dustrial Development Division • ENGINEERING EXPERIMENT STATION
EORGIA INSTITUTE OF TECHNOLOGY

W. PEACHTREE ST., N.W.
.ANTA 8, GEORGIA

February 6, 1963

The Honorable Carl E. Sanders
Governor of Georgia
Atlanta

Dear Governor Sanders:

This special report outlining the vast space age, industrial, recreational and agricultural potentials which would be produced by a cross-Georgia waterway is being submitted in advance of the overall report in preparation on our study for the Georgia Aeronautics and Space Administration because of the importance of securing authorization for an engineering study by the U.S. Corps of Engineers as soon as possible.

The vast costs and inefficiencies presently required to transport large boosters and other equipment from production to testing and launching sites and often back for repairs can be substantially cut by the proposed waterway. The anticipated development of Georgia's coast as an inevitable and logical extension of the Cape Canaveral space complex gives the projected waterway additional import because of the increased efficiencies and lowered costs which would certainly accrue to future Georgia space operations.

The proposed waterway would have a tremendous impact also on the waterways of the nation as a whole. Georgia's protected inland waterway would then connect the Atlantic Intracoastal waterway to the vast Mississippi River system, as well as to the Great Lakes and their connecting waterways. A total of some 22,000 miles of navigable, protected waterways would then serve 33 states containing 82% of the nation's population.

The industrial development implications are almost unlimited. One of Georgia's least developed areas would be opened up to new industrial development which would otherwise be impossible. Our recent analysis of the Columbus area's potentials only suggests the possibilities. We estimated that, as a result of the opening up of the 9-foot channel on the Chattahoochee, Columbus can anticipate the development of a $300,000,000 chemical complex by 1975 if needed sites are provided. Without extensive study we cannot even estimate what the total might be for the 31 counties directly affected by the proposed cross-Georgia waterway.

Nor is this all. The tremendous lake which would be created would offer almost unlimited recreational and tourist industry potentials. Hydroelectric power production, flood control, and an increased and stabilized

water supply would also result. In addition, new agricultural potentials would be possible through irrigation.

The proposed waterway across Georgia offers many advantages over the much discussed cross-Florida canal. The Georgia route would eliminate the need for crossing open water. At the same time it offers a hurricane free route which Florida cannot provide.

Given the many potentials which the project offers not only for Georgia but for the entire nation and especially for the more rapid and more efficient development of the country's space age potentials, we strongly recommend that every effort be made to secure authorization of needed engineering studies by the U.S. Corps of Engineers as soon as possible as the first of the steps required to implement the plan.

We will be glad to work with you in any way we can as the project evolves.

Sincerely,

Kenneth C. Wagner, Chief
Industrial Development Division

KCW:mt

Project B-242

A CROSS-GEORGIA WATERWAY TO SERVE THE SPACE AGE

A Special Report to
Governor Carl E. Sanders

by
Wade McKoy

Industrial Development Division
Engineering Experiment Station
GEORGIA INSTITUTE OF TECHNOLOGY
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A CROSS-GEORGIA WATERWAY TO SERVE THE SPACE AGE

Water Site Requirements of the Space Industry

The equipment required to put man into space staggers the imagination. The facilities to put a man on the moon will far exceed in size and complexity any that have yet been devised. Although less glamorous than the more technical aspects of space flight, one of the many problems which confront the space program is the transportation of large boosters, upper stages and space craft between production, testing and launching sites. The significance of this problem is indicated by the fact that the Air Force and NASA, in preparing their programs, emphasize that water site facilities are a necessity. So essential is water transportation to the space program that prospective sites without access to water have been ruled out.[1/]

The part that water transportation will play is illustrated by NASA's Mississippi Test Facility, to be built near Picayune. The facility will have 15 miles of canals, consisting of a main canal with a branch canal to each test stand. It is designed to permit unloading rocket hardware directly from barges on to test stands.

Present NASA manned space facilities are all located east of the Rockies and on water transportation. These are located at Houston, Texas; New Orleans, Louisiana; Huntsville, Alabama; Picayune, Mississippi; and Cape Canaveral, Florida. (See Map 1.) The trip to and from Cape Canaveral presently requires travel in open water around Florida.

The Need for an Inland Gulf-Atlantic Interconnecting Waterway

A waterway between the intracoastal waterways of the Gulf and the Atlantic is critically needed to provide a shorter, better protected water transportation route between production and testing facilities using Gulf ports and launching facilities at Cape Canaveral, Florida.

The river systems of Georgia can be used to provide such an interconnecting waterway. The Flint-Apalachicola River flowing to the Gulf and

