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DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

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ILLINOIS RIVER
LIVERPOOL, ILLINOIS

WITH FINAL ENVIRONMENTAL IMPACT STATEMENT

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OCTOBER 1989



US Army Corps
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Rock Island District

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FOR
SECTION 205 FLOOD CONTROL

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ACKNOWLEDGEMENT

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US Army Corps of Engineers
Rock Island District

WE'RE PROUD TO SIGN OUR WORK

SYLLABUS

The village of Liverpool is located along the Illinois River in Fulton County, Illinois. The village lies on the riverside of an agricultural levee and frequently suffers severe flooding. Consequently, in 1983, the village requested the Corps of Engineers' assistance. In response to their request, the Rock Island District completed reconnaissance reports in 1983 and 1985. Based on the findings of these studies and continued interest by local officials, the District conducted a detailed project study.

The Corps of Engineers evaluated several flood control alternatives, which included levees at various protection levels and permanent evacuation.

The selected plan consists of constructing a levee to protect the village which ties into the agricultural levee. The levee would be built to a 50-year level of protection, which is the level of the existing agricultural levee. The plan would include a gravity outlet and a pump station for interior drainage, three road ramps, raising a parking area, and approximately 4,395 feet of levee ranging in height from 3.5 to 17.5 feet.

The draft Definite Project Report was distributed to the public and reviewed. The responses to comments are contained in this final report. In response to concerns expressed by the Liverpool Drainage and Levee District, this report proposes another borrow site in addition to the one recommended in the draft report.

The entire cost of Liverpool's flood protection is $1,511,000. This cost will be divided into a $1,123,450 Federal contribution and a $387,550 non-Federal share. The average annual economic costs, including operation and maintenance, are estimated at $134,600, using an 8-5/8 percent annual interest rate. The corresponding average annual benefit for this plan is estimated to be $236,700, with a benefit-to-cost ratio of 1.80 to 1.0.

The average annual economic costs and benefits, using an annual interest rate of 8-5/8 percent, are $140,900 and $245,100, respectively. The benefit-to-cost ratio remains 1.8 to 1.0.

DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

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A	Hydrology and Hydraulics
B	Geotechnical
C	Detailed Cost Estimate
D	Economic and Social Analysis
E	Cultural Resources
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DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

SECTION 1 - INTRODUCTION

This report presents the results of an investigation of the flooding problems along the Illinois River within the village limits of Liverpool, Illinois. The village initially requested an investigation in a letter to the Rock Island District dated January 18, 1983 (appendix F). A reconnaissance report was completed in February 1985. This study was initiated in April 1985.

STUDY AUTHORITY

Congress allows the Secretary of the Army under Section 205 of the 1948 Flood Control Act, as amended, to authorize construction of certain small flood control projects which are economically feasible, environmentally sound, and complete in themselves, provided the total Federal investment does not exceed $5,000,000.

STUDY PURPOSE AND SCOPE

The purpose of the feasibility study is to determine if there is a Federal interest in a water resources project at Liverpool, Illinois, and the scope and scale of the project. This Definite Project Report (DPR) documents analyses performed in previous studies and contains the recommendation for project approval.

STUDY AREA

The study area includes the village of Liverpool, Illinois. The community is located in Fulton County on the west bank of the Illinois River, approximately 30 miles southwest of Peoria, Illinois (see plate 1).

TYPE, DEPTH, AND DETAIL OF INVESTIGATIONS

This report summarizes the results of analyses in the areas of hydrology and hydraulics, foundation and materials, engineering, economics, environment, and archeology. The study was conducted in sufficient detail to determine the economic feasibility of various flood control plans and to select a potential plan to be recommended for implementation. An environmental analysis also was conducted. The report contains sufficient detail to allow authorization of construction of the project and preparation of plans and specifications.

RELATED STUDIES, REPORTS, AND EXISTING WATER PROJECTS

Studies and reports that are pertinent to this study include:

a. Flood Insurance Study, Village of Liverpool, Illinois, Fulton County, by the Federal Emergency Management Agency, Federal Insurance Administration, Final Report, December 1980.

b. Reconnaissance Report on Flood Problems at Liverpool, Illinois, Under Section 205 of the 1948 Flood Control Act, as Amended, by the Chicago District, Corps of Engineers, dated June 1976. The report recommended that no Federal action be taken.

c. Reconnaissance Report for Section 205 Flood Control, Illinois River, Liverpool, Illinois, by the Rock Island District, Corps of Engineers, dated August 1983. The report recommended that additional, more detailed studies be undertaken for a levee protection plan.

d. Reconnaissance Report for Section 205 Flood Control, Illinois River, Liverpool, Illinois, by the Rock Island District, Corps of Engineers, dated February 1985. The report recommended that a Detailed Project Study (DPS) be undertaken for the village.

Two existing Federal projects are located in the vicinity of Liverpool:

a. The Flood Control Act of 1936 authorized the construction of a setback levee and improvement of existing levees to protect the farmland surrounding Liverpool. This project, completed in 1941, included the construction of two levees. One levee, about 7 miles in length and located immediately north and west of Liverpool, protects the Liverpool Drainage and Levee District. The other levee, also approximately 7 miles in length and located east of the village, protects the East Liverpool Drainage and Levee District. Neither levee protects the village of Liverpool.

b. The River and Harbor Act of January 21, 1927, as presented in House Document No. 4, 69th Congress, 1st Session, and in Senate Document No. 130, 69th Congress, 1st Session, authorized the construction of a navigation channel on the Illinois River, 9 feet deep and 200 feet wide from the mouth to Utica, 231 miles upstream. Liverpool is located between river miles 127.5 and 128.2.

SECTION 2 - PLAN FORMULATION

ASSESSMENT OF WATER AND LAND RESOURCE PROBLEMS AND OPPORTUNITIES

EXISTING CONDITIONS

General

The village of Liverpool, a small residential community of approximately 200 people, is located on the riverside of an agricultural levee. The entire community is in the 100-year floodplain, making the village subject to frequent and severe flooding. In past years, flood damage in Liverpool has been substantial. Severe floods occurred in 1973, 1974, 1979, twice in 1982, and 1985. Further complicating the problem are the hydraulic and hydrologic characteristics of the lower Illinois River, which cause flood-waters to rise slowly, continue for long periods, and recede slowly.

During the average flood year, the river is out of its banks approximately 90 days. During the 1979 flood, residents were displaced for 1.5 to 2 months. High water from the December 1982 flood persisted for 1 month. Local businesses were disrupted 1 to 2 months during a 1-year period in 1982 and early 1983.

The severe flooding has caused many residents to vacate their homes. In 1983 when the Rock Island District initiated its first phase of study, there were 60 occupied houses, 12 occupied trailers, 18 unoccupied houses, and 13 unoccupied trailers. The property in the village was insured for $1,953,000 under the National Flood Insurance Program. By May of 1986, following several severe floods, there were 34 occupied houses and 15 occupied trailers. The vacated properties included 36 houses and 7 trailers. Flood insurance in effect in 1986 was $1,267,000 (53 policies). Some reoccupation of residences occurred during the summer and fall of 1986, signaling a potential change in the trend to leave Liverpool. In June 1987, there were 70 occupied residences in the village.

The National Flood Insurance Program has paid a significant amount of claims for flood damage since Liverpool began participating. The record of payments is shown in table 1.

TABLE 1

Flood Insurance Claims and Insurance in Force, Liverpool, Illinois

Year	Claims	Amount Paid ($) Actual	Amount Paid ($) 1986 Prices	Policies	Total Insurance ($)
1978	-	-	-	58	962,000
1979	50	502,200	733,200	87	1,656,100
1980	-	-	-	82	1,656,800
1981	-	-	-	71	1,627,800
1982	126	58[illegible],200	783,600	87	Unavailable
1983	25	70,800	75,000	80	1,952,700
1984	2	15,300	15,600	88	2,061,000
1985	85	300,100	303,100	55	1,331,000
1986	Unavailable	Unavailable	-	53	1,266,80[illegible]

The Federal Emergency Management Agency (FEMA) has been active in the Liverpool area under its 1362 Program. The program provides for the acquisition of properties damaged severely in one flood (50 percent of insured value) or in three floods (25 percent of insured value). Following a severe flood in 1982, FEMA proposed a 1362 Program for the village which included the purchase of 21 properties. The village then would have been responsible for demolishing the structures, assuming title to the property, and assuming ultimate responsibility for maintenance of the property. The village turned down the FEMA proposal because, although some residents would be moved from the floodplain, a majority would remain and would incur the additional costs of supporting village services with a reduced tax base.

Hydrology and Hydraulics

Liverpool is located on the right bank of the Illinois River at river mile 128.0. The drainage area of the Illinois River at Liverpool is about 16,400 square miles.

Flooding in Liverpool is caused by frequent high stages on the Illinois River. Most flooding occurs during late winter and early spring and is generally caused by snowmelt or a combination of snowmelt and heavy rainfall. Flooding characteristics are unique on this portion of the river because of the flat gradient of the natural river channel. This causes floodwaters to rise slowly, persist for long durations, and recede slowly. Consequently, Liverpool residents have at least 3 days warning to place sandbags and to prepare for flood stages. Discharges for major floods at Liverpool are listed in table 2.

TABLE 2

Floods of Record
Illinois River at Liverpool, Illinois

Date	Peak Discharge (ft^3/s)	Elevation (NGVD)
Apr 22	60,500	447.3
Oct 26	62,500	448.5
May 43	83,100	* 452.1
Apr 44	64,200	448.0
May 70	63,300	449.0
Jun 74	71,900	448.9
Mar 79	74,800	450.9
Mar 82	70,700	450.4
Dec 82	84,700	450.5
Apr 83	71,600	448.8
Mar 85	78,800	451.3
Nov 85	67,100	450.1

* Highest Recorded Elevation

The discharges and elevations relating to various frequencies of flooding are:

Frequency	Discharge (ft^3/s)	Elevation (NGVD)
50	123,800	452.5
100	132,900	454.2
500	152,000	457.8
SPF	196,800	464.0

Human Resources, Development, and Economy

The population of Liverpool in 1983 was approximately 250. Since 1983, some residents have vacated their homes because they have been unwilling or unable to repair flood damage. Although the 1986 population fell below 200, vacant properties are being reoccupied by both property owners and tenants.

Ten special use properties are located in the village, as identified below:

Riverview Inn Restaurant
Turk's Wheel Alignment Shop
Tire Repair Shop Body Repair Shop
Church
Vacant Brick Building
Fire Department
Boat Ramp and Parking Area
Village Hall
City Park Shelter and Equipment

The commercial businesses in Liverpool provide services to residents of the village, the surrounding agricultural area, and nearby communities. In addition, these businesses serve recreationists using the Fulton County boat ramp in Liverpool. No manufacturing establishments are located in the village.

Liverpool's labor force includes approximately 53 percent of the community residents. For the most part, residents must find work in Peoria or other larger urban centers nearby. Nearly 80 percent of Liverpool's employed labor force work is in blue collar occupations. Severe unemployment plagues Fulton County, and the local economy is depressed. Liverpool's unemployment rate reached 14.4 percent in 1984.

Damages from flooding in Liverpool begin at a 2-year frequency flood (zero damage point). Total estimated average annual damages equal $557,400. The record of historical flood damage, including both village and private losses is as follows:

Flood Date	Estimated Village Cost ($) (Jan 87 Price Levels)	Estimated Private Loss ($) (Jan 87 Price Levels)
April 1979	54,000	758,000
March 1982	24,600	234,000
December 1982	7,700	550,000
March 1985	11,600	690,900

None of the floods exceeded a 40-year frequency.

Cultural Resources

Numerous prehistoric and historic archeological sites are known in the immediate vicinity of Liverpool. Current evidence indicates that the area was utilized periodically from the Middle Archaic period (ca. 5000 B.C.) through the Mississippian period (1400 A.D.). The most extensive use of the area occurred during the Early and Middle Woodland periods approximately 2,000 years ago.

Archeological resources important to understanding the prehistory of the Midwest region have been discovered within the proposed construction area for the Liverpool project. Detailed information on the resources present and the impact proposed construction will have on significant resources is presented in Appendix E - Cultural Resources and in the Final Environmental Impact Statement (FEIS).

Environmental Setting and Natural Resources

Geology and Soils

The village of Liverpool is located on a low terrace remnant of Henry formation, a glacial outwash which consists mainly of fine to coarse sand and sandy gravel. The surface of the terrace is 5 to 15 feet above the floodplain.

The floodplain soil deposits consist of recent Cahokia alluvium in the form of clayey and sandy silt, in addition to small pockets of silty sand and gravel. Borings taken show the alluvium to be 8 feet thick, consisting of fat clay, sandy lean clay, and clayey sand.

Climate

The climate of Fulton County is humid continental and is characterized by cold winters and hot summers. The annual mean temperature is 53 degrees F. (11.4 degrees C.). The mean winter temperature is 28.3 degrees F. (-2.1 degrees C.). Temperatures between 90 degrees F. (32 degrees C.) and 100 degrees F. (38.1 degrees C.) are common during July and August. The average annual precipitation is 35.5 inches (90.2 cm). The average snowfall is 23 inches (58.4 cm).

Air Quality

Consultation with the Illinois Environmental Protection Agency has determined that air quality in the village of Liverpool and vicinity is generally good, with no apparent violations of air quality standards.

Noise

Noise levels within Liverpool are generally typical for a small urban area. Ambient noise levels are low and result from local vehicle traffic in and around the village.

Fish and Wildlife

Wildlife habitat value is marginal because of the limited area and human disturbance. Small mammals expected to use the study area include mice, voles, rabbits, possums, skunks, and raccoons. Deer also may use the perimeters occasionally. Songbirds would utilize the study area. Reptiles and amphibians would be expected to be found, particularly in the moister areas and along the streambanks.

Threatened and Endangered Species

There are two federally endangered species listed for Fulton County, Illinois: the Indiana bat and the bald eagle. However, no suitable habitat exists for either species within the study area.

FUTURE CONDITIONS WITHOUT PROJECT

General

It is difficult to predict what will happen if there is no Federal (Corps of Engineers) involvement through a flood control plan. During the 1978-1983 period, the community suffered severe flooding several times and the residents remained in the village, using flood insurance benefits to reinvest in their homes and businesses. Some residents raised their homes to a level above the 100-year flood. Based on this period, it could be assumed that residents would continue living in the village, perhaps a few continuing the trend of floodproofing (raising) houses.

The situation changed in 1984 when 88 flood insurance policies were in effect. In March and November 1985, high water occurred. By June 1986, only 53 policies were in effect. Based on that trend, it could be assumed that if flooding would continue, vacating of properties in the village would also continue. However, by June of 1987, occupation levels were near those of 1983.

The future is likely to be somewhere between these two trends. Although some vacating of properties will likely continue following flooding, rehabilitation of other properties also is likely. Severe unemployment plagues the county and the economy is depressed. In spite of this, many persons find Liverpool an attractive community because property can be acquired inexpensively and property taxes are very low. Most of the residents also enjoy the recreational opportunities, the quiet atmosphere, and the slower pace which the village affords.

The village president, village officials, and the residents strongly favor flood protection. This has been evident throughout the many contacts between the village, Corps of Engineers, and FEMA officials. The village had the opportunity to participate in a relocation program with FEMA. The village turned down the proposal because it involved only a portion of the residents and would have a severe impact on the tax base. The residents are strongly committed to the community, and the possibility of flood protection is an added reason for them to remain in the community.

Those persons remaining in the village will continue to receive flood insurance benefits. Access during flood events also will continue to be a problem. As mentioned previously, the Illinois River has a very flat slope and therefore floodwaters recede very slowly. In the past, residents have been forced to use boats to access properties for periods ranging from 6 weeks to 2 months.

PROBLEMS, NEEDS, AND OPPORTUNITIES

The water resource problem considered in this study is the flooding of Liverpool by the Illinois River. Local officials, property owners, and State and Federal (FEMA) officials have expressed concern regarding the severe property damage caused by flooding.

A letter received from the village requesting Corps of Engineers assistance is contained in appendix F.

The village residents have continued to express their needs throughout the study process. The many field visits to Liverpool by Corps of Engineers personnel and the coordination meetings have provided opportunities for village trustees and residents to voice opinions and concerns. The village seeks relief from the frequent, severe flooding it experiences. This flooding causes significant damage. Residents choose to remain in the community despite the flooding.

The Corps of Engineers is in frequent contact with the village in order to ascertain the village's continuing support of levee protection. Support for levee protection has been expressed by two area school districts, the West Liverpool Drainage and Levee District, the Fulton County Board, and the city of Canton, Illinois, which is the county seat. All passed resolutions in favor of levee protection (see appendix F).

Several public meetings have been held in Liverpool during the study process, wherein residents voiced their concerns. Generally, residents favored flood protection. They also supported accelerated efforts to implement flood protection.

PLANNING OBJECTIVES

NATIONAL OBJECTIVE

The national objective of water and related land resources planning is to contribute to economic development consistent with protecting the Nation's environment. Contributions to National Economic Development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct benefits and costs that accrue in the planning area and the rest of the Nation, and include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed.

SPECIFIC OBJECTIVE

The specific planning objective for this study is to reduce economic losses associated with flooding of Liverpool, Illinois.

PLANNING CONSTRAINTS

The Section 205 authority provides for the construction of projects for flood control and related purposes. Each project is limited to a Federal investment of not more than $5 million. This Federal investment limitation includes all project-related costs for investigation, inspection, engineering, preparation of plans and specifications, supervision and administration, and construction.

Water resource planning studies are bound by all State and Federal laws and Executive Orders.

ALTERNATIVE PLANS

AVAILABLE MEASURES

The available measures used to alleviate flooding include both nonstructural and structural means. Nonstructural measures are defined as those which reduce or avoid flood damages, without significantly altering the nature or extent of flooding, by changing the use made of floodplains or accommodating existing uses to the flood hazard. Examples of nonstructural measures are floodproofing, permanent evacuation, and regulation of the uses of floodplains.

Floodproofing is not being considered for the village of Liverpool. A common method of floodproofing is to raise residences above flood levels. Other methods of floodproofing include providing watertight entrances and windows or building individual levees or walls around a residence. These alternatives were not investigated as they cannot reasonably be implemented in areas where the depth of flooding is as considerable as it is in Liverpool. In the past, these depths have reached 8 to 10 feet. Implementing such an alternative would require residents to reach their homes by boat during floods where flows have historically reached 85,000 ft3/s. This situation could continue from 6 weeks to 2 months. Floodproofing therefore is not an appropriate flood damage reduction alternative.

The only structural measure available for Liverpool is an earthen levee.

DEVELOPMENT OF ALTERNATIVE PLANS

FORMULATION CRITERIA

Formulated plans contribute to the Federal objective of NED. One of these plans must reasonably maximize contributions to NED. The remaining plans may be formulated which reduce net NED benefits in order to further address certain Federal, State, and local concerns not fully addressed by the NED plan. All plans should be formulated in consideration of completeness, effectiveness, efficiency, and acceptability.

DESCRIPTION OF PLANS

Several flood control plans have been examined throughout the studies of Liverpool's flooding problem: permanent evacuation, village levees (including ring levees), and raising the agricultural levee.

Permanent Evacuation

In the reconnaissance study, the plan involved acquiring and demolishing all properties in the village. The land then would be cleared and seeded. There is an existing boat ramp in Liverpool currently owned by Fulton County. The land could be used in conjunction with the boat ramp. The land would be seeded whether it would be used in conjunction with the boat ramp or not.

This plan was not recommended for further study because it was not economically feasible.

Following distribution of the findings of the reconnaissance study, FEMA expressed concern about the recommendation to continue detailed studies of levee protection for the village and to discontinue analysis of permanent evacuation. FEMA's concerns were contained in a letter to the Corps of Engineers.

The Corps, FEMA, and the State of Illinois met to discuss concerns and share information. FEMA offered information based on their experience with permanent evacuation under their Section 1362 program. The agencies discussed a joint plan for permanent evacuation. The plan would include FEMA's Section 1362 program and the Corps' Section 205 program. FEMA provided information on costs which added to the existing information base and were used to revise the analysis.

Based on this information, the Corps of Engineers reanalyzed the permanent evacuation plan. The plan includes acquisition and demolition of all property in the village. The cost estimate was compiled based on information obtained through site visits, conversations with local residents, research of recent property sales, and from information provided by FEMA. The cost estimate is contained in table 3.

The cost estimate in table 3 is compiled based on the Federal Government accomplishing the relocation within the Section 205 program. Therefore the cost estimate also includes the cost of acquisition (title evidence, appraisals, negotiating and closing, salaries and travel expenses); the cost of supervision and administration (temporary field office, removal of structures, other clearing of right-of-way, and salary and travel expense); and contingency costs. All of these costs must be assigned to the project, since this program will be cost-shared with a minimum 25 percent contribution by the local sponsor. Because Liverpool does not have the resources necessary to accomplish the real estate purchasing requirements, the Federal Government would oversee this function.

The economic cost of permanent evacuation would equal the financial cost of $2,342,500 minus 70 percent of the relocation assistance costs of $650,000, which equals $1,887,500. Thirty percent of the relocation assistance costs is considered a betterment. This translates to an average annual cost of $168,500. Total average annual benefits equal $144,900. (The composition of the benefits is discussed in Appendix D - Economic Analysis.) The benefit-to-cost ratio equals 0.89.

TABLE 3

Permanent Evacuation
Cost Estimate ($)
(1986 Evaluation) *

Acquisition		
Houses		
34 occupied at $8,000 per house	272,000	
36 vacant at $2,000 per house	72,000	
land value, 70 lots at $1,000 per lot	70,000	
Trailers		
15 occupied at $5,000 per trailer	75,000	
7 vacant at $1,500 per trailer	10,500	
land value, 22 lots at $1,000 per lot	22,000	
Special Use Properties		
10 properties at $17,000 (average) per property	170,000	
land value, 10 lots at $2,000 per lot	20,000	
city streets, value of access to county boat ramp	175,000	
Acquisition Subtotal		886,500

TABLE 3 (Cont'd)

"Construction Costs"		
Demolition and Removal		
70 houses at $1,500 per house	105,000	
22 trailers at $500 per trailer	11,000	
10 special use properties at $2,000 per property	20,000	
Land Treatment Following Demolition		
earthwork, 55 acres at $1,000 per acre	55,000	
seeding, 55 acres at $1,000 per acre	55,000	
"Construction" Subtotal		246,000
Relocation Assistance		
34 houses at $15,000 per house	510,000	
15 trailers at $6,000 per trailer	90,000	
10 special use properties at $5,000 per property	50,000	
Relocation Assistance Subtotal		650,000
Cost of Acquisition		
102 owners at $2,500 per owner	255,000	
Contingencies on Acquisition		
20 percent of $886,500	177,000	
Contingencies on "Construction" Costs		
20 percent of $246,000	49,000	
Engineering and Design on "Construction"		
12 percent of ($246,000 + $49,000)	35,000	
SUBTOTAL		2,298,500
Supervision and Administration		
(15 percent of $246,000 + $49,000)	44,000	
TOTAL (includes relocation assistance)		2,342,500

*Estimate and analysis completed in 1986; 49 structures occupied at that time. Incremental B/C for houses reoccupied since 1986 is 1.0.

This plan is not economically feasible. In addition, the village, the school districts, and the county oppose a permanent evacuation plan. Therefore, the plan will not be considered further.

Ring Levees

Liverpool is located on the riverside of the agricultural levee (see plate 2). The levee has an elevation of at least 455.6 feet NGVD (National Geodetic Vertical Datum of 1929) behind the village. The access road to the village is the only exception, with an elevation of approximately 452.0 feet NGVD. The elevation of a 50-year flood plus 3 feet of freeboard is 455.5 feet NGVD.

One method of providing high levels of protection to Liverpool is to construct a ring levee. This involves constructing a village levee and raising the agricultural levee behind the village. The 100-year ring levee would cost approximately $2.6 million and is not economically feasible. The 500-year and Standard Project Flood (SPF) ring levees also are not feasible.

Agricultural Levee

The existing agricultural levee currently provides approximately 50-year protection (including 3 feet of freeboard) for the Liverpool Drainage District. This plan involves raising the existing agricultural levee to a 100-year level of protection plus freeboard and constructing a 100-year village levee (plus freeboard). The 100-year agricultural levee alignment is shown on plate 2. Note that the portion of the agricultural levee behind the village would not be raised. The village levee, therefore, becomes the main line of protection.

The freeboard requirements used in this analysis are 4 feet along the upper flank and around the village. Downstream of the village, at river mile 127.0, the freeboard is transitioned to 2 feet.

The levee slopes would be 3 feet horizontal to 1 foot vertical, and the top width would be increased from 8 to 10 feet. The levee raise would be accomplished entirely within the levee district. Approximately 14 acres are needed for this purpose.

The village portion of the levee would protect all residences in the village, except for a portion located on the eastern side of the community. A number of these homes have been vacated. The alignment was placed to maximize benefits and reduce costs. At the time this analysis was performed, two village residences outside of this alignment were occupied. The plan included acquiring these two residences, plus two vacant trailers and three vacant residences within the levee

right-of-way. Additional real estate requirements include 11.5 acres for the levee and 2.5 acres for ponding. The borrow required for both the village and agricultural levees includes a 13-acre site and a 21-acre site near the village.

The detailed estimate is contained in table 4.

TABLE 4

Cost Estimate, 100-Year Levee
Agricultural District and Village

Item	Qty	Unit	Unit Price ($)	Federal($)	Non-Federal($)
Lands and Damages (with 20% contingencies)					207,500
Cost of Acquisition (25 owners)					62,500
P.L. 91-646 (2 replacement housing)					30,000
Clearing					
Village Levee Area	3	Ac	2,500.00	7,500	
Stripping (Waste)					
Agricultural Levee	1,446	yd3	1.40	44,024	
Village Levee	7,787	yd3	2.80	21,804	
Inspection Trench					
Village Levee	16,634	yd3	2.00	33,268	
Impervious Fill					
Agricultural Levee	171,873	yd3	4.80	824,990	
Village Levee	274,814	yd3	4.80	1,319,107	
Seeding					
Agricultural Levee	52.4	Ac	1,500.00	78,600	
Village Levee	11.5	Ac	3,000.00	34,500	
Interior Drainage (Prev. Est.) Agricultural Levee	1	Job	Sum	59,230	
Village Levee	1	Job	Sum	250,000	
Clearing					
Borrow Site #1	21	Ac	3,000.00	63,000	

TABLE 4 (Cont'd)

Item	Qty	Unit	Unit Price ($)	Federal($)	Non-Federal($)
Road Ramps					77,494
Boat Ramp (Road)					21,000
			Subtotal	2,736,023	398,494
		25%	Contingencies	684,006	24,624
			8% E&D	273,602	9,849
			6% S&A	205,202	7,387
			Total	3,898,833	440,354
				4,339,000	

The total cost of this plan is $4,339,000, including $300,000 for lands, easements, and rights-of-way, $30,000 of which is for the fulfillment of Public Law 91-646 requirements. The local sponsor would be responsible for the $300,000, plus a cash payment of $785,000 ($300,000 + $785,000 = 25 percent of the cost of the project). The Federal share would be $3,254,000.

The average annual cost equals $407,800, and average annual benefits are equal to $364,200. The benefit-to-cost ratio is 0.89. (A discussion of the benefits is contained in Appendix D - Economic Analysis.)

A 500-year and SPF agricultural levee raise are also economically infeasible. The right-of-way constraints that existed for the ring levee also would apply to the agricultural levee raise. Therefore, this alternative will not be considered in the final array of plans.

Village Levee

A village levee would be constructed around the village and tie into the existing agricultural levee.

The 50-year levee would be constructed to an elevation of 455.5 feet NGVD (includes 3 feet of freeboard). The levee alignment is shown on plate 3. The side slopes would be 3 feet horizontal to 1 foot vertical, with a top width of 10 feet. A ponding area, gravity outlet, and pump station are included in the plan (see plate 6).

The borrow sites for this levee are in close proximity to the construction site (see plate 7).
The total cost of this plan is $1,511,000, including the cost for mitigating the impacts to cultural resources, which is estimated to cost $60,000.

The average annual cost of this plan is $134,600, and the average annual benefits equal $236,700. The benefit-to-cost ratio is 1.80. Lower levels were evaluated and, although they are economically feasible, the 50-year plan has higher net benefits.

Table 5 displays the net benefits for the 25- and 50-year plans.

TABLE 5

Summary of Average Annual Benefits and Costs - Village Levee

Alternative	Average Annual Benefits ($)	Average Annual Costs ($)	B/C Ratio	Net Benefits ($)
25-Year Village Levee	136,100	121,900	1.12	14,200
50-Year Village Levee	236,700	134,600	1.80	102,100

The 50-year village levee is the NED Plan. This plan has considerable local and State of Illinois support (see Appendix F - Pertinent Correspondence). It will therefore be considered in the final array of plans.

EVALUATION OF ALTERNATIVE PLANS

Of those plans considered, two have positive net benefits. The village levees, at both the 25- and 50-year levels, are economically feasible. The 50-year levee has the highest net benefits and is the NED plan. Table 6 displays the effects of the 50-year levee and the "no additional Federal action" plan.

TABLE 6

Effects of Alternative Plans

Economic Effects	50-Year Levee	No Additional Federal Action
First Cost ($)	1,511,000	
Annual Cost ($)	134,600	
Annual Benefits ($)	236,700	
Net Benefits ($)	102,100	
Benefit-to-Cost Ratio	1.80	
Environmental Quality, Regional Economic Development, and Other Social Effects		
Noise	Temporary elevated noise levels during construction.	No change.
Displacement of People	Two households would be displaced by the proposed project.	Continued displacement during floods.
Community Cohesion	Improved by reduced threat of flooding. Social cohesion and community pride enhanced.	No change.
Community Growth	Project would encourage non-resident property owners and others to establish permanent residence.	Growth will continue to be adversely affected by flooding.
Tax Revenues	Positive effect.	Adversel affected by continued impact on property values from flooding
Property Values	Positive effect.	Adversely affected by flooding.

TABLE 6 (Cont'd)

Economic Effects	50-Year Levee	No Additional Federal Action
Public Facilities/ Other Services	Temporary disruption during construction. Improved access during flood events Less disruption due to flooding.	Continued disruption during floods.
Regional Growth	No impact.	No impact.
Employment/Labor Force	Temporary increase in employment during construction of project. Existing businesses could expand. New businesses may relocate in Liverpool.	No change.
Business/Industrial Activity	Project would enhance commercial viability of study area.	No change.
Displacement of Farms	No farmsteads would be lost; 13.5 acres required for project.	No impact.
Natural Resources	4.9 acres of floodplain habitat affected.	No change.
Man-Made Resources	Village property would be protected. Two occupied residences demolished.	Damages from flooding would continue
Air Quality	Temporary degradation during construction.	No change.
Water Quality	No impact anticipated.	No change.
Aesthetic Values	Residents adjacent to the river would have view blocked. Temporary impact until levee was revegetated. Permanent impact from riprap.	No change.

TABLE 6 (Cont'd)

Economic Effects	50-Year Levee	No Additional Federal Action
Threatened and Endangered Species	No impact.	No impact.
Cultural Resources	Adverse impact at one site. A second site will be avoided.	No change.

RISK AND UNCERTAINTY - SENSITIVITY ANALYSIS

LEVEL OF PROTECTION

Protection from the 50-year frequency flood plus freeboard will leave the community vulnerable to flooding by higher, less frequent floods. The 100-year flood, or the event that has a 0.1 percent chance of occurring in any year, is 2 feet higher than the 50-year flood and would be within the freeboard allowance of 3 feet. The SPF elevation is 464 feet NGVD. This would overtop the levee by almost 9 feet.

The flood elevations and discharges were obtained from the published Flood Insurance Study for Liverpool and were verified by two methods. A discussion is contained in Appendix A - Hydrology and Hydraulics.

Due to the risk of overtopping of the 50-year levee, an evacuation plan is necessary. An additional advance-warning system is not included because the slow rate of rise of the river allows the residents at least 3 days warning. The evacuation plan is discussed in Section 3. The area being protected is small enough that there will be no specific location designated for overtopping. The river's profile does not change along the length of the levee.

SELECTION OF THE FINAL PLAN

The 50-year levee plan is the most viable alternative plan formulated which has positive net benefits. The plan has the support of the village of Liverpool and the State of Illinois and has average annual net benefits of $102,100. It is the NED plan.

Liverpool has never experienced a 50-year flood. Implementation of the plan would prevent damages from flooding up to a 50-year frequency. The village is seeking relief from the more frequent, severe flooding; therefore, the 50-year alternative is the selected plan.

SECTION 3 - DESCRIPTION OF THE SELECTED PLAN

PLAN COMPONENTS

The selected plan to protect the village of Liverpool is an earthen levee which provides a 50-year level of protection plus 3 feet of freeboard. The major components of the plan are the levee itself, interior drainage provisions, relocations (including ramps and parking area), and cultural resource mitigation.

LEVEE

The levee alignment around the village has been modified several times due to changing conditions within Liverpool. Plate 3 displays the alignment. The levee ties into the existing agricultural levee. It is approximately 4,400 feet in length, generally ranges in height from 3.5 to 17.5 feet, has side slopes of 3 feet horizontal to 1 foot vertical, and has a top width of 10 feet. The levee would be seeded and a ramp to allow access for operation and maintenance purposes would be provided at Station 4+58.

Riprap would be placed along the full length of the slope from Station 29+00 to 33+00 to prevent erosion. Riprap to control wavewash is not required (see Appendix B - Geotechnical). Typical sections are shown on plate 4.

INTERIOR DRAINAGE PROVISIONS

Analysis of the interior drainage is contained in Appendix A - Hydrology and Hydraulics. A gravity outlet with a 24-inch discharge pipe and a 2-acre pond are included in the plan. The foundation conditions that exist beneath the levee will allow seepage to occur during flood conditions. Therefore, a pump station has been incorporated in the plan. Two 4,000 gal/min submersible centrifugal pumps will prevent the ponding level from going above elevation 442 feet NGVD during the design flood. The maximum head is 18.5 feet. Plate 6 is a cross section of the gravity outlet and pump station. The pump station details are displayed on plate 12.

RELOCATIONS

The necessary relocations include the natural gas lines which intersect the alignment. Power lines are overhead and telephone lines will be relocated overhead, so it is not anticipated that these will be affected. Each house has its own well and septic tank. No wells will be affected; however, one septic tank discharge pipe will be crossed.

Also included in the area of relocations are any road ramps that must be built over the levee (see plate 5). The new levee crosses Exchange, Laurel, and Main Streets. Ramps will be constructed so that vehicular access will not be affected. The existing pavement will be removed, fill will be placed in addition to the levee, and the road will be resurfaced. The Exchange and Laurel Street ramps will be built to a 12.5 percent slope and the Main Street ramp will be built to an 8 percent slope.

The Main Street ramp will provide access to an existing Fulton County boat ramp. The parking lot will be raised so that the ramp can intersect within the limits of the existing parking lot. This was a problem because of the height of the levee.

CULTURAL RESOURCES

The village of Liverpool is located in an area of high prehistoric site density. Fulton County in general and the Liverpool region in particular contain numerous nationally recognized "type" sites for the Archaic and Woodland periods. The local place names -- Liverpool, Sister Creek, Tampico, Rice Lake and Maples Mill (all within 20 miles) -- have all been used to designate ceramic styles spanning the Early through Late Woodland periods (significant in Illinois and Midwestern prehistory). Of particular concern are the substantial numbers of village sites with associated mound groups. One of the residential structures constructed within the village is located on top of the largest mound in the Whitehead Mound Group (11-F-22). Information on this site was first published by Cole and Deuel (1937:132). The Liverpool Mound Group (Illinois Archeological Survey Site Number 11-F-24; Illinois State Museum Mound Numbers Fo 77, 78, 79, 80 and 87) and village site (11-F-25; Fv 88) lie immediately west of the village of Liverpool. Much of the Liverpool Mound and village site was destroyed in the early 1930's when they were borrowed for levee fill (McGimsey et al. 1985:11).

Previous historical research in the village of Liverpool is restricted to two architectural surveys funded by the Illinois Department of Conservation (Illinois Historic Structures Survey 1977; Illinois Historic Landmarks Survey 1976; Illinois River Survey n.d.). The Illinois Historic Landmarks Survey lists one structure in Liverpool: the Methodist Church located on Chestnut Street. The Illinois Historic Structures Survey does not list any buildings in Liverpool. It is possible that the structures survey did not visit Liverpool, as communities with populations under 500 were not routinely included in the survey (Illinois Historic Structures Survey 1977). An architectural survey was conducted by the Illinois Rural Survey in 1983. Three residences, one barn, and one abandoned store building are listed as being architecturally interesting (Department of Conservation survey records). None of the structures identified during these surveys are located within potential construction areas. No structures in the village are currently listed on the National Register of Historic Places (NRHP). Plate 10 displays an early 20th century plat of Liverpool.

Recently the Illinois State Museum, under contract with the Rock Island District, Corps of Engineers, has conducted investigations designed to evaluate the impact of the proposed levee project to cultural resources. These investigations have located and recorded seven new sites in the Liverpool vicinity. Details of the investigations can be found in the Illinois State Museum reports (McGimsey et al., 1985; McGimsey and Wiant 1987) and in the Final Environmental Impact Statement (FEIS) attached to this report. The following cultural resource discussion draws heavily from the Illinois State Museum reports.

The evaluation of Federal project impacts on cultural resources is in accordance with the National Historic Preservation Act (as amended in 1980), the Archeological and Historic Preservation Act of 1974, Executive Order 11593, the Archeological Resources Protection Act of 1979 (as amended in 1984), and Title 36 of the Code of Federal Regulations, Parts 60-66 and 800, as appropriate.

A detailed presentation of the prehistoric and historic background of Liverpool and the present cultural investigation is contained in Appendix E - Cultural Resources and in the DEIS.

Investigations conducted to evaluate the effect of the proposed Liverpool Flood Protection project to significant cultural resources identified a significant prehistoric archeological site (11-F-25) in one of the proposed borrow areas. The archeological site will be avoided and therefore not affected. The proposed limits of the borrow area have been modified to assure no impacts to this resource. Particular attention to the modification is necessary during future planning and construction phases of this project.

A second site (11-F-2713) located at the eastern end of the proposed levee alignment also has been determined to be eligible for listing on the National Register of Historic Places. The development and execution of a Data Recovery Plan (DRP) to mitigate for the adverse effect of project construction to the site will be necessary.

In addition to the above investigations, an archeologist will be required to monitor construction activities at selected sensitive locations in the alignment and borrow areas.

Plans to mitigate for the adverse effects of project construction to site 11-F-2713 will be coordinated with the Illinois State Historic Preservation Office and the Advisory Council on Historic Preservation (ACHP) pursuant to the ACHP's guidelines for the implementation of Section 106 of the National Historic Preservation Act. All necessary mitgation (Data Recovery) will take place prior to construction.

Cultural resources are being fully considered only within the project impact zone of the 50-year flood protection plan. Other alternatives have not been fully evaluated and would require further coordination and evaluation prior to execution.

The current estimate of the "construction phase" or mitigation cost is $60,000.

DESIGN AND CONSTRUCTION CONSIDERATIONS

The proposed levee would be constructed of suitable impervious material obtained from two borrow sites totalling 13 acres in size (see plate 7). The material would be semi-compacted. As part of the construction process, one of the borrow sites (5 acres) will be shaped to allow some open water and establishment of wetland vegetation. This will be done to compensate for the loss of approximately 5-acres of floodplain land within the village. Additional information is contained in the FEIS.

The levee would be built with 3 feet of freeboard. The top width of the levee would be 10 feet and the side slopes would be 3 feet horizontal to 1 foot vertical. An inspection trench is planned to ensure the quality of the foundation material and to check for utilities that may cross the alignment. The material from the trench will be reused to fill the trench. The slopes of the levee will be seeded. Construction can be accomplished in one construction season.

OPERATION AND MAINTENANCE CONSIDERATIONS

The levee must be kept mowed and free from tree and brush growth. This is the responsibility of the village of Liverpool when the project is completed. Annual operation and maintenance costs are estimated to be $800.

Part of the operation considerations is an evacuation plan for the village. The plan is essentially a communication exercise which must take place when flood heights reach elevation 452.5 feet NGVD.

The Liverpool village president and the village trustees are responsible for monitoring flood heights when the Illinois River begins to rise.

A suggested evacuation plan would be developed by using current policies and incorporating methods currently used by the village during flooding conditions. The flood evacuation plan for the village of Liverpool would need to be adopted by the village prior to the Corps of Engineers turning the project over to the village for operation. The plan would need to be adopted in the form of a village ordinance.

Liverpool has at least 3 days warning prior to a flood event. During past floods, the village had 5 to 6 days warning. The flood evacuation plan would be developed with the knowledge that this warning time exists.

The suggested components of a flood evacuation plan include actions to be taken during pre-emergency conditions, emergency conditions, and cleanup or post-emergency conditions. A communication network also must be established to inform the community of the impending emergency.

The communication network could begin with the county Emergency Services and Disaster Agency (ESDA) or the county sheriff. The county ESDA director could be responsible for monitoring conditions which indicate a potential flood event. If there is potential for a flood, the ESDA director or the county sheriff would inform the mayor.

The pre-emergency conditon would be signalled by one of a number of occurrences:

a. Closing of the gatewell.

b. Leakage around the gatewell (when closed).

c. Development of a weakness in levee system (soft spots, wave wash damage).

d. Seepage through the levee (rodent holes).

e. Underseepage at landside toe of levee and beyond (boils).

f. Notification of an impending flood.

When one of the above occurs, actions to be taken include:

a. The mayor and designees (village trustees) meet to determine a plan of action.

b. Begin recording in logbook.

c. Monitor conditions (leakage, rising river, weakness in levee, seepage, etc.) and log.

d. Obtain information on upstream river condition and log.

e. Obtain forecasts for area and log.

The emergency condition exists when the river is forecasted to exceed or is actually at the design flood level. Actions to be taken include:

a. Implement a systematic community evacuation plan (which has previously been developed).

b. Coordinate with the county and State ESDA for assistance.

c. Ensure all inhabitants are evacuated when or prior to the river reaching the freeboard zone.

d. Implement a system of levee monitors.

The post-emergency condition occurs after the flood. A plan should be developed for cleanup if the levee has been overtopped and for inhabitants to return to the village.

The previously mentioned plans should be developed and filed with the county ESDA and should include pertinent information on telephone numbers (National Weather Service, ESDA) and persons who are part of the communication network. Also included should be the river gage to be monitored during flood conditions. The logbook mentioned above is necessary for legal purposes.

The detailed flood preparedness and evacuation plan will be developed as part of the project engineering and design effort in close cooperation with the village of Liverpool.

PLAN ACCOMPLISHMENTS

Implementation of the 50-year levee plan would substantially reduce damages due to flooding from the Illinois River. The village seeks relief from the frequent, yet severe, floods they experience. This plan provides that protection.

The plan does not exempt the community from the requirements and restrictions of the Flood Insurance Program. Property owners will pay the same insurance premiums as they do now.

ECONOMIC EFFECTS

The greatest economic effect to be considered is the cost of the project.

A cost estimate is contained in table 7. The total cost is $1,511,000. This includes $35,000 for relocation assistance as required by Public Law 91-646. The average annual costs equal $134,600, and the average annual benefits equal $236,700. The benefit-to-cost ratio is 1.80. Other economic effects, including a description of the benefits, are discussed in Appendix D - Economic Analysis. A detailed cost estimate is contained in appendix C.

