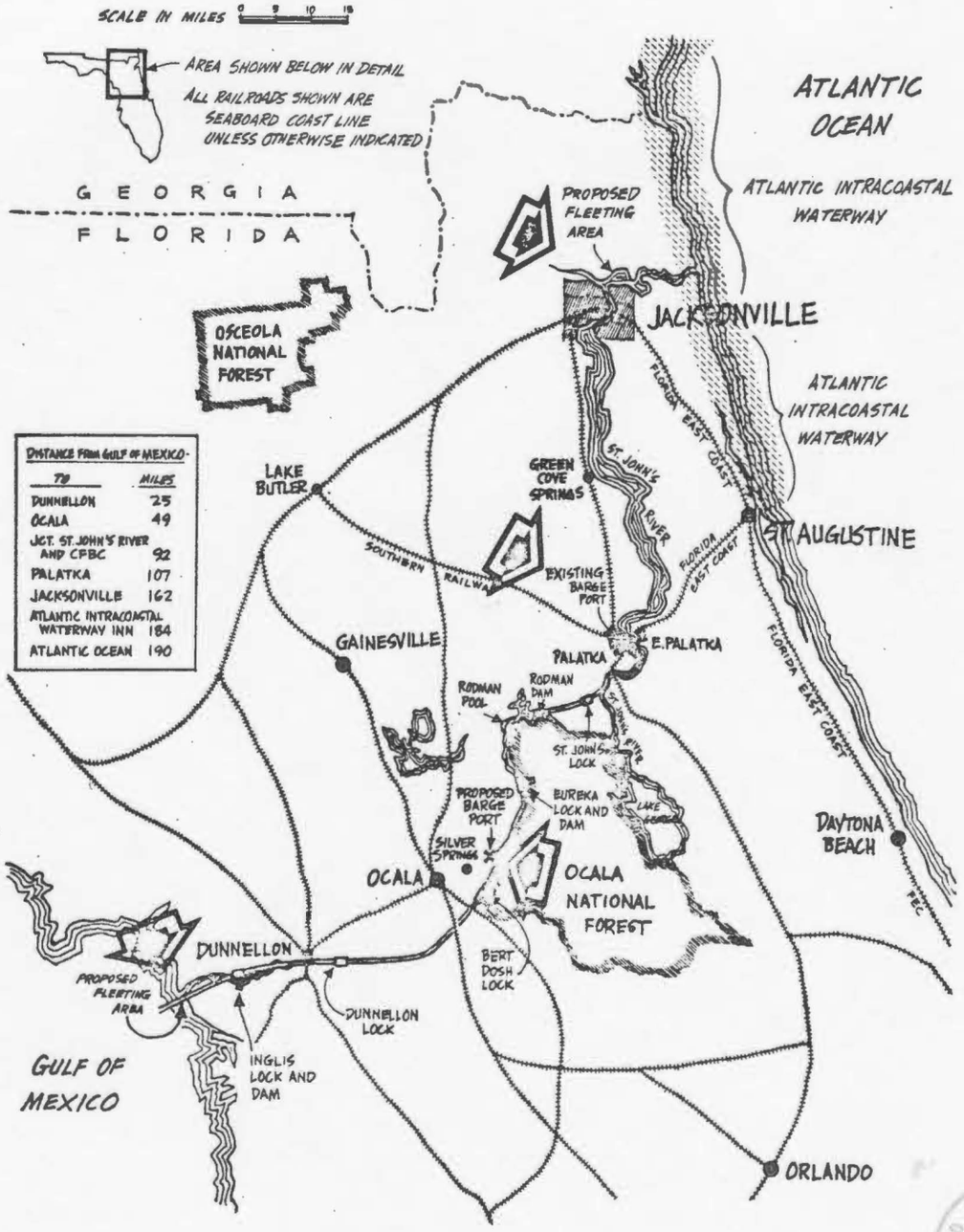
John's River portion of the CFBC. An additional barge port is planned for the new portion of the Canal east of Silver Springs. Other private or public port facilities would develop as warranted by the growth of commerce along the CFBC.

Barge fleeting areas would be available at each end of the Canal to facilitate the making/breaking of tows and interchange of barges between waterway segments.

A diagram of the Canal with the locations of fleeting and port locations is shown in Figure 2 on the next page.

Figure 2

Cross Florida Barge Canal Operations Scenario



(b) Connecting Waterway Operations

Towing across the Gulf of Mexico requires specially constructed barges capable of open-water navigation.[1] These barges are available in two types--deep draft ocean barges and shallow draft river-Gulf barges.