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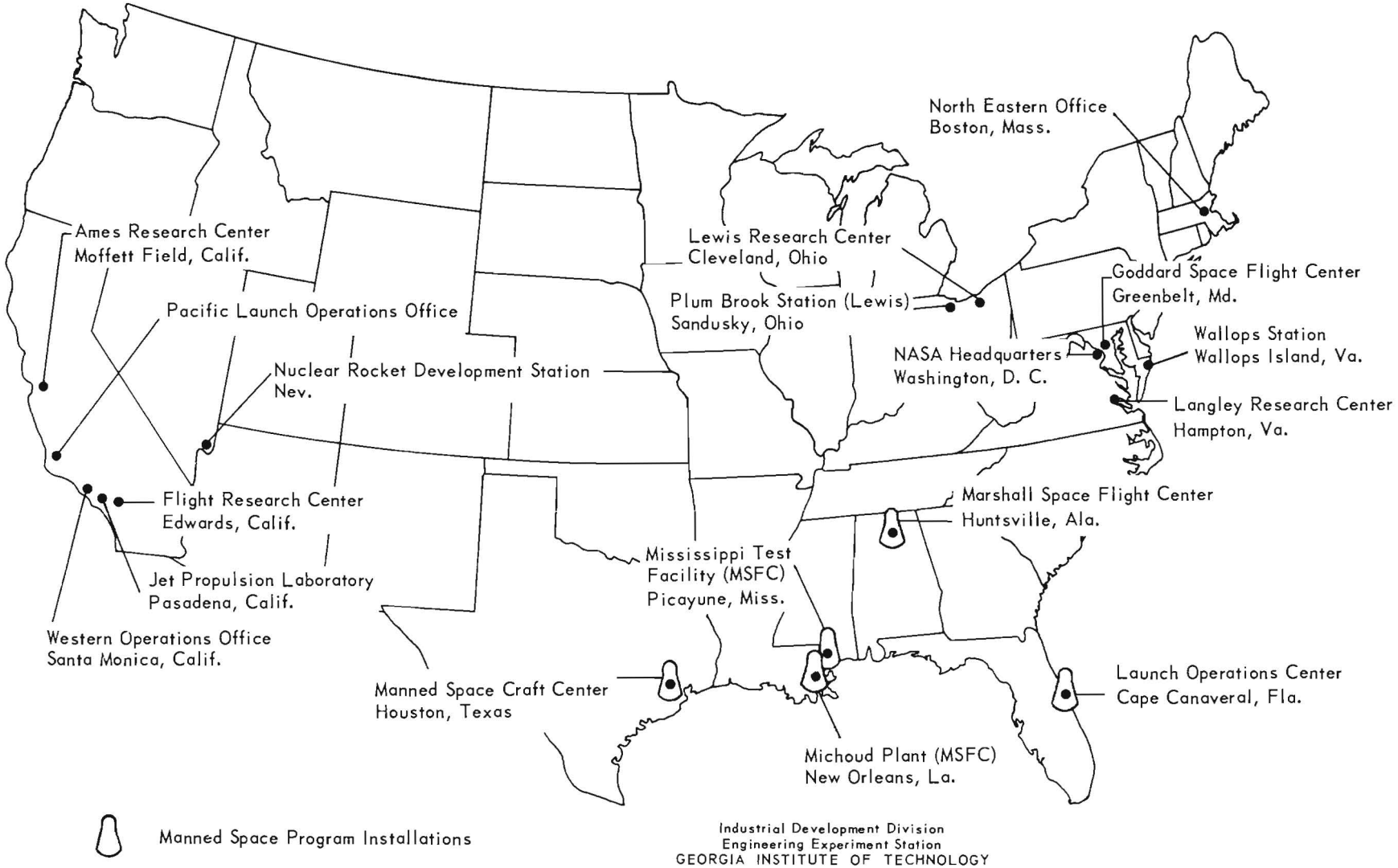
1/ An example is White Sands Proving Ground, New Mexico.

MAP 1

NASA INSTALLATIONS



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the Ocmulgee-Altamaha River flowing to the Atlantic have adjoining river systems. Several tributaries of each originate very close to each other. A system of locks and dams would provide navigable water for the river systems, and these could be joined with an interconnecting canal which could be less than one mile in length.

Plans have been considered for constructing a barge canal across Florida to provide a Gulf-Atlantic waterway. The U. S. Army Corps of Engineers estimates that a high-level lock barge canal 107 miles long across Florida would cost approximately $158 million. However, present plans still require navigation across a 150-mile stretch of open Gulf, and many barges and tugs cannot operate in the open sea. To resolve this problem, a protected coastline waterway could be constructed. An educated guess for the waterway along the Florida Gulf Coast is $120 million, bringing the total interconnecting system in Florida to approximately $280 million. Hurricane damage is an important consideration, however, since this section of the Florida coast has five times as many hurricanes as the Georgia coast.

An interconnecting waterway through Georgia would provide a more feasible route from the Gulf to the Atlantic. A thorough study of the Georgia interconnecting waterway should be made before construction work starts on the Cross-Florida Barge Canal.

Advantages of an Interconnecting Waterway through Georgia

In addition to its critical contribution to the space program, an inland Gulf-Atlantic interconnecting waterway through Georgia would benefit the nation, the region and the state in many ways.

The Atlantic Intracoastal Waterway from Miami to New Jersey would be connected to the Gulf Intracoastal Waterway and to the vast inland waterways of the Mississippi River system as well as the Great Lakes and their other connecting waterways. Present barge service would be greatly expanded, since much of the nation's inland waterway fleet cannot operate in unprotected waters. An integrated waterway system would be created, composed of approximately 22,000 miles of navigable, protected waterways serving 33 states containing 82% of the nation's population.

The route through Georgia offers protection from hurricanes and storms.

Georgia has the best record along the Atlantic and Gulf coasts of freedom from hurricane damage over the last 50 years.

The proposed interconnecting waterway would provide an economic stimulus to the area it spans. Of the 31 Georgia counties along the proposed waterway, 28 showed a loss in population due to migration from 1950 to 1960. The per capita income is only 54% of the U. S. average. Nineteen of the counties have been designated as redevelopment areas by the Area Redevelopment Administration. With the development of the waterway the area could be expected to become one of the nation's true "new frontiers," providing new jobs and helping in the drive to increase the country's rate of growth.