TABLE 7

Summary of First Costs ($)

Item	Project Construction Costs	Lands, Easements, Rights-of-Way, and Relocations
Lands and Damages		200,000.00 a/
Relocations and Road Ramps		81,477.75
Levee	621,828.45	
Interior Drainage	157,572.00	
Supporting Features (Riprap)	31,004.67	
Contingencies	155,695.00	16,522.25
Subtotal	966,000.00	298,000.00

TABLE 7 (Cont'd)

Item	Project Construction Costs	Lands, Easements, Rights-of-Way, and Relocations
Cultural Resources Mitigation	60,000.00	
Engineering and Design	96,000.00	8,000.00 b/
Supervision and Admin	77,000.00	6,000.00 b/
TOTAL FIRST COST	1,199,000.00	312,000.00 a/

a/ Includes $35,000 for Relocation Assistance (Public Law 91-646).

b/ Contingencies, E&D, S&A applied to relocation costs. Figure for LER is inclusive of those types of costs.

c/ Cost of preparing flood preparedness and evacuation plan included.

The breakdown of costs between Federal and non-Federal interests is contained in Section 4 - Implementation Responsibilities.

ENVIRONMENTAL EFFECTS

Implementation of the 50-year levee plan temporarily disrupts access to some homes and the public boat ramp. Approximately 5.5 acres of farmland are required: 5.0 in the borrow site and the remaining 0.5 acre in levee right-of-way. Floodplain habitat, 4.9 acres, would be affected by levee construction. Air quality would be temporarily degraded during construction, but no impact is anticipated to water quality.

SOCIAL EFFECTS

Six properties would be acquired for the levee right-of-way. Two of these are occupied and in good condition, four are vacant. One is currently being demolished, two are in poor condition, and the other is in fair condition. There are comparable properties available in the village for those residing in the homes being acquired.

The socio-economic impacts associated with the 50-year levee plan would be positive. The project would provide the backbone for revitalization of the community. The village would be more economically viable for the

continued operation of existing businesses. Further, the project would make Liverpool a more attractive site for the establishment of new commercial businesses and the expansion of existing firms, increasing potential employment opportunities in the village. Property owners would likely renovate deteriorated structures, and vacant properties would be reoccupied by landlords or tenants. With flood protection, property values could reach the value of comparable, protected property, and tax revenues could increase as well. The community also would benefit from greatly reduced life, health, and safety risks faced by residents during flood events. The reduced threat of flooding would increase community cohesion, and, as the village would revitalize, residents would experience even greater social cohesion and community pride. A more detailed discussion of socio-economic impacts is provided in Appendix D - Economic and Social Analysis.

CULTURAL RESOURCES

Significant archeological site 11-F-2713 is located within the levee alignment and will require mitigation during the construction phase. A second site, 11-F-25, is located adjacent to the borrow area. Care will be taken during design and construction not to impact this area. (See the FEIS and Appendix E - Cultural Resources for more information.)

SECTION 4 - IMPLEMENTATION RESPONSIBILITIES

The division of plan responsibilities between the Federal Government and non-Federal interests is discussed in the following paragraphs. Legislative and administrative policies have established the basis for Federal and non-Federal sharing of responsibilities in the construction, operation, and maintenance of Federal water resources projects.

COST APPORTIONMENT

Sharing of costs between Federal and non-Federal interests for the Liverpool project is based on Federal policy, including the Water Resources Development Act of 1986. Non-Federal interests are required to furnish all lands, easements, and rights-of-way required for construction and operation, accomplish any required relocations, and operate and maintain the project after construction. Included within the category of relocations are the ramps built over the levee for streets or roads which cross the alignment. Under cost-sharing specified in the Water Resources Development Act of 1986, non-Federal interests must be responsible for a minimum 25 percent of project costs,

including a 5 percent up-front cash contribution. Credit toward the local share is given for the lands, easements, rights-of-way, and relocations (LERR). The local sponsor's share is currently estimated at $387,550.

FEDERAL RESPONSIBILITIES

The estimated Federal Government's share for the implementation of this project is $1,123,450. The remaining responsibilities of the Federal Government include preparing plans and specifications and supervising and administering the construction contract after authorization and funding.

NON-FEDERAL RESPONSIBILITIES

The village of Liverpool must agree to act as a local sponsor prior to actual implementation of the project. The current non-Federal cost is $387,550. The formal assurance is termed a Local Cooperation Agreement (LCA). A copy of the draft LCA is included within correspondence to the village in Appendix F (pages F-143 to F-155). Within the LCA, the sponsor must agree to:

a. Provide, without cost to the Government, during the period of construction, all lands, easements, rights-of-way, and utility and facility alterations and relocations required for construction and maintenance of the project, regardless of their value.

b. Make a cash payment of not less than 5 percent of total project costs during the period of construction, regardless of the value of the items in a. above. If the value of the items in a. above is less than 20 percent of total project costs, the villlage shall, during the period of construction, make such additional cash payments as are necessary to bring its total contribution in cash and value of lands, easements, rights-of-way, and utility and facility alterations and relocations, to an amount equal to 25 percent of total project costs.

c. Contribute all project costs in excess of the Federal statutory limitation of $5,000,000.

d. Hold and save the Government free from all damages arising from the construction, operation, maintenance, and rehabilitation of the completed project, except for damages due to the fault or negligence of the Government or its contractors.

e. Operate, maintain, and rehabilitate the project upon completion in accordance with regulations or directions prescribed by the Secretary of the Army.

f. Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities, and other structures and improvements made necessary by construction of the project.

g. Prevent encroachment on any of the flood protection structures, including ponding areas, and if ponding areas are impaired, provide substitute storage capacity or equivalent pump capacity promptly without cost to the United States.

h. Prescribe and enforce regulations to prevent obstruction or encroachment on channels which would reduce their flood-carrying capacity or hinder maintenance and operation.

i. Participate in and comply with applicable Federal floodplain management and flood insurance programs. Publicize floodplain information in the areas concerned and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the floodplain and in adopting such regulations as may be necessary to ensure compatibility between future development and protection levels, including ponding areas, provided by the project.

j. Implement a flood-warning system and a flood preparedness plan. The plan will be adopted in the form of a village ordinance. The plan will be updated as necessary to remain current. Action will be taken as necessary to evacuate the community when needed.

k. Annually inform residents of the potential flood risks.

l. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved January 2, 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent operation and maintenance

of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

m. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, in connection with the construction, operation, and maintenance of the project.

n. Prior to construction, and in accordance with the provisions of Section 221 of Public Law 91-611, the village will enter into a contract with the Government whereby the village will grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the village owns or controls for access to the project, for the purpose of inspection, and, if necessary, for the purpose of completing, operating, repairing, maintaining and rehabilitating the project. If an inspection shows that the village, for any reason, is failing to complete, operate, repair, maintain or rehabilitate the project in accordance with the assurances hereunder, the Government will send a written notice to the village. If the village persists in such failure for thirty (30) calendar days after receipt of the notice, then the Government shall have a right to enter, at reasonable times and in a reasonable manner, upon the land that the village owns or controls for access to the project for the purpose of completing, operating, repairing, maintaining and rehabilitating the project. No completion, operation, repair, maintenance, or rehabilitation by the Government shall operate to relieve the village of responsibility to meet its obligations as set forth in the Agreement, or to preclude the Government from pursuing any other remedy at law or equity to assure faithful performance pursuant to the Agreement.

FINANCIAL ANALYSIS

The village of Liverpool, with a $12,000 annual budget, is not capable of providing the non-Federal portion of the cost of the project. The State of Illinois Department of Transportation, Division of Water Resources, has indicated that they will aid the community in financing the project.

REAL ESTATE REQUIREMENTS

The levee right-of-way, road ramps, and parking lot raise require approximately 12.8 acres of permanent easement and 1.8 acres of temporary easement. The land's present use is an agricultural levee, village lots, village streets, a low wet area along the river, and a parking lot for a boat ramp. A temporary easement also will be obtained on 13.0 acres for a borrow area. Relocation assistance (P.L. 91-646) of $35,000 was included for those occupied residences to be acquired. No amount was included for relocation of railroads and pipelines. Total estimate for lands, easements, and rights-of-way is $200,000.

SUMMARY OF PLAN IMPLEMENTATION

This report has been reviewed by the public and modified due to comments received. This constitutes one step in a series of events which must take place before the project can become a reality. The project can be modified at any stage of review, and only if it successfully passes all stages will it ultimately be constructed. These events are:

- Final public review of FEIS
- Request funding for plans and specifications.
- Upon receipt of funding, initiate preparation of plans and specifications.
- Submit plans and specifications to Corps higher headquarters for approval and funding for construction.
- Receive funding for project.
- Execute local cooperation agreement. Local sponsor obtains lands, easements, and rights-of-way.
- Upon receipt of funding, award construction contracts under Corps supervision and administration.
- Project is turned over to local sponsor following completion and acceptance of construction. Operation and maintenance will be the sole responsibility of the local sponsor.

SECTION 5 - SUMMARY OF COORDINATION, PUBLIC VIEWS, AND COMMENTS

COORDINATION

Coordination was maintained throughout the planning process with Federal and non-Federal agencies, groups, the news media, and individual citizens. A listing is provided at the end of this report under "Distribution List." Coordination was accomplished by various methods, including specific coordination letters, public meetings, and news releases.

Table 8 lists the major coordination events and their corresponding dates.

PUBLIC AND INSTITUTIONAL COMMENTS

Throughout the study process, the Corps of Engineers has been in touch with the village officials. The village has maintained their support for the project from the beginning. Their input has affected the levee plans, and the alignment has been modified several times to take into account their needs. The village has provided a letter of assurance that they are willing and able to participate in the flood control project.

The Liverpool, Illinois, Section 205, Draft Definite Project Report with Draft Environmental Impact Statement was released for a 45-day public review on September 1, 1988. Public review of this document generated a small number of public and institutional comments. The number of responses received, however, is too small to make valid statistical inferences about the apparent support of opposition regarding implementation of the proposed local flood protection project. However, the small number of received and the overall positive nature of the comments indicate that public response to the proposed flood protection project at Liverpool, Illinois, is positive.

TABLE 8

Major Coordination Events

Date	Correspondence
June 9, 1983	Field visit and meeting with village officials and the State of Illinois
November 8, 1984	Workshop attended by 74 persons, including village officials, State agencies, and local residents
May 14, 1985	Village board meeting
August 15, 1985	Meeting with village officials and the State of Illinois, Division of Water Resources
December 10, 1985	Coordination meeting attended by Corps of Engineers (Rock Island District and North Central Division), Federal Emergency Management Agency, and the State of Illinois
September 11, 1986	Coordination meeting attended by Corps of Engineers, Federal Emergency Management Agency, village officials, and congressional representative
June 15, 1987	Field visit and meeting with village officials.
March 28, 1989	Meeting with Liverpool Drainage and Levee District Commissioners

Some individuals have expressed concern over the impact of the project on their properties. One resident owns property outside of the village and will not be protected by the levee. Including this property in the protection is economically infeasible. A second resident is concerned

that the project would adversely affect his riverside property. His property will not be affected and access will be provided.

FEMA has continued to work with the Corps of Engineers on the analysis of permanent evacuation of Liverpool. The Corps of Engineers has had several coordination meetings with FEMA and exchanged information. The correspondence is contained in appendix F.

Other pertinent correspondence and project-related information is contained in appendix F.

SECTION 6 - RECOMMENDATION

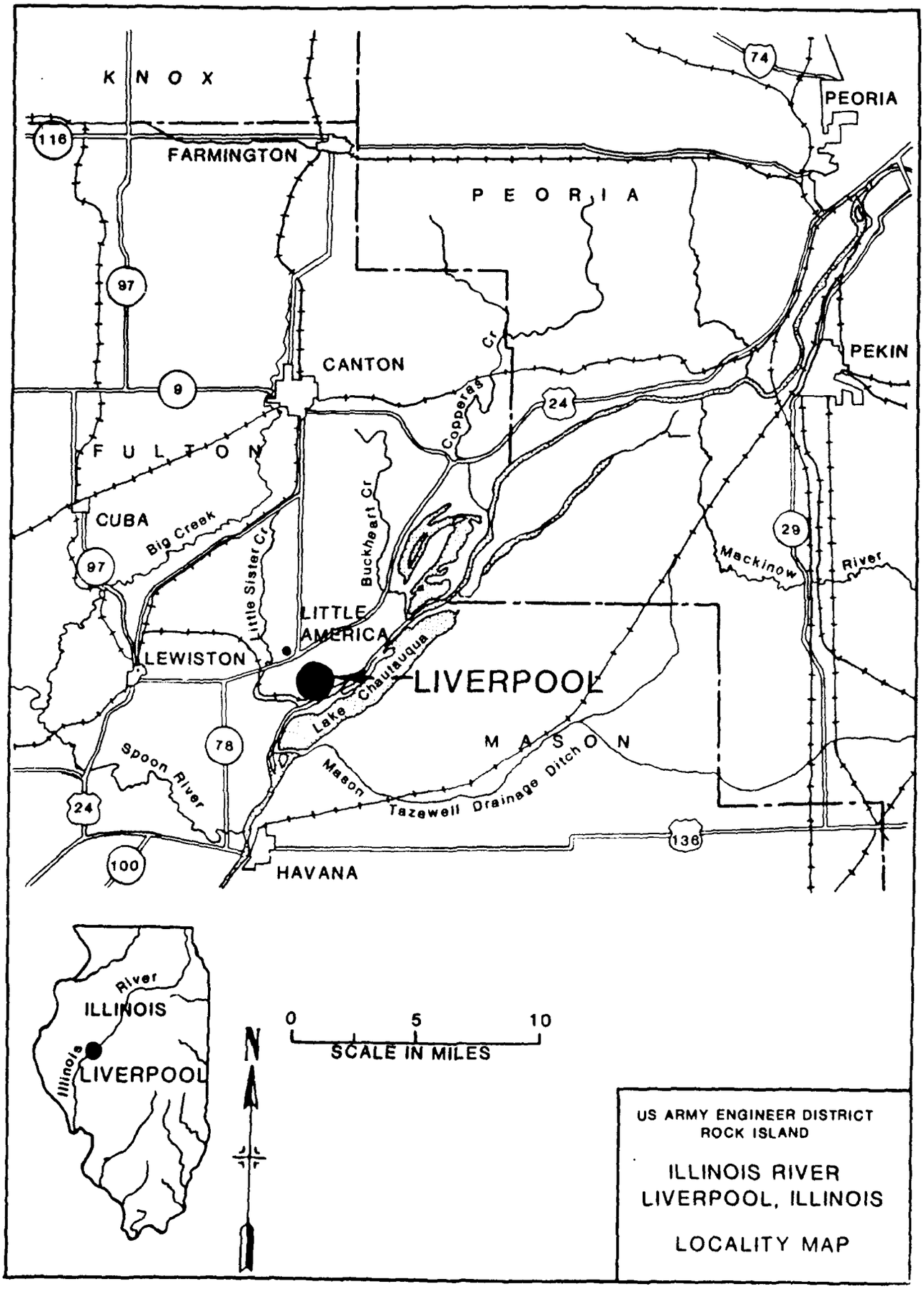
I recommend that the NED plan, which would provide a 50-year level of protection from flooding on the Illinois River for Liverpool, Illinois, be authorized for construction with such modifications as, in the discretion of the Chief of Engineers, may be advisable.

The levee would extend for a length of 4,395 feet, with heights ranging from 3.5 to 17.5 feet. The project would produce net annual benefits of $102,100 and has a benefit-to-cost ratio of 1.80 to 1.0, based on a 100-year economic life and a discount rate of 8-5/8 percent. The estimated total cost of the project is $1,511,000.

General legislation authorizing implementation of water resources projects, the most recent being the Water Resources Development Act of 1986, generally contains local cooperation requirements established by enactment of various laws. This report contains information based upon application of these requirements.

The Water Resources Development Act of 1986 contains cost-sharing requirements for various types of water resources projects. Local sponsors of flood control projects are responsible for a minimum of 25 percent of the cost of the project, and at least 5 percent must be in cash. Accordingly, I recommend authorization to construct and to otherwise implement the project subject to these cost-sharing requirements.

for John R. Brown
Colonel, U.S. Army
District Engineer

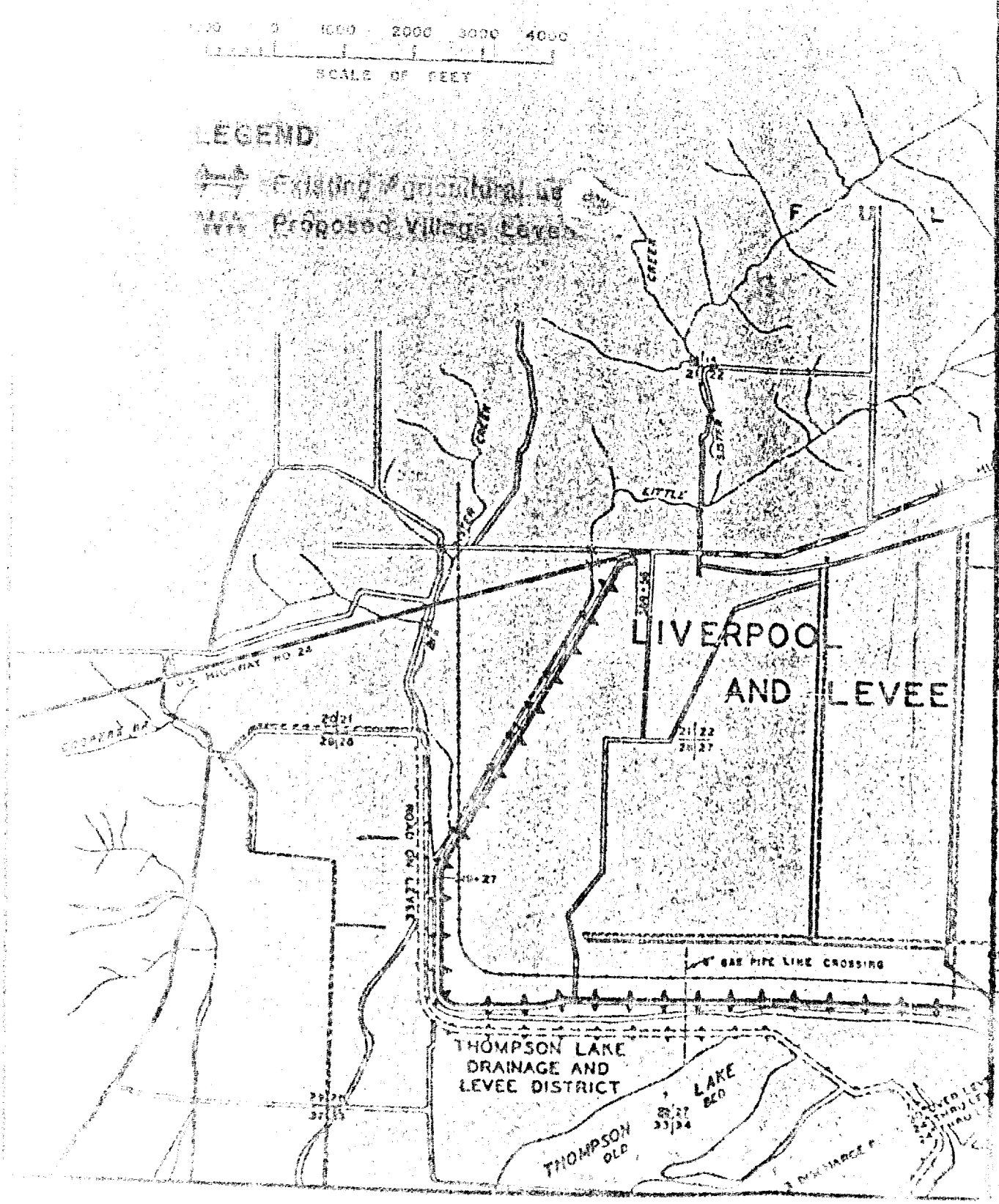


US ARMY ENGINEER DISTRICT
ROCK ISLAND

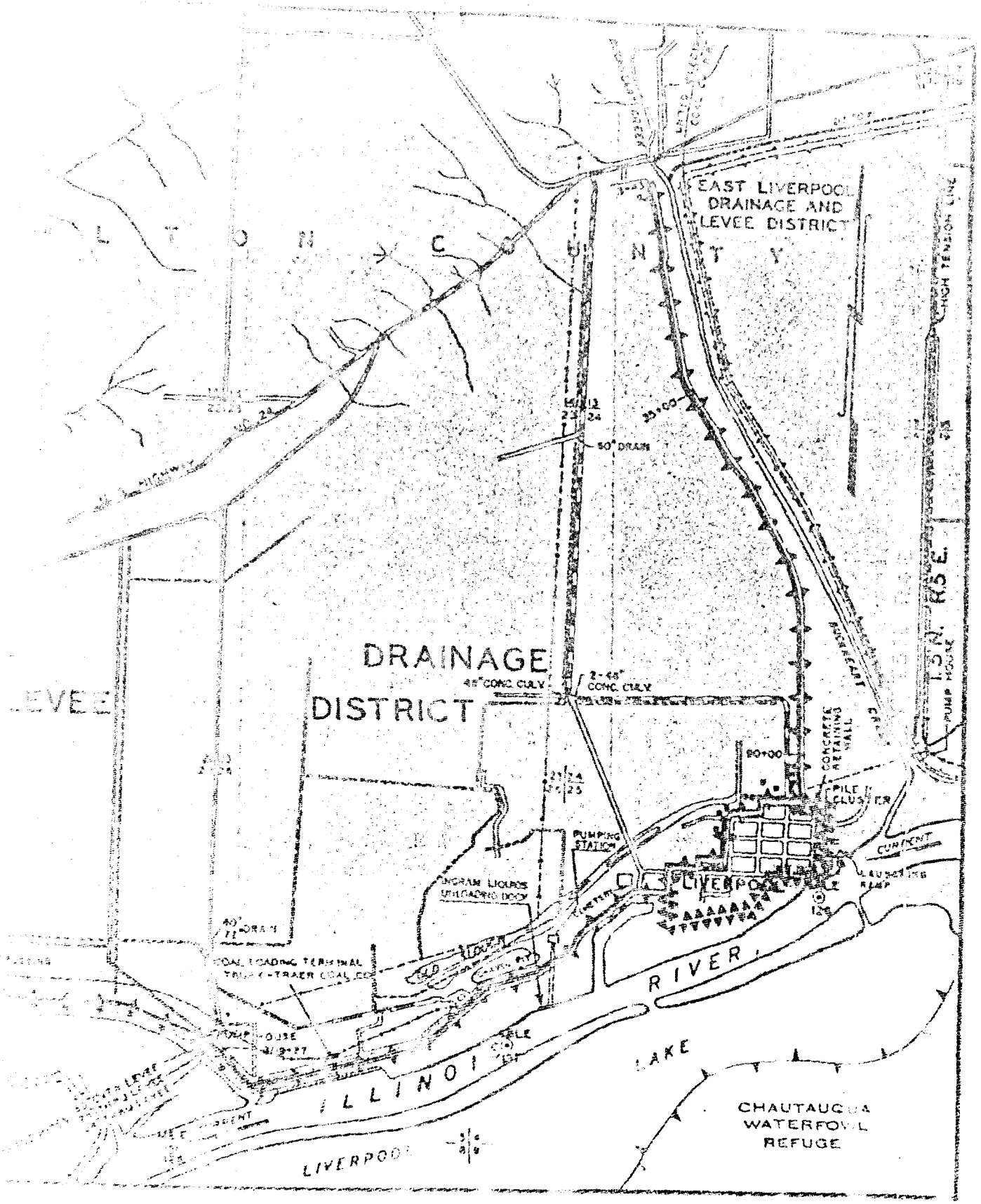
ILLINOIS RIVER
LIVERPOOL, ILLINOIS

LOCALITY MAP

PLATE 1



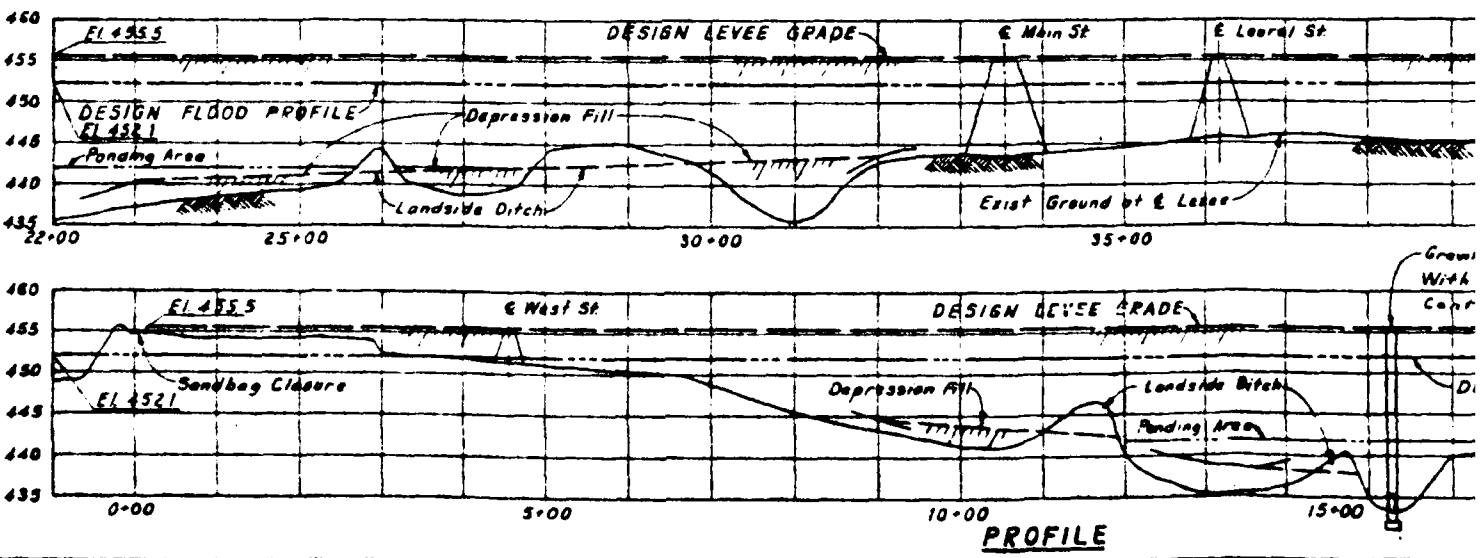
Raise existing agricultural levee
and construct village levee



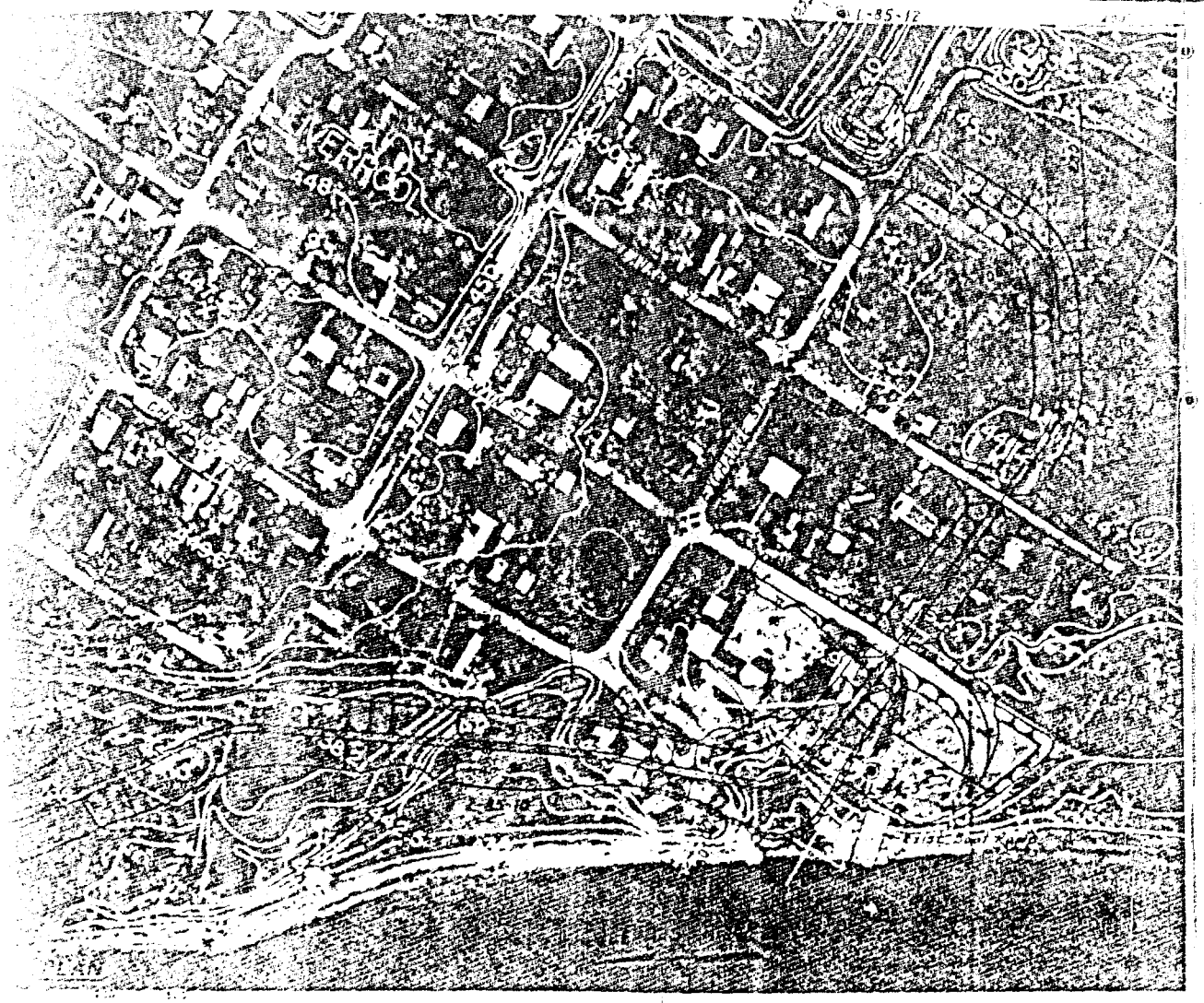
ILLINOIS RIVER
LIVERPOOL, ILLINOIS
SECTION 205
FLOOD CONTROL PROJECT
100 - YEAR
AGRICULTURAL LEVEE RAISE

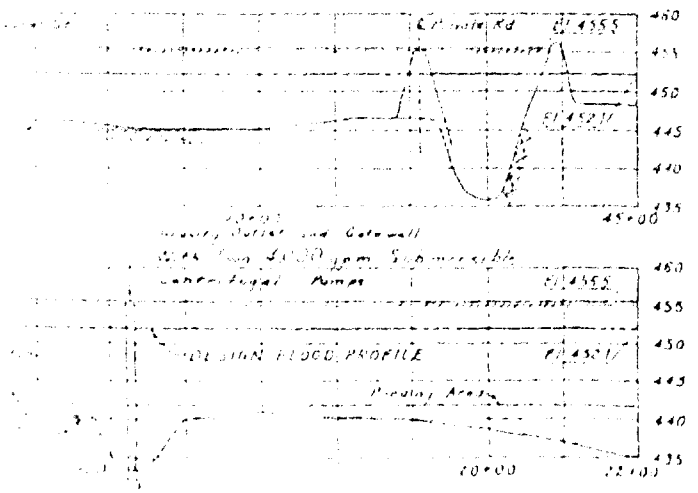
PLATE 2


5
4
3
D
C
B
A
1507
X435.8
X431.0
X447.3
X435.8
434
X433.8
438
440
446.2
438
430
0
100
200


460
455
450
445
440
435
El 455.5
DESIGN LEVEE GRADE
℄ Main St
℄ Laural St
DESIGN FLOOD PROFILE
El 452.1
Depression Fill
Ponding Area
Landside Ditch
Exist Ground at ℄ Levee
22+00
25+00
30+00
35+00
460
455
450
445
440
435
El 455.5
℄ West St
DESIGN LEVEE GRADE
Sandbag Closure
El 452.1
Depression Fill
Landside Ditch
Ponding Area
0+00
5+00
10+00
15+00

PROFILE





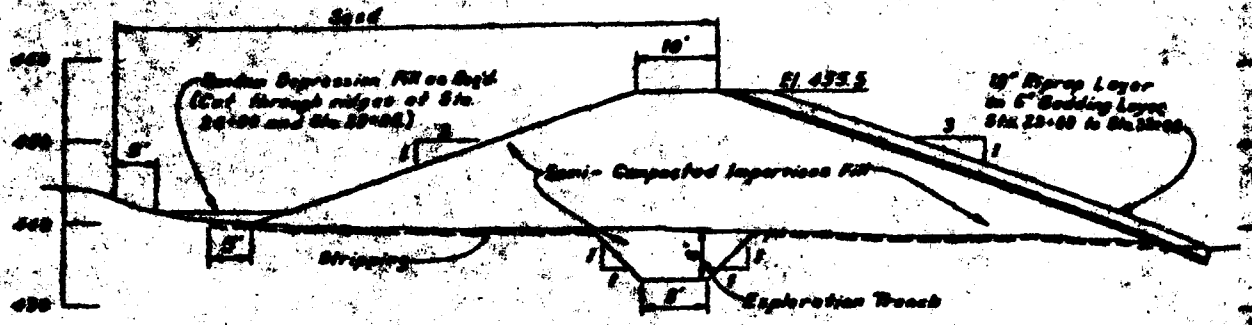
U. S. ARMY ENGINEER DISTRICT, ROCK ISLAND
CORPS OF ENGINEERS

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

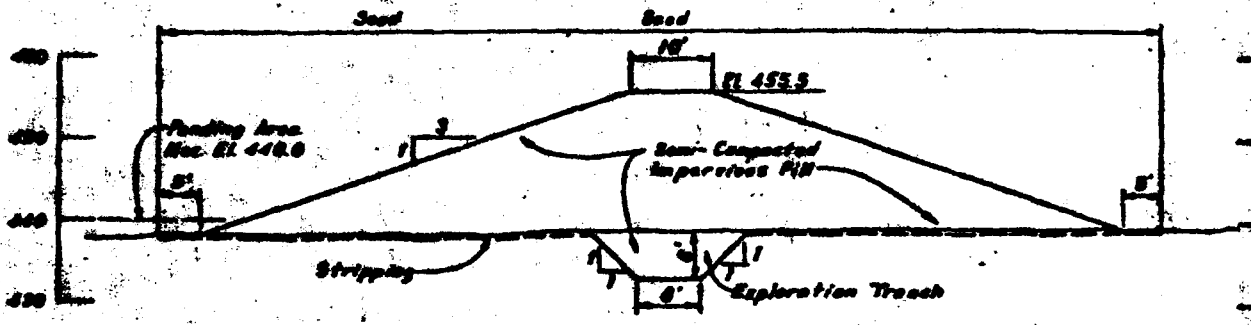
50-YEAR LEVEE
GENERAL PLAN

AS SHOWN

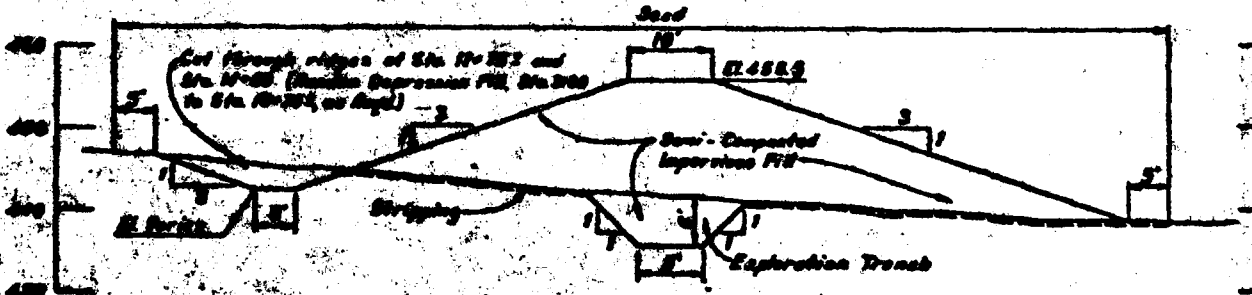
PLATE 3



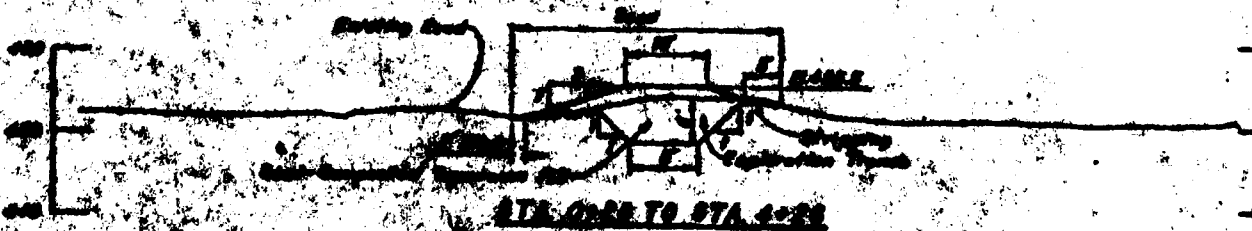
STA. 23+00 TO STA. 32+00



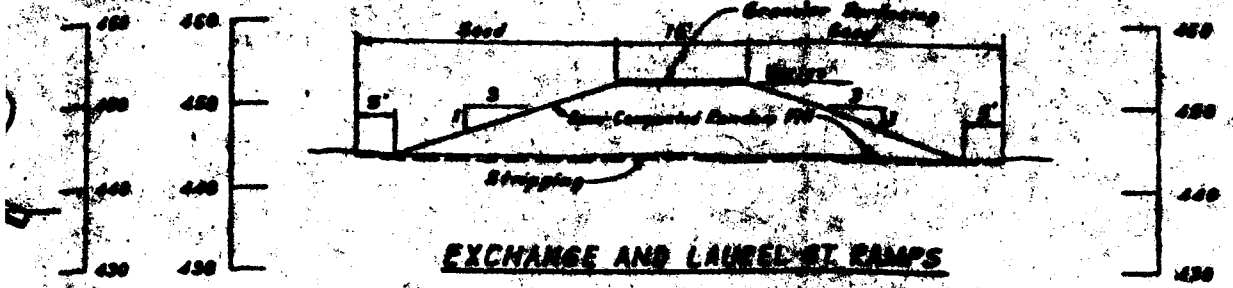
STA. 15+50 TO STA. 23+00



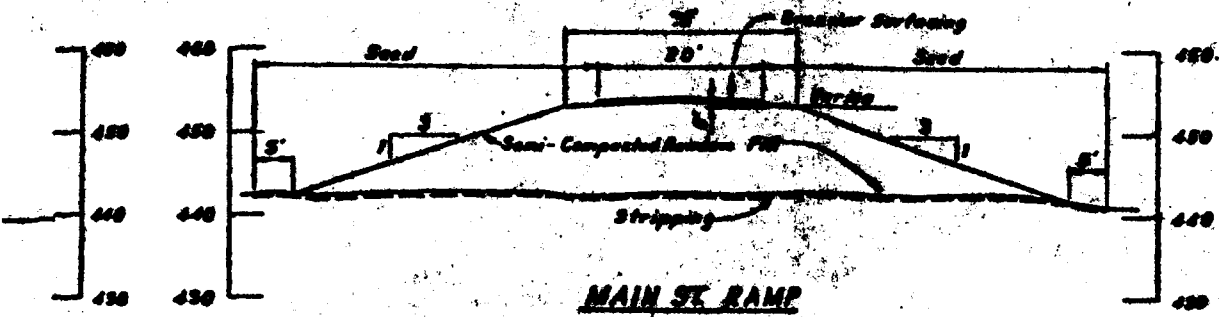
STA. 4+26 TO STA. 15+50



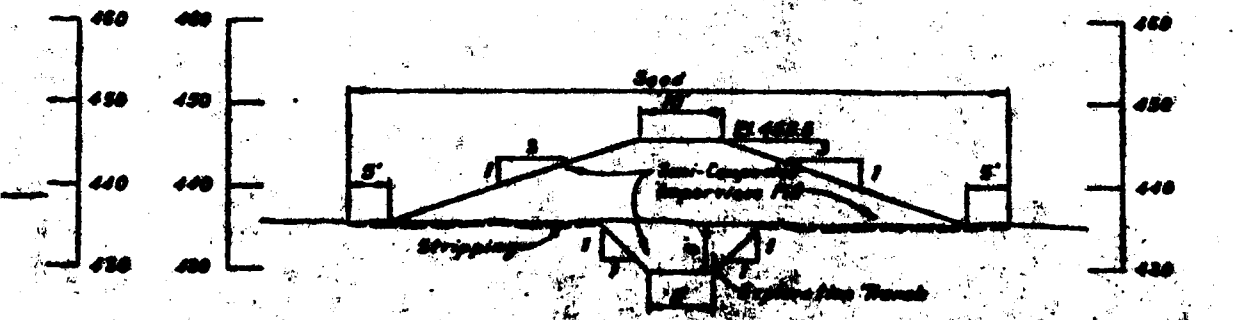
STA. 0+00 TO STA. 4+26



EXCHANGE AND LAUREL ST. RAMPS

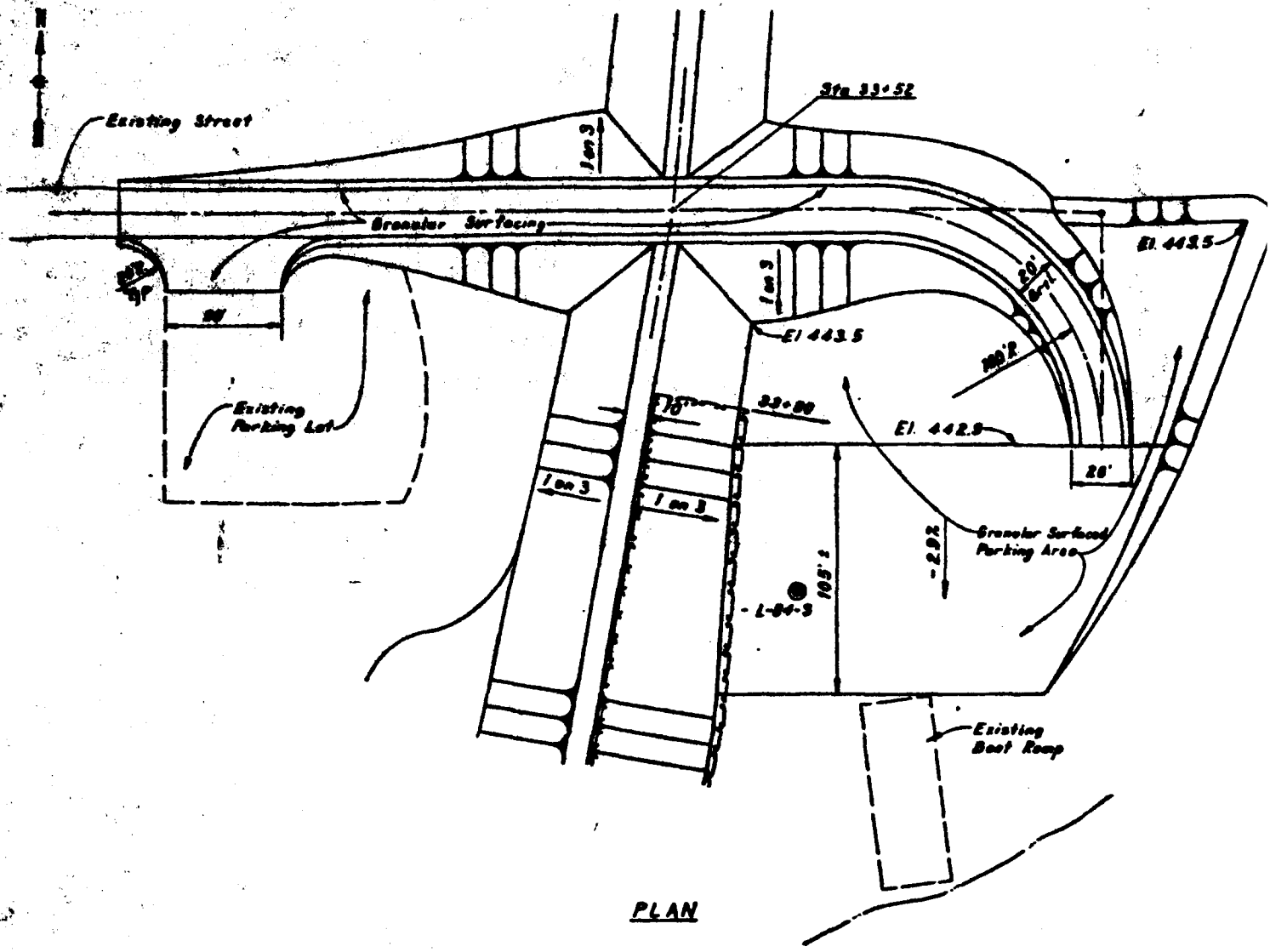


MAIN ST. RAMP

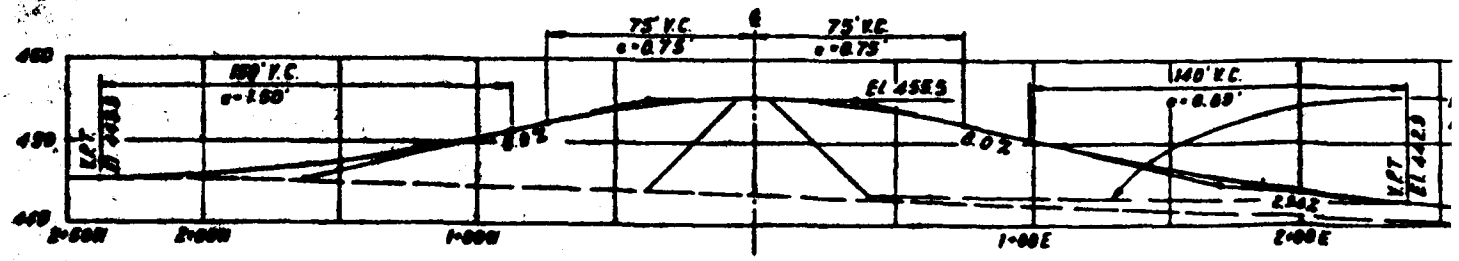


STA. 35+00.70 STA. 43+00

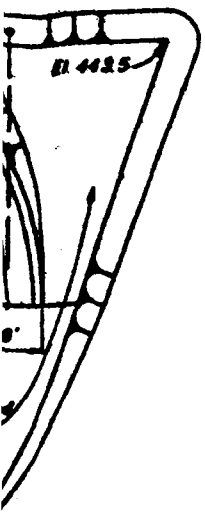
ILLINOIS RIVER
LIVERPOOL, ILLINOIS
FLOOD CONTROL STUDY
TYPICAL SECTIONS

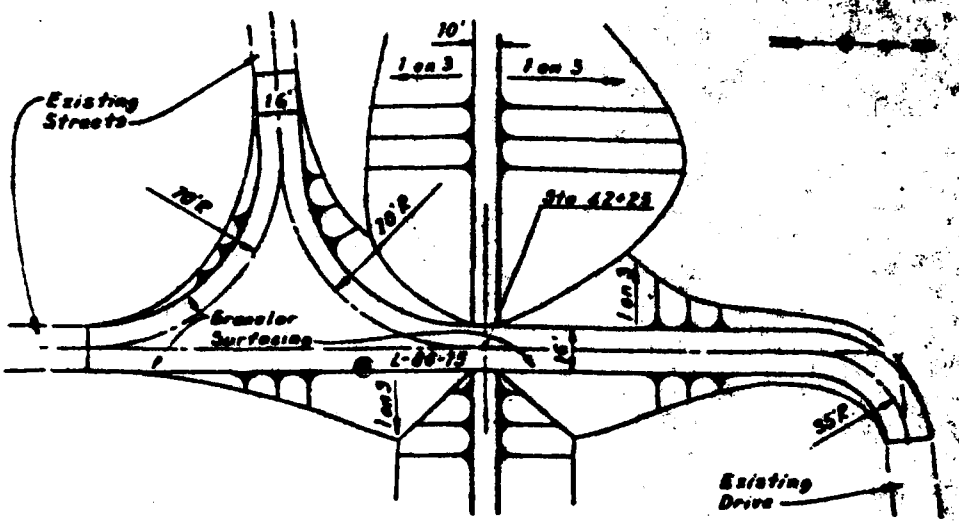


PLAN

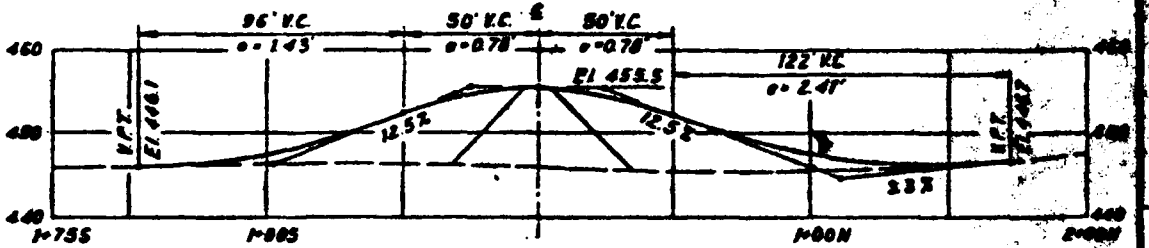


PROFILE
MAIN ST.