Typical deep draft ocean barges require navigating depths greater than the 12 feet available in the CFBC. River-Gulf barges are designed to be watertight for open-water navigation and compatible with inland barges in tows operating on the inland waterways. River-Gulf barges are the standard (195 x 35) jumbo size and can operate in the Gulf and in the CFBC as well as other inland waterways. River-Gulf barges are approximately 2-1/2 times more costly to operate than inland barges.

A river-Gulf barge tow operating cross-Gulf generally contains two or three barges. Some towing companies prefer to operate with only two barges for safety and crew inexperience reasons. Other operators claim a three-barge tow is the only economical tow size for regular operation. This study utilizes a three-barge cross-Gulf tow powered by a

[1] Certified as suitable for deep draft ("load-line") navigation by the United States Coast Guard.

1,200-horsepower tug.[1][2] River-Gulf barges are assumed for all open-Gulf movements.[3]

The GIWW extends between Brownsville, Texas on the western end to St. Marks, Florida on the eastern end. The section of waterway between St. Marks and Tampa has been authorized for completion but no funding has been approved. Thus the project concerning that section of waterway is currently inactive. For purposes of this study, it is assumed that the GIWW extension will not be available.

The advantage provided by the GIWW is that it allows the use of inland tows--the same as used on the Mississippi River System. Since the waterway segment between St. Marks and the CFBC is not complete, inland tows cannot transit between the Mississippi River System/GIWW and the CFBC.

The normal tow size on the GIWW, west of New Orleans, is three to five barges and east of New Orleans is three barges powered by a 1,200-horsepower towboat.

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(1) Since published rates are primarily used as the basis of constructed rates, this tow size is only critical in a few movements for rate analysis.

(2) Tug horsepower applied in this trade varies considerably due to the nature of the market involving ocean barges in addition to river-Gulf barges.

(3) Possible good weather use of inland equipment is not considered, due to Coast Guard regulation.

The AIWW stretches between Maine and Key West, Florida. Tow sizes on this waterway are generally limited to two barges powered by a 1,200-horsepower towboat. Most ports on the AIWW are deep draft oriented. Consequently barge loading/unloading charges are often as costly as ocean vessel handling charges. Thus, barge transportation is often not competitive with rail transportation and as a result the AIWW has limited barge traffic compared to other waterways.

The operating pattern, tow size and towboat horsepower, on the Mississippi River System is summarized in the table below.

Table 3

Operating Pattern on Selected Rivers - Mississippi River System

River	Average Tow Size	Horsepower Required per Average Tow	Number of Navigation Locks
Arkansas River	8	1,800	19
Illinois River	15	3,200	7
Mississippi River - Upper	15	3,200	27
Mississippi River - Lower	22	5,600	0
Missouri River	8	1,800	0
Tombigbee/Black Warrior	6	1,800	6

Source: A. T. Kearney, Inc.

(c) Alternate Operating Scenario Features

There are several pending factors not considered in this

Interim Report which could impact on the operating pattern of the CFBC.

1. GIWW Completion. If the GIWW between St. Marks and the entrance to the CFBC and Tampa were completed, it would be possible to use inland equipment rather than river-Gulf equipment between the Mississippi River System and the CFBC, and the cross-Gulf Tampa trade, thus reducing the overall water transportation cost.

2. Transloading Capability. Considerable interest was expressed by potential CFBC users for a transloading capability between inland barges and ocean barges. This feature would permit these companies to continue to use their ocean barge equipment. Such a transloading capability would require a deeper channel approach to the CFBC than currently anticipated. Most interest in transloading was for a channel depth of 16-20 feet, while some expressed interest in a depth of 30 feet.

RATE ANALYSIS AND ESTIMATED SAVINGS

This section will discuss the traffic base developed for analysis, the water rate construction methodology, a comparison of current transportation rates to transportation rates via the CFBC and estimated base year benefits.

(a) Approach

Based on an extensive interview program, a potential traffic base was established for further analysis. This analysis consisted of comparing the December, 1974 point-to-point rate of the current transportation mode (existing movement) or most likely transportation mode (projected movement) to the point-to-point rate involving barge transportation via the CFBC. All differential elements of origin to destination shipper costs (dockage, wharfage, handling costs, feeder costs, storage, inventory carrying costs, etc.) are included in each point-to-point rate comparison.