Other benefits from the development would be hydro-electric power production, flood control, recreational activities with opportunities for tourism, improved agriculture from irrigation, increased water supply, and river regulation.

Illustration of Proposed Georgia Waterway

One example of how an interconnecting waterway through Georgia could be developed is illustrated by Maps 2 and 3 and Figure 1. This example proposes a navigable waterway from the Gulf Intracoastal Waterway to the Atlantic Intracoastal Waterway of approximately 460 miles in length.

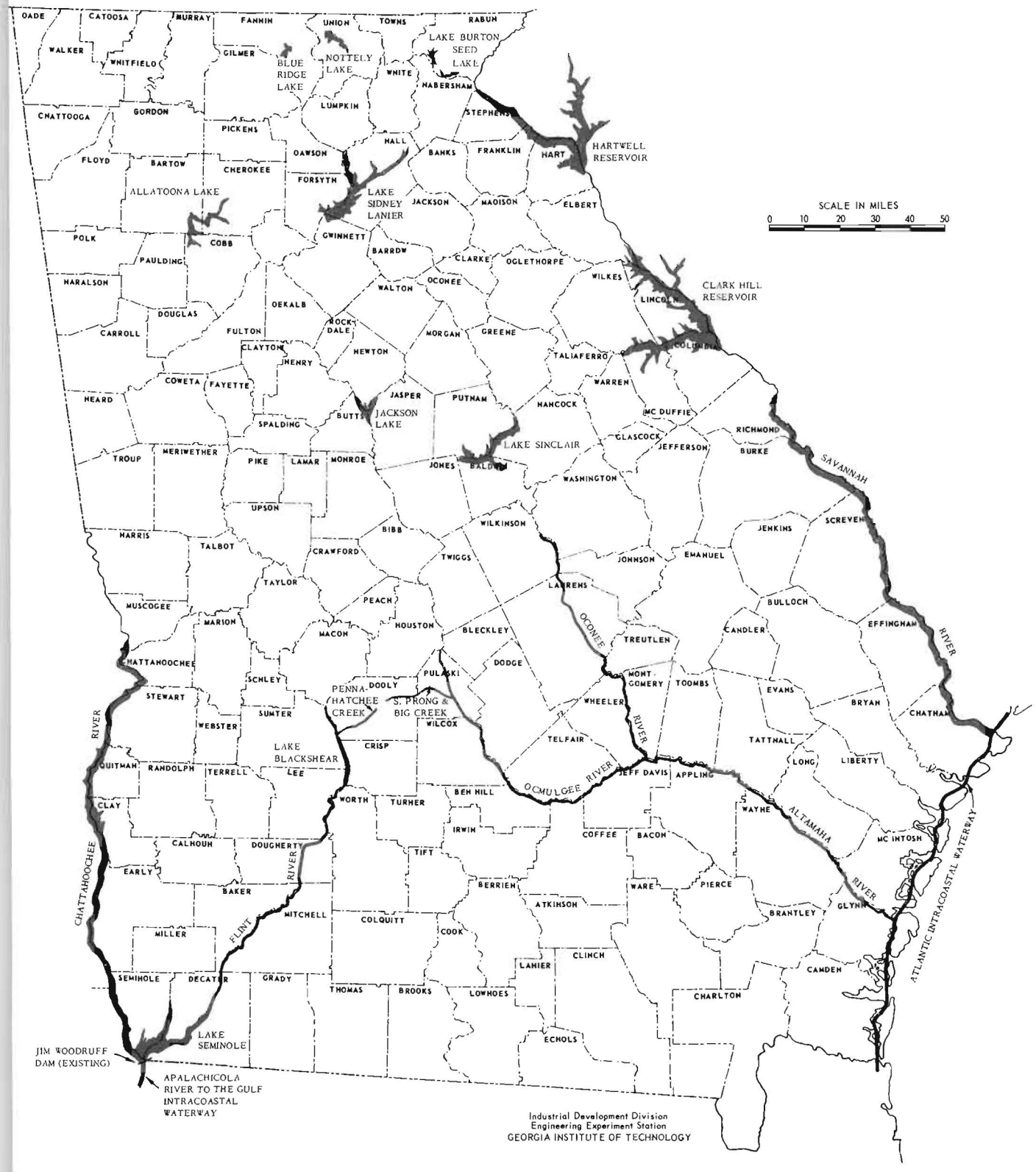
The location chosen for the interconnection of the river systems is the Pennahatchee Creek tributary of the Flint River in Dooly County and the South Prong Creek-Big Creek tributary of the Ocmulgee River in Pulaski County. (See Maps 2 and 3.) Locks and dams are used on the tributaries with a short canal (less than one mile long) across the ridge near Pinehurst. A profile is shown in Figure 1.

The top locks and dams and the canal have a relatively small watershed providing water for their operation. Supplementary water could be provided by a reversible pumped storage system which would also provide electric power during peak demand periods. The principle of reversible pumped storage is explained in a later section.