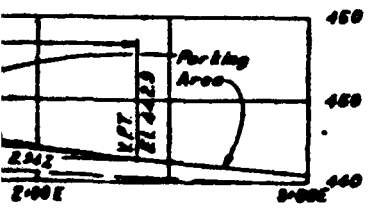




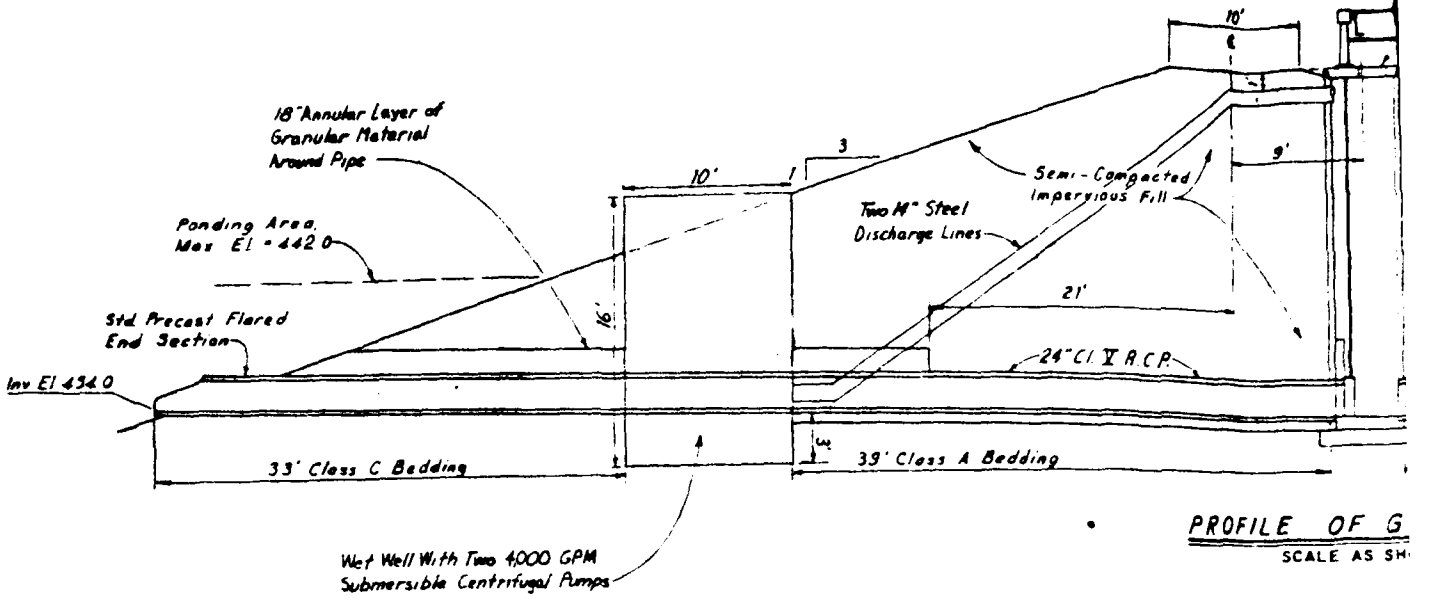
PLAN



PROFILE
EXCHANGE ST

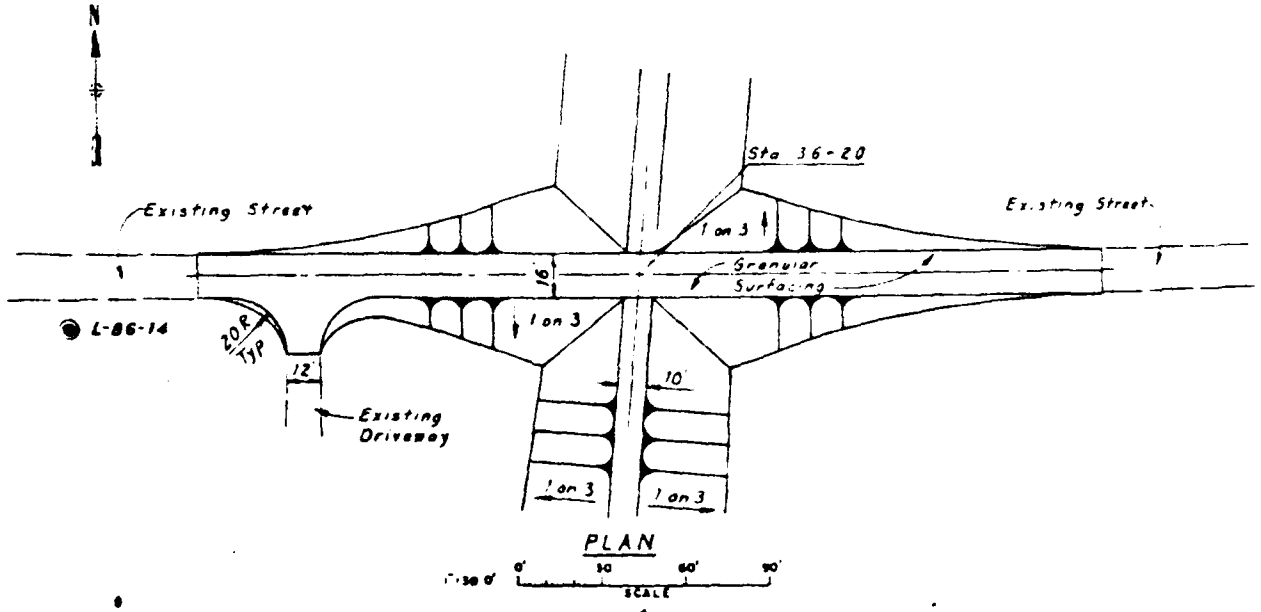


ILLINOIS RIVER
LIVERPOOL, ILLINOIS
SECTION 205
FLOOD CONTROL STUDY
50-YEAR LEVEE
ROAD RAMPS



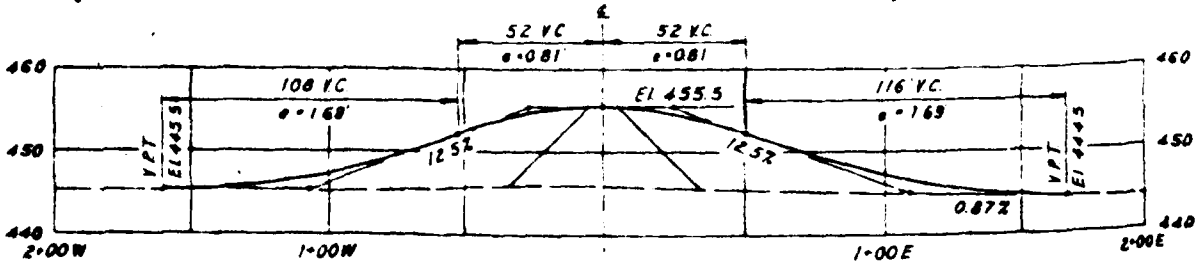
PROFILE OF G

SCALE AS SH



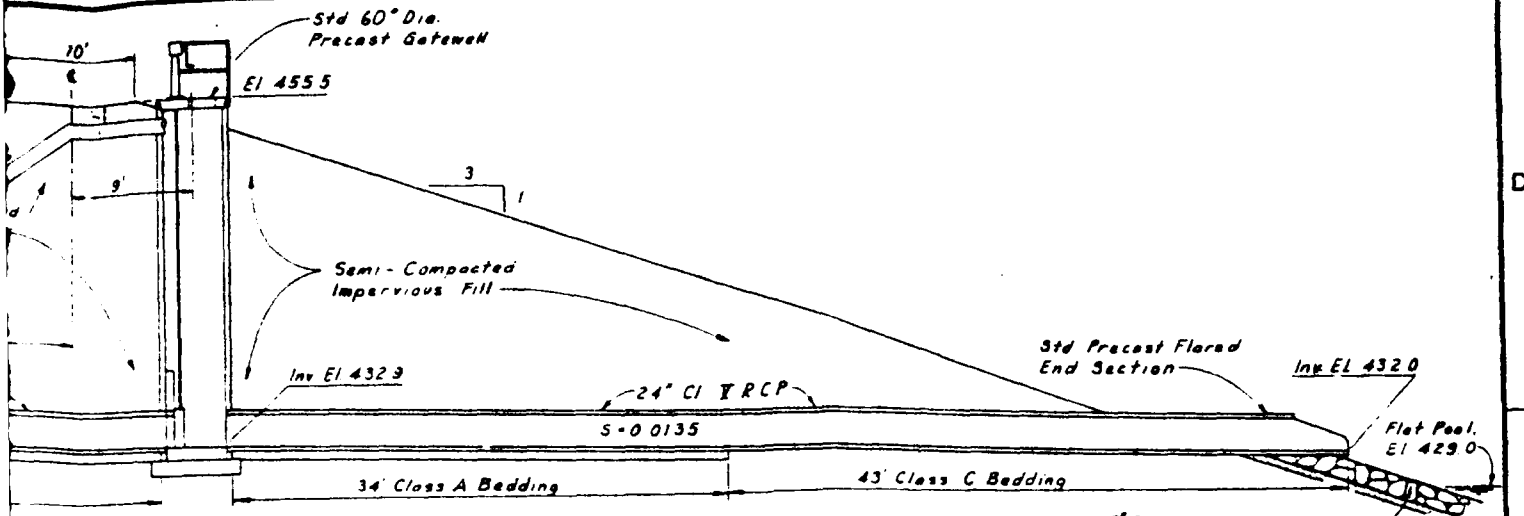
PLAN

SCALE



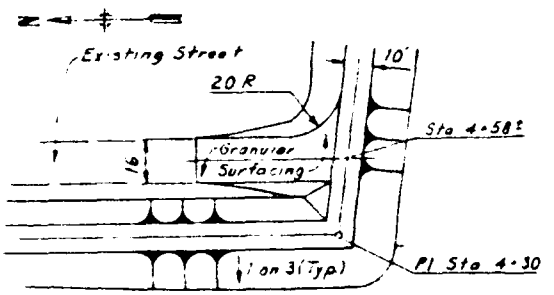
PROFILE

LAUREL ST. RAMP



PROFILE OF GRAVITY OUTLET

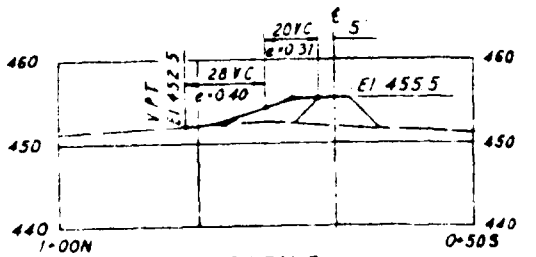
SCALE AS SHOWN



PLAN

0' 30' 60' 90'

SCALE



PROFILE

WEST ST RAMP

460

450

440

2+00E

Symbol	Description of Revisions	Date	Approved

U. S. ARMY ENGINEER DISTRICT, ROCK ISLAND
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

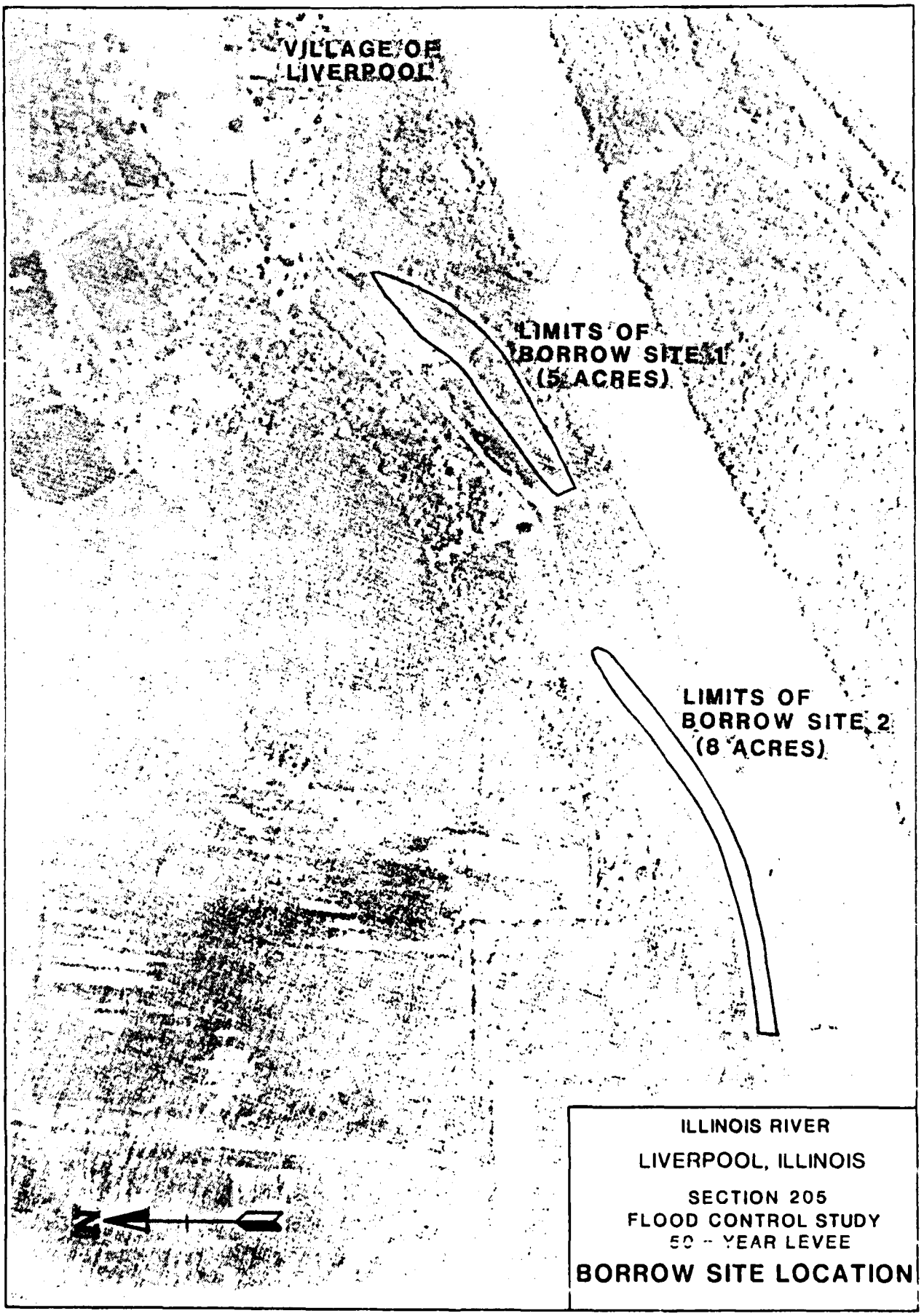
50-YEAR LEVEE

GRAVITY OUTLET
AND
ROAD RAMPS

Designed by
Drawn by
Checked by
Submitted by
Approved by

Scale: AS SHOWN
Date:
Drawing Number:
Sheet _ of _

PLATE 6



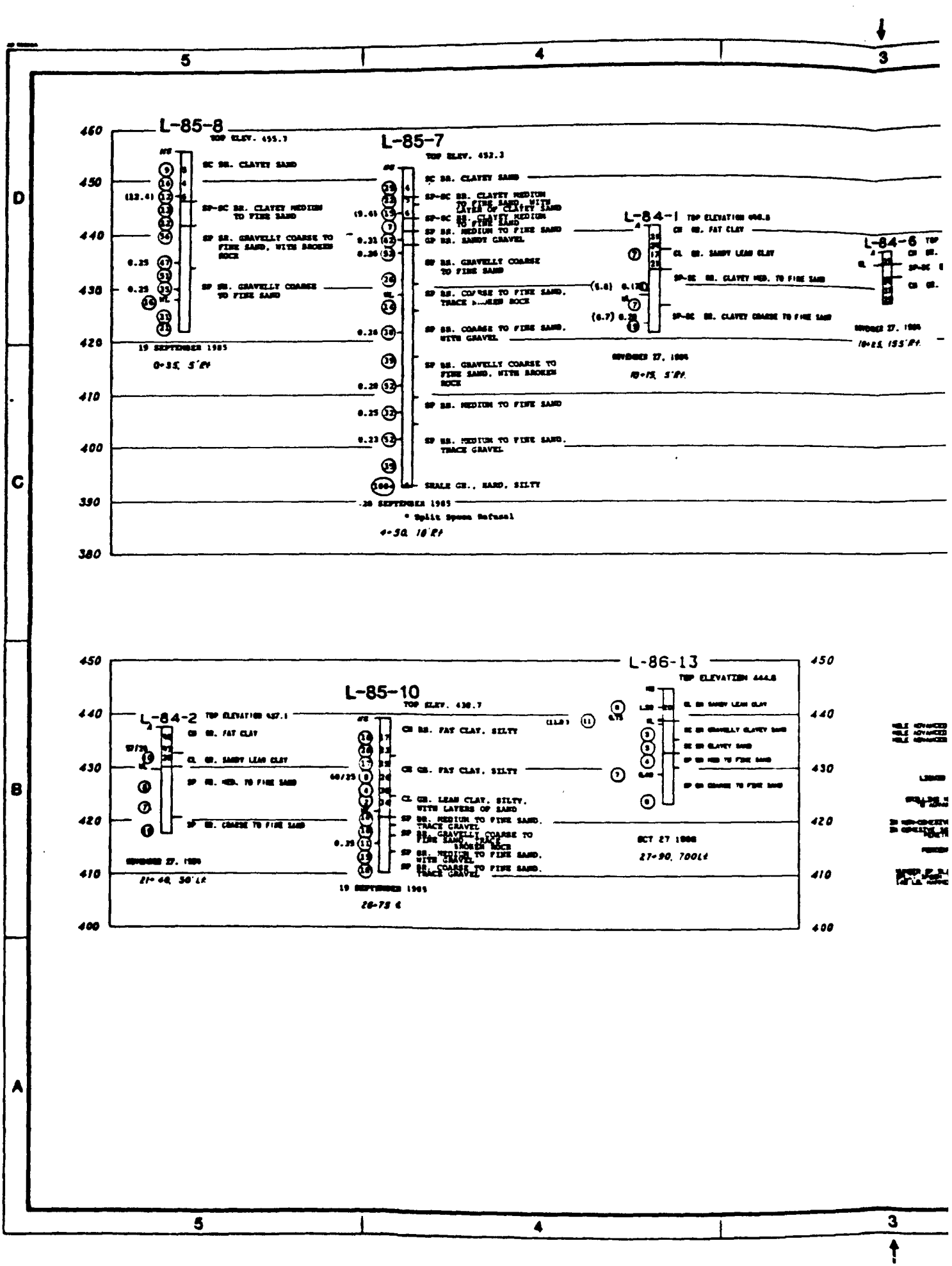
ILLINOIS RIVER

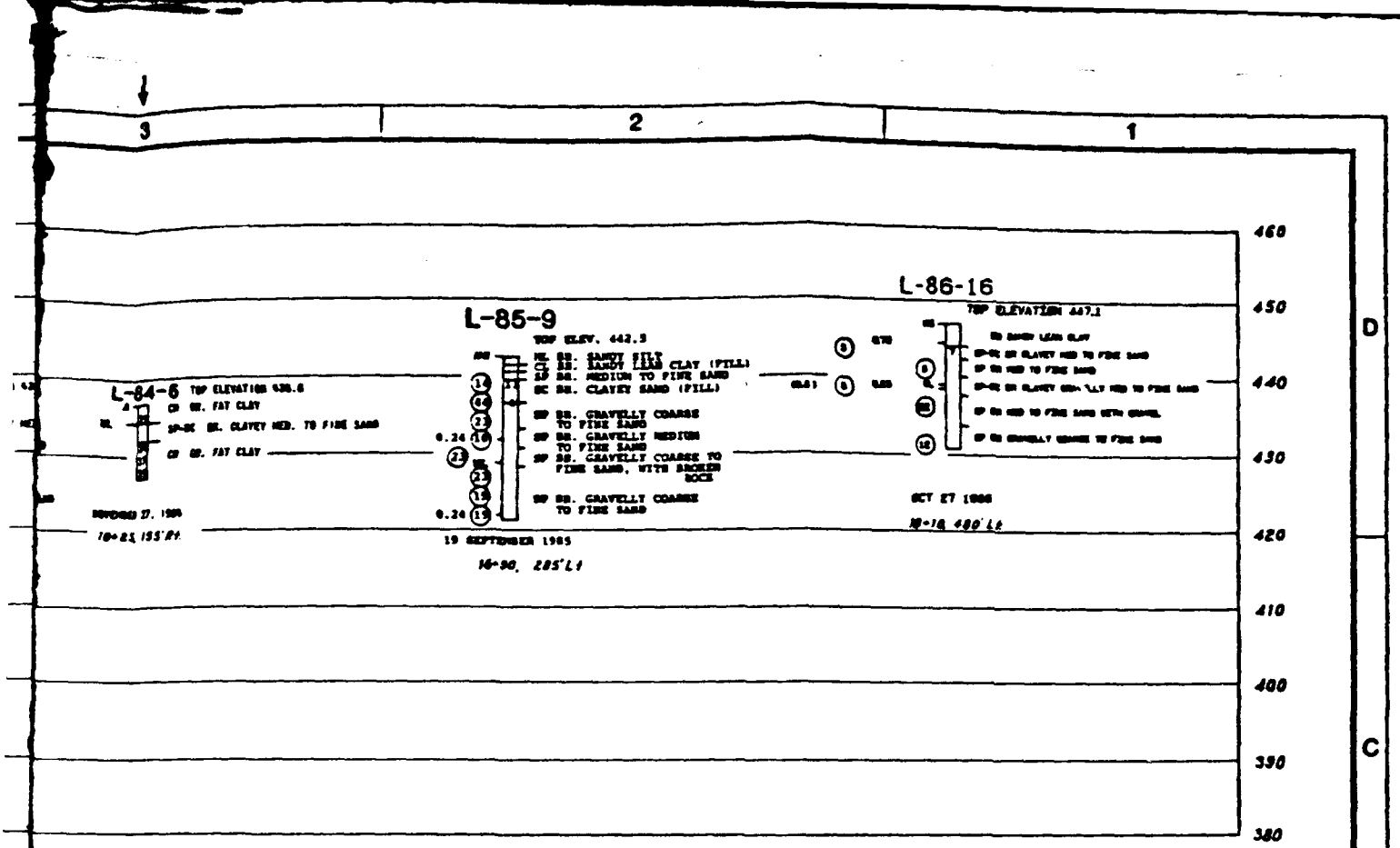
LIVERPOOL, ILLINOIS

SECTION 205
FLOOD CONTROL STUDY
50 - YEAR LEVEE

BORROW SITE LOCATION

PLATE 7


5
4
3
D
C
B
A
460
450
440
430
420
410
400
390
380
L-85-8
TOP ELEV. 455.7
SC SR. CLAYEY SAND
SP-SC SR. CLAYEY MEDIUM TO FINE SAND
SP SR. GRAVELLY COARSE TO FINE SAND, WITH BROKEN ROCK
SP SR. GRAVELLY COARSE TO FINE SAND
(12.4)
0.25
0.25
19 SEPTEMBER 1985
0+35, 5'Rt
L-85-7
TOP ELEV. 452.3
SC SR. CLAYEY SAND
SP-SC SR. CLAYEY MEDIUM TO FINE SAND, WITH LAYER OF CLAYEY SAND
SP-SC SR. CLAYEY MEDIUM TO FINE SAND
SP SR. MEDIUM TO FINE SAND
GP SR. SANDY GRAVEL
SP SR. GRAVELLY COARSE TO FINE SAND
SP SR. COARSE TO FINE SAND, TRACE [illegible] ROCK
SP SR. COARSE TO FINE SAND, WITH GRAVEL
SP SR. GRAVELLY COARSE TO FINE SAND, WITH BROKEN ROCK
SP SR. MEDIUM TO FINE SAND
SP SR. MEDIUM TO FINE SAND, TRACE GRAVEL
SHALE CR., HARD, SILTY
(9.6)
0.31
0.26
0.26
0.20
0.25
0.23
100+
20 SEPTEMBER 1985
* Split Spoon Refusal
4+50, 10'Rt
L-84-1
TOP ELEVATION 446.8
CH SR. FAT CLAY
CL SR. SANDY LEAN CLAY
SP-SC SR. CLAYEY MED. TO FINE SAND
SP-SC SR. CLAYEY COARSE TO FINE SAND
(5.8)
(6.7)
NOVEMBER 27, 1985
10+15, 5'Rt
L-84-6
TOP
CH SR.
CL
SP-SC
CH SR.
NOVEMBER 27, 1985
10+25, 155'Rt
L-84-2
TOP ELEVATION 437.1
CH SR. FAT CLAY
CL SR. SANDY LEAN CLAY
SP SR. MED. TO FINE SAND
SP SR. COARSE TO FINE SAND
50/25
NOVEMBER 27, 1985
21+40, 30'Lt
L-85-10
TOP ELEV. 430.7
CH SR. FAT CLAY, SILTY
CH CR. FAT CLAY, SILTY
CL CR. LEAN CLAY, SILTY, WITH LAYERS OF SAND
SP SR. MEDIUM TO FINE SAND, TRACE GRAVEL
SP SR. GRAVELLY COARSE TO FINE SAND, TRACE BROKEN ROCK
SP SR. MEDIUM TO FINE SAND, WITH GRAVEL
SP SR. COARSE TO FINE SAND, TRACE GRAVEL
(11.8)
0.35
50/25
19 SEPTEMBER 1985
28+75 C
L-86-13
TOP ELEVATION 444.8
CL SR. SANDY LEAN CLAY
SC SR. GRAVELLY CLAYEY SAND
SC SR. CLAYEY SAND
SP SR. MED TO FINE SAND
SP SR. COARSE TO FINE SAND
0.75
OCT 27 1986
27+90, 700Lt



LEGEND

BORING NUMBER

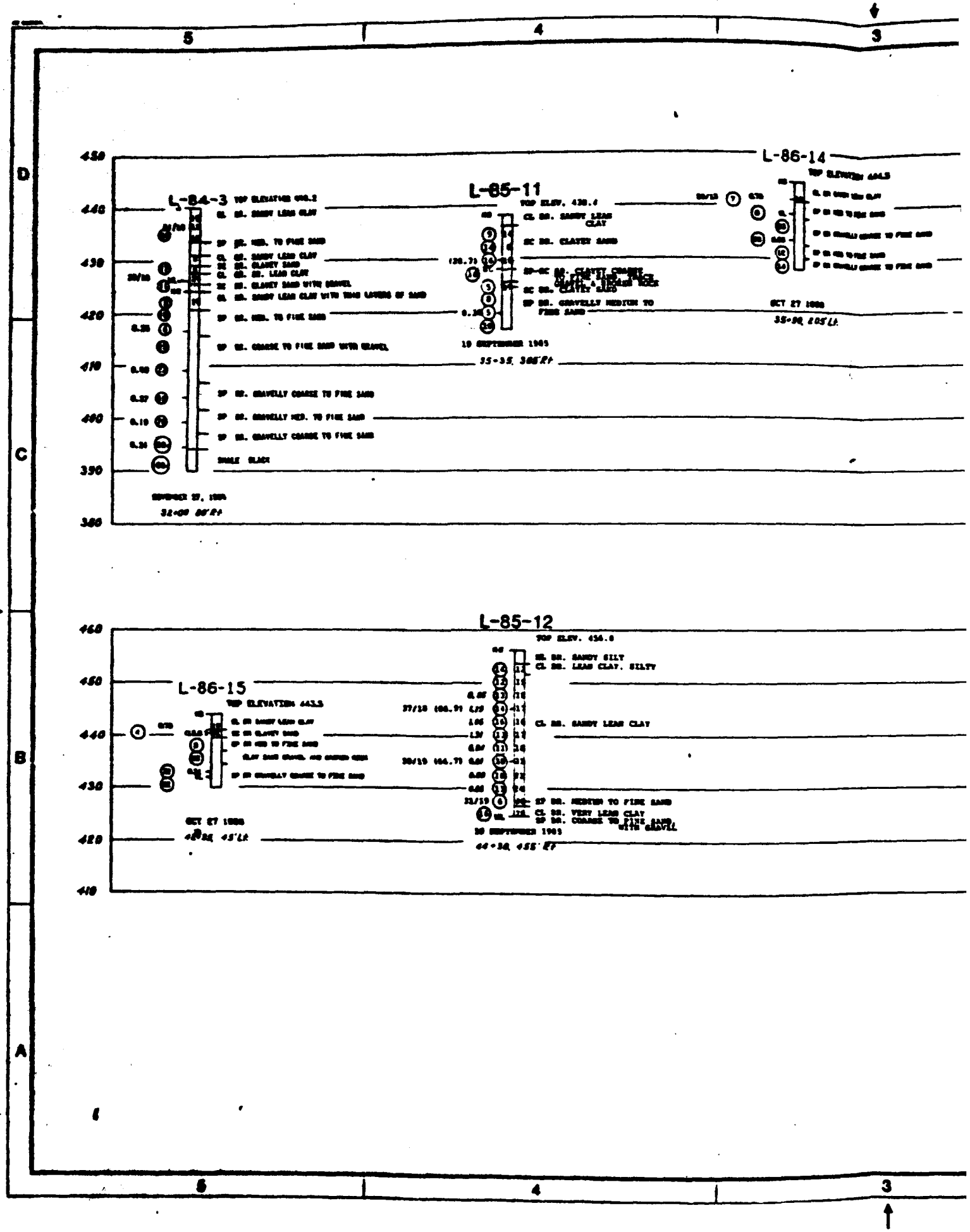
*UNIFIED SOIL CLASSIFICATION

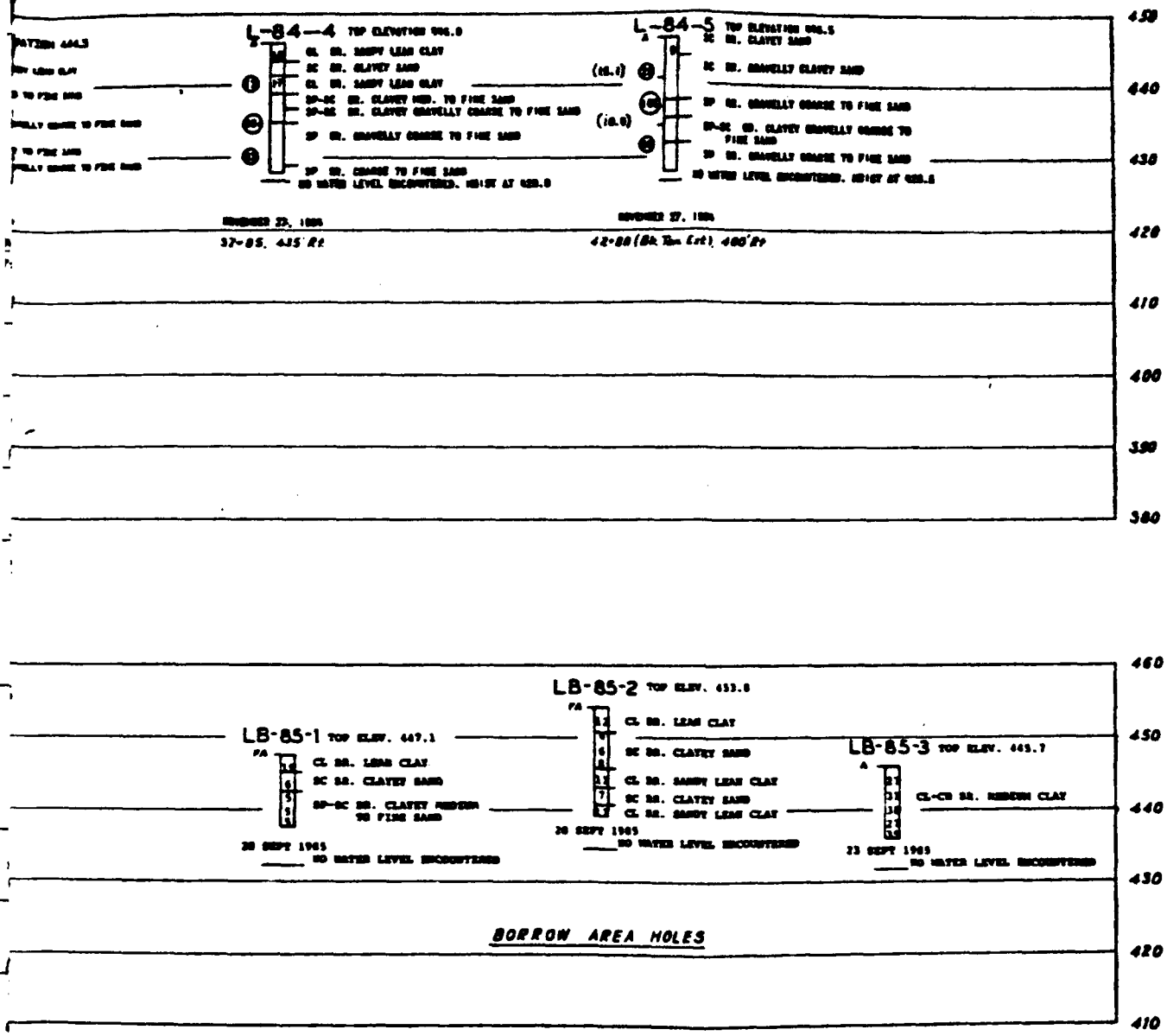
MAJOR DIVISIONS		TYPE	LETTER SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS >50% OF MATERIAL IS RETAINED ON #200 SIEVE	GRAVELS >50% OF COARSE FRACTION IS RETAINED ON #4 SIEVE	CLEAN GRAVELS	GW	GRAVEL, WELL GRADED, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	GRAVEL, POORLY GRADED, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES
	SANDS >50% OF COARSE FRACTION PASSES #4 SIEVE	CLEAN SANDS	SW	SAND, WELL GRADED, GRAVELLY SANDS
			SP	SAND, POORLY GRADED, GRAVELLY SANDS
		SANDS WITH FINES	SM	SILTY SAND, SAND-SILT MIXTURES
			SC	CLAYEY SAND, SAND-CLAY MIXTURES
FINE GRAINED SOILS >50% OF MATERIAL PASSES # #200 SIEVE		SILTS AND CLAYS LL<50	ML	SILT & VERY FINE SAND, SILTY OR CLAYEY FINE SAND OR CLAYEY SILT
			CL	LEAN CLAY, SANDY CLAY, SILTY CLAY, OF LOW TO MEDIUM PLASTICITY
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
		SILTS AND CLAYS LL>50	MH	SILT, FINE SANDY OR SILTY SOIL WITH HIGH PLASTICITY
			CH	FAT CLAY, INORGANIC CLAY OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, AND HIGHLY ORGANIC SOIL

* THE CLASSIFICATION OF SOILS IS IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM AS ONLY PRESENTED IN THE TABLE ABOVE. FOR A COMPLETE DESCRIPTION OF THE UNIFIED SOIL CLASSIFICATION SYSTEM REFER TO: TECHNICAL MEMORANDUM NO. 3-357 PREPARED BY THE U. S. ARMY CORPS OF ENGINEERS, WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS, VICKSBURG, MISSISSIPPI.