Since published rates are not available for the CFBC or for many movements on other waterways, it was necessary to "construct" rates for the CFBC and other waterway segments to use where no published tariff data were available or applicable to a specific movement.

Constructed rates were developed to reflect the market conditions as of December, 1974. These rates were developed through detailed interviews and discussions with the towboat industry. Either single barge (less than 50,000 tons shipped annually) or long-term contract rates were applied to individual movements. The constructed rates reflect backhaul opportunities provided by coal, phosphate and dolomite. The rate analysis specifically considered the

backhaul opportunities for each movement. The rate construction methodology used is generalized so as not to reveal proprietary information of any individual towing company. This methodology is detailed in "Appendix B - Constructed Waterway Rate Methodology". Where possible, published tariffs of the Waterways Freight Bureau and data of the Corps of Engineers were used to corroborate the reasonableness of the constructed rate results.

Constructed rates are a function of the waterway involved, the annual tonnage, length of haul and balance of movements and an iterative analysis. After the transportation rate via the CFBC is estimated, any changes in the tonnage or movement pattern which result from the comparative rate analysis may require an adjustment of the rate analyses of all movements to reflect a realistic set of adjusted operating conditions.

The point-to-point water rate for the CFBC movement was compared to the December, 1974 rate for the existing or most likely transportation mode (for nonexisting movements) to determine benefits. Quite often this mode was rail, although in a few instances the alternate mode was ocean barge. Competing rail rates were confirmed by a recognized professional rate bureau. Any differentials in handling or feeder costs

between the existing mode and marine mode via the CFBC were included in each movement benefit analysis. Additional costs incurred in shipping via the CFBC (storage, warehouse or inventory carrying cost) were also included in each analysis.

(b) Traffic Base

As the result of nearly 600 traffic survey interviews, approximately 100 movements were identified as potential users of the CFBC. These movements were analyzed for potential transportation benefits if routed via the CFBC. Of the movements analyzed, 31 showed benefits if routed via the CFBC. Table 4 shows the movements which remained in the benefit base. All movements including both present traffic and traffic which will begin in future years have been projected to a 1985 base year using OBERS projection factors.

Table 4

Estimated 1985 Traffic Base for
Cross Florida Barge Canal

Movement Category	1985 Annual Tonnage (Millions of Tons)	Annual Bargeload Equivalent (Numbers of Bargeloads)
Local Traffic	2.31	1,651
Through Traffic	2.42	1,744
Florida Origin or Destination	.37	261
Total - All Traffic	5.10 (1) (2)	3,656 (1) (2)

Note: (1) Nuclear equipment, package boilers and boat transits are not included in tonnage, but nuclear equipment and package boilers are included in bargeload equivalents.
(2) This includes a significant movement which has a 50% probability of moving through the CFBC based on specific commercial arrangements being finalized at this time. This movement is included in all subsequent tables.

Source: A. T. Kearney, Inc.

Note that approximately five million tons of traffic is estimated for the CFBC in 1985. The data in Table 4 also indicate the dominance of local and through traffic in the overall traffic base.

(c) 1985 Base Year Unit Savings

The unit savings on the movements shown in Table 4 are shown in Table 5 on the following page.

Table 5

Estimated Cross Florida Barge Canal
Transportation Unit Savings

Movement Category	Weighted Average Unit Savings (Dollars per Ton)
Local Traffic	$ .37
Through[1] Traffic	1.93
Florida Origin or Destination	2.57
All Traffic	1.24

Note: (1) Excludes boat transits.

Source: Appendix I (Confidential).

As indicated by the data in Table 5 the unit savings estimates for the CFBC vary by traffic category between $.37 to $2.57 per ton with an average $1.24 per ton on all traffic.

FORECAST OF TONNAGE AND BENEFITS

This section reviews the forecasted tonnage, the capacity of the CFBC to handle the traffic, the estimated annual equivalent benefits, and additional and alternative benefit estimates.

(a) Forecasted Tonnage

The forecast approach is primarily based on utilizing OBERS projections as an index applied to the initial flow to

project its growth over the project life. OBERS projections directly related to the economic activities generating the traffic flow were selected for this purpose. In addition the forecast considered resource limitations such as mineable reserves, qualitative information on future market and industry prospects, and the nature of the commercial relationships of the movement identified in the initial traffic survey. Based on these factors, some movements were projected as nonincreasing.

Table 6 below, shows the forecasted tonnage by movement category.