Ten locks and dams are used in the illustration. The Jim Woodruff Lock and Dam on the Flint-Apalachicola River is in operation and provides a navigable channel to Bainbridge. The next two dams have been proposed by the

MAP 2

PRESENT STATUS OF RIVERS AND CREEKS IN THE AREA USED FOR ILLUSTRATING A CROSS GEORGIA WATERWAY



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MAP 3

ONE EXAMPLE OF THE PROPOSED GEORGIA WATERWAY CONNECTING THE GULF AND ATLANTIC INTRACOASTAL WATERWAYS

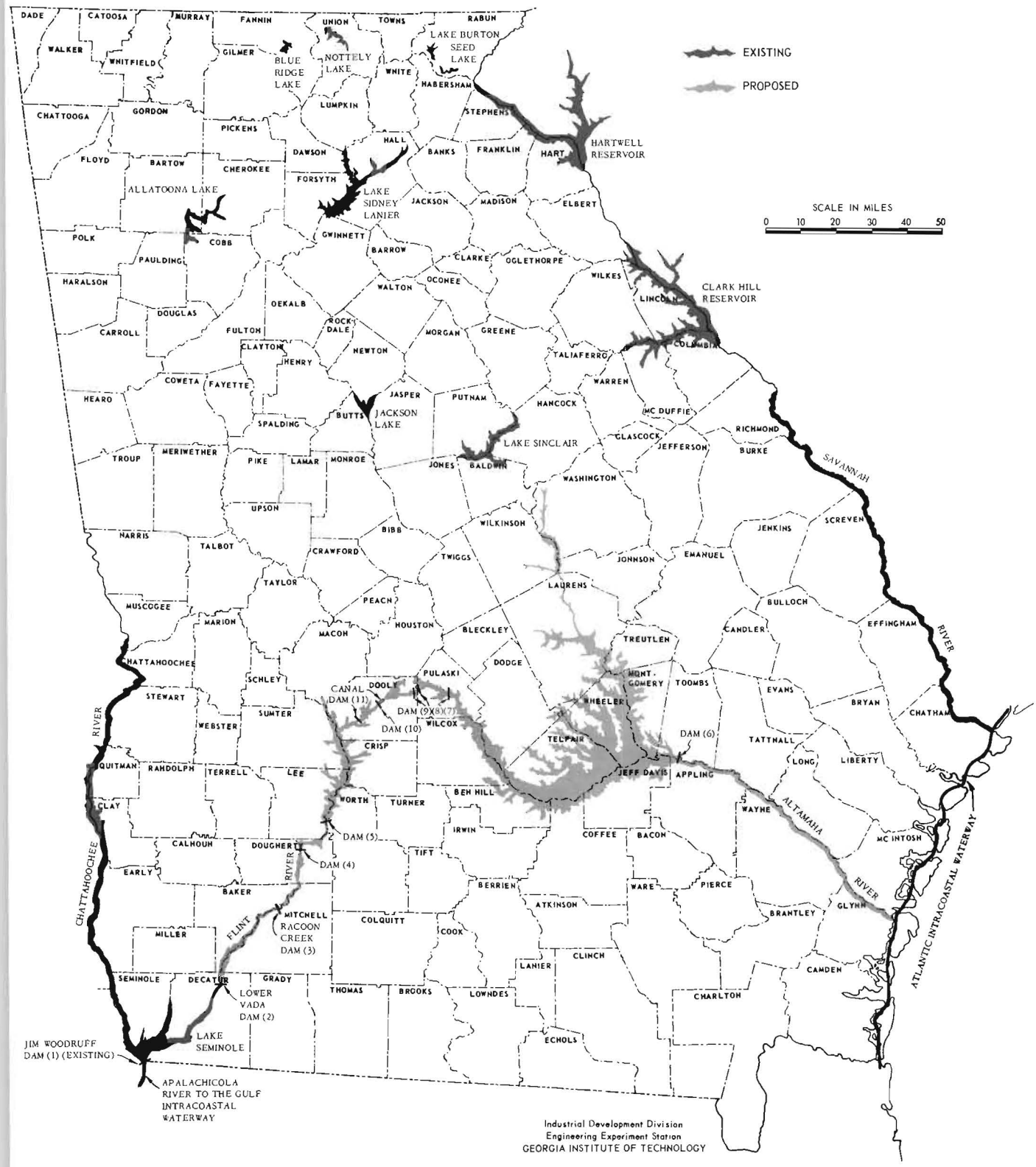
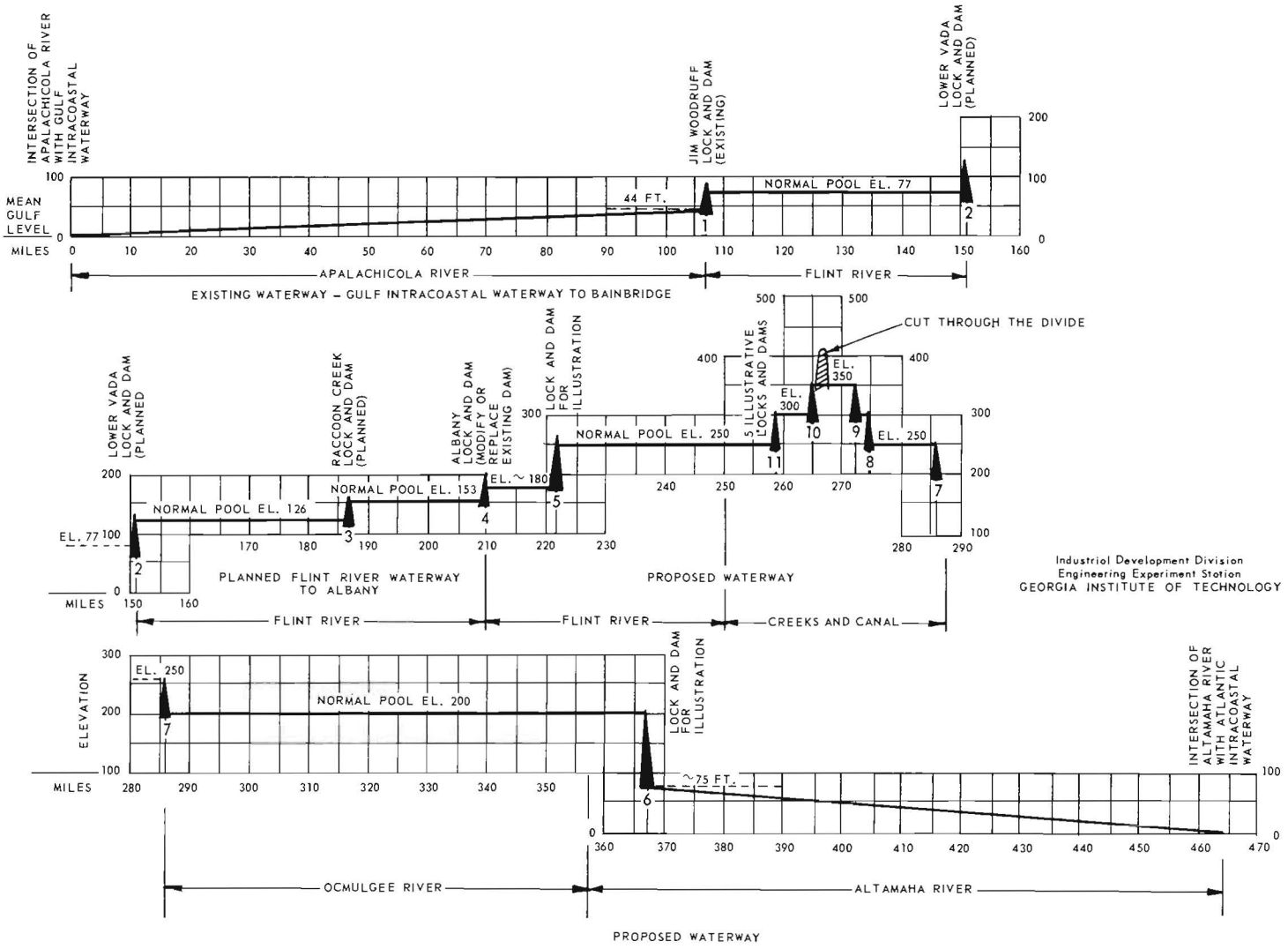