ILLINOIS RIVER
LIVERPOOL, ILLINOIS
SECTION 205
FLOOD CONTROL STUDY
50-YEAR LEVEE
BORING LOGS

PLATE 8


5
4
3
D
C
B
A
L-84-3
L-85-11
L-86-14
L-86-15
L-85-12
450
440
430
420
410
400
390
380
460



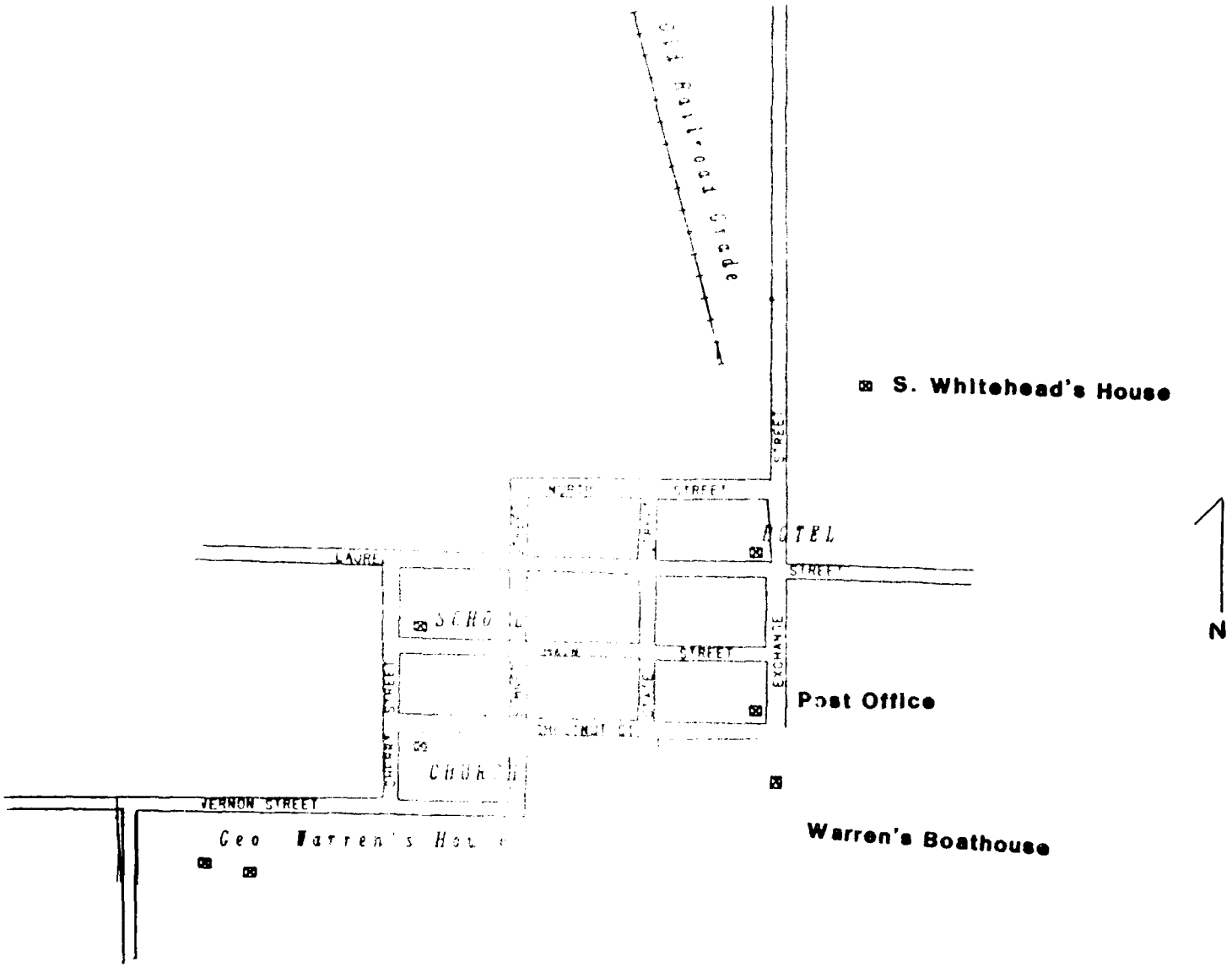
ILLINOIS RIVER

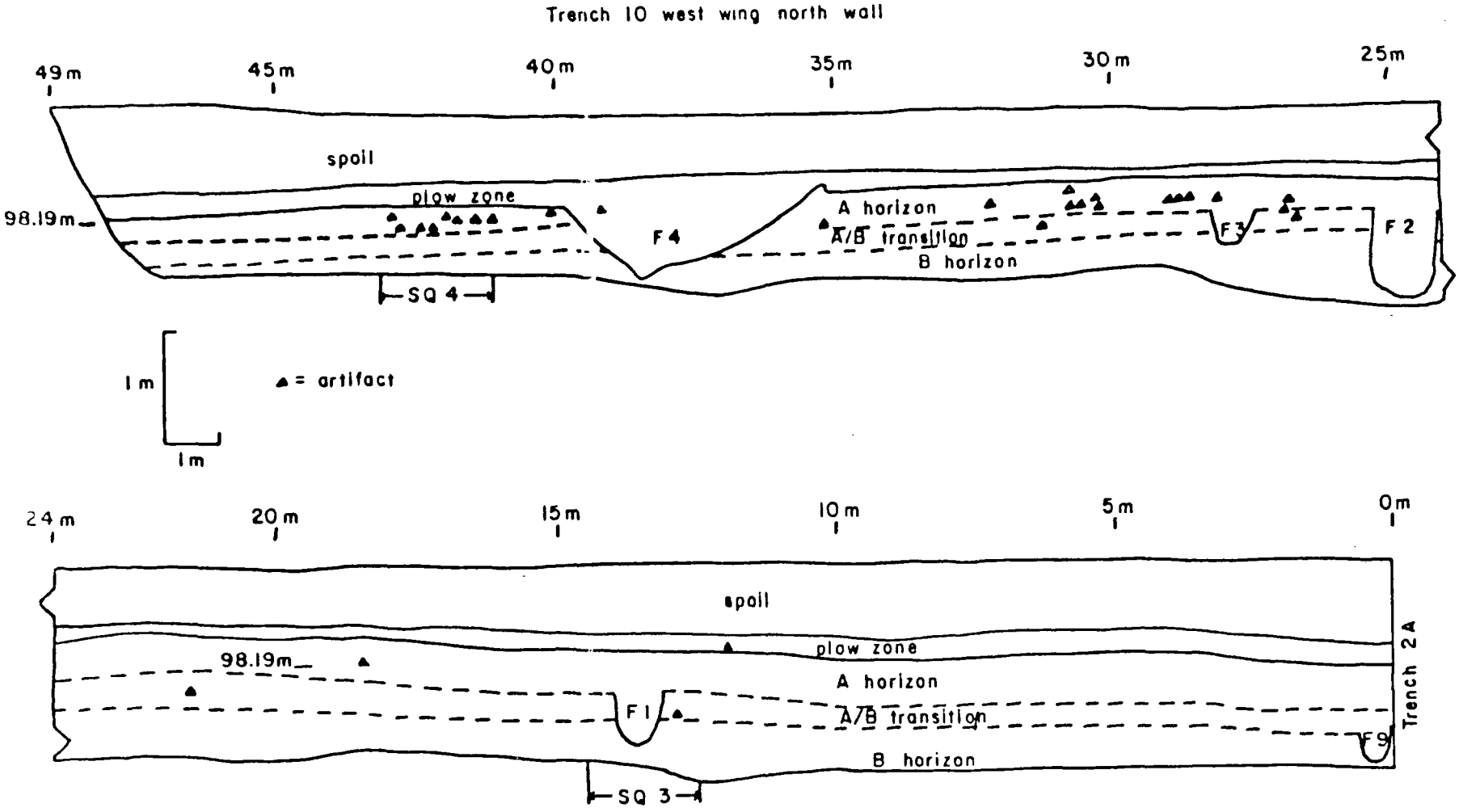
LIVERPOOL, ILLINOIS

SECTION 205
FLOOD CONTROL STUDY
50-YEAR LEVEE

BORING LOGS

PLATE 9

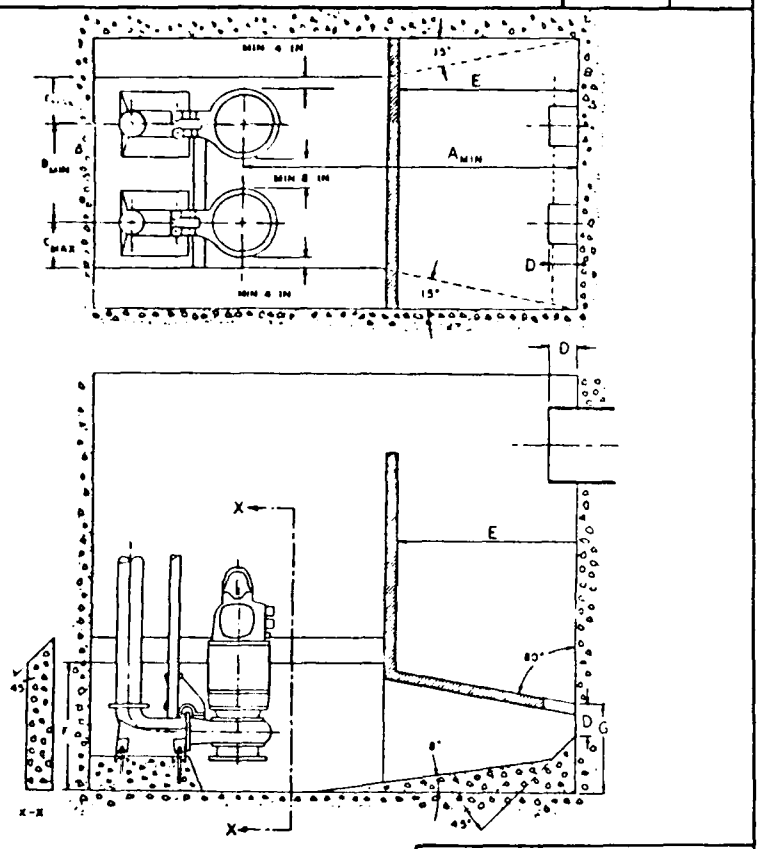

Old Railroad Grade
S. Whitehead's House
HOTEL
Post Office
Warren's Boathouse
JERNON STREET
N



Profile of Archeological Site 11-F-25 (Borrow Site)

DESIGN OF LARGE SUBMERSIBLE PUMP STATIONS — FIGURE 3

SECTION	PAGE
J	3
SUPERSEDES	ISSUED
—	JUN77



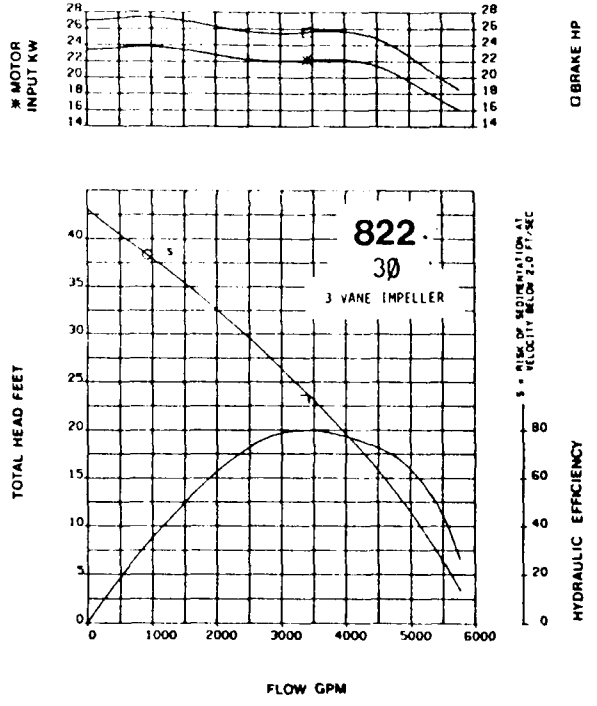
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WASTEWATER

IMPELLER PERFORMANCE CURVES

C-3201



ILLINOIS RIVER

LIVERPOOL, ILLINOIS

SECTION 205
FLOOD CONTROL STUDY

PUMP STATION

PLATE 12

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

CENCR-PD-E

FINAL ENVIRONMENTAL IMPACT STATEMENT
DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

OCTOBER 1989

FINAL ENVIRONMENTAL IMPACT STATEMENT
DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

The responsible lead agency is the U.S. Army Engineer District, Rock Island.

Abstract: The village of Liverpool is a small community located along the Illinois River in Fulton County, Illinois. Severe flooding has occurred in 1973, 1974, 1979, twice in 1982, and in 1985, causing substantial flood damages in the village. Four alternatives were evaluated in this Final Environmental Impact Statement (FEIS) to determine which plan is in the best overall public interest. A 50-year flood protection levee, which would involve constructing a levee around the riverward side of Liverpool and connecting with an existing agricultural levee, was selected as the recommended plan. Construction of this plan is both environmentally and economically acceptable; however, it may cause significant impacts to cultural resources that lie within the levee alignment.

Significant archeological sites eligible for listing on the National Register of Historic Places (NRHP) are present within the proposed levee alignment and adjacent to the proposed borrow area. An archeological Data Recovery Plan (DRP) will be developed and executed to mitigate the adverse effects of project construction to the significant prehistoric archeological site located in the levee alignment. The remaining portion of the 50-year levee alignment contains no significant historic properties.

Please send comments you may have on this statement to the following address within 30 days:

District Engineer U.S. Army Engineer District, Rock Island ATTN: Planning Division, Clock Tower Building - P.O. Box 2004, Rock Island, Illinois 61204-2004

NOTE: Information, displays, maps, etc., discussed in the main report are incorporated by reference in the FEIS.

SUMMARY

MAJOR CONCLUSIONS AND FINDINGS

Four plans, including "no action," were evaluated in the FEIS, with the 50-year levee plan being selected as the recommended plan.

Two plans, the "no action" and permanent evacuation, were found to be infeasible. The "no action" plan did not answer the need for flood protection, and the permanent evacuation plan had costs that outweighed the benefits.

Both the 25- and 50-year levee plans were feasible in that both had benefits greater than the costs. However, the 50-year plan maximizes net National Economic Development (NED) benefits while minimizing impacts, making it the plan that best meets the project's planning objectives.

RELATIONSHIP TO ENVIRONMENTAL PROTECTION STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS

Table EIS-1 lists statutes, plans, and regulations that may be applicable to this project and whether or not their requirements were met.

SUMMARY OF ENVIRONMENTAL EFFECTS

1. Community Growth - The proposed project would encourage non-resident property owners and others to establish permanent residence in Liverpool.

2. Regional Growth - The project would not significantly affect regional growth.

3. Displacement of People - The project would necessitate the relocation of residents of two occupied dwellings (one house, one mobile home). The alignment would leave three vacant properties unprotected.

4. Community Cohesion - The project would improve community cohesion by reducing the threat of flooding. Population growth and improved economic viability also would enhance social cohesion and community pride.

5. Property Values - Property values could increase following construction of the proposed project.

6. Tax Revenues - Tax revenues could increase as a result of elevated property values. With the project, the village might experience an increase in business activity and resulting tax revenues.

7. Public Facilities - The project would improve access to the village during flood events. Access to a public boat ramp would be improved during minor floods. Additional benefits would accrue to four public buildings and one park.

8. Public Services - The project would improve access to Liverpool; residents would experience fewer delays in emergency vehicle service during flood events. Flood-fighting and cleanup costs would be reduced.

9. Life, Health and Safety - The provision of flood protection would greatly reduce life, health, and safety risks faced by Liverpool residents.

10. Employment and Labor Force - The project would create temporary employment for some Liverpool residents. The project would help to maintain the viability of the community for operating and expanding existing businesses. New businesses might locate in Liverpool, thereby increasing employment opportunities.

11. Business and Industrial Activity - The project would enhance the commercial viability of the study area, avoiding potential commercial migration to areas outside of the floodplain. Liverpool would be more attractive for the establishment of new businesses or the expansion of existing businesses.

12. Farm Displacement - No farmsteads or prime or unique farmland would be lost as a result of the project.

13. Noise Levels - Temporary increases in noise would occur from heavy machinery used during the construction of the proposed levee. The completed project would have no effect on current noise levels.

14. Man-Made Resources - Man-made resources affected by the project include the village of Liverpool and significant archeological deposits within the portions of levee alignment.

15. Natural Environment - Natural resources affected by the project include 4.9 acres of floodplain habitat.

16. Air Quality - Temporary emissions from heavy equipment and fugitive dust particles would occur during construction. There would be no permanent effects on air quality.

17. Aesthetics - The levee would block the view of the river of residents living adjacent to the levee. Temporary impacts would occur until the levee is revegetated; permanent impacts would occur from the placement of riprap.

18. Water Quality - Temporary increases in turbidity from runoff would occur until the project area is revegetated. No permanent effects to water quality would occur.

FEDERAL STATUTES

Archaeological and Historic Preservation Act - This act is directed to the preservation of historic and archeological data that would otherwise be lost as a result of Federal construction. Significant cultural resources present in the proposed Liverpool project construction area will require the development and execution of a Data Recovery Plan to mitigate the adverse effects of project construction.

Endangered Species Act (as amended) - The project will have no effect on any federally endangered or threatened species.

Fish and Wildlife Coordination Act - The proposed project is in compliance with this act. A copy of the draft Fish and Wildlife Coordination Act Report (FWCAR) can be found in appendix F of the main report. A letter dated 8 August 1987 was sent to the Illinois Department of Conservation coordinating the project. No comments were received. A copy of the letter can be found in appendix F.

National Historic Preservation Act (as amended) - Coordination with the State Historic Preservation Officer (SHPO) has been initiated to assure that the project will not have an adverse effect on significant cultural resources.

Executive Order 11988 - Floodplain Management - The proposed project would provide flood protection to Liverpool. While this may encourage development of vacant lots and abandoned housing within the village, levee construction will be kept to the minimum amount necessary and will not promote outward expansion of the village.

Farmland Protection Policy Act - In accordance with this act, project alternatives have been submitted to the Soil Conservation Service on SCS Form AD-1006. The preferred alternative will not result in the loss of any prime or unique farmland and is in compliance with this Act.

Executive Order 11990 - Protection of Wetlands - Approximately 4.9 acres of floodplain habitat would be affected by the project. Disturbance would be kept to the minimum amount necessary to complete the project.

TABLE EIS-1

Relationship to Environmental Protection Statutes
and Other Environmental Requirements

STATUTE OR REQUIREMENT	50-YEAR LEVEE PREFERRED PLAN	100-YEAR AG. LEVEE	PERMANENT EVACUATION	NO ACTION
FEDERAL STATUTES				
Archaeological and Historic Preservation Act (as amended)	Full	Full	Full	Full
Clean Air Act (as amended)	Full	Full	Full	Full
Clean Water Act (as amended)	Full	Full	Full	Full
Coastal Zone Management Act (as amended)	N/A	N/A	N/A	N/A
Endangered Species Act (as amended)	Full	Full	Full	Full
Estuary Protection Act	N/A	N/A	N/A	N/A
Federal Water Project Recreation Act (as amended)	Full	Full	Full	Full
Fish and Wildlife Coordination Act (as amended)	Full	Full	Full	Full
Land and Water Conservation Fund Act (as amended)	Full	Full	Full	Full
Marine Protection, Research and Sanctuaries Act	N/A	N/A	N/A	N/A
National Historic Preservation Act (as amended)	Full	Full	Full	Full
National Environmental Policy Act (as amended)	Full	Full	Full	Full
River and Harbor Act	N/A	N/A	N/A	N/A
Watershed Protection and Flood Prevention Act	N/A	N/A	N/A	N/A
Wild and Scenic Rivers Act (as amended)	N/A	N/A	N/A	N/A
Farmland Policy Protection Act	Full	Full	Full	Full
EXECUTIVE ORDERS AND MEMORANDA				
Floodplain Management (E.O. 11988)	Full	Full	Full	Full
Protection of Wetlands (E.O. 11990)	Full	Full	Full	Full
Analysis of Prime & Unique Farmlands	Full	Full	Full	Full
LAND-USE PLANS	N/A	N/A	N/A	N/A
REQUIRED FEDERAL ENTITLEMENTS				
Section 404 Evaluation (Clean Water Act)	Full	Full	Full	Full
Section 401 (State Certification)	Full	Full	Full	Full

COMPLIANCE CATEGORIES:

a. Full Compliance. Having met all requirements of the statute, E.O., or other environmental requirement for the current stage of planning (either pre- or postauthorization).

b. Partial Compliance. Not having met some of the requirements that normally are met in the current stage of planning.

c. Noncompliance. Violation of a requirement of the statute, E.O., or other environmental requirement.

d. Not Applicable. No requirements for the statute, E.O., or other environmental requirement for the current stage of planning.

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ILLINOIS RIVER
LIVERPOOL, ILLINOIS

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FINAL ENVIRONMENTAL IMPACT STATEMENT
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ILLINOIS RIVER
LIVERPOOL, ILLINOIS

SECTION 1 - NEED FOR AND OBJECTIVES OF ACTION

STUDY AUTHORITY

The Corps of Engineers has been given authority to construct feasible small projects without the specific authorization of Congress. The authority for this report is Section 205 of the Flood Control Act, approved 30 June 1948, as amended by Section 205 of the Flood Control Act, approved 23 October 1962; Section 61 of the Water Resources Development Act, approved 7 March 1974; and Section 133(b) of the Water Resources Development Act, approved 22 October 1976. The authority, as amended, is presented below:

> The Secretary of the Army is authorized to allot from any appropriations heretofore or hereafter made for flood control, not to exceed $30,000,000 for any one fiscal year, for the construction of small projects for flood control and related purposes not specifically authorized by Congress, which come within the provisions of Section 1 of the Flood Control Act of June 22, 1936, when in the opinion of the Chief of Engineers such work is advisable. The amount allotted for a project shall be sufficient to complete Federal participation in the project. Not more than $4,000,000 shall be allotted under this section for a project at any single locality. The provisions of local cooperation specified in Section 3 of the Flood Control Act of June 22, 1936, as amended, shall apply. The work shall be complete in itself and not commit the United States to any additional improvement to ensure its successful operation, except as may result from the normal procedure applying to projects authorized after submission of preliminary examination and survey reports.

INTENT OF CONGRESS

The intent of Congress was to grant direct authority to the Chief of Engineers for a more prompt analysis and response to certain local flood

control problems than the comprehensive study investigations which require specific authorization by Congress.

PUBLIC CONCERNS

The Liverpool area has a history of flood problems. With the entire village located in the 100-year floodplain, severe flooding has occurred in 1973, 1974, 1979, twice in 1982, and in 1985. Floodwaters on the lower Illinois River characteristically rise slowly, continue for long periods, and recede slowly, often displacing residents and businesses for over 1 month at a time. Because of recent flooding, the number of occupied houses and trailers has decreased from 72 in 1983, when the Rock Island District initiated its first phase of study, to 49 as of May 1986.

PLANNING OBJECTIVES

The national planning objective that exists for all water and related land resources planning requires that this planning be directed to achieve National Economic Development (NED).

The NED objective is achieved by increasing the value of the Nation's output of goods and services, and improving national economic efficiency. The achievement of the NED objective must be consistent with protecting the Nation's environment.

The specific planning objective of this study is to reduce damages to the Liverpool, Illinois, area from flooding of the Illinois River.

SECTION 2 - ALTERNATIVES

PLANS ELIMINATED FROM FURTHER STUDY

25-YEAR LEVEE

This plan would provide 25-year flood protection by constructing a levee around Liverpool and tying into an existing agricultural levee. The levee alignment, formulated in the Corps' Liverpool Reconnaissance Report dated February 1985, differs from the currently preferred alternative by providing protection to a larger area at the upstream end of Liverpool. The 25-year plan would have required approximately 10.3

acres for levee right-of-way, 2.5 acres for ponding, and 2.0 acres for relocation of the boat ramp.

Flooding in recent years has exceeded this level of protection several times, and this plan was dropped from further consideration because the net benefits for the 50-year plan are greater.

100-YEAR RING LEVEE

This plan would provide 100-year flood protection to Liverpool by ringing the village with a 100-year levee. It consists of constructing new alignment around three sides of Liverpool and connecting with the existing agricultural levee. The agricultural levee adjacent to the village also would be raised.

This plan was dropped from further consideration because the benefit-to-cost (B/C) ratio was 0.89.

FLOODPROOFING

This plan was eliminated early on and not studied in detail because of flooding depth and duration and structural soundness. Methods of floodproofing include raising the residences above flood levels, providing water-tight entrances and windows, or building individual levees or walls. Raising residences could not reasonably be implemented because many were not structurally sound enough to raise. Heavy ice flows during winter flooding present a safety hazard to residences raised up on concrete blocks. Because of the depth of flooding that Liverpool receives, levees or walls and water-tight entrances and windows are infeasible.

Since the Illinois River within the project area recedes slowly, access is a problem. Residents would be required to use boats for long periods of time to reach their homes.

For the above reasons, floodproofing was not investigated further as a means of reducing damages from flooding in Liverpool.

PLANS CONSIDERED IN DETAIL

50-YEAR LEVEE (PREFERRED PLAN)

This plan involves constructing a flood control levee around three sides of Liverpool that would connect to an existing agricultural levee. The

levee would be built to provide a 50-year level of protection, the same protection level as the agricultural levee.

The levee would be 4,395 feet long and would require 10.0 acres of right-of-way. Levee slopes would be built on a 3 horizontal to 1 vertical pitch. Approximately 400 lineal feet of levee, at the lower elevation between the village and river, would have a 6-inch layer of bedding rock and an 18-inch layer of riprap placed along its riverward side for erosion protection. Total cubic yards of bedding rock and riprap would be 340 and 1,010, respectively.

A 2.1-acre ponding area is required for interior drainage. It would be located in a low area between the village and the river and would require no additional excavation. A gravity outlet and two submersible centrifugal pumps would drain the ponding area.

This plan also includes ramping existing roads in three places to permit continued access to areas bisected by the levee, raising the boat ramp parking lot to provide sight clearance over the levee, and filling four depressions, for a total of 0.3 acre, to direct runoff to the ponding area.

Approximately 131,185 cubic yards of fill would be required for project construction. Fill material (for the levee, levee ramps, depressions, and raised boat ramp parking lot) would come from two borrow sites. The first is an abandoned railroad berm. It is a linear strip of land approximately 2200 feet in length and comprises approximately 8 acres. It is located one mile downstream of Liverpool. The second site is also downstream of Liverpool, but is adjacent to the project. This 5 acre site would be sloped to allow for open water and the establishment of wetland vegetation. Plate 7 of the main report show the location of the borrow sites.

This plan provides the greatest net benefits at $102,100 per year and has a B/C ratio of 1.80. Standard erosion control items would also be used in disturbed area during construction. These include stacked straw bales, sediment basins, and temporary mulching. Construction within the waterway would take place during zero or low flow. Upon project completion base areas would be seeded.

100-YEAR AGRICULTURAL LEVEE

This plan involves constructing a levee built to the 100-year protection level around the village of Liverpool and tying it in with the existing agricultural levee. The agricultural levee, which was built to provide 50-year flood protection, would be raised to the 100-year level. That portion of the agricultural levee adjacent to the village would not be raised since the new alignment would serve as the main line of protection.

Levee design would generally be the same as that of the preferred plan. Both the slope and the alignment around the village would basically be the same, except that the 100-year levee would be wider. Borrow would come from the same sites as the preferred (50-year) plan. The Buckheart Creek site would be expanded within the 21 acre surveyed area to account for the additional fill of a larger levee. Plate 2 of the main report shows the 100-year levee alignment.

The B/C ratio is 0.89 and, consequently, this plan was not selected as the preferred plan.

PERMANENT EVACUATION

This plan calls for the acquisition and demolition of all property in the village. Residents would be relocated in nearby towns. With this plan, the floodplain would be restored for recreational use.

Because of the Federal Emergency Management Agency's (FEMA) involvement with Liverpool, this plan was studied in detail. However, with a B/C ratio of only 0.86, this is not the preferred plan.

WITHOUT CONDITION (NO ACTION)

Failure to provide flood protection would result in continued property damage and hardships for residents. FEMA would continue to make large flood insurance payments. The frequency of flooding in Liverpool makes this an unacceptable plan.

COMPARATIVE IMPACTS OF ALTERNATIVES

Table EIS-2 summarizes the relative impacts of all alternatives.

TABLE ES-2

Comparative Impacts of Alternatives

Category	50-Year Levee (Preferred Alternative)	100-Year Agricultural Levee	Permanent Evacuation	No Action
Natural Resources	6.0 acres of floodplain habitat would be affected by the levee alignment and borrow site. An additional 2.1 acres would be used for ponding.	27.0+ acres of floodplain habitat would be affected by the levee alignment and borrow. An additional 2.1 acres would be used for ponding.	Long-term positive impacts may result if population decreases or property is abandoned.	Long-term positive impacts may result if population decreases or property is abandoned.
Farmland	The levee alignment and borrow site would affect 13.5 acres of land.	The levee alignment and borrow sites would affect 27.5 acres of land.	No Impact	No Impact
Endangered Species	No Impact	No Impact	No Impact	No Impact
Cultural Resources	An NRHP quality prehistoric site is located in the levee alignment. The execution of a Data Recovery Plan is required to mitigate adverse impacts.	Impacts not fully evaluated. Cultural resource evaluation of expanded levee alignment and any borrow locations required if this becomes preferred plan.	Impacts not fully evaluated. An evaluation of historic structures would be required if this becomes preferred plan.	No Impact

TABLE EIS-2 (Cont'd)

Category	50-Year Levee (Preferred Alternative)	100-Year Agricultural Levee	Permanent Evacuation	No Action
Community and Regional Growth	**The project would encourage the rehabilitation and reoccupation of residential structures. No significant impacts to regional growth would result from the project.**	The project would encourage the rehabilitation and reoccupation of residential structures. No significant impacts to regional growth would result from the project.	As a result of this project, all village residents would be forced to find new housing and the village would cease to exist. The population would likely remain in the same geographic region, so no impacts to regional growth would result. This alternative is opposed by Fulton County Board.	The population of the community would remain unstable. Residents would move away following periods of flooding and structures would be reoccupied as flooding decreases. Properties would continue to be abandoned. No significant impacts to regional growth would result from project.
Displacement of People	**The project would require the relocation of residents of two occupied dwellings. Three unoccupied upstream dwellings would remain unprotected.**	The project would require the relocation of residents of two occupied dwellings. Three unoccupied upstream dwellings would remain unprotected.	The project necessitates relocating the entire village population. The impacts of these relocations would be extremely negative and long-lasting. In terms of its impacts on the resident population, this alternative is totally unacceptable.	No Impact
Community Cohesion	**The project would positively impact community cohesion. Population growth and improved economicconditions in the village would enhance social cohesion and community pride.**	The project would positively impact community cohesion. Population growth and improved economic conditions in the village would enhance social cohesion and community pride.	Community cohesion would suffer with this alternative. Residents generally do not support permanent evacuation as a solution to the village's flood problem. They oppose moving away from their friends, family and homes.	Community cohesion would decline as the village experiences continued flood problems and temporary losses in population. Residents would not renovate structures and village aesthetics would negatively affect community pride.

TABLE EIS-2 (Cont'd)

Category	50-Year Levee (Preferred Alternative)	100-Year Agricultural Levee	Permanent Evacuation	No Action
Property Values and Tax Revenues	The reduced threat of flooding could increase property values. Tax revenues would increase as a result of higher property values.	The reduced threat of flooding could increase property values. Tax revenues would increase as a result of higher property values.	Property values would decrease to that of comparable unprotected and undeveloped land. Tax revenues would decrease as a result. The loss of tax revenues would affect the budgets of Fulton County and local school districts.	Property values would continue to decrease if no flood protection were provided. Tax revenue would decrease as property values decline.
Public Facilities and Services	The project would improve access to public and private properties, reduce delays in emergency vehicle service, and reduce flood-fighting and cleanup costs.	The project would improve access to public and private properties, reduce delays in emergency vehicle service, and reduce flood-fighting and cleanup costs.	The project would positively impact public facilities and services. Village property would be utilized for passive recreation in conjunction with a county boat ramp. Money spent for flood-fighting and cleanup would be greatly reduced or eliminated.	Access to the village would remain a significant problem during flooding. Delays in emergency vehicle service would continue and expenses for flood-fighting and cleanup measures would continue to burden the community's State and Federal governments and social welfare agencies.
Life, Health and Safety	The project would greatly reduce threats to life, health and safety. Residents would not live without sanitary facilities, electricity, heat, water, or phone service as frequently, since threat of flooding would be reduced.	The project would greatly reduce threats to life, health and safety. Residents would not live without sanitary facilities, electricity, heat, water, or phone service as frequently, since threat of flooding would be reduced.	Threats to life, health and safety would be eliminated with this alternative. Residents would not face the problems of living without necessary services during prolonged floods.	The residents of Liverpool would continue to face significant threats to their lives, health, and safety.

TABLE EIS-2 (Cont'd)

Category	50-Year Levee (Preferred Alternative)	100-Year Agricultural Levee	Permanent Evacuation	No Action
Employment and Labor Force	Construction of project would slightly increase employment opportunities in the village. After construction the project would have an indirect, positive impact on employment. The village would remain a viable location for existing businesses. Business might expand and new businesses might open, adding new jobs.	Construction of project would slightly increase employment opportunities in the village. After construction the project would have an indirect, positive impact on employment. The village would remain a viable location for existing businesses. Business might expand and new businesses might open, adding new jobs.	The project would create temporary employment during the raising of properties and the clearing and seeding of vacant land. Liverpool businesses might shut down rather than move to new locations, resulting in lost positions. Residents might move closer to their places of employment or to areas with increased job opportunities.	Existing commercial establishments would possibly migrate out of the study area or shut down permanently. This would reduce the number of employment positions in the village.
Business and Industrial Development	The project would enhance the commercial viability of the study area. Existing businesses might renovate or expand and new businesses might to attracted to the area.	New construction starts would no longer be restricted by FEMA regulations. The project would enhance the commercial viability of the study area. Existing businesses might renovate or expand and new businesses might be attracted to the village.	This alternative would eliminate any business or industrial development in the village. Existing businesses would have to relocate or else permanently shut down.	Existing businesses might be forced to close as the economic viability of the community decreases. No business expansions or new business establishments would be likely.
Farm Displacement	No farms would be displaced; however, approximately 14.5 acres of agricultural land would be required for project right-of-way.	No farms would be displaced; however, approximately 13.5 acres of agricultural land would be required for project right-of-way.	No impact	No impact
Cost				
Total First Cost	$1,511,000	$4,339,000	$2,699,500	
Net Benefits	102,100	-41,600	-23,600	
B/C Ratio	1.8	0.89	0.86	

SECTION 3 - AFFECTED ENVIRONMENT

BACKGROUND

Liverpool is situated within the floodplain along the west bank of the Illinois River at river mile 128. The village is about 30 miles downstream of Peoria, Illinois, the nearest large metropolitan area. Most of the area in and around Liverpool has been disturbed. Much of the surrounding floodplain has been sectioned off by levee systems and the land put to agricultural uses.

Corridors of naturally occurring vegetation, which still remain along the Illinois River and secondary drainages, are generally not conducive to tilling or are subject to frequent flooding. However, a number of important natural resource areas are located within the vicinity of Liverpool. These are the Chautauqua National Wildlife Refuge, located directly across the river; the Rice Lake and Spring Lake State Conservation Areas, approximately 5 miles upstream on the respective west and east banks of the Illinois River; and the Sand Ridge State Forest, about 4 miles to the east.

Liverpool lies in a portion of the Illinois River Valley that contains extremely high concentrations of prehistoric sites. Over 2,000 known sites are located in Fulton County. The village itself is located in an area of high prehistoric site density.

ENVIRONMENTAL RESOURCES

FLORA

Liverpool is bounded on the north and west by an agricultural levee and adjacent farmland. The farmland consists of fields of row crops (corn and soybeans) and some pasture. The eastern periphery of Liverpool contains both fallow and cultivated fields outside of the agricultural levee system. The fallow fields consist of low to medium-sized grasses and forbs, while the cultivated fields were last planted in corn. Vegetation in the village is mown grasses and planted trees and shrubs.

The southern, or riverward, side of Liverpool consists of bottomland hardwood forest intermixed with large, open areas. The wooded areas are dominated by middle-aged silver maple (*Acer saccharinum*), although cottonwood (*Populus deltoides*), mulberry (*Morus* sp.), elm (*Ulmus* sp.), and willow (*Salix* sp.) also occur. With the exception of its edges,

there is little mid-story or ground cover in the forested areas. A portion is fenced and used as pasture.

The open areas are at a lower elevation and appear to be the silted-in remnants of old river channel. Vegetation consists of monoculture stands of common cocklebur (Xanthium stumarium), composites, and willow sapling thickets. Smaller portions of these areas close to residences have a mown ground cover.

FAUNA

The project area has limited value as wildlife habitat because of human disturbance and lack of ground cover. Small mammals such as mice, voles, cottontail rabbits, raccoons, skunks, possums, and fox are likely to utilize the area. Nearby agricultural fields supply an important alternate food source to many of these species, including the white-tailed deer which may feed in the fields nocturnally and rest in more remote areas that have sufficient cover.

Past field inventories list a large number of bird species as occurring in the general vicinity of Liverpool. Some of the more common species are the English and tree sparrows, starlings, dark-eyed juncos, red-winged blackbirds, common crows, common grackles, cardinals, blue jays, black-capped chickadees, American goldfinches, American robins, and brown-headed cowbirds. Downy and red-bellied woodpeckers are also common in the wooded areas.

Fish populations have been severely affected by the water quality of the Illinois River. The river at Liverpool is within the LaGrange Pool which was created by the LaGrange Lock and Dam. The 77-mile-long pool has a low gradient and is heavily degraded by sediment. Electrofishing studies have indicated that carp and other bottom-feeding fish are dominant in the LaGrange Pool. Minnow seine and hoop net surveys were dominated by gizzard shad and emerald shiner and by river carpsucker, gizzard shad, freshwater drum and carp, respectively (Havera, et al., 1980).

Both the species and numbers of mussels in the Illinois River have been reduced by pollution and sedimentation. The original mussel population in the uppermost reaches of the river had been eliminated as early as 1912. In Fulton County, only 18 of the 43 historically documented species were collected by Starrett in 1966. The most common species today include, in descending order, the three-ridge, maple leaf, floater, washboard, and fragile paper shell.

THREATENED AND ENDANGERED SPECIES

Federally Listed Species

Two federally listed endangered species are recorded for Fulton County, Illinois:

Indiana bat (Myotis sodalis)
Bald eagle (Haliaeetus leucocephalus)

The Indiana bat uses caves for winter hibernatum and typically uses large trees and shaggy or peeling park near a stream with an enclosed forest canopy as summer habitat. Since no caves or streams with an enclosed forest canopy will be affected, no impacts are anticipated to the Indiana bat.

The bald eagle is listed as wintering in Fulton County. The eagles typically would use large trees along shorelines of open water as daytime resting or feeding perches. They would roost in large trees in deeper sheltered valleys at night during periods of harsh weather. No shoreline trees would be affected, and no sheltered valleys that might be used as night roosts exist within the project area. The higher concentration of human activity also makes bald eagle use of the area unlikely. For these reasons, no impacts to the bald eagle are anticipated.

The U.S. Fish and Wildlife Service, in their Planning Aid Report dated December 7, 1984 and in their Draft Fish and Wildlife Corrdination Act Report dated November 24, 1986, concluded that there would be no impact to either dated federally listed endangered species.

State-Listed Species

Fifteen plant and two bird species recorded by the State of Illinois as threatened or endangered for Fulton County are listed in table EIS-3.

TABLE EIS-3

State Threatened and Endangered Species for Fulton County

Species	Habitat
Mead's milkweed (Asclepias meadii)	Mesic prairies
sedge (Carex laxiculmis)	Rich woods sedge
sedge (Carex pallescens)	Open areas
seaside spurge (Chamaesyce polygonifolia)	Open beach sands and gravel
jeweled shooting star (Dodecatheon amethystinum)	Bluffs and wooded slopes
prairie white-fringed orchid (Platanthera leucophaea)	Mesic and wet prairies
false heather (beach heather) (Hudsonia tomentosa)	Open sands, beaches, and blowouts
golden seal (Hydrastis canadensis)	Mesic and wet-mesic upland
forests ginseng (Panax quinquefolius)	Variety of rich, mesic
woodlands Wolf's bluegrass (Poa wolfii)	Meadows and woodlands
pink milkwort (Polygala incarnata)	Sand and gravel prairies and dry open sites
spearwort (Ranunculus ambigens)	Sloughs, ditches, and swamps
arrow-grass (Scheuchzeria palustris)	Bogs and other wet, peaty areas
buffalo clover (Trifolium reflexum)	Dry savannahs and prairies
marsh speedwell (Veronica scutellata)	Marshes, shores, and springy sites
American bittern (Betaurus lentiginosus)	Marshes and marshy lake shores
upland sandpiper (Bartramia longicauda)	Pastures, hayfields, dry prairies
decurrent false aster (Boltonia decurrens)	Moist sandy areas

The decurrent false aster (Boltonia decurrens), is listed as a threatened species. The aster, which is endemic to Illinois, was thought to have been extinct until 13 false aster populations were found in 1983. The largest population is a half-acre parcel located at Rice Lake Conservation Area 4 miles above Liverpool. Of the composites observed within the project area along the Illinois River bottomlands, none were the false aster. The false aster prefers moist, sandy areas without heavy sedimentation, and since this habitat does not occur within the project site, no impacts are anticipated.

Habitat for most of the listed plant species does not occur within the project area. Marsh speedwell and spearwort occur in sloughs, ditches, shores, and swamps often found in bottomland habitats. Such areas within the project's bottomlands are subject to prolonged flooding, heavy siltation, and general drying during summer. These areas do not contain a diverse plant population, but consist of monoculture stands of pioneering species, as previously discussed. None of the plant species were observed during field review of the project area. No prime or unique habitat is known to exist for any of the plant species within the project area, and no impacts are anticipated to occur.

Two animal species are listed for Fulton County, Illinois: the American bittern (Betaurus lentiginosus) and the upland sandpiper (Bartramia longi-cauda). The American bittern generally inhabits freshwater and brackish marshes and marshy lake shores and nests among cattails, bulrushes, and sedges. The upland sandpiper has a preference for pastureland and hayfields or dry prairie or prairie ridges with shorter grasses. No suitable habitat for either species is within the project area, and no significant impacts are anticipated.

WATER QUALITY

Water quality problems have historically plagued the Illinois River. The Chicago Sanitary and Ship Canal, which was completed in 1900, not only permitted navigation between Lake Michigan and the Illinois River, but also carried sewage effluent away from Chicago and deposited it in the Illinois River. Periodic testing by the Illinois Environmental Protection Agency (IEPA) from July 1979 to June 1981 at Havana (8 miles downstream of Liverpool) revealed single violations of Illinois Chapter 3 Water Quality Standards for nitrogen, copper, and silver and 27 violations for iron. Suspended solids also were tested at Havana during this time period and revealed above average, but moderate, suspended sediment problems.

In the Illinois Water Quality Inventory Report 1980-1981 prepared by the IEPA, the average water quality of the Illinois River at Liverpool was listed as having moderate problems.

Additional testing was done by Crawford, Murphy, & Tilly, Inc., under contract with the U.S. Army Engineer District, Rock Island, at 4 sites along the Illinois River from October 1984 through October 1985. Testing at Havana (the nearest site to Liverpool) revealed four and six violations of State or Federal standards for arsenic and mercury, respectively.

SOILS

The village of Liverpool is located on a low-level terrace of the ıry Formation. Boring samples indicate that the terrace is composed o: sandy clay 3 to 6 feet deep overlying various sand layers.

The terrace is surrounded by the lower floodplain and is composed of alluvial deposits largely of clayey and sandy silt with levees of silty sand and gravel. Boring samples within the levee alignment near the river indicate 6 to 8 feet of clays overlying sand with some gravel.

CULTURAL RESOURCES

INTRODUCTION

The village of Liverpool is located in an area of high prehistoric site density. Fulton County in general and the Liverpool region in particular contain numerous nationally recognized "type" sites for the Archaic and Woodland periods. The local place names -- Liverpool, Sister Creek, Tampico, Rice Lake and Maples Mill (all within 10 miles) -- have all been used to designate ceramic styles spanning the Early through Late Woodland periods (significant in Illinois and Midwestern prehistory).

Of particular concern are the substantial numbers of village sites with associated mound groups. The Tampico Mounds are located about a mile and a half northwest of Liverpool. One of the residential structures constructed within the village is located on top of the largest mound in the Whitehead Mound Group (11-F-22). Information on this site was first published by Cole and Deuel (1937:132). The Liverpool Mound Group (Illinois Archeological Survey Site Number 11-F-24; Illinois State Museum Mound Numbers Fo 77, 78, 79, 80 and 87) and village site (11-F-25; Fv 88) lie immediately west of the village of Liverpool. Most of the Liverpool Mound and village site was destroyed in the early 1930's when they were borrowed for levee fill (McGimsey et al. 1985:11).

BACKGROUND

The levee alignment was examined briefly by Corps of Engineers staff in October of 1984. This check confirmed the suspicion that several feet of recent alluvium covers much of the affected areas. Several local residents reported finding artifacts when digging foundations or working gardens. A Middle Archaic Godar point was reportedly recovered from within the village limits.

After advertising for competitive bids, the Rock Island District, on August 22, 1985, awarded a purchase order to Illinois State Museum to conduct a Reconnaissance Archeological and Geomorphological Survey of the Proposed Liverpool Levee construction area. Michael Wiant was designated Principal Investigator for the project. A report on the results of the reconnaissance with recommendations for Intensive Archeological Survey (Phase II testing) was prepared by Charles R. McGimsey, Erich K. Schroeder, and Edwin R. Hajic. A draft report was submitted to the Rock Island District and the Illinois State Historic Preservation Office (SHPO) for review and comment in November 1985.