Table 6

Forecasted Cross Florida Barge Canal
Tonnage by Movement Category,
1985, 2010, and 2035

Movement Category	Millions of Tons 1985	2010	2035	Percent Increase
Local Traffic	2.31	2.33	2.35	2%
Through Traffic	2.42	4.32	7.66	217
Florida Origin or Destination	.37	.58	.91	146
All Traffic	5.10	7.23	10.92	114%

Source: A. T. Kearney, Inc.

Note that the total traffic on the CFBC is forecasted to more than double over the 50-year project life 1985-2035.

Table 7 shows the forecasted tonnage by type of traffic--presently moving, planned future movement, and induced[1] by the waterway.

Table 7

Forecasted Cross Florida Barge Canal
Tonnage by Type of Traffic,
1985, 2010, and 2035

Traffic Category	Millions of Tons 1985	2010	2035	Percent Increase
Present	.82	1.66	2.97	262%
Future	1.98	3.27	5.65	185
Induced	2.30	2.30	2.30	0
All Traffic	5.10	7.23	10.92	114%

(c) CFBC Capacity Analysis

Based on the tonnage forecast and balance of CFBC movements between 1985 and 2035, it was possible to evaluate the probable CFBC traffic situation.

For 1985, the estimated total bargeload equivalent movements[2] eastbound are projected to be 2,700 loads per year. Based on a 365 day per year operation and tow size of 4.5 barges,[3] this annual volume average 1.7 eastbound tows per day.

(1) Traffic which develops as a result of a completed waterway.

(2) Excluding shrimp boat and yacht movements through the CFBC.

(3) Tow size varies from three to five barges per tow with an average (for analytical purposes) of 4.5 barges.

The westbound annual bargeload equivalent movements are slightly less than 1,000 loads per year. Thus, this creates a severe imbalance in traffic movements requiring a substantial number of empty barges in the westbound return (approximately 1,700 barges). In fact, the westbound empty returns are equivalent to 1.0 tows per day. Although westbound backhaul opportunities from the East Coast are limited, dolomite deposits at the CFBC offer backhaul opportunities to agricultural areas.

As indicated the eastbound or westbound shipments (loads and empties) average 1.7 tows per day. Thus, for both directions of CFBC movements, the capacity of the CFBC to handle 36 lockages per 24 hours is quite adequate to handle this amount of towing activity.

For the year 2035, the total bargeload equivalent movements[(1)] eastbound are projected at 7,710 loads per year. Based on 365 days per year operation and tow size of 4.5 barges, this annual volume averages 4.7 eastbound tows per day.

The westbound annual bargeload equivalent movements are slightly less than 2,900 loads per year and thereby requiring approximately 4,800 empty barge movements per year through the CFBC. The traffic imbalance for the year 2035 is

(1) Excluding shrimp boat and yacht movement through the CFBC.

considerably greater than shown for the 1985 traffic movements.

The projected CFBC traffic pattern of approximately five tows in each direction by the year 2035 does not pose a congestive or capacity problem for the CFBC (based on indicated capacity by the Corps of Engineers of 36 lockages per day). Once again, westbound backhaul opportunities from the East Coast are limited.

(d) Annual Equivalent Benefits

Using the tonnage forecast for the 50-year life of the CFBC together with the unit savings per ton, the transportation benefits were derived on an annual basis. These annual benefits were discounted to present value using three interest rates (2-7/8%, 5-7/8% and 6-7/8%). The annual equivalent benefits were derived by amortizing the discounted present value benefits of each movement over the 50-year project life using the same three interest rates, respectively.

The annual equivalent benefits for each interest rate were summarized by traffic categories and by movement categories. These summaries are shown in Table 8.

Table 8

Estimated Annual Equivalent Benefits Category

Traffic Category	Discounts Rate Calculation (Millions) 2-7/8%	5-7/8%	6-7/8%
Present	$3.79	$3.33	$3.20
Future	3.95	3.91	3.91
Induced	.86	.86	.86
All Traffic	$8.60	$8.10	$7.97
Movement Category			
Local Traffic	$ .88	$ .88	$ .88
Through Traffic	6.29	5.92	5.82
Florida Origin or Destination	1.43	1.30	1.27
All Traffic	$8.60	$8.10	$7.97

Source: A. T. Kearney, Inc.

As the table indicates, the total annual operation benefits range between $8.0 million and $8.6 million, depending on the discount rate selected.