FIGURE 1

PROFILE OF THE PROPOSED INTERCONNECTING WATERWAY THROUGH GEORGIA



U. S. Army Corps of Engineers in their survey report of the Flint River in order to extend the navigable waterway to Albany, Georgia.

The illustrated plan would enlarge the Georgia Power Dam at Albany and inundate the Crisp County Dam. The 250-foot elevation pool on the Flint River would be a lake comparable in size to either Lake Lanier, Lake Allatoona or Lake Seminole.

Navigation on the lower Altamaha would be provided by dredging and improving the natural channel. Sufficient water flow would be maintained from the reservoir up river, tentatively designated "Great Georgia Lake."

Special Features of the Proposed Georgia Waterway

Great Georgia Lake. The proposed dam on the Altamaha River, located a short distance upstream from the U. S. Highway 1 bridge, would form a lake of approximately 500,000 acres (about 780 square miles). The head of water at the dam would be approximately 125 feet, with the top level of the reservoir approximately 200 feet above sea level.

This Great Georgia Lake would be the largest man-made lake in the United States. It would be larger than Lake Okeechobee in Florida. The only lakes in the United States larger than the proposed lake are the Great Lakes and the Great Salt Lake.

This lake would provide several special benefits in addition to being a part of the Georgia interconnecting waterway. It would extend navigation up the Oconee River and Buffalo Creek into the clay belt to about two miles north of Sandersville, Georgia. Benefits would accrue from the transportation cost savings to companies engaged in the extensive mining operations in the area. About 74% of all kaolin mined in the United States comes from Georgia and is shipped long distances to other regions. Much of this clay is now shipped to Ohio for tile production.[1/] At present transportation costs exceed the value of the clay.

1/ Kennon, Walter and William E. Durrett, Ceramic Floor and Wall Tile: A Manufacturing Opportunity in Georgia, Industrial Development Branch, Engineering Experiment Station, Georgia Institute of Technology, December, 1958.

A major agricultural development in the Satilla River watershed could be supported by irrigation waters diverted from the proposed Great Georgia Lake. The irrigation ditches would feed agricultural land in the following seven counties: Appling, Bacon, Brantley, Camden, Jeff Davis, Pierce and Wayne. This is possible because several tributaries in the Satilla River watershed originate very close to the proposed Great Georgia Lake, being separated by low terrain. The height of the divide above the lake is estimated to range from a few feet up to 50 feet.[1/] Seven creeks in the Satilla River watershed are in the area of possibility, and the required irrigation ditches would range from two to 10 miles in length. The creeks and approximate lengths of the irrigation ditches are:

Sweetwater Creek	5 1/2 miles	Blackwater Creek	7 miles
Bishop Creek	5 miles	Big Satilla Creek	9 miles
Burket Creek	3 1/2 miles	Hurricane Creek	2 1/2 miles
Whitehead Creek	6 miles		

Inland Port Cities. Along the proposed waterway there are 27 Georgia towns and cities. Although the exact location must be determined through studies by the U. S. Army Corps of Engineers, the illustration worked out for this report shows six towns and cities on the waterway and 21 within 10 miles. Listed in Table 1 are the towns and cities, the straight line distance to the waterway, and the section of the waterway where they are located. In addition, many smaller Georgia communities are located along the waterway.