McGimsey (et al. 1985) summarized their findings as follows:

A geological assessment and Phase I cultural resource survey of the proposed Liverpool flood control levee and borrow areas was conducted. The potential for buried cultural deposits was evaluated through an examination of the geological units and depositional environments identified in the project area. Backhoe trenches and sediment cores were employed to determine the geological stratigraphy and to locate archaeological sites in potentially buried contexts. Sites in surface contexts were identified by surface survey and shovel testing methods.

Eight sites were located during this survey and six of these are located within the project boundaries. Four of the sites contain prehistoric and historic components, two contain only prehistoric components and two contain only historic components. Four of the six sites located in the project area are exposed in surface or near-surface sediments. Buried components were identified at two sites in the project area, one of which is buried by historic fill. The remaining site exhibits stratified paleosols in the Illinois River floodplain which may date to the Middle Archaic and Late Woodland periods, respectively.

The Illinois SHPO's Chief Archeologist reviewed the Draft Archeological reconnaissance report and, in a letter dated November 21, 1985, made the following recommendations for phase II investigations:

a) 11-F-2178A - Low density of material and absence of any in situ remains does not justify further work.

b) 11-F-2174A - Appears to warrant further investigation to establish its integrity and significance.

c) 11-F-2175A - The prehistoric component appears to require further investigation to determine its integrity and significance. In our opinion, the Phase I investigation recovered sufficient data on the historic component to indicate that it is not significant.

d) 11-F-2181A - The level of modern disturbance suggests that no intact prehistoric remains are present. This area appears to still require testing to determine if any intact historic remains are present and to investigate the western two-thirds of the parking lot that was in lawn.

e) 11-F-2176A - The three identified components at this site require Phase II testing to determine their extent, integrity, and significance.

f) 11-F-2180A - It appears necessary to conduct additional investigation to determine if this site actually extends into the borrow pit area.

After completion of the original archeological reconnaissance, social and economic factors in Liverpool have created a need to shorten the proposed levee alignment. The revised alignment will avoid previously discussed sites 11-F-2174A and 11-F-2176A. Because the boat ramp will not be relocated, the previously proposed parking lot designated 11-F-2181A also will be avoided (table EIS-4).

Based on the revised levee alignment, only the proposed borrow pit (11-F-2180A) area and the revised eastern portion of the alignment required additional archeological investigations (table EIS-4).

PRESENT INVESTIGATIONS

After advertising for competitive bids, a second contract was awarded to Illinois State Museum on October 21, 1986. The major work elements to be performed under the contract were: (1) intensive testing of Site 11-F-2180A (borrow area) to determine if it is eligible for inclusion in the National Register of Historic Places (NRHP); (2) reconnaissance survey of the revised, eastern portion of the proposed levee alignment; and (3) intensive testing of any site found in the revised alignment to determine the eligibility of the site(s) for inclusion in the NRHP.

The reconnaissance survey of the revised portion of the levee alignment and borrow area testing were completed in December 1986. Borrow area testing consisted of the excavation of 10 backhoe trenches, three 1- by 2-meter excavation units, and two 2- by 2-meter excavation units. All trench and excavation unit wall profiles were carefully trowel scraped to determine the presence of cultural artifact-bearing strata and features. Detailed profile maps also were prepared.

TABLE EIS-4

Archeological Sites and Project Impacts
50-Year Flood Protection, Liverpool, Illinois

Site (IAS #)	Location in Alignment	Size	Depth	Cultural Affiliation	Recommendation
11-F-2174A (11-F-22)	outside project area	ca. 1.5 hectares	LT 1.0m	Woodland	no project impact
11-F-2175A (11-F-2713)	within levee alignment	limits unknown ca. 2,570 m^2 in alignment	LT 1.0m	M. Woodland L. Woodland Mississippian	eligible NRHP; data recovery necessary
11-F-2176A (11-F-2714)	outside project area	unknown	ca. 2m	Middle Archaic Late Woodland	no project impact
11-F-2177A (11-F-2715)	outside project area	unknown	unknown	historic grist mill	no project impact
11-F-2178A (11-F-2716)	within levee alignment	isolated find	ca. 2m	prehistoric	not significant
11-F-2179A (11-F-2717)	outside project area	isolated find	surface	Late Woodland	no project impact
11-F-2180A (11-F-25)	adjacent to borrow area	limits unknown ca. 4,000 m^2 adjacent to borrow area	ca. 2m	E. Woodland M. Woodland L. Woodland Mississippian	eligible NRHP; Borrow area designed to avoid impacts
11-F-2181A (11-F-2718)	outside project area	unknown	unknown	historic	no project impact
ISM-F-2182A	outside project area	ca. 2,275 m^2	unknown	historic toll booth	no project impact

LT = Less than
NRHP = National Register of Historic Places

Based on these investigations, it was discovered that an NRHP quality prehistoric archeological site (ISM-F-2180A; IAS 11-F-25) is present in the western field of the proposed borrow area. The site occupies an approximate 4,000-square-meter (1 acre) area adjacent to the paved road and including a cattle lot. Three relatively distinct buried soil horizons were found to contain in situ archeological remains. The limited excavations also identified nine prehistoric pit features, a small dense lithic debitage concentration, and a concentration of igneous cobbles. Diagnostic ceramic sherds attributable to the Early, Middle, and Late Woodland, as well as the Mississippian period were recovered from the site. Details of this investigation can be found in the main report (appendix E) and in the Illinois State Museum repo entitled Additional Archaeological Reconnaissance and Testing, Liverpool Levee Project, Liverpool, Illinois (McGimsey and Wiant 1987).

A Phase I archeological reconnaissance survey of the revised eastern end of the proposed levee alignment located a potentially significant prehistoric archeological site (IAS 11-F-2713; ISM 11-F-2175A). Thirty-eight (38) small shovel test pits were excavated along the proposed alignment. All but four shovel tests produced prehistoric artifacts. Three garden areas in the alignment also contained prehistoric artifacts. Materials recovered from Site 11-F-2713 reconnaissance indicate early Middle Woodland, Middle Woodland, and Late Woodland components.

Phase II archeological testing designed to determine if Site 11-F-2713 is eligible for inclusion in the NRHP was conducted in April and May 1987. A fallow field located at the north end tieoff was disked and a controlled surface collection was conducted. Shovel test holes, hand-excavated 1- by 2-meter units, and a series of backhoe excavated trenches were used to explore the remainder of the revised levee alignment. The only evidence of intact cultural deposits was found within 1 city block (75m) portion of the proposed alignment (McGimsey and Wiant 1987).

The remains of a Mississippian period house structure and associated pit features were discovered to occupy a portion of the alignment (plate E-3). Artifacts associated with the structure included portions of 16 distinct ceramic vessels. Examination of the ceramic assemblage indicated that most, if not all, of the Mississippian sherds are attributable to a temporally limited portion of the Eveland Phase (ea. 1200 A.D.).

The terminal Eveland Phase in the Illinois River Valley was a time of significant change. It was at this time that fortified central towns with temple mound and plaza arrangements developed from the dispersed settlement pattern that typified the Eveland Phase. Documenting and comparing the evolving intra-valley geographic/environmental network and socio/political articulations are important in formulating potential descriptions and explanations of Spoon River Mississippian cultural development. The nature of external contacts for the Illinois Valley

changed rapidly during this period. Although strong Cahokian contacts were still much in evidence at the close of the Eveland Phase, the widespread western and northern connections of the initial period of "Mississippianization" of numerous Midwestern societies had rapidly faded.

The later portion of the Eveland Phase was a period of stabilization of the Mississippian lifeway in the Illinois River Valley, in terms of both local economy and cultural identity. Sites of this period are pivotal in developing explanatory models for Mississippian development, as well as for providing continuous chronological coverage for a multitude of related topics. For instance, no modern (flotation-era) environmental-subsistence data for pre-Orendorf Phase Mississippian occupations are available for the Illinois Valley. Proposed negative biological impacts presumably based on changes in dietary practices during the Late Woodland and Mississippian periods need to be evaluated with primary subsistence data before they can be accepted as valid in measuring local social and economic change.

In sum, that portion of the late Eveland Phase community at 11-F-2713 which lies within the proposed levee alignment will produce critical data concerning the Mississippian occupation of the Illinois River Valley which has not been developed in the previous 60 years of excavations.

A Late Woodland Maples Mills component was identified by two pit features and a sizeable ceramic assemblage located near the Mississippian structure. This component is significant because no subsistence data, chronometric data or habitation features related to this cultural manifestation in the Illinois River drainage have been previously reported. This lack of data has made interpretation and integration with surrounding Late Woodland manifestations difficult and hampered understanding of the period of Late Woodland/ Mississippian interface. The intact Maples Mills features exposed at Liverpool and the clear potential for preservation of additional undisturbed deposits provide an important opportunity to develop a data base to address this period of prehistory.

The portion of archeological Site 11-F-2713 located within the proposed levee alignment contains significant information important to our understanding of the prehistory of the region. Therefore, it is eligible for inclusion on the NRHP. By letter dated July 22, 1987, the Illinois SHPO concurred with a determination of eligibility (DOE) for the site.

Investigations outside the proposed alignment indicate that Site 11-F-2713 extends from the edge of the river terrace east of Liverpool west at least to Exchange Street. The extensive nature of this site precludes avoidance of the resource through moving the alignment. Therefore, it will be necessary to develop and execute an archeological Data Recovery Plan to mitigate for the adverse effects of project

construction at the site. Any necessary mitigation will be accomplished prior to project construction.

The portion of archeological Site 11-F-25 located adjacent to the proposed borrow area also is eligible for listing on the NRHP. By letter dated March 17, 1987, the Illinois SHPO concurred with the DOE for this resource. Design plans for the borrow area will not impact this significant resource (plate EIS-1). Extreme care will be taken during design and construction to assure no impact to the site. Furthermore, an archeologist will monitor borrow removal in the vicinity of the site in order to interpret any unexpected resources that may be encountered during construction.

SECTION 4 - ENVIRONMENTAL EFFECTS

NATURAL RESOURCES EFFECTS

The 50-year levee (preferred) plan would have relatively minor impacts to natural resources. Approximately 4.9 acres of floodplain habitat would be lost as a result of the levee alignment, and an additional 2.1 acres would be used for ponding. The wooded areas contain little cover for ground-dwelling animals, and a portion is fenced and grazed by livestock. The open, low-lying areas are without diverse stands of aquatic plants, but contain monoculture stands of vegetation more adapted to pioneering barren ground. The draft Fish and Wildlife Coordination Act Report (FWCAR), found in appendix F of the main report, indicates that the area has low to moderate quality wildlife habitat.

Historically, sand and gravel was quaried from a nearby pit, which is now used as a recreational lake. This pit is outside of the areas affected by project construction. No other mineral resources are known to occur or to be affected and no impacts to minimal resources should occur.

The 100-year agricultural levee alignment would have similar but slightly greater floodplain habitat impacts than the 50-year plan. However, additional borrow would be taken from a 21-acre bottomland forested site northeast of Liverpool, thereby impacting an overall larger area than the 50-year levee plan.

The permanent evacuation and "no action" plans would involve no construction, and would be without the negative impacts of the levee alternatives. Long-term positive impacts may result if the population decreases and property is abandoned in the project area.

Should any of the nonpreferred plans become the preferred plan, further study would be needed and coordination would be required with the U.S. Fish and Wildlife Service (FWS) and the Illinois Department of Conservation.

ENDANGERED SPECIES

Suitable habitat for Federal and State-listed threatened and endangered species generally does not occur within the study area, and no impacts are anticipated from any of the alternatives. Coordination with U.S. FWS indicates that the preferred plan would have no impacts to Federal species. Should the 100-year agricultural levee or permanent evacuation become the preferred plan, re-coordination with the U.S. FWS would be required.

FARMLAND

No farms or prime or unique farmland would be displaced by any of the alternatives considered in detail.

WATER QUALITY

The 50-year levee plan would cause minor, temporary increases in turbidity during periods of rapid runoff of the construction sites prior to revegetation. Portions of the levee would be below the ordinary high water (OHW) mark and require a Section 404(b)(1) evaluation, which is attached to this EIS. State 401 Certification from the Illinois Environmental Protection Agency has been received pending compliance with all conditions listed in their letter, dated December 1, 1988. This letter can be found in Appendix F - Pertinent Correspondence. All conditions will be complied with.

The 100-year agricultural levee plan again would have similar but slightly greater impacts due to a wider alignment. A Section 404(b)(1) evaluation and State 401 Certification would be required should it become the preferred plan.

The permanent relocation and "no action" plans would have no noticeable effect on water quality. Neither plan would place any fill below the OHW mark of the Illinois River and would not require Section 404(b)(1) evaluation or State 401 certification.

AIR QUALITY

The 50-year levee and 100-year agricultural levee would result in impacts to air quality from heavy machinery exhaust and fugitive dust particles during construction. These impacts, however, would be minor and end upon completion of the project.

The permanent relocation plan also would cause temporary impacts to air quality from dust particles during demolition of existing structures in Liverpool. If burning were required of demolished materials, a burning permit may be needed and further studies required to determine impacts.

The no Federal action plan would have no effect on air quality.

CULTURAL RESOURCES

50-YEAR LEVEE (PREFERRED ALTERNATIVE)

The proposed 50-year flood protection levee and associated borrow area will impact on an NRHP-quality historic property (11-F-2713) located in the proposed levee alignment. In addition, special care must be taken during project design and construction not to impact NRHP eligible Site 11-F-25 located adjacent to the borrow area (table EIS-4).

The site (11-F-2180A Illinois State Museum number) discovered adjacent to the proposed borrow area for the Liverpool flood protection project appears to be a preserved remnant of the Liverpool village site first reported by Cole and Deuel in 1937 (142-150). Therefore, the State site number 11-F-25 first assigned to the Liverpool village site also has been assigned to the cultural deposits in the borrow area. Investigations of the site in the 1920's and 1930's dealt primarily with burial mounds and burial features. The limited early investigations conducted in the village area failed to identify any cultural pit features or to establish data on internal site structure. Although we learned much about Woodland period death and burial practices, these investigations discovered little about how the people lived in, and interacted with, their environment.

The preserved remnant of 11-F-25 discovered in the borrow area is considered a significant cultural resource based on its ability to contribute to our understanding of cultural processes operating in the Illinois River Valley during the Woodland periods. Plate EIS-1 illustrates the borrow area design plan which will be executed to assure that Site 11-F-25 is not impacted by project construction.

The portion of Site 11-F-2713 located within the proposed levee alignment contains significant subsurface remains that can add to our understanding of cultural events during the Late Woodland and Mississippian periods. The development and execution of an archeological Data Recovery Plan (DRP) will be necessary to mitigate for the adverse impact of the proposed levee project to the significant resource. The DRP will be coordinated with the Illinois SHPO and the Advisory Council on Historic Preservation.

In addition to significant archeological Sites 11-F-25 and 11-F-2713, unknown buried cultural resources may be discovered in portions of the proposed alignment and borrow area during construction. An archeologist shall monitor construction activities in sensitive locations. If cultural resources are discovered, construction activities will be halted at the location and the Illinois SHPO and the District Archeologist will be notified immediately so that appropriate actions can be taken.

100-YEAR AGRICULTURAL LEVEE

Due to local preference for the 50-year levee plan, potential impacts to historic properties that would result from construction of the 100-year agricultural levee were not fully evaluated. Should the 100-year agricultural levee become the preferred plan, additional cultural resources identification and evaluation would be necessary. Project areas that may contain significant cultural resources include the expanded agricultural levee base and any proposed borrow location.

PERMANENT EVACUATION

The permanent evacuation plan was determined to be economically infeasible. Therefore, the potential impacts of the plan to cultural resources were not fully evaluated. Should the evacuation plan become the preferred alternative, structures within the village or Liverpool would need to be inventoried and assessed to determine if they are eligible NRHP properties.

NO ACTION

Without flood protection, little new development or construction is anticipated for Liverpool. Therefore, buried archeological resources present in the area will continue to be relatively undisturbed.

SOCIAL-ECONOMIC EFFECTS

This section presents an assessment of socio-economic impacts that would be associated with the proposed flood control alternatives for Liverpool, Illinois. Impacts assessed include the following categories: community impacts; life, health and safety factors; and displacement.

50-YEAR LEVEE ALTERNATIVE AND NO ACTION

This plan involves constructing a 50-year levee around the village of Liverpool. The detailed project study by the Corps of Engineers identifies a 50-year levee alternative as being justified and as having the greatest NED benefits.

Community and Regional Growth

Short-and long-term impacts to community growth would be positive. The existing flood problem in the village discourages the rehabilitation of existing residential structures, especially those that are currently vacant and abandoned. With the provision of flood protection, non-resident property owners, and others seeking an inexpensive and safe place to live may establish permanent residence in Liverpool.

It should be noted that, even with flood protection, community growth would be limited by FEMA regulations. FEMA regulations require that the first floor elevation of new constructions be above the 100-year flood elevation. Under these guidelines, new construction starts in Liverpool would be very limited because structures would have to be raised more than 10 feet above ground level.

During the past 3 years, there has been a steady migration of residents due to the flood hazard. In 1983, the village had approximately 250 residents, 72 occupied dwellings, and 31 unoccupied dwellings; in 1986, there were an estimated population of fewer than 200 residents, 49 occupied dwellings, 43 unoccupied dwellings. Continued flood problems discourage the remaining population to continue residing in Liverpool. However, if the current cycle of flooding declines, historic trends indicate that former residents may move back to the village. Additionally, new residents looking for an inexpensive place to live may move to the village. Vacated properties already are being reoccupied through immigration. This process would occur more readily following the construction of the proposed levee.

Overall, no significant impacts to regional growth would result from the proposed project.

Displacement of People

The proposed project would require the relocation of residents of two occupied residential structures. The number of residents to be relocated would not be of a large enough size to significantly affect the population of the project area. One of the occupied structures is a mobile home which could be moved to a different lot. Further, there are opportunities in the local area, and even within the protected area of the village as proposed, for relocating these residents to similar structures.

In addition to the required relocations, the alignment would leave three upstream properties unprotected. These year-round residences are vacant, however.

Community Cohesion

The project would improve community cohesion by reducing the threat of flooding. As stated previously, the project would make the community more attractive for residential renovation and reoccupation of abandoned structures. Non-resident property owners (and other non-residents) may choose to move to Liverpool following project completion, either as seasonal or year-round residents. Growth in community population and improvement in economic viability would enhance social cohesion and community pride.

Without the proposed flood control measures, community cohesion may deteriorate. The number of resident property owners leaving (or entering) Liverpool at any point in time serves as an indicator of the village's social stability. Past trends in the village indicate that following a major flood some Liverpool residents (especially renters) migrate out of the village. After a period of time with no floods, homes tend to be reoccupied through immigration.

The recent downward shifts in total population demonstrate some degree of instability which would relate to declining community cohesion. A base of residents committed to the village of Liverpool does exist, however.

Property Values and Tax Revenues

Property values could increase with the proposed levee, but they would not reach the value of comparable, protected property for at least 5 years. Property values would reach their potential following the

reoccupation of abandoned residences and the renovation of deteriorating structures within the community.

Tax revenues could increase as a result of elevated property values following project construction. With the greater protection from flooding provided by the project, businesses in the village (e.g., restaurant, auto repair shop) might experience an increase in business and resulting tax revenues.

Public Facilities and Services

The proposed levee construction would positively impact public facilities and services. Improved access to the village during flood events would be especially noticeable. The Illinois River has a very flat slope, and, therefore, floodwaters recede slowly. Past floods have forced residents to use boats to access their properties for periods ranging from 6 weeks to 2 months. Further, residents would experience fewer delays in emergency vehicle service during flood events.

The village of Liverpool had a 1986 annual budget of $12,000. As part of that budget, $5,000 was allocated for emergency flood-fighting/cleanup costs. In 1985, emergency costs totaled $11,000 but the village was reimbursed by State and Federal governments for $6,000 of that amount. With provision of flood protection, flood-fighting and cleanup costs would be reduced. The money the village saved could be utilized for other needed services, such as road repair. Federal and State monies allocated to the village for emergency costs also could be used more efficiently.

As part of the proposed project, the parking area for a public boat ramp would be raised and an access over the levee to the ramp would be provided. Improved access would increase ramp usage during minor floods (less than 10-year event). Additional benefits would accrue from reduced damage potential to one park, the Liverpool village hall, the fire station, the U.S. Post Office, and a church.

Life, Health and Safety

The provision of flood protection would greatly reduce the life, health, and safety risks faced by residents of Liverpool. Currently, many residential structures are raised and are therefore susceptible to structural collapse, especially if they were struck by floating debris or ice. Many residents move in with neighbors who have raised structures when major flood events occur. Occupants in these raised structures live without electricity, heat, water, sanitary facilities, or phone service during the duration of the flood. Water levels often reach the roof tops of smaller homes and do not recede for weeks or even

months due to the flat slope of the Illinois River. This results in evacuation of many residents to less desirable, temporary housing. Older residents could find it difficult to evacuate by themselves if they were in poor physical condition. Further, several residents have physical handicaps and require extra care and time to evacuate.

The potential for loss of life or injury to residents is great. In addition to the obvious health and safety risks, residents would find it difficult to send for ambulance or other emergency vehicle service. Emergency vehicle response times would be very slow since emergency crews would have to use boats to reach properties.

Other impacts include damage to the restaurant in the village. During floods, the restaurant is totally inundated and requires complete remodeling in order to meet public health codes. This imposes an economic hardship on the owners while the restaurant has to remain closed after the floodwaters have receded. Also, with the restaurant closed, village residents and persons using the public boat ramp in the village have no place to meet. The prolonged shutdown of the restaurant and other businesses in Liverpool impacts not only the village, but also the surrounding agricultural area and nearby communities.

Employment and Labor Force

Construction of the proposed project would have a small, short-term impact on employment in the Liverpool area. Based on the small scale of the project and the high unemployment rate in Fulton County, the area's labor pool would absorb project needs without noticeable impact.

No direct long-term impacts on employment in the Liverpool area would be realized from the project. The project would indirectly impact long-term employment in the community, however. The village would remain a viable community for operating its existing businesses and would be a more attractive site for new commercial businesses.

Without provision of flood protection, existing commercial establishments might begin migrating out of the floodplain. This would impact Liverpool's employment by reducing the number of available jobs.

Business and Industrial Development

The project would enhance the commercial viability of the study area and would avoid potential commercial migration to areas outside of the floodplain. Following provision of 50-year flood protection, renovation of existing businesses would likely occur. A nearby scrap metal industry has expressed interest in reopening if Liverpool obtains flood

protection. Currently, this business is shut down because of local economic conditions.

Without provision of flood protection, the instability in the village population size would continue. The economic viability of maintaining a commercial establishment in the community would likely decrease. Further, the village would not attract new commercial businesses. In recent years, several individuals have considered opening small stores in Liverpool but have not located there because of the flood hazard.

Noise Levels

Both the study area and the borrow site would experience a temporary increase in noise during the project construction. Heavy trucks also would generate an increase in noise levels as borrow material is transported from the borrow site to the project area. No sensitive receptors (e.g., schools) are located within the project vicinity. Therefore, noise-related impacts during the construction phase of the project would not be significant. The completed project would have no effect on current noise levels in the community.

100-YEAR AGRICULTURAL LEVEE

This plan involves raising an existing agricultural levee to a 100-year level of protection and constructing a 100-year village levee. The portion of the agricultural levee behind Liverpool would not be raised. The village portion of the levee would follow the alignment of the 50-year levee plan. Socio-economic impacts resulting from this project would be similar to those related to the 50-year levee alternative. However, the 100-year levee alternative would be more beneficial to Liverpool and the Liverpool Drainage District residents and property owners.

While no impacts to regional growth would result from the project, impacts to community growth would be positive. With the provision of flood protection, non-resident property owners, and others seeking an inexpensive place to live, may establish a permanent residence in Liverpool. Vacant properties would be reoccupied and deteriorated structures might to renovated.

New construction starts would no longer be restricted by FEMA regulations. This would make Liverpool a more attractive location for business development. Existing businesses would find the village a more viable location and would likely remain in the community. Construction of the project would temporarily increase area employment. The labor

force would benefit because village businesses would be more secure economically and the protection from flooding might increase future employment opportunities in the village.

The project would require the relocation of residents of two occupied residential structures. As described under the 50-year levee alternative, these relocations would not significantly affect the population of the project area. These relocations would not affect the community or social cohesion of project area residents and non-resident property owners. The project would improve community cohesion by reducing flooding, and, thus, provide the backbone for revitalization of the community.

Property values and tax revenues could increase with the 100-year levee alternative, as explained under the 50-year levee alternative. The proposed project also would positively impact public facilities and services (see 50-year levee alternative).

Following project construction, life, health, and safety risks faced by Liverpool residents and the Liverpool Drainage District would be greatly reduced. Residents would not encounter the problems of living without necessary services as described under the 50-year levee plan.

This plan is not economically feasible and has been excluded from consideration. The State of Illinois Department of Transportation policy does not support the raising of agricultural levees to provide greater than a 50-year level of protection.

PERMANENT EVACUATION

This alternative involves acquiring and demolishing all properties in the village of Liverpool. The land would be cleared and seeded for use in conjunction with the existing county boat ramp located in the village. Residents would be reimbursed for their properties and would be provided assistance to move into suitable housing outside of the floodplain.

While this alternative would eliminate nearly all damages associated with flooding in Liverpool, it would be detrimental in terms of its socio-economic impacts. Most of Liverpool's residents oppose permanent evacuation as a solution to the flood problem in their community. Residents feel great attachment to their community. Many have resided in Liverpool all their lives, and most have relatives and close friends in the village. The impacts of displacing residents to nearby communities would be significant.

If this alternative were implemented, all village residents would have to find new housing. It is unlikely that village residents would establish their homes in the same basic locale; however, the community

population would likely remain in the same geographic region. Therefore, this alternative would not significantly impact regional growth.

Community cohesion would suffer from any permanent evacuation of residents. As previously mentioned, most village residents do not support this alternative. They are opposed to moving away from their homes, friends, and families. Also, residents fear they would be unable to afford the higher property taxes and mortgage payments they would incur if they moved.

The project would create temporary employment during the raising of properties and the clearing and seeding of vacant land. However, this alternative would eliminate any business or industrial development in the study area. Existing Liverpool businesses would have to move to new locations or close down permanently. The permanent shut-down of any village business would result in lost employment in the study area. Residents might use their evacuation as an incentive to move nearer their place of employment or to areas with better employment opportunities.

Property values would decrease to that of comparable unprotected and undeveloped land. As a result, tax revenues also would decrease. This loss of tax revenue would affect the budgets of Fulton County and at least two school districts. The Fulton County Board or the school districts do not support this alternative for this reason.

This alternative would positively impact public facilities and services. Property in the village would be utilized for passive recreation in conjunction with a public boat ramp. Money spent on flood-fighting and cleanup would be greatly reduced, if not eliminated; money from the Salvation Army, Red Cross, and State and Federal public assistance programs would no longer be needed. Threats to the lives, health, and safety of Liverpool residents would be eliminated. Residents would not face the problems of living without necessary services during prolonged floods, as described under the 50-year levee alternative.

This alternative was excluded from further consideration because it is not economically feasible. In addition, the socio-economic impacts of any permanent evacuation alternative are extremely adverse. Permanent evacuation in any form is not a socially acceptable solution to Liverpool's flood problems.

LIST OF PREPARERS

Name	Field of Expertise	Preparation
Ron Klump	Botanist-6 years technical and professional experience preparing environmental documents	Biological Impacts
Ken Barr	Archeologist-10 years private Sector and University, 4 years Rock Island District	Cultural Resources
Patricia Risser	Social Science Analyst-6 years technical and professional experience performing socio-economic analyses	Socio-economic assessment
Consultant Illinois State Museum		Provided detailed cultural resource assessments

SECTION 5 - PUBLIC INVOLVEMENT/MITIGATION

PUBLIC MEETING

A public workshop was held in Liverpool on November 8, 1984. The workshop was attended by 74 people, including village officials, State agencies, and local residents. Alternatives to flood damage reduction, as well as study procedures and time requirements, were presented. There was a general consensus among attendees that Liverpool needs flood protection project and they supported the concept of a levee structure.

AGENCY COORDINATION

The following agencies were contacted during the preparation of this document:

a. U.S. Department of Interior - U.S. Fish and Wildlife Service

b. U.S. Department of Agriculture - Soil Conservation Service

c. U.S. Environmental Protection Agency (U.S. EPA)

d. Illinois Department of Conservation (IDOC)

e. Illinois Environmental Protection Agency (IEPA)

f. Illinois State Historic Preservation Officer (SHPO)

This FEIS will be sent to Federal, State, and local agencies, as well as to private groups and individuals known to have an interest in the project. A list of document recipients is included in the main report (see distribution list).

The U.S. FWS, in their draft FWCAR dated November 24, 1986, recommended that the borrow site be used to replace lost habitat values by designing the site so that it will be revegetated as a wetland. This recommendation is included and described under "Design Considerations" of this EIS.

Correspondence from the U.S. EPA dated September 10, 1986, requested additional information and provided several comments. These concerns, which were discussed with U.S. EPA staff, include:

1. COMMENT: "The report states that the levee will affect 9 acres and therefore, our Agency would like to know if this is due to the construction impact or if this is the size of the protected area. An additional 2.5 acres within the protected area would be used as a ponding zone for drainage purposes."

REPLY: The 9 acres are those lands within the levee right-of-way that would be affected by construction. (Note that, due to levee realignment since then, the affected right-of-way area now totals 10 acres.)

2. COMMENT: "No alternative actions were considered for the project."

REPLY: A number of alternative actions were studied, with the 50-year levee being the most economically feasible and the preferred action.

3. COMMENT: "Our Agency believes that protection by a boxed-levee system may result in increased flood damages due to the overtopping of floodwaters into the area. If for some reason flood levels are found to be higher than expected, then the project construction level would prove to be insufficient. The costs and environmental impacts of any of these events with their associated impacts of greater losses of lands, must be compared to the costs of other alternative actions. In addition, if further development is to be constructed in the vicinity within the levee system, then a question remains as to whether or not the wastewater treatment plant for Liverpool is capable of handling the induced changes."

REPLY: The proposed levee would be constructed to the same height as the agricultural levee and tied in with it. This would prevent isolation from high ground by floodwaters, as often occurs in a box (or ring) levee system.

The costs and environmental impacts for the various alternatives were compared. While higher levee systems would provide a greater level of protection, they were not found to be economically justifiable and are not feasible for construction under current Corps policy.

The proposed levee would provide protection to only the existing village limits of Liverpool. It may, however, encourage the development of vacant lots between existing structures, but it would not encourage any significant new growth in undeveloped areas.

The village of Liverpool has no sewage treatment plant.

4. COMMENT: "A more effective long-term and cost-efficient measure would be provided with evacuation rather than an increased construction procedure. We request that an assessment of this alternative be developed for this project."

REPLY: Permanent evacuation was studied. This alternative may provide a more effective long-term means of eliminating flood damages but, again, it was not economically justifiable.

5. COMMENT: "The Federal Emergency Management Assistance (FEMA) is proposing to move the town to higher ground, outside the floodplain. The existing site of the town would be demolished by burning structures in adherence to an Illinois Environmental Protection Agency Open Burning Permit. This achievement will be effective upon the demonstration that in-place structures can be used for local fire department training programs such as arson techniques, room fires, total burndown, etc. Adequate information on the size, amount, and type of materials bu ed along with the estimation of the number of people affected by the moke must be known."

REPLY: Our office has met with FEMA on several occasions. At this time, permanent evacuation is not a feasible alternative. Should this become the preferred plan in the future, then impacts of the action would be analyzed and all necessary permit requests would be applied for at that time.

Coordination was initiated with the Illinois SHPO through provision of the Reconnaissance Report for Section 205 Flood Protection, Illinois River, Liverpool, Illinois, issued February 1985. On October 25, 1985, a draft report prepared by Illinois State Museum detailing the initial archeological reconnaissance was provided to the SHPO's office. By letter dated November 21, 1985, the SHPO provided comments on the archeological reconnaissance survey with recommendations for additional archeological investigations. A draft Scope of Work (SOW), prepared by the Rock Island District to procure a contractor to evaluate sites in the proposed project area and to determine National Register eligibility, was provided by letter dated July 15, 1986 to the SHPO for review and comment prior to advertisement. The SHPO's Chief Archeologist, Tom Emmerson, in a telephone conversation with District Archeologist Ken Barr, stated that the SOW appeared adequate for assessing NRHP eligibility. An on-site visit to Liverpool with the archeological contractor, the SHPO archeologist, and the Rock Island District archeologist was conducted May 14, 1987. The draft archeological Phase II testing report was provided to the SHPO for comment. Archeological sites 11-F-25 and 11-F-2713 were considered eligible for listing on the NRHP by letters from the Illinois SHPO dated March 17, 1987 and July 22, 1987, respectively.

DESIGN CONSIDERATIONS

ENVIRONMENTAL

The DEIS proposed to use a 13 acre borrow site on the downstream edge of Liverpool. The area was to have been shaped to promote wetland development. Because of comments received concerning underseepage, it is proposed to take only 5 acres from this site and add an additional 8-acre site as described under the "Preferred Plan." The original 5-acre borrow site would be shaped to prevent drainage and promote wetland development. Plate EIS-1 is an idealized design, to which the construction contractor would be required to conform. The 8-acre site, because of its extreme closeness to the agricultural levee, would be reduced to no less than the original ground contour.

CULTURAL

Design plans for the borrow area will assure that a 4,000-square-meter (1 acre) area adjacent to the proposed borrow area containing Site 11-F-25 will not be impacted. Design plans must consider indirect impacts to the site that may result from an insufficient buffer between the site area and the construction zone.

A significant archeological site (11-F-2713) located at the eastern end of the proposed levee alignment will require execution of a DRP to mitigate for the adverse effects of project construction. Mitigation plans shall be coordinated with the Illinois SHPO and the Advisory Council on Historic Preservation. All necessary archeological mitigation will be conducted prior to project construction.

COMMENTS RECEIVED ON THE DEIS

Twelve letters have been received commenting on the Draft Environmental Impact Statement:

1. Letter from the United States Department of Agriculture, Soil Conservation Service, dated September 21, 1988.

2. Letter from the State of Illinois, Department of Agriculture, Division of Natural Resources, dated September 23, 1988.

3. Letter from the Illinois Department of Conservation, dated September 28, 1988.

4. Letter from the Department of Health and Human Services, dated October 6, 1988.

5. Letter from the U.S. Department of Interior, Office of Environmental Project Review, dated October 24, 1988.

6. Letter from the Illinois Natural History Survey, dated October 26, 1988.

7. Letter from the U.S. Environmental Protection Agency, dated October 27, 1988.

8. Letter from the U.S. Environmental Protection Agency, dated November 3, 1988.

9. Letter from the Illinois Environmental Protection Agency, dated December 1, 1988.

10. Letter from the Illinois Historic Preservation Agency, dated December 12, 1988.

11. Letter from the U.S. Fish and Wildlife Service, dated February 8, 1989.

12. Form AD-1106, Farmland Conversion Impact Rating, dated May 14, 1987.

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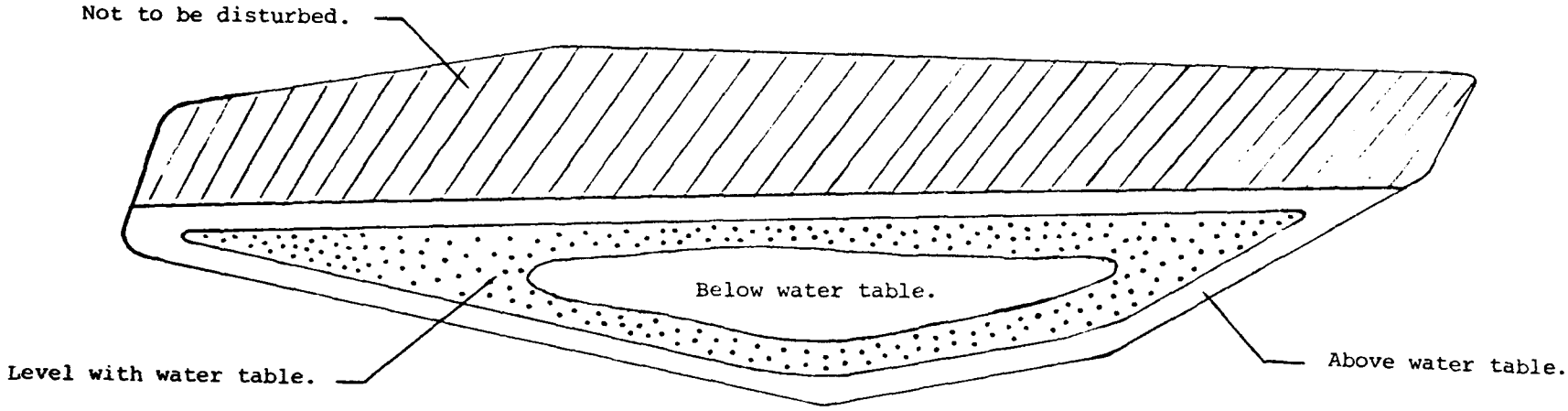
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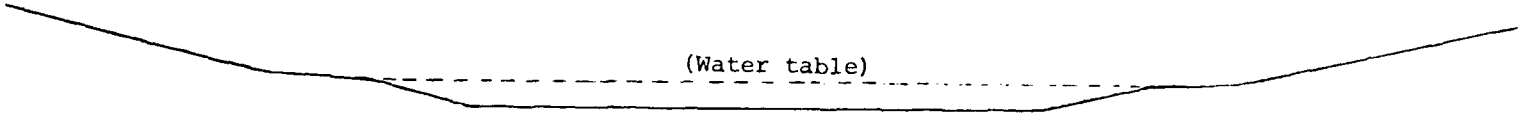
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Cross section at widest point.

Wetland Design of 5-Acre Borrow Site

PLATE EIS-1

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF:

CENCR-PD-E

FINAL CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

SECTION 205 FLOOD CONTROL
ILLINOIS RIVER
LIVERPOOL, ILLINOIS

OCTOBER 1989

FINAL CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

SECTION 205 FLOOD CONTROL
ILLINOIS RIVER
LIVERPOOL, ILLINOIS

SECTION 1 - PROJECT DESCRIPTION

LOCATION

The project is located in Liverpool, Fulton County, Illinois. The site is 30 miles northwest of Peoria, Illinois, along the Illinois River. Plate 1 of the main report shows the general vicinity.

GENERAL DESCRIPTION

The levee system would be constructed on a 3 horizontal to 1 vertical pitch. Both bedding rock and riprap would be placed on the upstream end of a 400-foot section of levee nearest the river.

A 2.1-acre ponding site would be used for interior drainage. The site is naturally low and no excavation would be required. A one-way gravity outlet through the levee would be used to drain the ponding site.

Plate 3 of the main report gives the locations of the levee alignment, ponding area, and gravity outlet, while plate 4 shows typical levee cross sections and plate 7 shows the location of the borrow site.

AUTHORITY AND PURPOSE

The purpose of this project is to provide flood protection to the village of Liverpool. The authority to construct this project is contained in Section 205 of the 1948 Flood Control Act, as amended, which is presented below:

The Secretary of the Army is authorized to allot from any appropriations heretofore or hereafter made for flood control, not to exceed $30,000,000 for any one fiscal year, for the construction of small projects for flood control and related purposes not specifically authorized by Congress, which come within the provisions of Section 1 of the Flood Control Act of June 22, 1936, when, in the opinion of the Chief of Engineers, such work is advisable. The amount allotted for a project shall be sufficient to complete Federal participation in the project. Not more than $4,000,000 shall be allotted under this section for a project at any single locality. The provisions of local coopera- tion specified in Section 3 of the Flood Control Act of June 22, 1936, as amended, shall apply. The work shall be complete in itself and not commit the United States to any additional improvement to ensure its successful operation, except as may result from the normal procedure applying to projects authorized after submission of preliminary examination and survey reports.

GENERAL DESCRIPTION OF DREDGED AND FILL MATERIALS

The material for levee construction would be taken from 2 sites near Liverpool (see plate 7 of the main report). Presently land use is agricultural. Approximately 131,185 cubic yards would be used.

The bedding material would consist of crushed stone with a maximum size of 1 to 1.5 inches. The riprap would consist of larger quarried stone. Approximately 340 cubic yards of bedding rock and 1,010 cubic yards of riprap would be used. These would be obtained from a commercial source.

DESCRIPTION OF THE PROPOSED DISCHARGE SITES

Approximately one-half of the levee alignment would be within the urban area of Liverpool and would affect already disturbed areas of lawns and vacant lots.

The other half of the levee alignment would occupy a relatively undeveloped portion of land between the village and the river. This area is composed of floodplain forest interspersed with lower, more open areas of old river channel.

The forested areas are dominated by silver maple (Acer saccharinum) but also include cottonwood (Populus deltoids), willow (Salix sp.), mulberry (Morus sp.), and elm (Ulmus sp.). A large section of the forest is fenced and grazed by livestock.

The lower, more open areas are remnants of old river channel and often are more prone to flooding than the forested areas. These areas occur within four sections of the levee alignment, two of which are below the OHW mark and directly connected to the river. The other two, also below the OHW mark, are separated from the river by higher ground.

Vegetation consists of species adapted to pioneering disturbed or barren areas and are of monoculture stands of common cocklebur (Xanthium stumarium), members of the composite family, and a willow sapling thicket near the downstream end of the alignment. Smaller portions of the open areas close to residences have a mown ground cover.

DESCRIPTION OF DISPOSAL METHOD

Clay fill, bedding rock, and riprap would be brought to the project site by truck. A bulldozer, backhoe, or similar construction equipment then would be used to shape or place materials to their correct dimensions.

SECTION 2 - FACTUAL DETERMINATIONS

PHYSICAL SUBSTRATE DETERMINATIONS

Approximately one-half the levee alignment including Liverpool is located on the Beardstown terrace which is largely 5 to 15 feet above the modern floodplain. Boring samples indicated a surface layer of sandy lean clay 3 to 6 feet deep overlying deep deposits of various sand layers.

The lower half of the levee, which is between Liverpool and the river, contains modern alluvium deposits composed largely of clayey silt and sandy silt with lenses of silty sand and gravel. Boring samples indicated 6 feet to just over 8 feet of clays overlying sand with some gravel.

WATER CIRCULATION, FLUCTUATION, AND SALINITY DETERMINATIONS

WATER

Portions of the project site are frequently flooded by the Illinois River. Historically the river has had water quality problems since the completion of the Chicago Sanitary and Ship Canal in 1900, that not only permitted navigation between Lake Michigan and the Illinois River, but also carried sewage effluent away from Chicago the river. In the Illinois Water Quality Inventory Report 1980-1981 prepared by the Illinois Environmental Protection Agency, the river was listed as having moderate overall water quality problems.

CURRENT PATTERNS AND CIRCULATION

The levee alignment is above the normal river level and would be set back from the river's banks. No significant effects to current patterns or circulation are anticipated.

NORMAL WATER LEVEL FLUCTUATIONS

Illinois River water levels at Liverpool are influenced by the LaGrange Lock and Dam located 48 river miles downstream, which maintains a flat pool elevation of 429.0 feet for the 9-foot navigation channel. The levee is above the normal pool elevation, although sections are below the OHW mark. These sections are small and would have no noticeable effect on normal water level fluctuations.

ACTION TAKEN TO MINIMIZE IMPACTS

Construction would take place at periods of low water to avoid excess turbidity. The levee would be limited to the length practical for providing flood protection to the village.

CONTAMINANT DETERMINATIONS

The levee material would consist of clay fill that, with the exception of sand being deposited over its surface, is relatively undisturbed. The bedding rock and riprap would be clean and chemically stable. No impacts from contaminants are expected.

AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS

The proposed project should not significantly impact the aquatic ecosystem. Use of the project site by fish, other nekton, and plankton would be limited to periods of high water. Benthos would be limited to those species adapted to a substrate that is at least periodically dry. The site may provide some cover for smaller mammals, reptiles, and amphibians.

Two federally threatened or endangered species are listed for Fulton County, Illinois: the bald eagle (Haliaeetus leucocephalus) and the Indiana bat (Myotis sodalis). However, suitable habitat for either species does not exist within the project area, and no impacts are anticipated. The U.S. Fish and Wildlife Service concurs with this determination in their Planning Aid Report dated December 7, 1984; their Draft Fish and Wildlife Coordination Act Report dated November 24, 1986; and their Final Fish and Wildlife Coordination Act Report dated November 24, 1986.

There are 15 plant and 2 animal species listed as State threatened or endangered species in Fulton County. No prime or unique habitat for any of these species exists and none were observed during field review of the project area. Consequently, no impacts are anticipated. The project area also was checked for another rare plant, the decurrent false aster (Boltonia asteroides var. decurrens), but it was not found within the project area.

PROPOSED DISPOSAL SITE DETERMINATIONS

The placement of riprap would result in minor losses of vegetation within the project alignment and temporary increases in turbidity during construction.

Certification under Section 401 of the Clean Water Act has been received from the Illinois Environmental Protection Agency; all conditions of the certification will be complied with.

DETERMINATION OF CUMULATIVE AND SECONDARY EFFECTS ON THE AQUATIC ECOSYSTEM

While a small amount of the levee alignment lies below the OHW mark, no fill would be placed at normal water levels. Water quality impacts resulting from construction would be temporary. No significant

cumulative or secondary effects to the aquatic ecosystem are expected to occur.

SECTION 3 - FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

1. No significant adaptations of the guidelines were made relating to this evaluation.

2. The alternative of No Federal Action was not feasible because it did not provide needed flood protection.

3. Certification under Section 401 of the Clean Water Act has been received from the Illinois Environmental Protection Agency.

4. The project would not introduce substances into nearby waters or result in appreciable increases in existing levels of toxic materials.

5. No impacts to Federal or State-listed endangered or threatened species will result from this project.

6. The erosion control projects are in inland fresh water systems. No marine sanctuaries are involved.

7. No municipal or private water supplies would be affected. Minor impacts would result from construction but no sensitive or critical habitats would be affected.

8. Project construction materials will be physically and chemically stable.

9. The proposed actions will not significantly affect water quality or the acquatic ecosystem and are in compliance with the requirements of guidelines for Section 404(b)(1) of the Clean Water Act, as amended.

_____
Date

_____
John R. Brown
Colonel, U.S. Army
District Engineer

FEIS APPENDIX A

PUBLIC REVIEW COMMENTS ON DEIS AND RESPONSES

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*

Name Of Project: **Liverpool, Illinois**
Proposed Land Use: **Flood control**
Date Of Land Evaluation Request: **12 May 1987**
Federal Agency Involved: **Corps of Eng, Rock Island District**
County And State: **Fulton County, Illinois**

PART II *(To be completed by SCS)*

Date Request Received By SCS: 17 / 7

Does the site contain prime, unique, statewide or local important farmland? Yes ☐ No ☑
(If no, the FPPA does not apply - do not complete additional parts of this form)

Acres Irrigated | Average Farm Size

Major Crop(s)

Farmable Land In Govt Jurisdiction: Acres ____ %

Amount Of Farmland As Defined in FPPA: Acres ____ %

Name Of Land Evaluation System Used

Name Of Local Site Assessment System

Date Land Evaluation Returned By SCS

PART III *(To be completed by Federal Agency)*

	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly (borrow and levee)	23.0	58.0		
B. Total Acres To Be Converted Indirectly (ponding area)	2.1	2.1		
C. Total Acres In Site	25.1	60.1		

PART IV *(To be completed by SCS)* Land Evaluation Information

A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt Unit To Be Converted				
D. Percentage Of Farmland In Govt Jurisdiction With Same Or Higher Relative Value				

PART V *(To be completed by SCS)* Land Evaluation Criterion
Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*

PART VI *(To be completed by Federal Agency)*
Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b))*

	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Service					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				

PART VII *(To be completed by Federal Agency)*

Relative Value Of Farmland *(From Part V)*	100			
Total Site Assessment *(From Part VI above or a local site assessment)*	160			
TOTAL POINTS *(Total of above 2 lines)*	260			

Site Selected | Date Of Selection | Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection

A-1

CORPS OF ENGINEERS' RESPONSES TO USDA FORM AD-1006:

Noted.

United States Department of Agriculture

Soil Conservation Service

Springer Federal Building
301 North Randolph Street
Champaign, Illinois 61820

September 21, 1988

District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building
P. O. Box 2004
Rock Island, IL 61204-2004

ATTN: Planning Division

Gentlemen:

1. We have reviewed the Draft Definite Project Report for Section 205 Flood Control Illinois River, Liverpool, Illinois with Draft Environmental Impact Statement.

We have the following comment:

2. A description of soil types which would be affected by the project should be included to allow for identification of prime farmland and to confirm compliance with the Farmland Protection Policy Act.

Thank you for the opportunity to review this document.

Sincerely,

John J. Eckes

JOHN J. ECKES
State Conservationist

cc
Rick Macho, AC, Edwardsville, IL

GP:17pm29

A-2

CORPS OF ENGINEERS' RESPONSES TO U.S. DEPT. OF AGRICULTURE, SCS:

1. Noted.

2. Form AD-1006 was submitted to the district conservationist for Fulton County, Illinois. It was returned with an indication that no prime or unique farmland would be affected. This form was left out of the DEIS, but is incorporated into the FEIS in FEIS Appendix A - Public Review Comments on DEIS and Responses. The FEIS addresses the findings of this form.

5. The Department concurs with the selection of the downstream borrow site. Although the site has been in recent agricultural production, we feel its use meets the intent of the Illinois Farmland Preservation Act to utilize less productive soils. The site may be in yearly cropland production, but its ability to produce respectable yields are determinate upon the duration of spring and/or fall flooding.

6. We support the Corps' final recommendation in the Draft Environmental Impact Statement to construct an earthen levee around the Village of Liverpool.

Sincerely,

Teresa J. Savko

Teresa J. Savko
Bureau of Farmland Protection

TJS:ll
cc: Fulton County SWCD

CORPS OF ENGINEERS' RESPONSES TO ILLINOIS DEPARTMENT OF AGRICULTURE (Cont'd):

5. Noted.

6. Noted.

Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787
CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH 60601
MARK FRECH, DIRECTOR

September 28, 1988

Mr. Dudley M. Hanson, P.E.
Chief, Planning Division
Rock Island District, Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island Illinois 61204-2004

A-5

Dear Mr. Hanson:

1. The Department has completed its review of the August 1988 Draft Definite Project Report for Section 205 Flood Control, Illinois River, Liverpool, Illinois and the accompanying Draft Environmental Impact Statement which you transmitted to us on August 31, 1988.

2. The Department believes the selected plan (the 50-year levee) can be implemented with minimal impacts to the area's fish and wildlife resources. We do note, however, that access to the village public boat ramp will be temporarily disrupted. We hope this inconvenience to the boating public will be brief.

3. We support your plan to use the borrow site to replace habitat lost from project construction. We understand the borrow pit slopes will be shaped and the center of the 13-acre site will be deepened to allow for open water and the establishment of wetland vegetation around the water's perimeter.

Thank you for the opportunity to comment.

Sincerely,

Mark Frech

Mark Frech

Director

MF:RWL:se

cc: USFWS, Rock Island

CORPS OF ENGINEERS' RESPONSES TO ILLINOIS DEPARTMENT OF CONSERVATION:

1. Noted.

2. Noted.

3. This borrow site has been reduced to 5 acres. It will be shaped as noted in comment.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333

October 6, 1988

Dudley H. Hanson, P.E.
Department of the Army
Corps of Engineers
Rock Island District
P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Hanson:

1. Thank you for sending the Draft Definite Project Report and Environmental Impact Statement (DEIS) for "Section 205 Flood Control on the Illinois River, Liverpool, Illinois." We are responding on behalf of the U.S. Public Health Service. We feel that the proposed levee to protect the village of Liverpool, Illinois will result in a safer, more healthful community by substantially reducing the likelihood of a flood. The selection of the 50-year level of protection appears to be a prudent choice balancing cost and protection against the flood hazard. The benefit-to-cost ratio of the selected plan at 1.80 to 1.0 provides a particularly good benefit from the investment of public funds. We appreciate the Summary of Environmental Effects provided on the second page of the DEIS. This summary allows a rapid, yet comprehensive scan of the potential adverse impacts of this project.

2. We have reviewed the portions of the document which relate to public health and safety and based upon the information provided in the EIS, we see no potential for adverse effects on human health.

3. Thank you for sending this document for our review. Please insure that we are included on your mailing list for further documents which are developed under the National Environmental Policy Act (NEPA).

Sincerely yours,

David E. Clapp

David E. Clapp, Ph.D., P.E., CIH
Environmental Health Scientist
Special Programs Group
Center for Environmental Health
and Injury Control

A-6

CORPS OF ENGINEERS' RESPONSES TO DEPARTMENT OF HEALTH & HUMAN SERVICES:

1. Noted.

2. Noted.

3. Noted.

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
230 S. DEARBORN SUITE 3422
CHICAGO, ILLINOIS 60604

ER-88/832 October 24, 1988

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building, P. O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

The Department of the Interior has reviewed the Draft Definite Project Report and Environmental Impact Statement for the Section 205 Flood Control Project on the Illinois River at Liverpool, Illinois. Consolidated Departmental comments are provided for your consideration during future planning phases.

1. Personnel of the Intermountain Field Operations Center, Bureau of Mines reviewed the project document for possible conflict with mineral resources and mineral-producing facilities. Although the report does not mention mineral resources, the nature of the project is such that no significant impact to mineral resources is anticipated. Therefore, we suggest that a statement to that effect should be incorporated in subsequent versions of the document. Such an inclusion would provide users of the document with the knowledge that mineral resources had been considered during project planning.

2. The Fish and Wildlife Service's Planning Aid Report of December 7, 1984, and Draft Fish and Wildlife Coordination Act Report of November 24, 1986, are incorporated in the document. The Service has no additional comments to offer at this time.

We appreciate the opportunity to review the project document, and look forward to continued involvement in the future.

Sincerely,

for Sheila Minor Huff
Regional Environmental Officer

CORPS OF ENGINEERS' RESPONSES TO U.S. DEPT. OF INTERIOR, OFFICE OF ENVIRONMENTAL PROJECT REVIEW:

1. Comment noted. Statement concerning mineral resources will be incorporated into final EIS.

2. Noted.

Illinois Natural History Survey A Division of the Department of Energy and Natural Resources **ENR**
River Research Laboratory, Box 599, Havana, Illinois 62644, (309) 543-3950

October 26, 1988

RECEIVED
NOV - 1 1988
CENCR-OD-S

Mr. Michael Diedrichsen
IL Dept. of Transportation
Division of Water Resources
2300 South Dirksen Parkway
Springfield, IL 62764

Dear Mr. Diedrichsen:

1. This letter raises two points regarding the proposed flood control levee around the village of Liverpool on the Illinois River between miles 127.5 and 128.2 (Public Notice No. CENCR-17141Z).

2. Slight modifications to this project would enhance fish and wildlife values and wetlands. First, although the 2.5-acre ponding site within the levee is small, it could become a productive wetland if properly designed and managed. Second and more important, the 13-acre borrow site outside the levee could be excavated in such a way that it would extend or deepen the adjacent backwater. An alternative design would be to open and shape the backwater so that it would receive some flow from the main channel and maintain itself by scouring. Either approach would require engineering analysis to determine the most feasible design.

3. Our studies on habitat utilization by fish in the Illinois River indicate that many species select side channel and backwater habitats when they have access to them. Former backwaters and side channels in the Liverpool reach of the Illinois River and in the Spoon River bottoms have been degraded by sedimentation, drainage, dredge spoil, or are isolated from the river by levees. Liverpool Ditch (also includes Liverpool Lake and Mud Lake in the Chautauqua National Wildlife Refuge, on the east side of the River) and the Senate Island side channel (west side) now are completely or partially filled with sediment and are unusable or inaccessible to fish during low river stages. The borrow pits for the Liverpool Levee have the potential to replace some of this lost habitat.

Thank you for the opportunity to comment on this project.

Sincerely yours,

Richard E. Sparks

Dr. Richard E. Sparks
Aquatic Biologist

RES:mw

cc: District Engineer, Rock Island
L. Osborne, INHS, Champaign
G. Miller, Chautauqua National Wildlife Refuge, Havana
S. Havera, INHS, Havana
L. Vogt, DENR
T. Heavisides, DENR

A-88

CORPS OF ENGINEERS' RESPONSES TO ILLINOIS NATURAL HISTORY SURVEY:

1. Noted.

2. As the project now stands, the 2.5-acre ponding site cannot be appreciably altered. Retaining water within the ponding area would result in the loss of the storage needed for interior drainage purposes. Also, interior runoff cannot be allowed to pond to a greater elevation as damage will be induced to properties in the village. Excavation is also not feasible because of the potential underseepage problems to the proposed levee.

Because of the heavy siltation within the area along the Illinois River, it was decided to leave the borrow site isolated frm the riv Creating flows that would result in scouring of the borrow area is feasible because of the potential for erosion to the adjacent agricultural levee.

The 13-acre borrow site has been reduced to 5 acres. An additional acre site has been added.

3. Noted.

To: CNCR (157:ACE2019)
From: [redacted] (EM8562) Delivered: Thu 27-Oct-88 9:47
EDF Sys 163 (48)
Subject: ATTENTION STEVE VANDERHORN
Mail Id: IM#-163-881027-088150008

October 27, 1988

Steve VanderHorn, Chief
Regulatory Functions Branch
Rock Island District, Corps of Engineers
Department of the Army
Clock Tower Building
Rock Island, Illinois 61201-2004

Dear Mr. VanderHorn:

The U.S. Environmental Protection Agency has received the Public Notice(s) of the proposed project(s) as described on the following list. We are unable to review the project(s) for the impacts on water quality, wetlands, or other water resource concerns. Therefore, no action is contemplated at this time.

In the event that information becomes available of an unexpected adverse impact results from any of these activities, we would appreciate the opportunity to review the project(s).

NOTICE-NO./NOTICE-DATE	APPLICANT	COMMENTS-DUE
17141Z/10-07-88	U.S. Army Corps of Engineers	10-07-88
17194Z/09-26-88	*City of Decatur, Illinois*	10-16-88
Reg. Permit #19/10-14-88	U.S. Army Corps of Engineers	11-14-88
CENCR-172890/10-17-88	Clarence McGuinty	11-06-88
CENCR-171580 and 17159Z	U.S. Army Corps of Engineers	11-06-88
CENCR-167750/10-12-88	Mr. Wayne Stewart	11-01-88

If you have any questions concerning this matter, please contact Ms. A. Marie Ecton of my staff, at 312/886-5266.

Sincerely yours,

James D. Giattina, Chief
Planning and Standards Section

cc: Richard Nelson, Fish & Wildlife Service, Rock Island, IL
James Park, Illinois Environmental Protection Agency, Springfield, IL

Robert Schanzle, Illinois Department of Conservation
Springfield, IL

A-9

171417 w/p

CORPS OF ENGINEERS' RESPONSES TO U.S. EPA:

Noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

8 NOV 1983

Dudley M. Hanson, P.E.
Chief, Planning Division
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Hanson:

1. In accordance with National Environmental Policy Act and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement(DEIS), for the Section 205 Flood Control for Liverpool on the Illinois River in Fulton County, Illinois.

2. The DEIS proposes the construction of a levee at the 50 year level of protection. The levee would tie in with the existing agricultural levee, which is located on the north side of the town. The length of the levee would be approximately 4,400 feet with a maximum height of 17.5 feet. The levee would be seeded, and riprapped to protect against erosion during flood conditions. A ramp would be provided to allow access for levee operation and maintenance. For interior drainage a gravity outlet with a 24 inch discharge pipe, 2 acre pond, and two 4000 gallons per minute pumps will be included in the flood control plan.

3. We offer the following comments on the DEIS. The DEIS did not outline or specify the measures that would be taken to control erosion. In terms of erosion, the proposed plan must contain provisions to prevent soils from entering the river, during the construction phase of the project. This is to reduce the negative impacts to the water quality of the Illinois River. Measures that will be incorporated into the project and required of the contractor should be provided.

4. The use of the borrow sites after excavation, was not addressed in the DEIS. We recommend that the these areas be converted into wetlands. The proposed project requires that approximately 10 acres of wetlands to be utilized for the levee. It is the policy of our Agency that the any loss of wetlands be mitigated by replacement in terms of a ratio of 1.5 to 1. The conversion of the borrowed site to wetlands would fulfill this requirement. The natural flood control of the wetlands would also enhance the proposed flood control plan. The Final Environmental Impact Statement should include a plan for using the borrow pits for mitigation of wetland impacts. We would be willing to review a draft plan for such a mitigation plan prior to the publication of the Final Environment Impact Statement.

CORPS OF ENGINEERS' RESPONSES TO U.S. EPA:

1. Noted.

2. Noted.

3. Standard erosion control items will be used. These include: staked straw bales, sedimentation basins, and temporary mulching. Construction within the waterway would take place at zero or low-flow conditions.

4. The draft EIS, on page EIS-33, proposes to establish the borrow site as a wetland. Plate EIS-1 shows an idealized design.

5 based on our review of the information provided and incorporation of the above comments, our Agency does not have any objections to the proposed flood control project for Liverpool in Fulton County, Illinois. We have rated the project as a "LO". The rating of "LO" indicates our lack of objection to the project. This rating will be published in the Federal Register.

Thank you for the opportunity to comment on the DEIS for Liverpool, Illinois. If you have any questions or comments, please contact Al Fenedick of my staff at (312) 886-6072.

Sincerely yours,

William D. Franz

William D. Franz, Chief
Environmental Review Branch
Planning and Management Division

CORPS OF ENGINEERS' RESPONSES TO U.S. EPA (Cont'd):

5. Noted.

Illinois Environmental Protection Agency · P. O. Box 19276, Springfield, IL 62794-9276

217/782-0610

Rock Island District Corps of Engineers (Fulton County)
Liverpool Levee -- Illinois River
Log # C-792-87 [CoE Appl. #171412]

RECEIVED
DEC 5 1988
CENCR-O

December 1, 1988

Mr. James H. Blanchar, P.E.
Chief, Operations Division
Rock Island District
Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Dear Mr. Blanchar:

1. This Agency received a request on November 9, 1987, from the Rock Island District Corps of Engineers requesting necessary comments for environmental consideration concerning the construction of a 4,400 foot long earthen levee at Liverpool. We offer the following comments.

2. Based on the information included in this submittal, it is our engineering judgment that the proposed project may be completed without causing water pollution as defined in the Illinois Environmental Protection Act, provided the project is carefully planned and supervised.

3. These comments are directed at the effect on water quality of the construction procedures involved in the above described project and is not an approval of any discharge resulting from the completed facility, nor an approval of the design of the facility. These comments do not supplant any permit responsibilities of the applicant towards this Agency.

4. This Agency hereby issues certification under Section 401 of the Clean Water Act (PL 95-217), subject to the applicant's compliance with the following conditions:

1. The applicant shall not cause:

   a. violation of applicable water quality standards of the Illinois Pollution Control Board, Title 35, Subtitle C: Water Pollution Rules and Regulations;

   b. water pollution as defined and prohibited by the Illinois Environmental Protection Act; and

   c. interference with water use practices near public recreation areas or water supply intakes.

2. The applicant shall provide adequate planning and supervision during the project construction period for implementing construction methods, processes and cleanup procedures necessary to prevent water pollution and control erosion.

CORPS OF ENGINEERS' RESPONSES TO ILLINOIS EPA:

1. Noted.

2. Noted.

3. Noted.

4. All conditions for certification under Section 401 of the Clean Water Act will be complied with.

3. Any spoil material excavated, dredged or otherwise produced must not be returned to the waterway but must be deposited in a self-contained area in compliance with all State statutes, regulations and permit requirements with no discharge to the waters of the State unless a permit has been issued by this Agency. Any back filling must be done with clean material and placed in a manner to prevent violation of applicable water quality standards.

4. All areas affected by construction shall be mulched and seeded as soon after construction as possible. The applicant shall undertake necessary measures and procedures to reduce erosion during construction. Interim measures to prevent erosion during construction shall be taken and may include the installation of staked straw bales, sedimentation basins and temporary mulching. All construction within the waterway shall be conducted during zero or low flow conditions.

5. The applicant shall implement erosion control measures consistent with the "Standards and Specifications for Soil Erosion and Sediment Control" (ISPA/WPC/87-012).

6. The levee, borrow site and other areas affected by construction shall be revegetated as soon after construction as possible.

7. This certification becomes effective when the Department of the Army, Corps of Engineers, includes the above conditions #1 through 6 as conditions of the requested permit issued pursuant to Section 404 of PL. 95-217.

This certification does not grant immunity from any enforcement action found necessary by this Agency to meet its responsibilities in prevention, abatement, and control of water pollution.

Very truly yours,

Thomas G. McSwiggin, P.E.
Manager, Permit Section
Division of Water Pollution Control

TGM:f.Y:jab/3700j/33-34

cc: IEPA, DWPC, Records Unit
DWPC, Field Operations Section, Region 3
IDOT, Division of Water Resources, Springfield
USEPA, Region V

A-13

CORPS OF ENGINEER'S RESPONSES TO ILLINOIS EPA (Cont'd):

5. Noted.

Illinois Historic
Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4512

FULTON COUNTY
CENCR-171412
Flood control levee project
Liverpool

December 12, 1988

Neil A. Smart, Colonel
District Engineer, U.S. Corps of Engineers
Rock Island District
Clock Tower Building
Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Sir:

A-14

Thank you for requesting comments from our office concerning the possible effects of the project referenced above on cultural resources. Our comments are required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

Our office was requested by the Corps of Engineers - Rock Island District to comment on the above referenced project during the planning stage. We have previously reviewed the Phase I survey and Phase II testing reports prepared by Illinois State Musuem Society for the project area and have commented on the Draft Definite Project Report for Section 205 Flood Control, Illinois River, Liverpool, Illinois with Draft Environmental Impact Statement.

The following is a summary of our past consultation concerning this project:

1) Archaeological sites 11-F-25 and 11-F-2713 possess sufficient archaeological significance for listing on the National Register of Historic Places;

   a) Site 11-F-25, located adjacent to the proposed borrow area, will be avoided during project activities; and

   b) A plan to mitigate the adverse effects of project construction to site 11-F-2713 will be developed and coordinated with the Illinois State Preservation Office and the Advisory Council on Historic Preservation.

CORPS OF ENGINEERS' RESPONSES TO ILLINOIS SHPO:

1. Noted.

Illinois Historic Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

2. A revised levee alignment was designed to avoid impact to the archaeological sites identified during the Phase I survey with the exception of 11-F-2713.

3. At this point in the consultation process, the Corps of Engineers - Rock Island District should initiate a Memorandum of Agreement concerning the mitigation of adverse effects to site 11-F-2713 to ensure compliance with the National Preservation Act of 1966, as amended.

If you have any further questions, please contact Ms. Paula G. Cross, Staff Archaeologist, Illinois Historic Preservation Agency, Old State Capitol, Springfield, Illinois 62701, 217/785-4997.

Sincerely,

Theodore Hild

Theodore H. Hild
Deputy State Historic
Preservation Officer

THH:PGC:bw

cc: Dudley Hanson, CoE-Planning Division

CORPS OF ENGINEERS' RESPONSES TO ILLINOIS SHPO (Cont'd):

2. Noted.

3. The MOA will be initiated early in the Plans and Specifications stage.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
ROCK ISLAND FIELD OFFICE (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201
IN REPLY REFER TO:
COM: 309/793-5800
FTS: 386-5800

February 8, 1989

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Plaza, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

This is in reference to your study of flood protection from the Illinois River at Liverpool, Illinois which is being conducted under the authority of Section 205 of the 1948 Flood Control Act.

On November 24, 1986, we provided our Draft Fish and Wildlife Coordination Act Report on the subject project. In that report we recommended that the 13-acre borrow site for the flood levee be developed into a wetland and that, if possible, that the wetland be connected to the river. Your agency's plans have incorporated the wetland development feature. We concur that connecting the wetland to the river will only hasten its eventual demise through sedimentation.

Inasmuch as your agency's plans have not significantly changed since our Draft Report, and our recommendation has been adopted, our Draft Report shall hereby stand as our Final Fish and Wildlife Coordination Act Report and we have no objection to the implementation of project plan.

Sincerely,

Richard C. Nelson
Field Supervisor

cc: IDOC (Lutz)

1

A-16

CORPS OF ENGINEERS' RESPONSES TO U.S. FISH AND WILDLIFE SERVICE:

1. Noted.

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A - HYDROLOGY AND HYDRAULICS

B - GEOTECHNICAL

C - DETAILED COST ESTIMATE

D - ECONOMIC AND SOCIAL ANALYSIS

E - CULTURAL RESOURCES

F - PERTINENT CORRESPONDENCE - PROJECT-RELATED INFORMATION

APPENDIX A

HYDROLOGY AND HYDRAULICS

DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX A
HYDROLOGY AND HYDRAULICS

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DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX A
HYDROLOGY AND HYDRAULICS

GENERAL

SITE LOCATION

Liverpool is located in Fulton County, Illinois, on the right bank of the Illinois River at river mile 128.0 (plate A-1). The drainage area of the Illinois River at Liverpool is approximately 16,400 square miles. The village is located on a low-lying river terrace in a wide floodplain. Most of the surrounding area is farmland with some swamp and timbered areas.

CLIMATOLOGY

The area's climate is typically continental with changeable weather and a wide range of temperature extremes. The mean annual temperature at Liverpool is 53 degrees Fahrenheit (F). January, the coldest month, has a mean temperature of 21.5 degrees F, while July, the warmest month, has a mean temperature of 75.0 degrees F. The normal annual precipitation for the period of record is 35.5 inches.

HISTORY

Flooding in Liverpool is caused by frequent high stages on the Illinois River. Most flooding occurs during late winter and early spring and is generally caused by snowmelt or a combination of snowmelt and heavy rainfall. Discharges for major floods at Liverpool are listed in table A-1.

TABLE A-1

Floods of Record
Illinois River at Liverpool, Illinois

Date	Peak Discharges (ft^3/s) a/	Elevation Feet, NGVD b/
Apr 22	60,500	447.3
Oct 26	62,500	448.5
May 43	83,100	452.1 c/
Apr 44	64,200	448.0
May 70	63,300	449.0
Jun 74	71,900	448.9
Mar 79	74,800	450.9
Mar 82	70,700	450.4
Dec 82	84,700	450.5
Apr 83	71,600	448.8
Mar 85	78,800	451.3
Nov 85	67,100	450.1

a/ Cubic feet per second
b/ National Geodetic Vertical Datum of 1929
c/ Highest recorded elevation

ADVANCE-WARNING SYSTEM

Flooding characteristics are unique on this portion of the river because of the flat gradient of the natural river channel. This causes floodwaters to rise slowly, persist for long durations, and recede slowly. The National Weather Service forecasts flooding on the Illinois River at Havana, and the local media disseminates this information throughout the region. Consequently, Liverpool residents have at least 3 days warning to place sandbags and prepare for flood stages. Because of this ample warning time, no formal advance-warning system is required.

ILLINOIS RIVER

In August 1987, the Rock Island District, Corps of Engineers, completed a study on flow frequencies on the Illinois River from river miles 70 to 230 (reference A). The study used an unsteady flow model that was calibrated for flow at Marseilles, Kingston Mines, and Meredosia, and for stages at several gaging stations along the reach. In the reach from river miles 230.0 to 70.8, the Illinois River is extremely flat, about 0.3 foot per mile. Numerous backwater areas and lakes parallel the main channel. Extensive levee systems have been built to protect

agricultural areas in the wide floodplain. In general, these levee systems provide protection up to the 25- or 50-year flood event.

The hydraulics of the flat reach are very complex. Flood flows are significantly attenuated by the storage areas located along the river channel. The flat gradient of the stream causes flow from entering tributaries to affect stages upstream as well as downstream. During very large events, the levees fail and dramatically attenuate the flood crest.

Because of the complex hydraulics of this reach, the standard technique for developing flood profiles should not be used. Typically, standa: step backwater profiles are computed using HEC-2 and steady stage discharges from derived frequency relationships. However, this procedure results in two apparent problems: (1) Attenuation is so great that ordinary hydrologic modeling and point frequency analysis cannot determine the spacial variation in flow; and (2) the attenuation of the flood crest due to levee failures could not be determined using hydrologic techniques.

For a given return period, the flow decreases moving downstream from Marseilles to Kingston Mines. This is despite the addition of flow from 7,300 square miles of drainage area. Backwater storage, primarily from Henry to Peoria, attenuates the flood flows.

A steady, gradually varied flow model like HEC-2 cannot simulate a dynamic event such as a levee failure; therefore, the HEC-2 model cannot be used for this type of problem. HEC-2 cannot account for the filling of the levees with time or the attenuation of stage due to the levee failures.

The unsteady flow model used in this study is capable of simulating the channel and floodplain routing and the failure of levee systems. Because this study offers the most accurate elevation and flow frequencies available for Liverpool, Illinois, its results are used in this report. The flow frequency is shown on plate A-2 and elevation frequency on plate A-3. Elevation duration was computed from the Corps of Engineers gage at Liverpool, Illinois, and is shown on plate A-4. Water surface profiles for the 10-, 50-, 100-, and 500-year flood events are shown on plate A-5.

The plotting positions of the historic stage record are shown in Table A-2 as a comparison to the frequency curve derived from the unsteady flow analysis. The historic analysis was derived from the past 20 years of record. This period was selected as long enough to give a reasonable representation of the frequency but not so long as to introduce errors caused by the changing channel and flood plan geometry due to sedimentation, scour, and levee construction.

TABLE A-2

Analysis of Historic Stage Data

Elevation	Plotting Position
451.4	0.048
450.9	0.095
450.5	0.143
449.0	0.190
448.6	0.238
448.0	0.286
446.8	0.333
446.1	0.381
445.6	0.429
445.0	0.476
444.8	0.524
444.3	0.571
444.2	0.619
443.2	0.667
442.7	0.714
441.9	0.762
441.5	0.810
440.4	0.857
440.4	0.857
440.4	0.905
440.0	0.952

INTERIOR DRAINAGE

Under existing conditions, Liverpool protects itself from high river stages by placing sandbags along low-lying areas around the perimeter of the village. Floodwaters are held back on the north side of the village by the existing agricultural levee. The water accumulating in the interior area is mostly seepage from the river through the sandbag closures. This water is removed by several small portable pumps. Rainfall during gravity conditions produces little or no runoff, as nearly all of it is absorbed into the ground.

An interior drainage analysis was made to determine what facilities were required to handle runoff with the proposed levee in place. The interior area of Liverpool, surrounded by the existing agricultural levee to the north and the proposed levee along the river and the east side of the village, was first divided into two separate subbasins. These subbasins, Area I and Area II, drain to three (total) separate locations, as shown on plate A-5. Unit hydrographs were derived for both subbasins using Clark's method. Flood hydrographs were computed by applying TP-40 (reference B) rainfall to the Clark unit hydrograph.

Peak hydrograph flows were verified by comparison with peak flows computed by the Rational method.

Area I included about 15.2 acres in the northwestern portion of Liverpool. All runoff within this area drains to the northwest where it enters two 24-inch pipes which pass through the agricultural levee and drain into an existing drainage ditch on the other side. This drainage ditch carries it to an existing pump station located immediately downstream of Liverpool. The Liverpool Drainage and Levee District has three pumps (two 12,000 gal/min and one 28,000 gal/min) to handle their interior drainage. This capacity can adequately handle the 100-year event; hence, water backing up from the levee district into the village of Liverpool is not a concern. The levee protecting Liverpool will help the levee district, because now most of the water that drains or is pumped into the levee district from Area I comes from the Illinois River seepage through or flowing over the emergency sandbag levees that the village uses to fight floods. Once the levee is in place, only storm runoff will need to be evacuated from the area. The two 24-inch pipes will pass the 100-year interior storm, except for the peak 20 minutes when less than 0.1 acre-foot will be ponded. This water will be drained from the area along with the last part of the interior runoff. The gravity rating curve for one 24-inch pipe is shown on plate A-7.

Area II, which included the remainder of interior area not included in Area I, is about 40 acres that naturally drains to the Illinois River. With the proposed levee in place, runoff from this area and seepage from the Illinois River needs to be passed to the river by a gravity outlet or pump(s). Interior drainage analysis shows that for a 100-year storm, a 24-inch pipe will pass the runoff directly into the Illinois River with a minimum of ponding requred under gravity conditions. Under blocked gravity conditions, the same 100-year storm could be stored using the natural low area near the toe of the levee as a ponding area. Plate A-7 shows the gravity rating of the 24-inch pipe for various Illinois River elevations. The area-capacity curves are shown on plate A-8. Since the 24-inch pipe was large enough and a larger pipe would require a field formed gatewell, a 30-inch or larger pipe was not considered. A smaller pipe was ruled out as too hard to keep clear of trash.

Because the Illinois River tends to rise slowly, hold its crest, and fall slowly during flood events, seepage under the levee becomes an important factor in determining the need for and size of pumps. The total probability method was used to determine the adequacy of the 24-inch pipe to handle the 100-year event, with seepage, for both gravity and blocked gravity conditions. Plates A-9 and A-10 show the inflow-outflow-elevation hydrographs for these conditions. In both cases, the volume was held within the ponding area (under 442.0 feet NGVD (National Geodetic Vertical Datum)). A period of record analyses was used to determine if seepage during long periods of high Illinois stages would require pumping. Plate A-11 shows the inflow-outflow-elevation hydrographs of the 1979 flood event with no pumping. The pond peaked at

just over 450 feet NGVD. A period of record analysis using data from 1948 through 1986 with pump sizes of 0, 5,000, 7,000, and 10,000 gal/min was run to determine the size of pumps needed. Table A-3 reviews the findings of that analysis.

TABLE A-3

Analysis of Pump Sizes Needed

	pump size in gal/min			
	0	5,000	7,000	10,000
Number of days of pumping	0	1,692	1,682	1,672
Peak elevation (feet NGVD)	450.11	445.54	441.78	440.0
Percent duration at 442.0	6.8	0.49	0	0

With the top of the ponding area at 442.0 feet NGVD, a 7,000 gal/min pumping capacity is required. In order to asure that greater than half of the needed capacity is available if half the pumps are out of operation, two 4,000 gal/min pumps are needed. Plates A-12 and A-13 show the elevation-frequency and the elevation-duration curves, respectively, of the ponding area with two 4,000 gal/min pumps.

STANDARD PROJECT FLOOD

A regional study was conducted to establish the provisional Standard Project Flood (SPF) for the Illinois River. First, an envelope line for all maximum discharges of record from Marseilles to Meredosia and the 0.2 percent exceedence flood estimates at Marseilles, Kingston Mines, and Meredosia was drawn against watershed yield. Then, a line was drawn parallel to this envelope line passing through 125,000 ft3/s at Dayton on the Fox River and 225,000 ft3/s at Meredosia on the Illinois River. The point at Dayton represents an SPF discharge computed by the Chicago District, Corps of Engineers, for the Fox River Basin (reference C). The Fox River accounts for 25 percent of the drainage area of the Illinois River at their confluence near Dayton. The point at Meredosia represents the SPF computed by the St. Louis District (reference D). Using this estimated envelope of the SPF, the SPF discharge for the Illinois River at Liverpool is 196,800 ft3/s at an elevation of 464.0 feet NGVD. The elevation frequency computes to a greater than 0.01 percent exceedence frequency event. The provisional SPF is shown on plate A-14.

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A. Draft Illinois River Water Surface Profiles, River Miles 70 to 230, Unsteady Flow Model, prepared by the Rock Island District, Corps of Engineers, August 1987, to be coordinated with the Illinois Department of Transportation Division of Water Resources, Illinois Department of Energy and Natural Resources State Water Survey Division, and the Illinois U.S. Geological Survey.

B. National Weather Service, Technical Paper No. 40: Rainfall Frequency Atlas of the United States, January 1963.

C. U.S. Army Corps of Engineers, Chicago District, Standard Project Profile, Fox River, Illinois, August 26, 1981.

D. U.S. Army Corps of Engineers, St. Louis District, Nutwood Drainage and Levee District, Illinois River Basin, Green and Jersey Counties, Illinois, Reevaluation Report, October 1984.

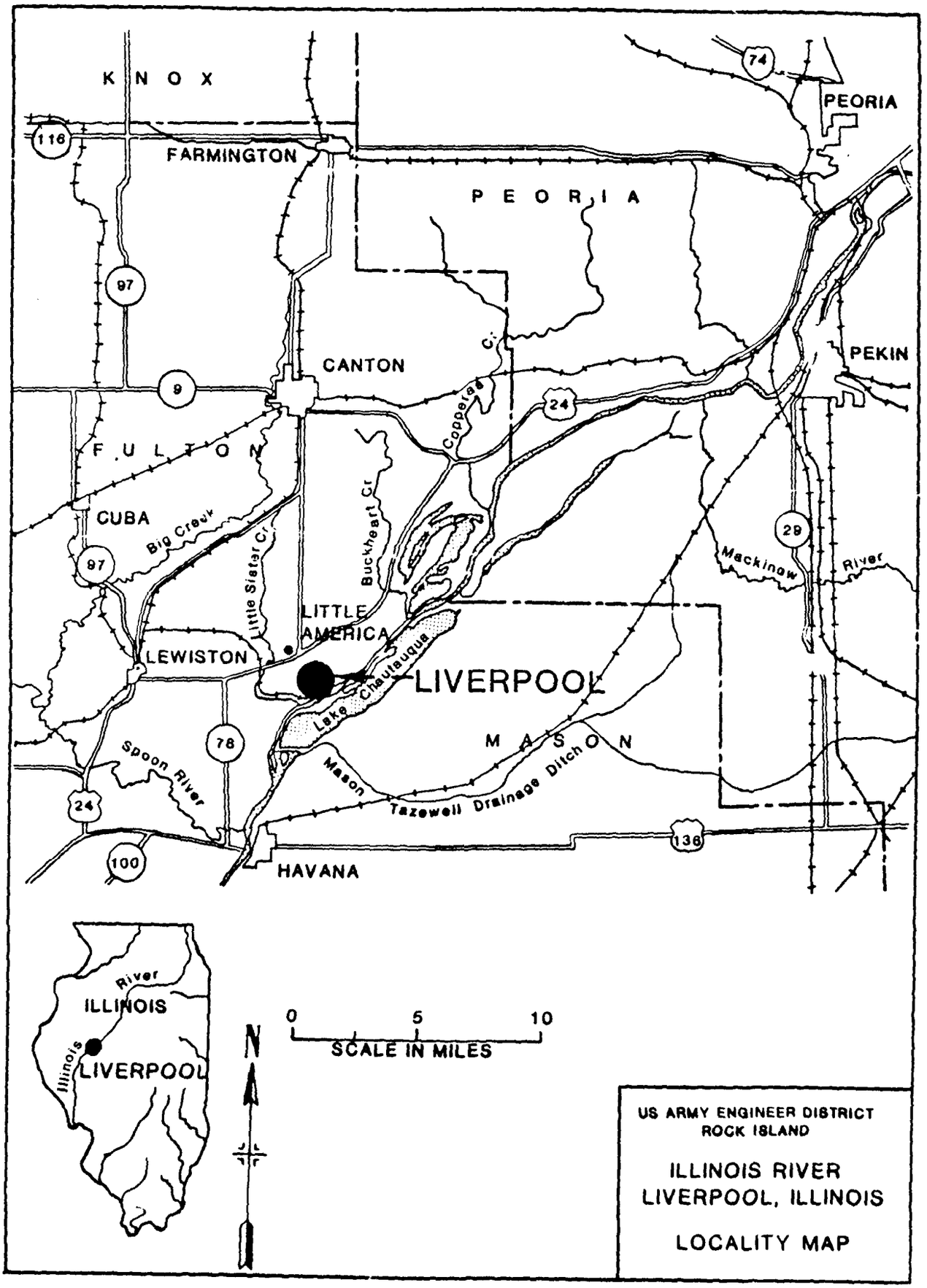

KNOX
FARMINGTON
PEORIA
PEORIA
CANTON
PEKIN
FULTON
CUBA
Big Creek
Little Sister Cr
Buckheart Cr
Copperas Cr
LITTLE AMERICA
LEWISTON
LIVERPOOL
Lake Chautauqua
MASON
Spoon River
Mason Tazewell Drainage Ditch
HAVANA
Mackinaw River
74
116
97
9
24
97
78
24
100
29
136
ILLINOIS River
Illinois
LIVERPOOL
N
0 5 10
SCALE IN MILES
US ARMY ENGINEER DISTRICT
ROCK ISLAND
ILLINOIS RIVER
LIVERPOOL, ILLINOIS
LOCALITY MAP

PLATE A-1

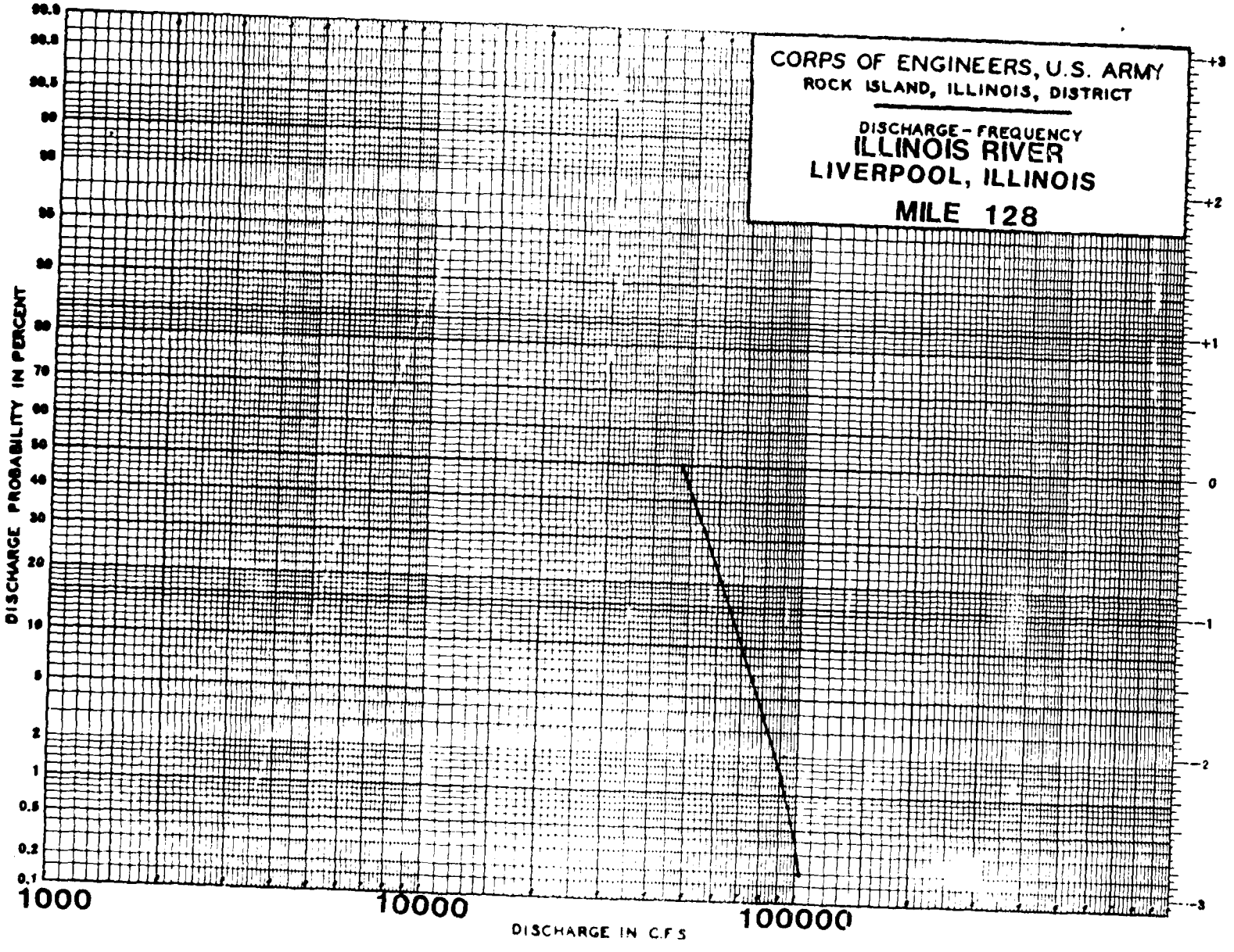

CORPS OF ENGINEERS, U.S. ARMY
ROCK ISLAND, ILLINOIS, DISTRICT
DISCHARGE - FREQUENCY
ILLINOIS RIVER
LIVERPOOL, ILLINOIS
MILE 128
DISCHARGE PROBABILITY IN PERCENT
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
+3
+2
+1
0
-1
-2
-3
1000
10000
100000
DISCHARGE IN C.F.S