(e) Additional and Alternative Benefit Estimates

This section briefly discusses several additional and alternative situations which can affect the final benefit estimate.

The possible establishment or conversion of two or three coal-fired utility plants in eastern Florida with an annual coal requirement per plant of 1.5 to 2.0 million tons could offer significant traffic potential for the CFBC.

The petroleum industry can have an impact on CFBC traffic in several ways.

1. The discovery of oil off the coast of Florida could result in crude oil movements to refinery locations permitting distribution of finished products via the CFBC.

2. The location of residual fuel oil distribution facilities along the CFBC could provide additional inbound tonnage.

The potential discovery of new mining and stone, sand and gravel deposits could increase the market share of these commodities in the traffic base. In addition, the discovery of new mining reserves for those companies already indicating shipments via the CFBC could offer increased benefit tonnage.

Kearney has forecast several movements at a constant rate throughout the life of the Canal due to the reserve limitations and commercial operations involved. Normal growth to maintain market share could be forecast if mineable reserves are able to be identified in the current production areas contributing movements.

A significant future movement is a 50 percent probability for movement through the CFBC based on the current status of the commercial relationship of the shipper and receiver. Should this movement go to an alternate location, a portion of tonnage and benefits currently included in the estimates would be eliminated. This decision will not be finalized until a future date.

Transportation benefits would be increased markedly for induced movements if regional transportation resources or savings estimates are utilized. In any event, substantial regional transportation benefits will arise from the induced movements. These are not included in the prior benefit estimates.

In summary, for these additional or alternative estimates, the total tonnage potential is in excess of 10 million tons annually with likely savings of $1.00 to $2.00 per ton. Altogether there is a potential of upwards of $15 million in benefits which have not been subjected to benefit estimation in this Interim Report. The Corps of Engineers will make a decision whether to study these potential benefits at a later date after the review of this Interim Report. In addition to

further information on other aspects (environmental, cost, etc.) of the CFBC, the passage of time is likely to help clarify energy policy and several other issues which could have a significant impact on the CFBC benefit base.

SUMMARY AND COMPARISON TO PRIOR STUDIES

This section includes a brief summary of the prior CFBC restudies and provides a comparison of the current study results with those of the previous studies.

The first restudy of the CFBC was concluded in June, 1958 by the Corps of Engineers, Jacksonville District. The key statistics of that restudy as well as the other restudies are summarized in Table 9 on the following page.

Table 9

Key Results of Economic Restudies
of the Cross Florida Barge Canal

	Number of Movements	Tonnage (Millions)	Average Unit Benefits (Per Ton)	Average Annual Benefits ($Millions)
Economic Restudy of Cross Florida Barge Canal, June, 1958	16	0.86	4.04	$7.63 (1)
Economic Evaluation of Cross Florida Barge Canal Project, March, 1962	16	0.86	4.04	7.19 (2)
Economic Evaluation of Cross Florida Barge Canal Project, A.D. Little, March, 1962	80	3.31	4.22	-
Cross Florida Barge Canal Chief of Engineers' Evaluations June, 1962	N.A.	0.98	2.93	7.23 (3)
Current Kearney Study	31	5.10	1.24	8.60 (4)

Notes: (1) Excludes recreational boating, discount rate = 2-1/2%.
(2) Excludes recreational boating, flood control or waterfront land enhancement; discount rate = 2-5/8%.
(3) Discount rate - 2-5/8%.
(4) Excludes recreational boating, flood control or waterfront land enhancement; discount rate = 2-7/8%.

Another restudy was conducted by the Corps of Engineers in 1962 to include other nontransportation oriented benefits not included in the 1958 restudy and an adjusted federal first cost. The new benefit categories included flood control and waterfront land enhancement. In addition, the interest rate used was 2-5/8% instead of 2-1/2% as in the 1958 restudy. The other key statistics of the restudy are shown in Table 9.

Arthur D. Little, Inc. was employed to update the benefit estimates of the 1958 restudy by the Corps of Engineers. This study developed a considerably greater number of CFBC movements, total tonnage and benefits as shown in Table 9.

The Chief of Engineers' Evaluation reviewed and updated all previous restudy results of cost and benefits. A summary of tonnage and benefit data is shown in Table 9.

The key results of this study are also shown in Table 9. Comparing the current study results with the previous restudies indicates that the current study has considerably greater tonnage than any of the prior studies. The unit benefits per ton are less, but the average annual benefits are almost twice those of the prior average annual benefits.