Some communities will be able to bring the waterway closer than indicated by digging or dredging a channel. For example, Oglethorpe and Montezuma are located about five miles above the waterway on the Flint River, and it should be possible to extend the navigable channel up to the two towns by dredging.

The proposed waterway does not include navigation to Macon. However, the head of navigation on the Ocmulgee River is only approximately 50 miles below that city. Subsequent development of the Ocmulgee can bring barge transportation to Macon.

1/ Closer estimates are not possible because available topographic maps of the area have 50-foot contour intervals.

Table 1

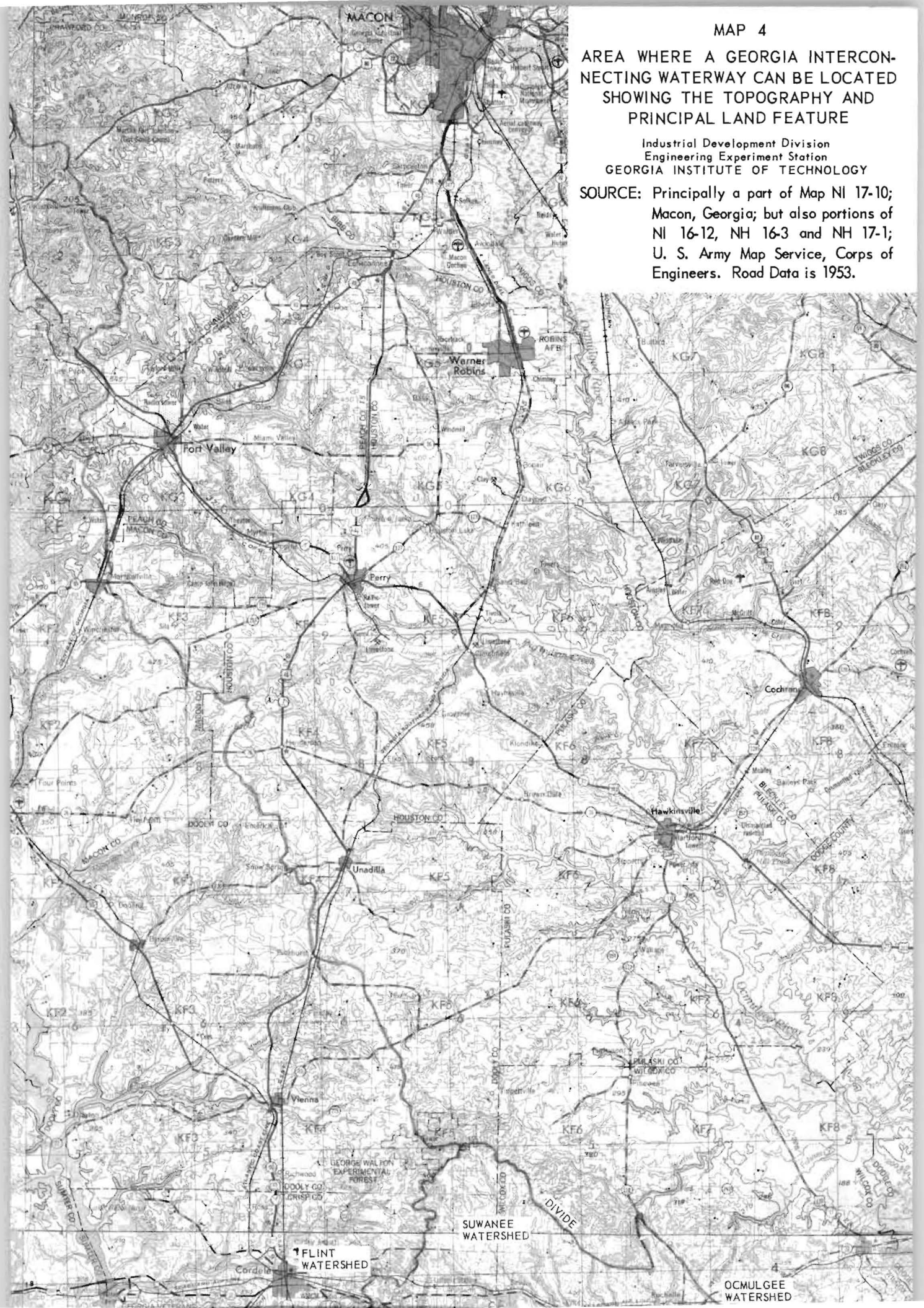
CITIES AND TOWNS ALONG THE PROPOSED WATERWAY