PLATE A-2

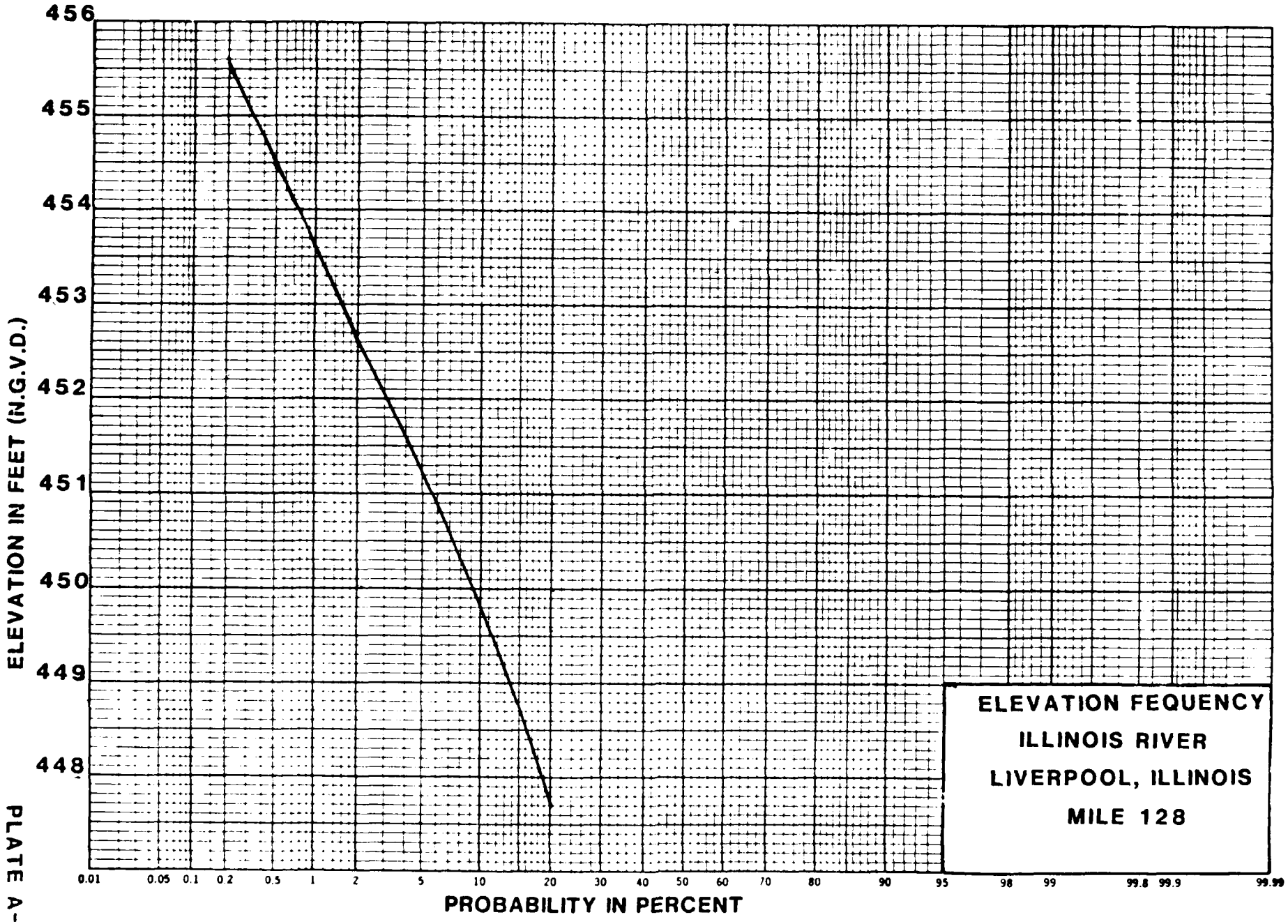

456
455
454
453
452
451
450
449
448
ELEVATION IN FEET (N.G.V.D.)
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PROBABILITY IN PERCENT
ELEVATION FEQUENCY
ILLINOIS RIVER
LIVERPOOL, ILLINOIS
MILE 128

PLATE A-3

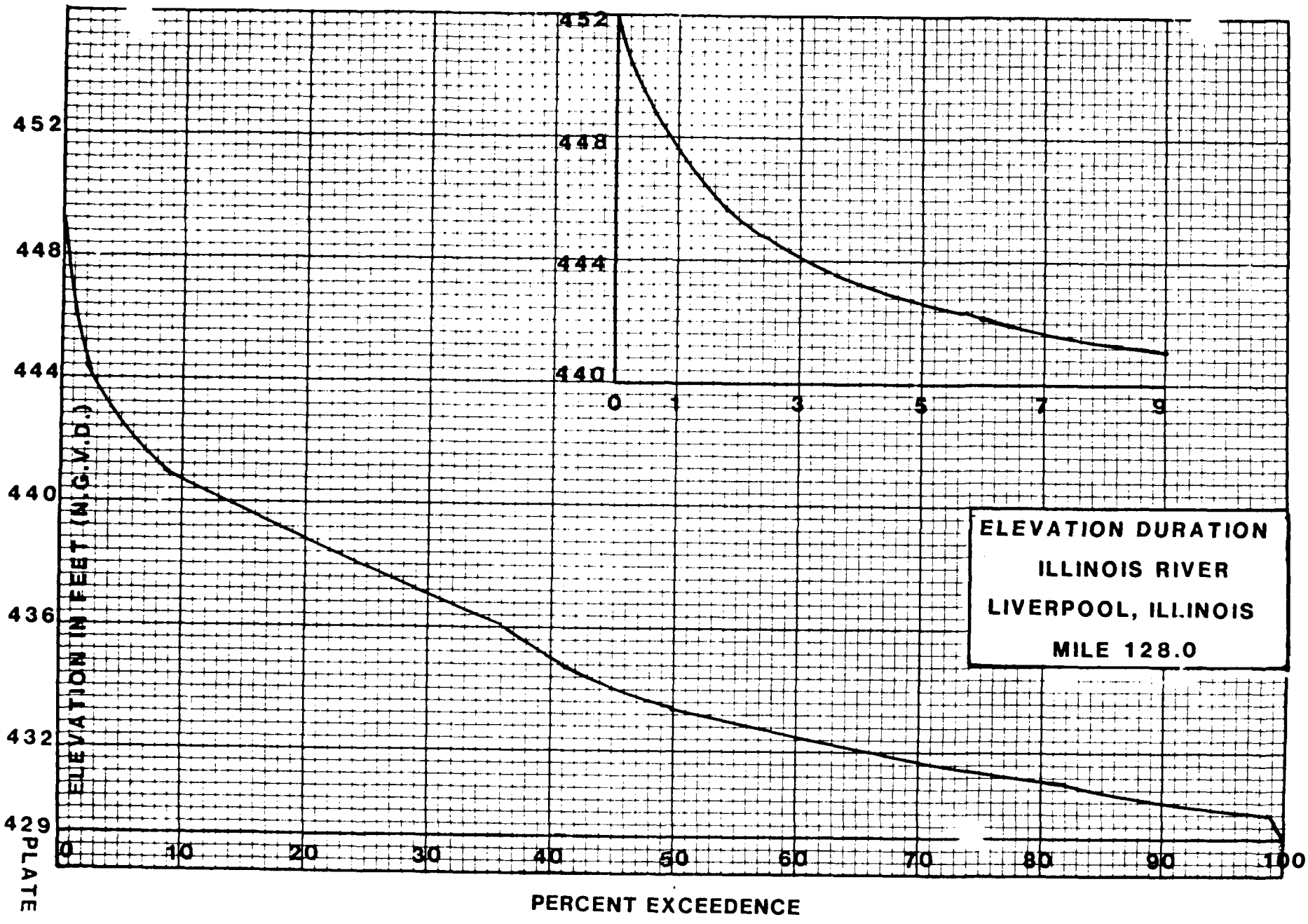

452
448
444
440
0
1
3
5
7
9
452
448
444
440
436
432
429
ELEVATION IN FEET (N.G.V.D.)
0
10
20
30
40
50
60
70
80
90
100
PERCENT EXCEEDENCE
ELEVATION DURATION
ILLINOIS RIVER
LIVERPOOL, ILLINOIS
MILE 128.0

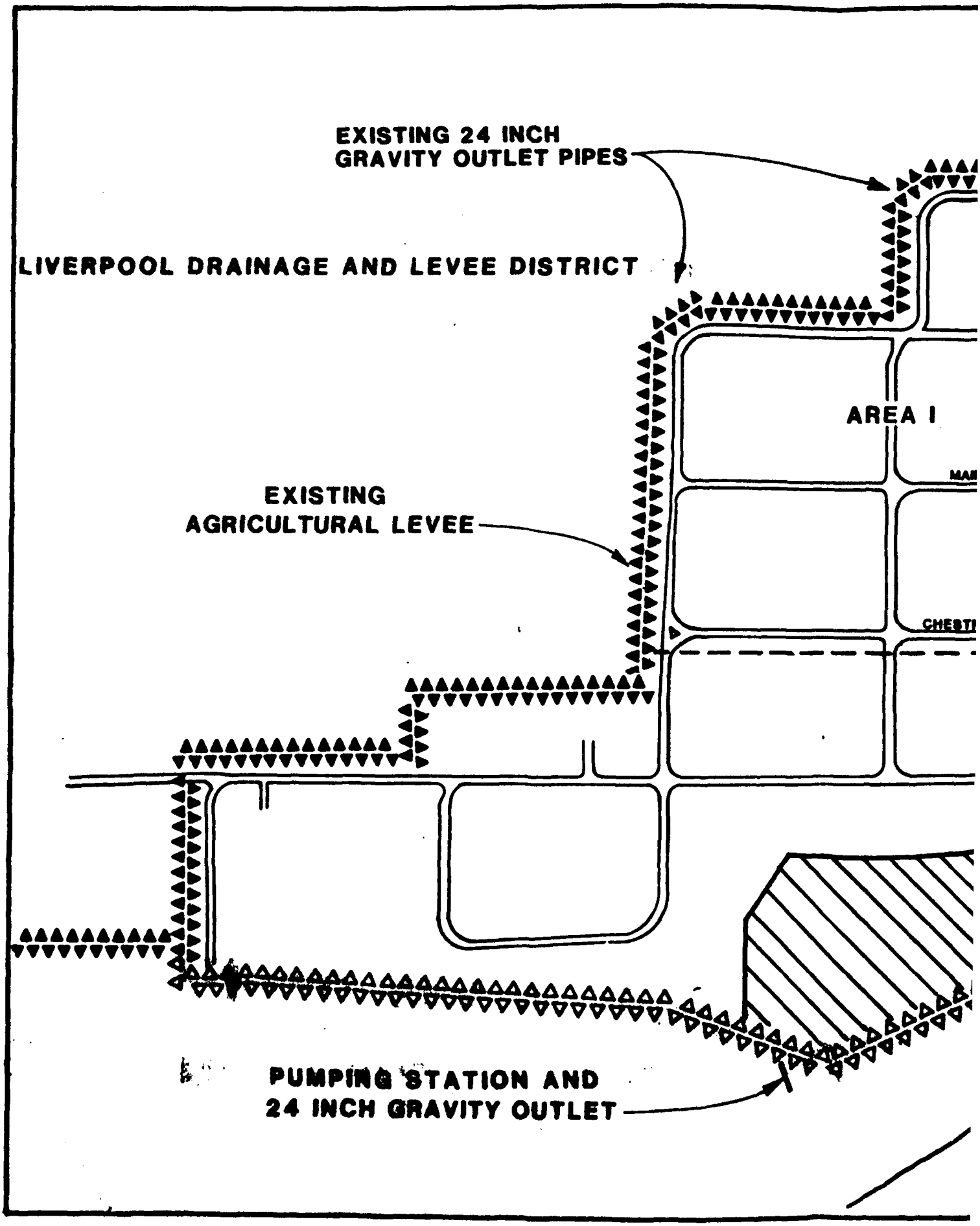
PLATE 1-4

ILLINOIS RIVER AT LIVERPOOL, ILLINOIS

FLOOD PROFILES

EXISTING CONDITIONS

PLATE A-5


EXISTING 24 INCH
GRAVITY OUTLET PIPES
LIVERPOOL DRAINAGE AND LEVEE DISTRICT
AREA I
EXISTING
AGRICULTURAL LEVEE
PUMPING STATION AND
24 INCH GRAVITY OUTLET

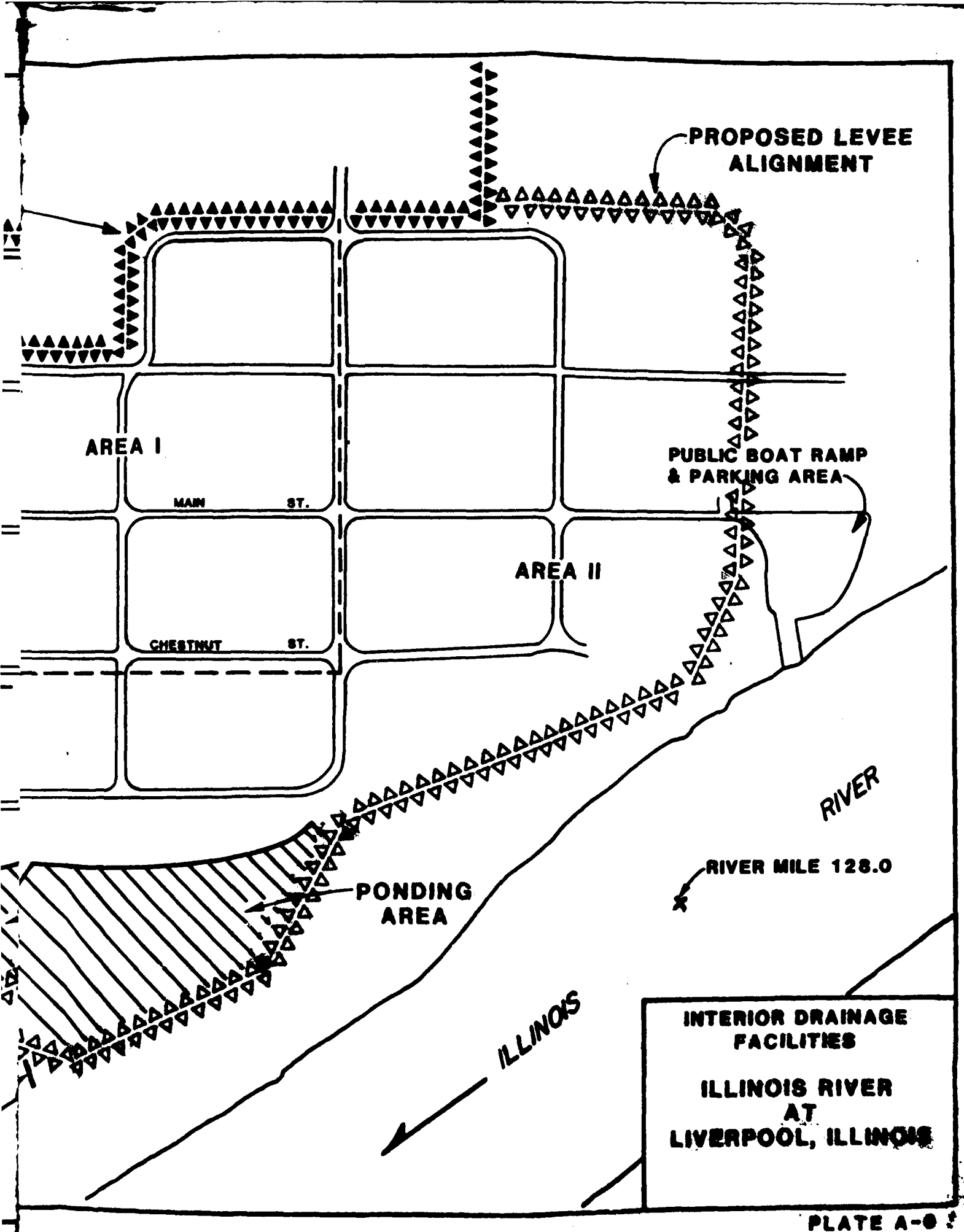
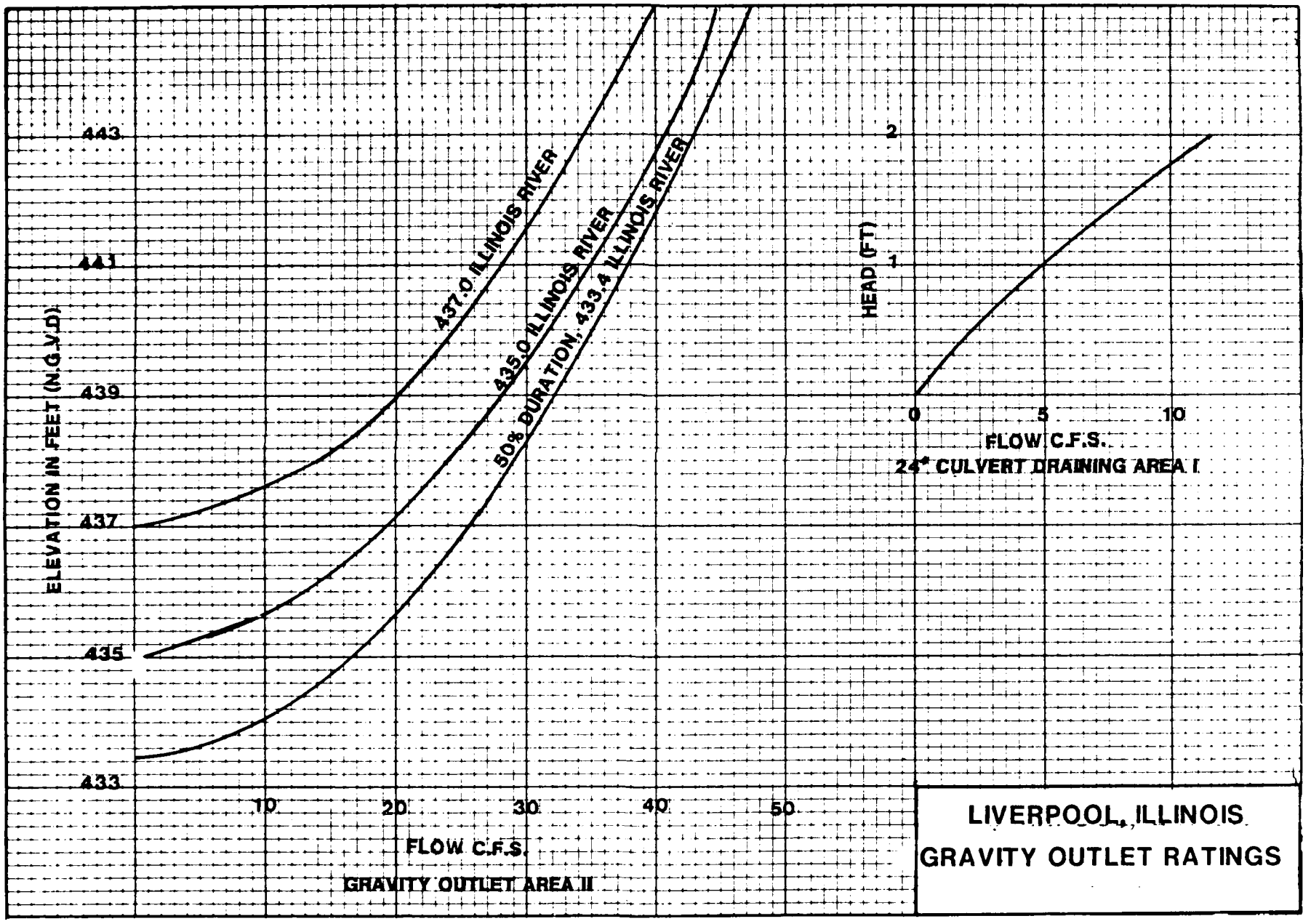
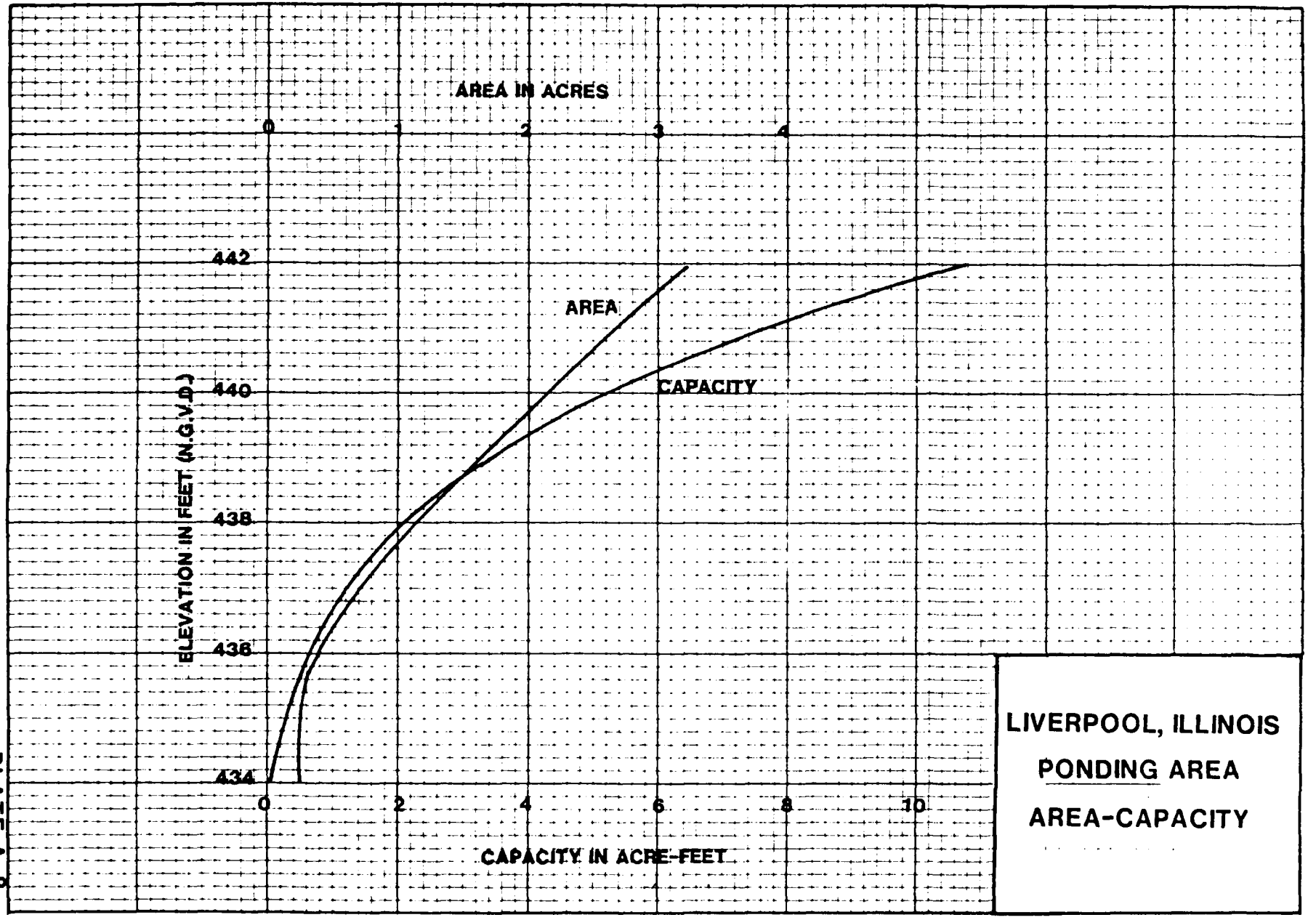

PROPOSED LEVEE ALIGNMENT
AREA I
MAIN ST.
PUBLIC BOAT RAMP & PARKING AREA
AREA II
CHESTNUT ST.
RIVER
RIVER MILE 128.0
PONDING AREA
ILLINOIS
INTERIOR DRAINAGE FACILITIES
ILLINOIS RIVER AT LIVERPOOL, ILLINOIS

PLATE A-8



LIVERPOOL, ILLINOIS
GRAVITY OUTLET RATINGS

PLATE A-7

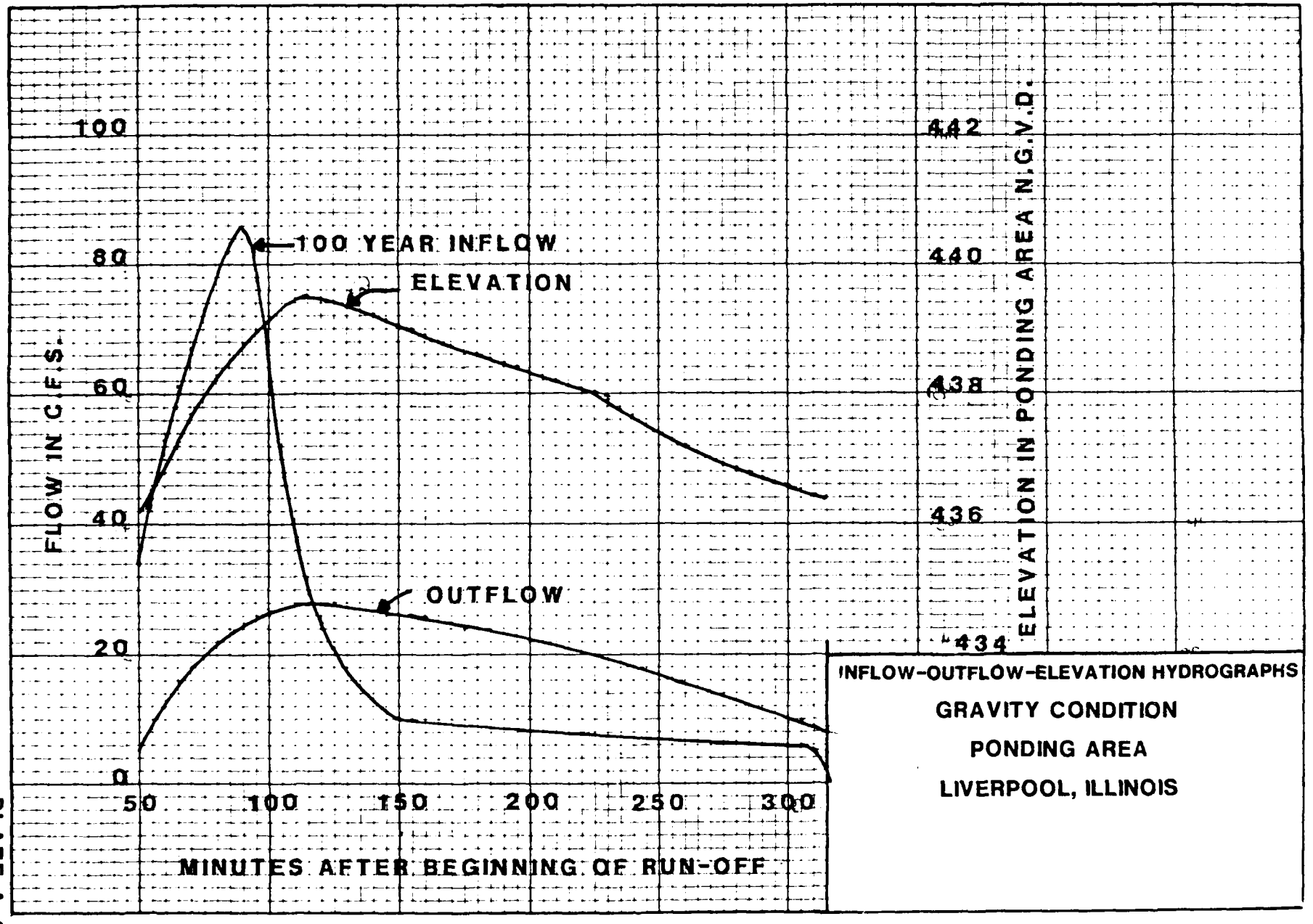


LIVERPOOL, ILLINOIS

PONDING AREA

AREA-CAPACITY

PLATE A-8



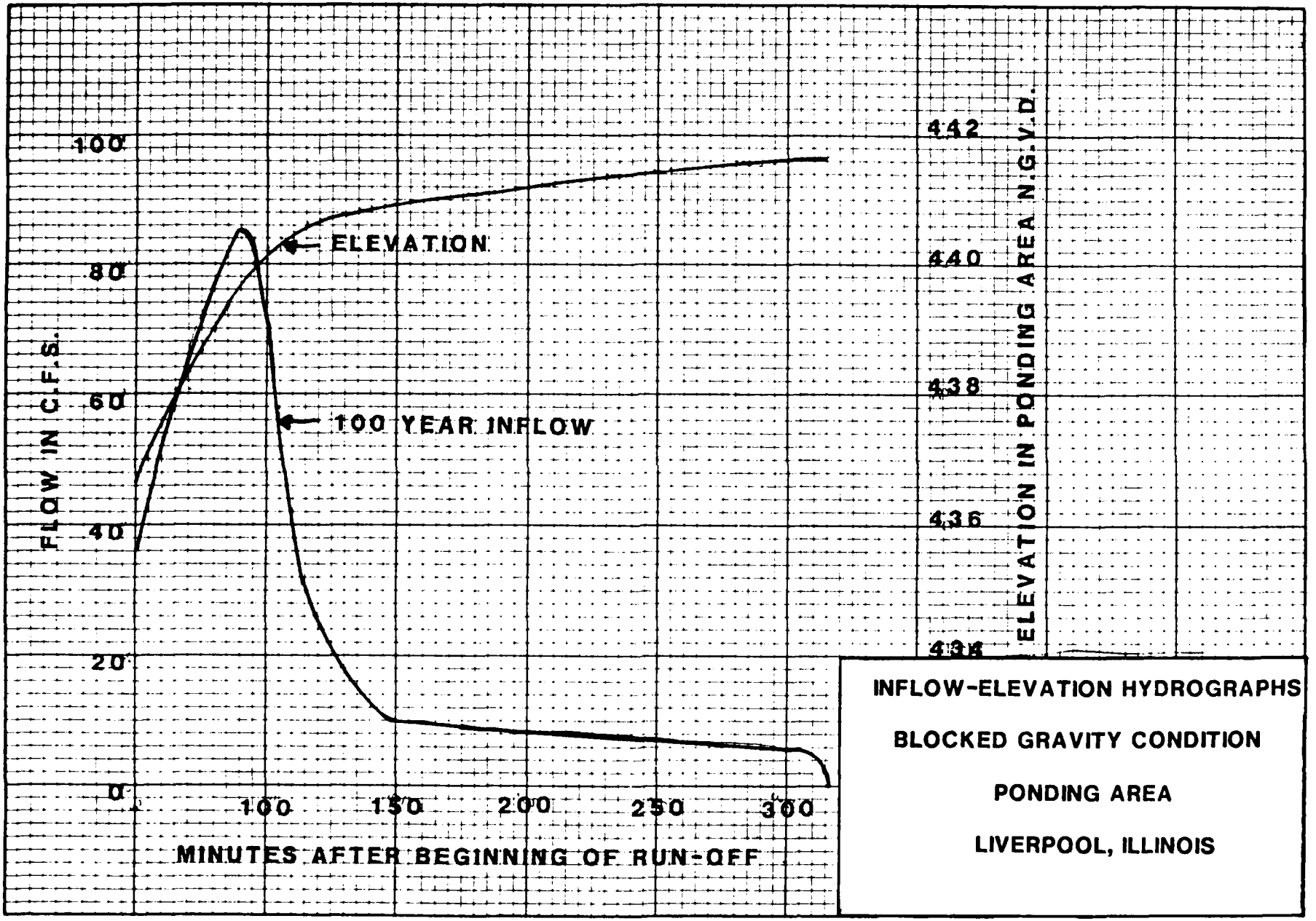
INFLOW-OUTFLOW-ELEVATION HYDROGRAPHS

GRAVITY CONDITION

PONDING AREA

LIVERPOOL, ILLINOIS

PLATE A-9



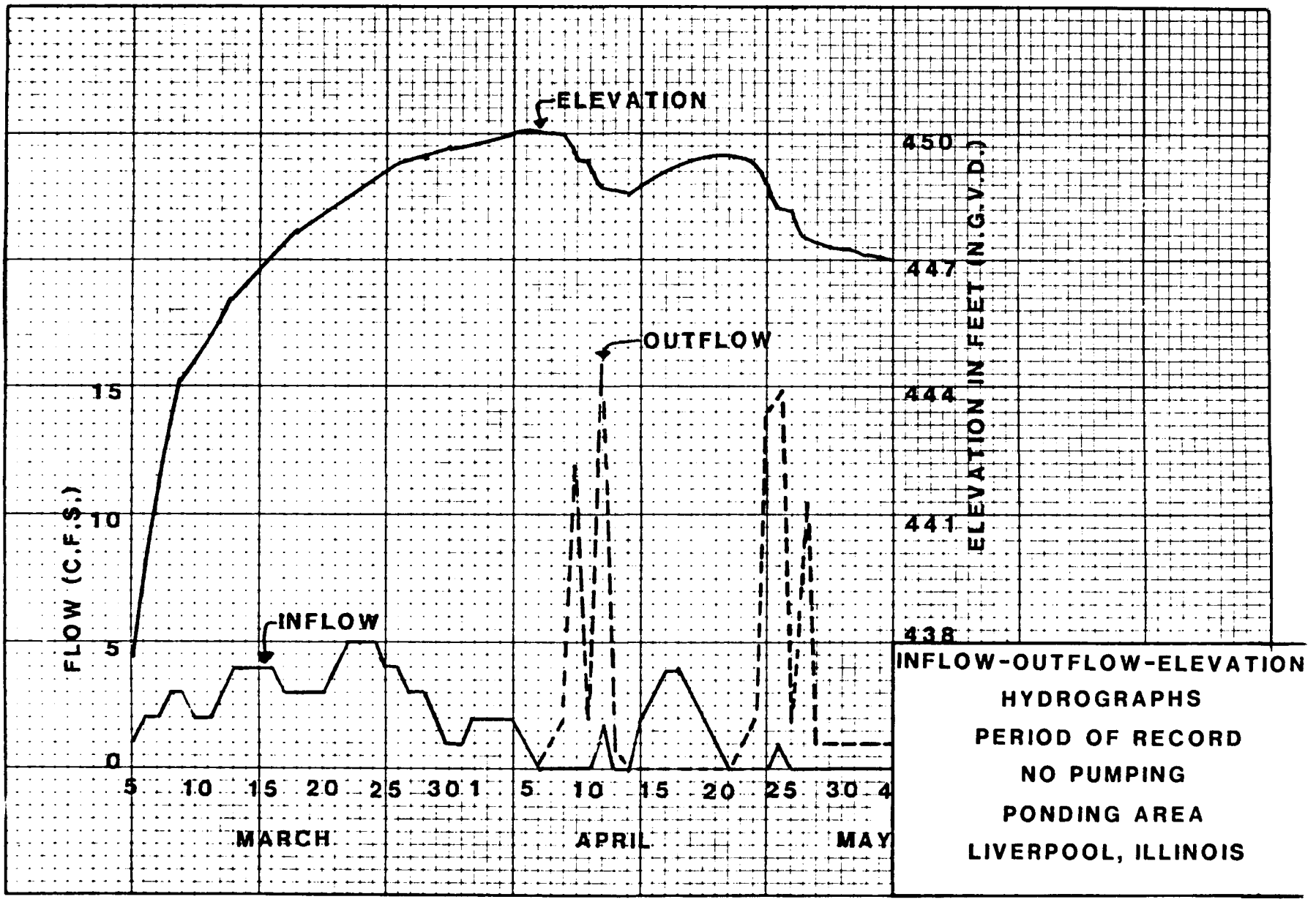
INFLOW-ELEVATION HYDROGRAPHS

BLOCKED GRAVITY CONDITION

PONDING AREA

LIVERPOOL, ILLINOIS

PLATE A-10



INFLOW-OUTFLOW-ELEVATION
HYDROGRAPHS
PERIOD OF RECORD
NO PUMPING
PONDING AREA
LIVERPOOL, ILLINOIS

PLATE A-11

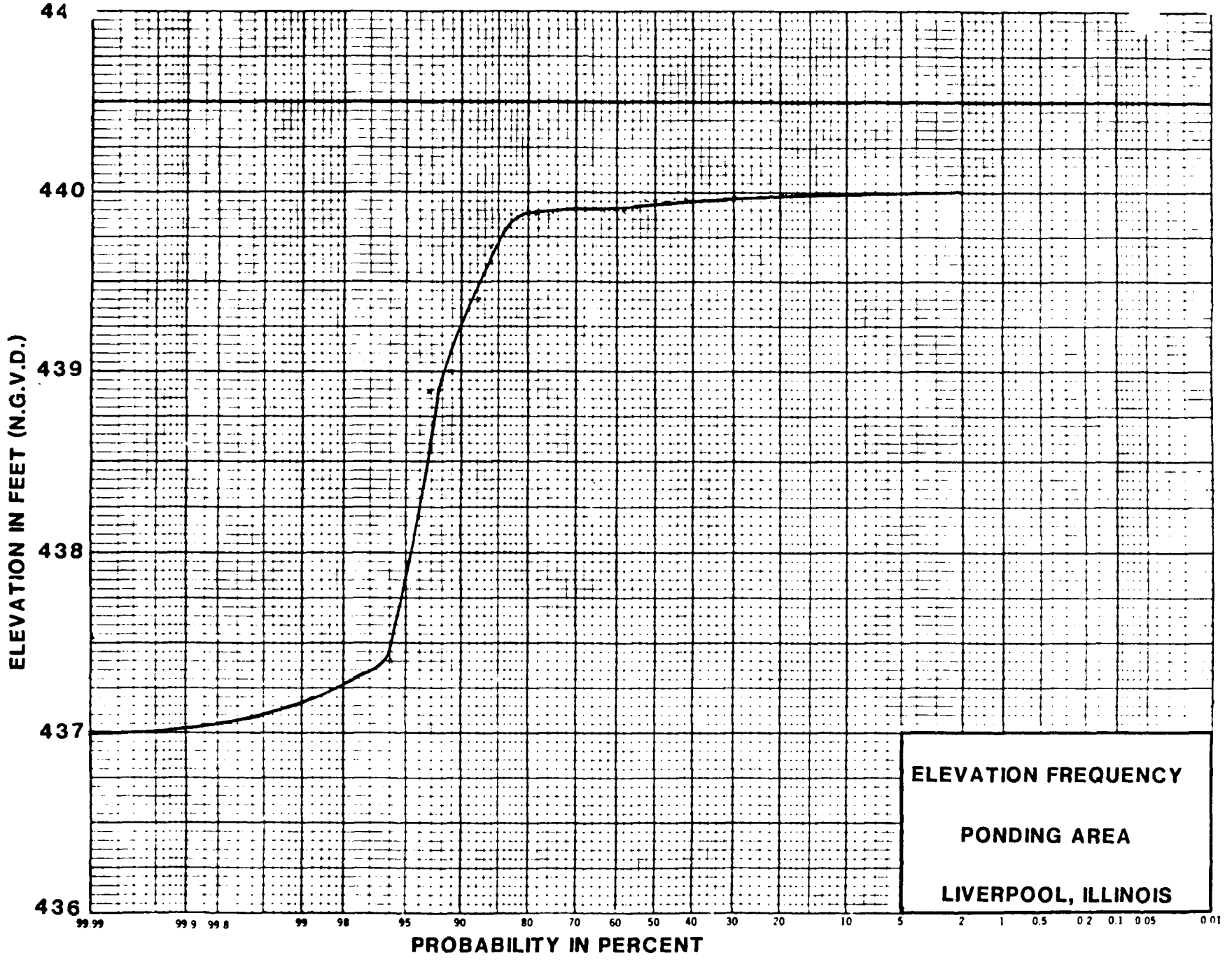

44
440
439
438
437
436
ELEVATION IN FEET (N.G.V.D.)
99.99
99.9
99.8
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
PROBABILITY IN PERCENT
ELEVATION FREQUENCY
PONDING AREA
LIVERPOOL, ILLINOIS