Place	Distance to the Waterway, Miles	Location on Waterway
Abbeville	On the waterway	Great Georgia Lake
Albany	On the waterway	Flint River
Dublin	On the waterway	Great Georgia Lake
Glenwood	On the waterway	Great Georgia Lake
Hazlehurst	On the waterway	Great Georgia Lake
McRae	On the waterway	Great Georgia Lake
Americus	10	Big Flint Lake Area
Baconton	1	Flint River Area
Baxley	7 1/2	Great Georgia Lake Area
Broxton	7 1/2	Great Georgia Lake Area
Byronville	5	Big Flint Lake Area
Camilla	7	Flint River Area
Cordele	1	Big Flint Lake Area
Dudley	2 1/2	Great Georgia Lake Area
Eastman	6 1/2	Great Georgia Lake Area
Fitzgerald	5	Great Georgia Lake Area
Hawkinsville	3	Great Georgia Lake Area
Leesburg	1/2	Lake at Albany Area
Milan	1 1/2	Great Georgia Lake Area
Montezuma	5	Big Flint Lake Area
Oglethorpe	5	Big Flint Lake Area
Sandersville	6	Great Georgia Lake Area
Soperton	1	Great Georgia Lake Area
Tennille	6 1/2	Great Georgia Lake Area
Unadilla	2 1/2	Canal Area
Vidalia	5 1/2	Great Georgia Lake Area
Vienna	1 1/2	Big Flint Lake Area

Supplemental Considerations of the Proposed Georgia Waterway

Interconnecting the Flint and Ocmulgee Waterways. The northern limit for connecting the Flint and Ocmulgee waterways is the fall line, which runs through Georgia from Columbus through Macon to Augusta. The limit on the south is where the watersheds of the two rivers adjoin each other. (See Map 4.)

Three methods are considered feasible for interconnecting the two waterways. One method is to use a canal which would cut deep through the dividing ridge. The canal would join reservoirs at equal pool levels on each river. The interconnecting canal would not have any locks.



MAP 4

AREA WHERE A GEORGIA INTERCONNECTING WATERWAY CAN BE LOCATED SHOWING THE TOPOGRAPHY AND PRINCIPAL LAND FEATURE

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SOURCE: Principally a part of Map NI 17-10; Macon, Georgia; but also portions of NI 16-12, NH 16-3 and NH 17-1; U. S. Army Map Service, Corps of Engineers. Road Data is 1953.

Another method is the one used in the illustrated example. Locks and dams are built on the tributaries of both rivers, bringing navigable water up to the dividing ridge. A short canal through the ridge connects the two. Water to operate the upper locks can be supplemented by using reversible pumped storage, since the top lock, dam and canal have a small watershed. This would also provide electric power during peak demand periods.

The third method is to build a canal from a high reservoir on one river through the dividing ridge and connect to the other river system. This plan would eliminate four locks and dams (Locks and Dams Nos. 8, 9, 10 and 11 on Figure 1 and Map 3). The divide cut would be approximately 11 miles long instead of 0.6 miles for the method used in the illustration. The deepest cut would be less than 175 feet deep, as compared to less than 75 feet for the short canal. In comparison, the Tennessee-Tombigbee waterway requires a divide cut approximately 27 miles long, and the deepest cut is 175 feet.

Reversible Pumped Storage. Reversible pumped storage (also called pumped storage) involves pumping water up to a high reservoir during evening and week-end hours when demand for power is slack. Power for the pumps is provided by generating capacity that would be idle otherwise. When demand for power reaches a peak, the water is sent back down hill to turn generators to produce electricity.

Interest in pumped storage plants has been spurred by the development in the past 10 years of versatile equipment that can both pump and generate. Capital costs have been reduced greatly by the new equipment.

One plan presented for the interconnecting canal between the Flint and Ocmulgee waterways uses pumped storage to insure an adequate supply of water to operate the uppermost locks even during drought.

An example of pump storage is the Taum Sauk plant near St. Louis, Missouri, which is the largest of seven reversible pumped storage facilities now operating in the U. S. Five more are under construction or planned in various parts of the country. The largest of these is a 1,350,000 kilowatt station planned by Consolidated Edison Company on the Hudson River near Cornwall, New York.

Tennessee-Tombigbee Waterway Comparison. The Tennessee-Tombigbee Waterway will be located in Alabama and Mississippi. (See Map 5.) When constructed it will provide an alternate route to the Mississippi River route,

MAP 5

VICINITY OF PROPOSED WATERWAYS

shortening the distance between certain points. The federal government's first cost for construction is estimated to be approximately $260 million. The project was authorized by Congress in 1946. A profile is shown in Figure 2.

The Tennessee-Tombigee Waterway will be approximately 200 miles long. The present upper pool of the Tombigbee is 73 feet above sea level. The new waterway will provide a lift of 341 feet by using 10 locks and five dams. A cut through a divide is planned that will be 27 miles long. The maximum depth of the cut at the peak of the divide will be about 175 feet. Also included in the plan is a canal section 45 miles long which will be constructed partly by excavation and partly by construction of levees.

The comparison is tabulated in Table 2 and includes the Cross-Florida Barge Canal.

The Need for U. S. Army Corps of Engineers Study

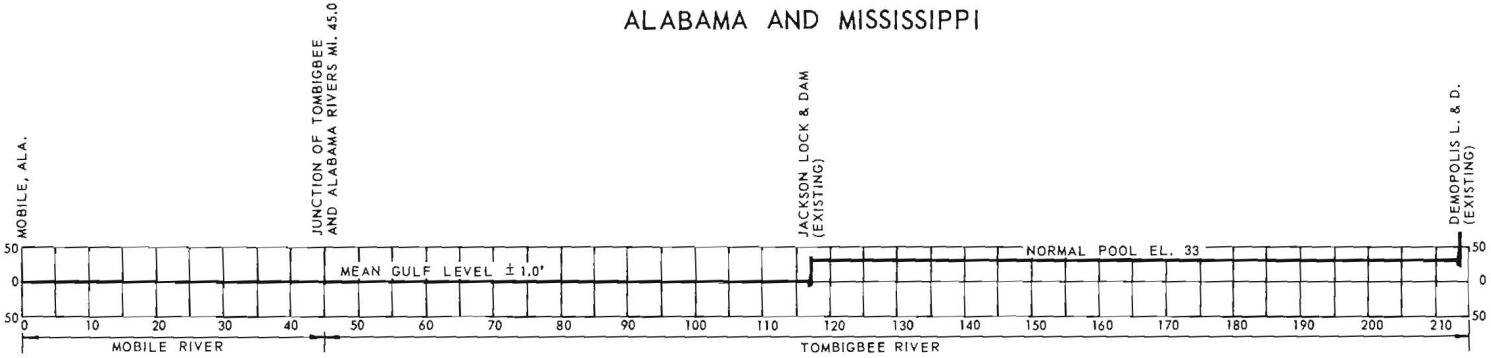
The proposed development of an interconnecting waterway through Georgia provides an illustration of what appears to be a feasible approach to the solution of a space program transportation problem. In addition, it offers tremendous potential for the economic development of the state, region and nation.

It is apparent that the actual amount of relocation required can only be determined after an engineering study has been made. Preliminary study has revealed no insurmountable obstacle to implementing the proposed project, since the large lake area in the proposed waterway is sparsely populated, and there are relatively few people, roads and railroads in the proposed inundated areas.

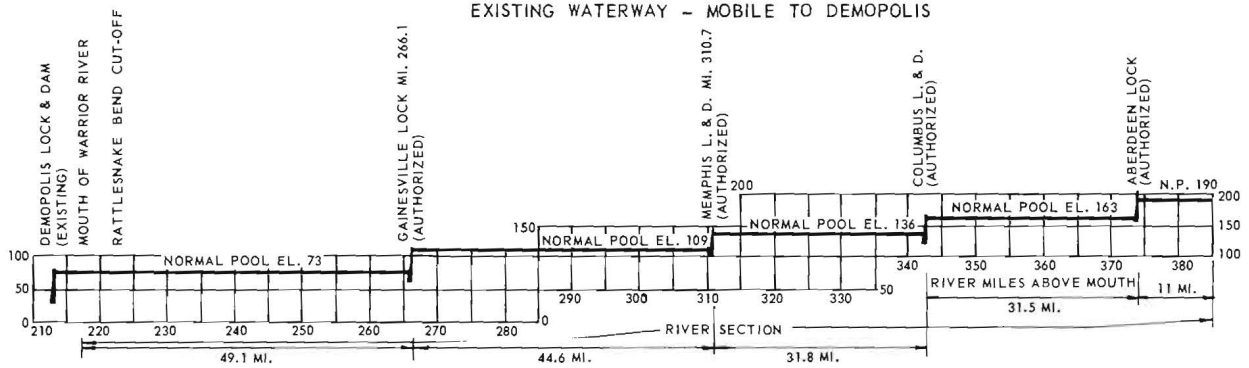
A detailed study by the U. S. Army Corps of Engineers will therefore be required to formulate the optimum plan of development.

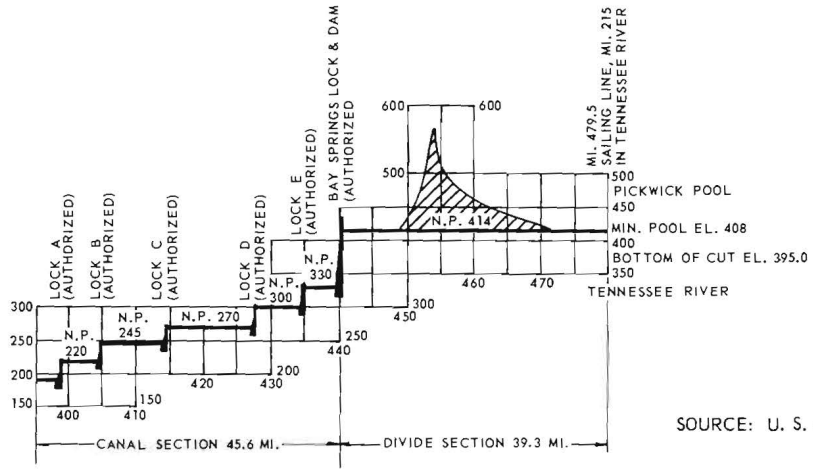
FIGURE 2

PROFILE OF THE TENNESSEE-TOMBIGBEE WATERWAY
ALABAMA AND MISSISSIPPI



EXISTING WATERWAY – MOBILE TO DEMOPOLIS





PROPOSED TENNESSEE–TOMBIGBEE WATERWAY

SOURCE: U. S. Army Corps of Engineers

Table 2

COMPARISON OF THE PROPOSED GEORGIA WATERWAY
WITH TWO WATERWAYS AUTHORIZED BY CONGRESS

	Tennessee-Tombigbee Waterway	Proposed Georgia Waterway: Up The Divide Plan	Proposed Georgia Waterway: Through The Divide Plan	Cross Florida Barge Canal and Connecting Gulf Intracoastal Canal
Total length of new waterway	200 mi.	313 mi.	313 mi.	260 mi.
Number of new dams	5	9	5	2
Number of new locks	10	10	6	5
Length of canals and divide cut (miles)	72	0.6	11	107
Deepest cut (feet)	175	less than 75	175	about 77
Estimated cost in millions of dollars	$260	--	--	$280