PLATE A-12

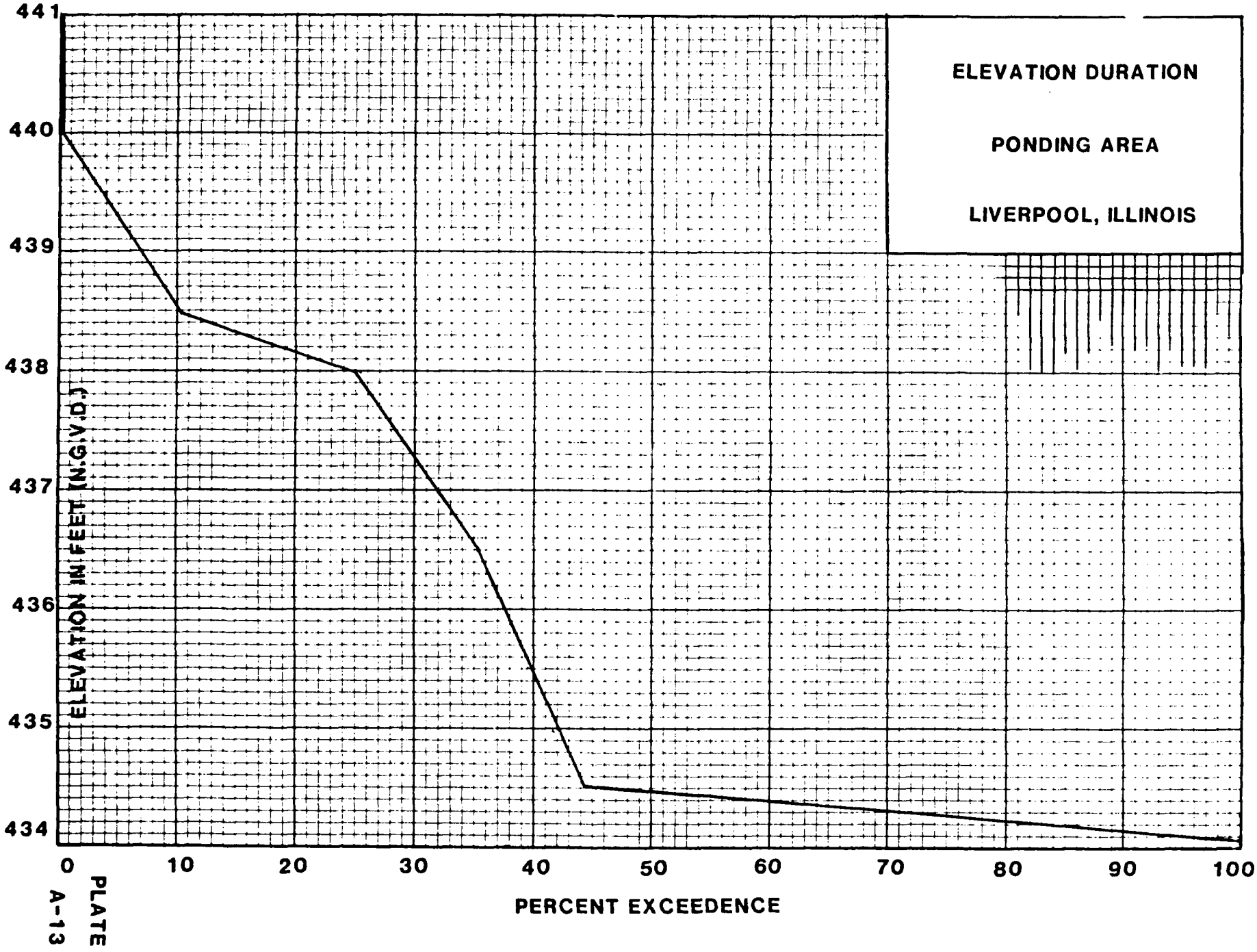

ELEVATION DURATION
PONDING AREA
LIVERPOOL, ILLINOIS
ELEVATION IN FEET (N.G.V.D.)
441
440
439
438
437
436
435
434
0
10
20
30
40
50
60
70
80
90
100
PERCENT EXCEEDENCE

PLATE A-13

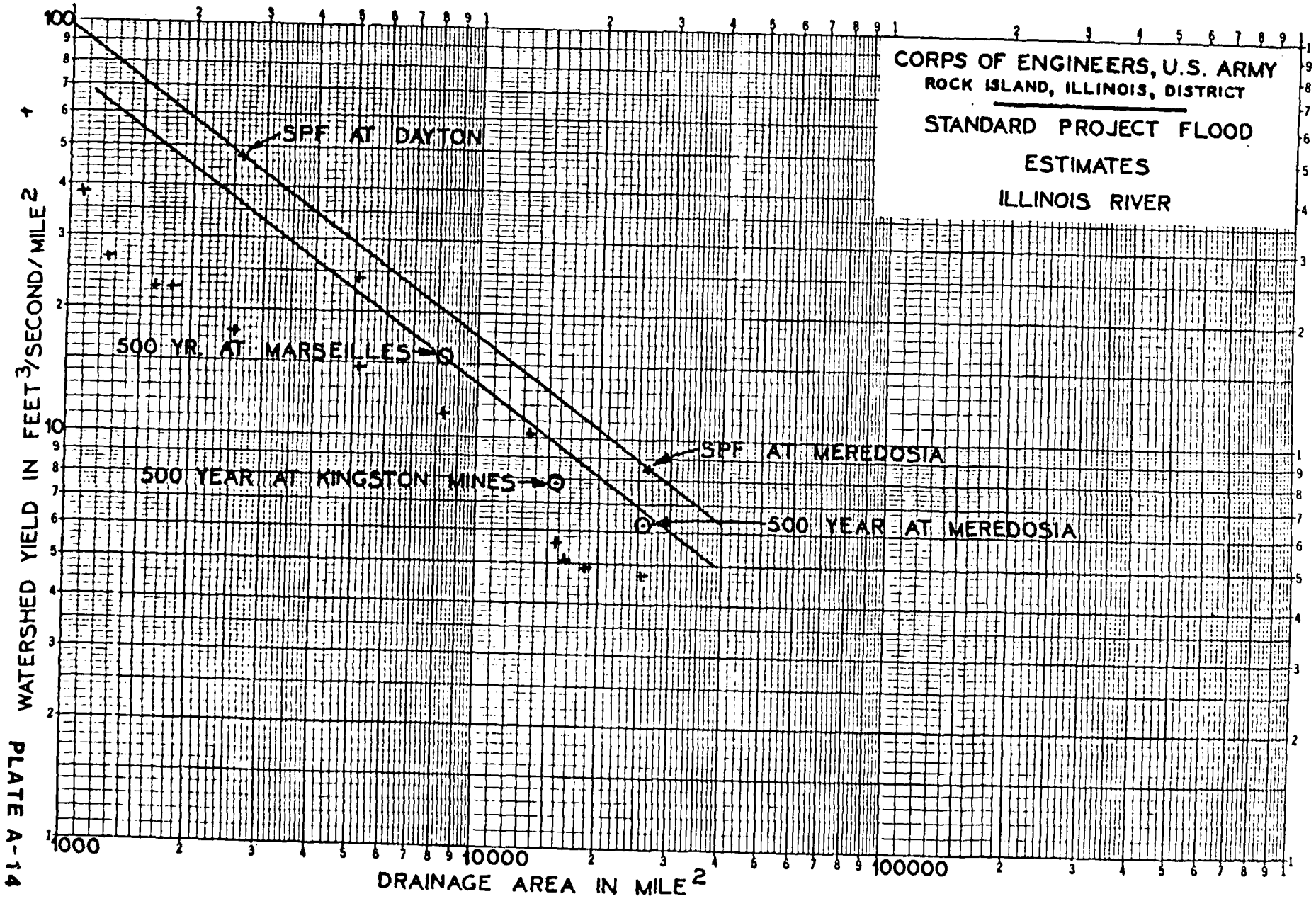

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ROCK ISLAND, ILLINOIS, DISTRICT
STANDARD PROJECT FLOOD
ESTIMATES
ILLINOIS RIVER
SPF AT DAYTON
500 YR. AT MARSEILLES
SPF AT MEREDOSIA
500 YEAR AT KINGSTON MINES
500 YEAR AT MEREDOSIA
WATERSHED YIELD IN FEET3/SECOND/MILE2
DRAINAGE AREA IN MILE2
1000
10000
100000

PLATE A-14

APPENDIX B

GEOTECHNICAL

DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX B
GEOTECHNICAL

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DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX B
GEOTECHNICAL

GEOLOGY AND SOILS

Liverpool, Illinois, a small community with a population of approximately 200, is located in Fulton County along the west bank of the Illinois River at river mile 128, about 30 miles downstream from Peoria, Illinois.

The geologic setting is within the Till Plains Section of the Central Lowlands Province of the Interior Plains. It is situated on the Galesburg Plain southwest of the Bloomington Moraine and northeast of the Quincy Hills. Liverpool lies on a remnant terrace just above the river floodplain.

Glacial and recent fluvial activity have contributed most to the topography as we see it today. Illinoian and Wisconsinan glaciers repeatedly moved over the area, eroding and lowering the surface of the sedimentary bedrock. The earlier Nebraskan and Kansan glaciers had already diverted many of the rivers to new positions. Below Peoria, the present Illinois River flows in the valley of the ancient Mississippi River. Although the area was covered by the Illinoian drift, later Wisconsinan outwash rivers eroded much of the older drift in the Illinois Valley. These floodwaters deepened and widened the Illinois Valley and scoured and cut an extensive surface upon which sands and gravels were again deposited by floodwaters to form glacial fluvial terraces such as at Liverpool. These terraces also have been noted at Hennepin, Henry, Peoria, Havana, and elsewhere and generally lie less than 15 feet above the modern floodplain.

The retreat of the glaciers does not mean the end of the cycle, however. Weathering processes, stream erosion, and deposition, along with many other geologic forces, are actively reshaping the land today. The bedrock valley of the Illinois River consists of dolomite, limestone, sandstone, and shale ranging in age from Ordovician through Pennsylvanian. Rock beneath the study area was found to be Pennsylvanian shale believed to be the Spoon Formation and is reported to be generally less than 50 feet thick. This bedrock was encountered at depths from 35 to 60 feet, depending on surface elevation, but at a

fairly constant elevation of about 393 feet NGVD. 1/ Some of the Spoon and younger Pennsylvanian strata have been mapped at the surface in the hills just northwest of Liverpool (plate B-1). These younger strata are classified as the Carbondale Formation and appear only as eroded remnants of shale, sandstone, clay, and thin beds of limestone and coal.

The unconsolidated materials that make up most of what we see both at the surface and down to rock are sediments of either recent (Holocene) erosion and stream activity or older Pleistocene materials.

Those Pleistocene deposits noted at the study area consist of either Illinoian or Wisconsinan glacial stage material. The oldest of these materials located within our study area consists of the Illinoian Stage till known as the Glasford Formation. It is primarily an unsorted calcareous, pebbly, silty clay and may contain beds of sand and gravel up to 40 feet thick. This unit is pretty much calcareous, except the uppermost 5 to 8 feet, which have been leached. Gravels within this unit are generally more iron stained and cemented than the younger Wisconsinan gravel. The Glasford Formation has been identified as the till forming the uplands just north of Liverpool (plate B-1).

The next youngest of the Pleistocene materials found near Liverpool are of the Wisconsin Stage. Within the Illinois Waterway, below Peoria, most of the sand, gravel, and floodplain alluvium in the lowlands and the loess on the bluffs and uplands are Wisconsinan.

The Henry Formation is the material that forms the sand terrace upon which the village of Liverpool is situated (plate B-1). This unit consists primarily of sand and gravel carried by glacial streams and deposited in the Illinois Valley. Deposits of the Henry Formation may have a capping of leached silt and soil 1 to 3 feet thick with the upper few inches of sand and gravel having also been leached. These sands are commonly pebbly and may contain fine, sandy gravels, but they are still coarser than the sands found in the higher terraces. Since most of these terraces are only 5 to 15 feet above the modern floodplain, they are subject to flooding, and floodplain silts may overlay these deposits.

Another Wisconsin Stage glacial deposit found in the bluffs north of Liverpool is the Equality Formation. This, too, is a remnant terrace deposit and generally lies 20 to 30 feet above the floodplain. This material consists primarily of slackwater lake deposits of sandy clayey silt and fine sand with interbedded silt (plate B-1).

1/ National Geodetic Vertical Datum of 1929.

While outwash deposits were being deposited from Wisconsinan glaciers, large volumes of windblown silt were carried from the Illinois Valley bottomlands and deposited on the highlands and bluffs. These widespread windblown silts are known as loess. The bluffs just north of Liverpool are comprised of a buff to tan, calcareous silt known as the Peoria Loess, with deposits ranging up to 50 feet thick in uneroded locations. In some places, the Peoria Loess may be underlain by a brown to pink silt known as the Roxana Silt which also is considered to be a loess. Holocene (recent) and some late Wisconsinan deposits have continued to form up to the present. Two of these formations are noted within the Liverpool area. The Cahokia Alluvium and the Peyton Colluvium form the outer floodplain around Liverpool and most of the Illinois Valley floodplain on the west side of the river, with the exception of the Henry Formation terrace at Liverpool cited earlier. The Cahokia is formed in the modern rivers and streams as clayey and sandy silt with lenses of silty sand and gravel. It is generally less than 40 feet thick in the Illinois Valley. Pieces of partially weathered Pennsylvanian sandstone and shale are commonly found within the alluvium, as evidenced by some of the borings taken during the project survey at Liverpool (plates 8 and 9 in the main report). The other Wisconsinan Holocene deposit is the Peyton Colluvium which is a slopewash deposit found at the foot of the bluffs just north of Liverpool and commonly found along the valley bluffs elsewhere. This material is composed of debris washed from materials in the hills above. Usually it is found to be clayey and pebbly silt with some bedrock fragments and drift materials. These colluvial fan deposits seldom reach 30 feet in thickness. Both the Peyton and Cahokia Formations are shown on plate B-1. The Liverpool morphology depicting the aforementioned formations is shown on plate B-2.

SUBSURFACE EXPLORATIONS

The exploration program was divided into three phases for the purpose of defining areas of generalized soil conditions as well as areas of specific concern for underseepage, slope stability, and settlement.

The phase 1 drilling program was determined during a walking site reconnaissance along the proposed levee alignment of the flood protection project. This inspection was conducted on November 20, 1984, by Geotechnical Branch personnel and served to uncover and document geotechnical features necessary to staking out drill holes. Six holes were layed out along the levee alignment and tied into nearby landmarks. In accordance with EM guidelines, various drilling depths were determined dependent on boring location. Holes designated as L-84-1 through -6 (shown on plates 8 and 9 in the main report) were extended to 10-, 20-, and 50-foot depths. Each boring extended through the impervious top stratum to a depth of at least 5 feet into the underlying pervious substratum. Spacing of the borings ranged from 200 to 1,000 feet.

The phase 2 drilling program was determined from evaluation of the phase 1 explorations. Holes designated L-85-7 through -12 (shown on plates 8 and 9 in the main report) were extended to 20- 30-, and 60-foot depths. These borings were spaced such that they fell between phase 1 explorations and provided an overall spacing of 500 feet between borings throughout the levee alignment. In addition, three available borrow areas also were explored at this time and will be discussed later in this report.

The phase 3 drilling program unexpectedly became twofold. First of all, the evaluation of phase 1 and phase 2 explorations indicated the existence of both a floodplain and a terrace top stratum. Secondly, a change in alignment at the upstream end of the project necessitated further concern for substratum evaluation. Holes designated L-86-14 and -15 (shown on plate 9 in the main report) were extended to 15- and 20-foot depths to complete alignment evaluation, whereas holes designated L-86-13 and -16 shown on plate 8 in the main report also were extended to 15- to 20-foot depths to establish existence of terrace top stratum.

Location of the drill holes are shown on plate 3 in the main report, and logs of borings are displayed on plates 8 and 9 in the main report. A geologic profile on plate B-3 depicts the drill borings along the proposed levee alignment. The soil was penetrated by means of a rotary drill rig; 5-inch hollow stem and 4-inch Iwan augers were used to extend the holes. Standard split spoon and auger sampling methods were employed to obtain jar samples at 2-, 2.5-, and 5-foot intervals. Standard "N" penetration (blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split spoon) were taken at interval depths shown on the boring logs (plates 8 and 9).

SOIL TESTS

Laboratory soil testing was performed by the Rock Island District Geotechnical Branch laboratory. Standard 2-inch split spoon penetration blow counts were recorded in the impervious (floodplain and terrace) top stratum, pervious substratum, and bedrock. Pocket penetrometer tests were performed in the field on both the Henry sand terrace top stratum and the existing impervious agricultural levee. Visual classifications were performed on each soil sample. The natural moisture content was determined on all impervious soils and the bedrock. Seven Atterberg limit tests were run on representative samples of the Cahokia alluvium floodplain and the Henry sand terrace impervious top stratum soils, along with soils of the existing impervious agricultural levee. Results of these tests are shown on the plasticity chart on plate B-4. Twenty-seven (27) gradation tests were performed using representative samples of the pervious substratum. Three minus No. 200 sieve wash tests were run on the Henry sand terrace top stratum. Effective grain size (D_{10}) and/or percent passing the No. 200 sieve were determined for each

gradation and wash test. Gradation curves are shown on plates B-5 through B-15. The D_{10} grain size, natural moisture content, pocket penetrometer, standard split spoon penetration blow counts, Atterberg limits, minus No. 200 sieve wash, and visual classifications are shown on logs of borings, plates 8 and 9 in the main report.

PROPOSED EMBANKMENTS

Existing levees along the levee alignment are nonexistent. However, agricultural levees in this area do exist and provide flood protection upstream, downstream, and behind (landward) of the project alignment. The existing agricultural levees are composed of adjacent area top stratum soils and were undoubtedly constructed by either or both uncompacted and semi-compacted methods. Pocket penetrometer tests indicated adequate embankment shear strength. Onsite inspection reveals embankment stability. These levees will junction with the proposed new embankments.

The new embankment will entail one type of levee design. Impervious clay and clayey sand either will be trucked in or hauled in by scrapers and placed. The material will come from a floodplain borrow area located only 1,000 feet downstream of the project site on the west bank of the Illinois River. The levees will be constructed by semi-compacted means to accommodate any less than optimum borrow soils. The slopes will be constructed of 1V on 3H riverside and 1V on 3H landside for the new embankment sections to accommodate urban space limitations and to provide stability to the structure. The crown of the levee will have a minimum width of 10 feet to accommodate normal maintenance and emergency floodfighting operations with modern earthmoving equipment. Typical levee sections are shown on plates B-16 through B-22. Inspection trench details for the proposed levee design are shown on plate 4 in the main report. Locations and logs of borrow borings are shown on plates 7 and 9, respectively, in the main report.

In general, new levee embankments will attain heights from 3.5 to 17.5 feet along the proposed alignment for the 50-year level of protection. Between stations 7+50 to 12+50, 27+50 to 30+50, and 42+50 to 44+00, depressions, ditches and sloughs landward of all levee embankments will be filled with sand to natural ground surface 100 feet beyond the levee toe. A levee grade elevation of 455.5 feet NGVD will offer protection from the 50-year flood. This level includes a freeboard allowance of 3.4 feet on both the upper and lower end necessary for urban levees.

The new embankments will be constructed entirely of acceptable impervious fill materials from the borrow area classified as SC, CL, and CL-CH. These soil types will be required to have not less than 35 percent by weight passing the No. 22 sieve. The construction plan is to monitor and control in-place moisture content of the embankment soils by on-site inspection. A deviation of no less than 2 percent nor more than

4 percent from the optimum moisture content is selected and desired for the impervious fill to establish conditioning limits of the borrow soils. Soil conditioning will be necessary to achieve the desired results since the average moisture content of the soils varies from 4 percent dry to 8.5 percent wet of optimum moisture content. Compaction curves of the available borrow are shown on plate B-23. The moisture control evaluation summary revealing allowable deviation from optimum moisture content for each soil type is shown on plate B-24. Should a mixing operation of the borrow soils be employed during construction, the deviation is anticipated to change (decrease) on the wet side of optimum by as much as 1 percent.

Maximum fill density will be controlled by uncompacted lift thickness (9 inches with tamper-type roller, and 12 inches with rubber-tired roller), and a number of complete passes using standard compaction equipment (4 to 6 passes with tamper-type roller, and 2 to 4 passes with rubber-tired roller). A minimum of 95 percent of maximum density is desired for impervious fill to establish control of the rolling operation.

Prior to completion of construction drawings and specifications for this project, it should be determined if the Government Construction Division quality assurance inspection force will be adequate to ensure a quality embankment under this construction plan. If not, it would be favorable to employ both moisture deviation and density requirements into the specifications to provide the Government a firm handle to control quality construction with a limited inspection force.

FOUNDATIONS FOR EMBANKMENTS

The entire foundation beneath the new levee embankments will be cleared, grubbed, and stripped to remove unsuitable matter. In addition, existing agricultural levee slopes shall be treated in the same manner, if necessary, when tied into the new levees. Exploration trenches will be necessary throughout the project. Exploration trenches in new levee areas will be 8 feet wide to accommodate modern construction equipment. For embankment heights greater than 6 feet, the trenches will be extended to a minimum depth of 6 feet to unveil any significant underground features such as pipes or unsuitable materials. For embankment heights less than 6 feet, the trenches will extend to a minimum depth equal to the embankment height. Side slopes for the trenches will be 1V on 1H. The trenches will be backfilled with impervious fill by regular compaction equipment to semi-compacted standards. The trenches will be located at the centerline of the proposed embankment. Details and locations of the trenches are shown on plate 4 in the main report. The purpose of the trenches will be to disclose any unsuitable materials that would encourage serious shallow seepage during high water. Removal of any soft foundation material does not appear evident throughout the alignment.

Boring logs indicate that the natural top stratum is composed of both impervious Cahokia alluvium (SC, CL and CH soils) and Henry terrace (SC and CL soils). The Cahokia extends some 7 to 20 feet beneath the natural ground surface, whereas the Henry extends some 3 to 9 feet. At levee stations 7+50 to 27+50 and 30+50 to 32+50, the natural top stratum beneath the new levee embankments is the Cahokia alluvium. The remaining embankments are underlain by the Henry terrace. Moisture contents of the Cahokia alluvium top stratum range from 6 to 14 percent for SC soils, 9 to 34 percent for CL soils, 26 to 33 percent for CL-CH soils, and 17 to 42 percent for CH soils. Moisture contents of the Henry terrace top stratum range from 4 to 12 percent for SC soils and 15 to 20 percent for CL soils. Existing agricultural embankment soils indicate a range in moisture contents of from 12 to 24 percent for CL soils. Atterberg limits tests indicate that no exceptionally weak soils were encountered, except between elevations 420 to 424 in boring L-85-10 at station 26+75. Standard penetration tests for Cahokia alluvium range from 5 to 17 for SC soils, indicating a stiff consistency; 2 to 44 for CL soils, indicating a soft to hard consistency; and 4 to 20 for CH soils, indicating a medium (firm) to stiff consistency. Standard penetration tests for Henry terrace range from 4 to 29 for SC soils, indicating medium (firm) to very stiff consistency; and 5 to 12 for CL soils, indicating medium (firm) to stiff consistency.

Undisturbed shear strength correlation curves for cohesive soils were developed from unconsolidated-undrained quick triaxial and unconfined compression tests supplied by the Rock Island District for Mississippi River alluvial soils. Cohesive shear strength versus water content plots are shown individually on plates B-25 through B-27 for CL, CL-CH, and CH soils, respectively. A summary plot of these soils is shown on plate B-28. For Cahokia alluvium soils, the in situ indicated strengths are as follows: The CL soils curve indicates a range in cohesion from 350 to more than 1,000 pounds per square foot (psf) with moisture contents varying from 9 to 34 percent. The CL-CH soils curve indicates a range in cohesion from 500 to more than 1,800 psf with moisture contents varying from 26 to 33 percent. The CH soils curve indicates a range in cohesion from 500 to more than 1,000 psf with moisture contents varying from 17 to 42 percent. For Henry terrace soils, the in situ indicated strengths are as follows: The CL soil curve indicates a range in cohesion from 600 to 800 psf with moisture contents varying from 15 to 20 percent.

The pervious substratum consists of SP soils and was penetrated from 5 to 55 feet below the Cahokia and Henry top strata. The upper portion of the pervious substratum is alluvial sand up to 10 feet in thickness. The lower portion is glacial outwash sand with a maximum depth of 45 feet. Gradation tests revealed that the effective grain size (D10) of the SP soils ranges from 0.17 to 0.25 mm for the alluvial sand, and 0.19 to 0.40 mm for the glacial outwash sand. The coefficient of permeability (kh) ranges from 0.07 to 0.15 cm/sec for alluvial sand, and 0.09 to 0.30 cm/sec for the glacial outwash sands. Standard penetration tests for the upper alluvial zone ranged from 4 to 22, and indicate a

loose to medium dense relative density. The lower glacial outwash zone had a standard penetration range of from 5 to 105, which indicates a loose to very dense consistency. Logs of borings, plates 8 and 9 in the main report, show these values.

Bedrock encountered at elevations 393 and 394 was penetrated sufficiently to obtain a standard split spoon sample. A standard penetration test of 100 and greater indicates that the shale is extremely hard.

FOUNDATION FOR OTHER STRUCTURES

Unsuitable foundation materials were not encountered during drilling operations. However, precautions will be taken during construction of the new 24-inch gravity outlet and gatewell through the levee at station 15+30 to replace any undesirable material with appropriate fill. The replacement materials will be placed and compacted to obtain a density equal to the adjacent undisturbed foundation.

SLOPE STABILITY

A review of all levee sections reveals that the maximum levee heights range from 3.5 to 17.5 feet. Levee sections at stations 10, 21, and 27 were selected to be the most critical with respect to both landside and riverside slope stability. The selections were based on both embankment height, steepness of slopes, and/or thickness and consistency of the clay foundation. Typical sections of these reaches are shown on plates B-17 and B-18.

The "least critical" of the three is represented by station 10, revealing the new semi-compacted impervious fill 16.5-foot-high embankment with 1V on 3H riverside and landside slopes. The new embankment overlies 9 feet of Cahokia alluvium. The alluvium is made up of 5 feet of fat clay overlying 4 feet of sandy lean clay. Indicated *in situ* shear strengths range from 620 to 730 psf for the fat clay and 580 to 800 psf for the sandy lean clay; 650 psf was selected as the average for each soil.

The "second most critical" section of which to conduct stability studies is represented by station 27, revealing a new 17.5-foot high semi-compacted impervious fill embankment with 1V on 3H riverside and landside slopes. The new embankment overlies 18 feet of Cahokia alluvium. The alluvium is made up of 14 feet of fat clay overlying 4 feet of silty lean clay with layers of sand. Indicated *in situ* shear strengths range from 800 to greater than 1,000 psf for the fat clay and 360 psf for the silty lean clay. The average for each soil was selected as 1,000 psf for the fat clay and 350 psf for the silty lean clay.

Of the three most critical sections, station 21 was selected as the "most critical" of which to conduct stability studies to ensure that minimum factors of safety are satisfied. This section is represented by a new semi-compacted impervious fill 17.5-foot high embankment with 1V on 3H riverside and landside slopes. The new embankment overlies 8 feet of Cahokia alluvium which is made up of 5 feet of fat clay overlying 3 feet of sandy lean clay. Indicated in situ shear strengths range from 490 to 520 psf for the fat clay and 600 psf for the sandy lean clay. The average for each soil was selected as 500 psf for the fat clay and 600 psf for the sandy lean clay.

Examination of moisture content and standard penetration tests revealed that the impervious alluvium top stratum in this area was consistently the softest of the three stations examined. In situ foundation soil shear strengths determined for the aforementioned sections are from undisturbed shear strength data from unconsolidated undrained (quick strain) triaxial and unconfined compression tests of alluvial soils. Correlation curves are shown for CL, CL-CH, and CH soils on plates B-25 through B-27, respectively, and together for comparison purposes on plate B-28. Usual conservative values were selected for the strength of the new embankments. Assumptions made regarding unit weights and shear strengths of both embankment and foundation for stations 21 and 27 are given on stability plates B-29 and B-33. Stability analyses were run in accordance with procedures in Engineer Manual 1110-2-1902, "Stability of Earth and Rock-Fill Dams," dated April 1970.

The purpose of the analyses is to examine factors of safety for various embankment conditions to ensure compliance with maximum safety standards. The circular arc analysis was determined to be the best suited method of analyzing the embankment stability. The end of construction condition riverside was selected as the most applicable case to study since it is anticipated that soils generally will be placed at water contents wetter than optimum. In the circular arc analyses, it was assumed that the elevation of the potential sliding surface would be tangent at the contact of the impervious top stratum overlying the pervious foundation. In all analyses, the side earth force direction was assumed to be equal to the average of the embankment slopes immediately adjacent to the slice interface, and a search routine was utilized to find the critical failure surface having the minimum factor of safety. The number of trial circles tried for each study condition before the minimum was determined are found on plates B-31, B-35, and B-39. A summary of the individual stability analyses and input data corresponding to computer force printout of the critical failure surfaces is shown on plates B-29 through B-40. The stability plates were plotted using Harris computer programs. Each analysis is discussed in detail in the following paragraphs, with the end result that stability berms are not required for the proposed levees.

For the end of construction condition of the riverside slope at station 21, the "most critical" section selected, a Q shear strength of 1,000 psf cohesion and no frictional angle was assumed for the new semi-compacted impervious fill embankment. The Q shear strength of the impervious Cahokia alluvium top stratum foundation was assumed to be 500 (CH soil) and 600 (CL coil) psf cohesion and no frictional angle. Ground water surface was determined from the drill boring to be at elevation 429. Results of the analyses reveal the minimum factor of safety to be 2.39, with zero seismic force for the 1V on 3H riverside slope. This factor of safety (2.39) exceeds the required minimum (1.3). The analyses are shown on plate B-29. Configuration, soil constants, and piezometric surface input data are shown on plate B-30. Trial search and selected minimum factors of safety are shown on plate B-31. Tabulation of slice data for the critical arc is shown on plate B-32.

For the end of construction condition of the riverside slope at station 27, the "second most critical" section selected, a Q shear strength of 1,000 psf cohesion and no frictional angle was assumed for the new semi-compacted impervious fill embankment. Ground water surface was determined from the drill boring to be at elevation 421. Results of the analyses reveal the minimum factor of safety to be 2.58 with zero seismic force. Again, this factor of safety (2.58) exceeds the required minimum (1.3). The analyses are shown on plate B-33. Backup input/output data, as discussed previously, are shown on plates B-34 through B-36. In conjunction with this study, a series of circles was run assuming that the potential sliding surface would be at the CH and CL soil contact. Results indicate the factor of safety to be 3.38. The analyses are shown on plate B-37. Backup input/output data are shown on plates B-38 through B-40.

SETTLEMENT AND CONSOLIDATION

Of the some 4,400 lineal feet of proposed new levee embankment, station 27 was selected for settlement study. At this location, the improved 15.5-foot-high levee will impose a maximum load of about 1.0 tons per square foot on the 19-foot-thick Cahokia alluvial clay top stratum foundation. Boring L-85-10 indicates CH and CL soils relatively moist in nature, with a soft to very stiff consistency. A settlement analysis conforming to Joseph E. Bowles' "Foundation Analysis and Design," 3rd edition, 1982, formula 2.35, indicates total settlement to be on the order of 13 inches, as shown on plate B-41. In order to anticipate the unexpected, a shrinkage allowance of 7 percent of the levee height will be provided in the specifications to allow for any consolidation of the embankment and settlement in the foundation. Although no excavation of existing top stratum soils is necessary, any alluvial clays encountered during construction that are softer than encountered during the exploration program will be removed to prevent unwanted settlement.

THROUGH SEEPAGE

Through seepage will not be a factor for new levees constructed with semi-compacted impervious fill. New levees are expected to be composed of clayey sand, lean clay, and medium clay in mixed form.

UNDERSEEPAGE

Underseepage control measures for the Liverpool, Illinois, project are based on a study of thickness and permeability, characteristics of the impervious top stratum and the pervious substratum, in addition to the extent of the riverward and landward top strata. Since underseepage is anticipated in the study area, control measures in the form of seepage berms will be provided, if necessary, to provide ample underseepage protection against uplift and piping. The seepage berms will be free draining (less than 5 percent passing the No. 200 sieve).

The underseepage and berm analysis used follows the criteria in "Relief Well Design," Civil Works Engineer Bulletin 55-11, dated June 28, 1955; Waterways Experiment Station publication Technical Memorandum 3-424, "Investigation of Underseepage and Its Control, Lower Mississippi River Levees," dated October 1956; and criteria contained in Engineer Manual 1110-2-1913, "Design and Construction of Levees," 1978. A report on "Conference on Underseepage for Agricultural Levees," NCRGT letter to OCE, Rock Island District, dated October 11, 1960, and "Tentative Criteria for Use of Underseepage Control Measures on Agricultural Levees," Office, Chief of Engineers, dated June 3, 1958, established empirical limitations on such items as maximum length of berms and permeability ratios. A further modification of this criteria resulted from the "Minutes of Geotechnical Conference" held at Rock Island District on April 29-30, 1976. The methodology of the underseepage and berm analysis is the result of continuing documentation of performance of existing levees during high water periods in 1965 through 1975 from Dubuque, Iowa, to Hamburg, Illinois, by personnel of the Geotechnical Branch. This documentation has been supplemented by continued observations during high river periods through 1986. This documentation includes periods when the river rose to the top of the existing levees while the levee performed satisfactorily with respect to underseepage and through-seepage. Methodology was further established in "Supplement No. 1 to Design Memorandum No. 1 for Fulton, Illinois, Local Flood Protection Project, Draft," December 1976.

Design values used in determining the need for and designing of seepage berms for levees are given on the Summary of Underseepage and Berm Analysis (plate B-42). Transformed depth and permeability of the pervious substratum at stations 4+50 and 32+00 are shown on plate B-43. A plot of effective grain size (D_{10}) versus coefficient of permeability

(k_h) used in the transformation of pervious stratum is shown on plate B-44. Vertical blanket permeability ratios were selected in accordance with the April 1976 conference. The factor of safety was computed from equation 9 on page 3 of Civil Works Engineering Bulletin 55-11. If a berm were considered, the thickness was computed for a factor of safety equal to 1.50 at the levee toe in accordance with the appropriate equation shown in Figure C-1 of EM 1110-2-1913. Reaches considered for berms are reflected by hold down factor of safety against uplift at the landside toe of levee, assumption that the sand berm will not increase the head at the landside toe, and the computed thickness. Any reaches found necessary to have berms will construct the berm to a length in accordance with criteria developed in Rock Island District for sand levees with sand berms at the April 1976 conference.

Results of the underseepage analysis are shown on plate B-42. The terminology reflecting the methodology established during the April 29-30, 1976, Geotechnical Conference are shown on plates B-45 through B-48. Typical sections for each levee reach are shown on plates B-16 through B-22. These sections show the subsurface profile developed from the pertinent borings.

A discussion of significant parameters for each specific reach of levee is not deemed necessary, since the data shown on the Summary of Underseepage and Berm Analysis (plate B-42) in conjunction with the Typical Sections (plates B-16 through B-22), and the Terminology of Methodology (plates B-45 through B-48) are generally self-explanatory. Due to the unique morphology of Liverpool (plate B-2), underseepage results were found to be dependent on not only natural blanket length riverward and landward, but, more importantly, on whether the structure was founded atop the Cahokia alluvium or the Henry terrace top strata. Since a connection of the two impervious top strata is not apparent, entrance and exit point selections were of utmost importance. Clarification of the underseepage and berm analysis results are discussed in the "remarks" on plate B-42.

The proposed ponding area is located within the protected zone in the low-lying area from station 12+50 to 22+50. A 24-inch gravity outlet and gatewell is located at station 15+30. No excavation will be necessary, as natural drainage contours will define the limits of the ponding area. The impervious top stratum at this location is interpolated to be greater than 8 feet in thickness and will remain in place.

The amount of underseepage into the ponding area was conservatively assumed to be equal to the entire flow under the levees. The seepage beneath the levees was computed using a flood stage equal to the design levee grade and the estimated values of D, kf, Ls and Le for various reaches of levee. The seepage flow (Q) per unit length of levee was computed. Results of the study are shown on plate B-49. From the quantities indicated, it appears that temporary pumping with a 15,000 gallon-per-minute capacity pump will adequately control the ponding elevation for infiltrating underseepage.

SLOPE PROTECTION

In the reach from stations 0 to 15 and 32 to 44, populated timber growth is evident along the west (right) bank of the Illinois River and riverward of the proposed levee alignment. In addition, populated timber growth is abundant east of the left bank of the Illinois River on Liverpool Lake Island. This island extends both upriver and downriver of the project area and serves as a wind protection barrier between Lake Chautauqua (immediately to the east) and the Illinois River. This protection barrier is of utmost concern to the project. Without it, the mergence of the Illinois River and Lake Chautauqua during high river overbank flooding and the potential 90-day flood duration will develop a fetch at Liverpool of up to 2 miles. Wind studies have determined a 3.5-foot wave would be generated requiring that 18 inches of 400-pound top size stone riprap would be necessary for protection from stations 15 to 32.

For this project, 18 inches of riprap and 6 inches of bedding stone will be placed to full levee height from stations 29 to 33 to protect against embankment erosion by velocity, whereas grass protection will be provided elsewhere throughout.

AVAILABILITY OF CONSTRUCTION MATERIALS

Impervious borrow material for the semi-compacted levee sections was explored at three sites adjacent to the project. Compaction curves of the encountered soils were run to determine conditioning limitations of each soil type.

Tampico Mounds Bluff, designated as borrow site 3 and located 2.5 miles by road from the project site, was explored in September 1985. Two drill borings not shown in this report indicated the presence of impervious CL and ML-CL soils. Classification and standard proctor testing shown on plate B-23 indicate the borrow material to be dry of optimum (plate B-24). This material, however, is not recommended for use due to the necessity for extremely tight conditioning control to achieve desirable maximum density.

Buckheart Creek, designated as borrow site 1 and located adjacent to the project site, was explored in September 1985. Three drill borings not shown in this report indicated the presence of impervious CL, CL-CH, and CH soils. Classification and standard proctor testing shown on plate B-23 indicate the borrow material to be wet of optimum (plate B-24). Although this soil would require conditioning (drying back) and is considered suitable borrow, this site is not recommended because of environmental concern in removal of dense timber.

Illinois River Downstream, designated as borrow site 2 and located 1,000 feet downstream of the project site (plate 7 in the main report), was explored in September 1985. Three drill borings shown on plate 9 in the main report indicated the presence of SC, CL, and CL-CH soils. Classification and standard proctor testing shown on plate B-23 indicate the borrow material to be both wet and dry of optimum (plate B-24). However, conditioning of this borrow material may be minimal with mixing of the soils prior to placement to achieve maximum density during placement. Although archeological findings somewhat limit the extent of this borrow area, this site was selected for use at this project.

Sand borrow, necessary for depression fill and pervious free-draining underseepage berms, can be obtained from local sources. The sand should preferably be relatively well graded with less than 5 percent by weight passing the No. 200 sieve and classified as a coarse to fine sand. The D10 size (i.e., size that 10 percent of material is finer than) may range from 0.12 to 0.55 mm, with a desired average to be 0.25 mm.

Protection (riprap and bedding) stone are available in the immediate area, as are concrete coarse and fine aggregates of suitable quality.

MATERIAL UTILIZATION

Although no unsuitable materials were encountered during drilling explorations, it is anticipated that limited excavation of unsuitable materials will undoubtedly occur at the project site. It is unlikely that any offsite disposal will be required or necessary during construction.

FLOOD HISTORY

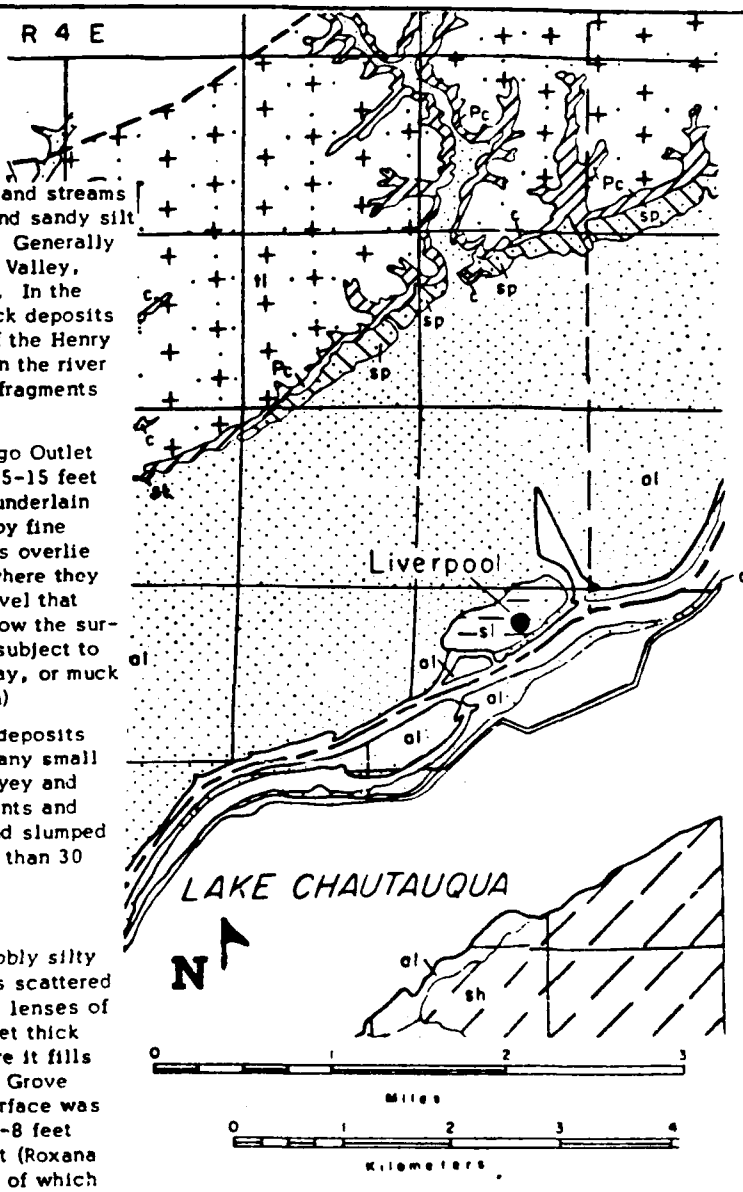
High water flooding of significant magnitude occurred in 1973, 1974, 1979, 1982, and 1983. During these periods lasting some 90 days in duration, the project site was inundated much of the time. These conditions caused temporary disruption and relocation of the Liverpool residents.

UNDERSEEPAGE CONTROL FOR PONDING AREA

Construction of a pumping plant to control underseepage infiltration and surface runoff is not planned for this project. The provision to control underseepage and prevent the formation of boils into the ponding area will be to leave the 8 feet of Cahokia impervious alluvium intact. A new 24-inch gravity outlet and gatewell will be installed at station 15+30. During high river stages when the gatewell structure is closed, excess surface runoff and underseepage infiltration will be removed by portable pumping. Under normal conditions, excess water in the ponding area will be discharged through the gatewell-controlled gravity outlet.

INSTRUMENTATION

Piezometers have not been installed in the study area. Upon completion of levee construction, consideration will be given to emplacing a line through the ponding area at station 17+50 to monitor groundwater fluctuations and underseepage pressures. Existing morphology at this station reveals a 17.5-foot-high levee atop an 8-foot-thick impervious top stratum of Cahokia alluvial clay. The natural blanket length riverside (100 feet) provides a relatively short underseepage entrance. In addition, the natural blanket length landside (150 feet) provides a short underseepage exit at the junction point of the Henry terrace. This installation would allow high water data to be collected, evaluated, and compared with the underseepage control measures determined in the study.



AFTER WILLMAN

al — Alluvium. Deposits of modern rivers and streams in floodplains. Largely clayey silt and sandy silt with lenses of silty sand and gravel. Generally less than 40 feet thick in the Illinois Valley, less than 20 feet in tributary valleys. In the Illinois Valley commonly overlies thick deposits of sand and, locally, sandy gravel of the Henry Formation. Sand and gravel in bars in the river is generally silty and contains wood fragments and shells. (Cahokia Alluvium)

sl — Low-level terrace underlain by Chicago Outlet River deposits. Surfaces are largely 5-15 feet above the modern floodplain and are underlain by medium and coarse sand, locally by fine sandy gravel. In some areas deposits overlie silt interbedded with sand, but elsewhere they overlie coarse sand or sandy fine gravel that extends to bedrock, 100-125 feet below the surface. Most of the terrace areas are subject to flooding, and in depressions silt, clay, or muck overlies the sand. (Henry Formation)

sp — Slopewash. Steep-sloped lenticular deposits along the base of bluffs, including many small alluvial fans and cones. Largely clayey and pebbly silt containing bedrock fragments and glacial drift materials; all washed and slumped from adjacent bluffs. Generally less than 30 feet thick. (Peyton Colluvium)

+ tl + — Till. Mostly unsorted calcareous pebbly silty clay deposited by glaciers. Contains scattered cobbles and boulders and, in places, lenses of sand and gravel. Generally 30-50 feet thick but is as much as 150 feet thick where it fills bedrock valleys, as east of Sheldons Grove and south of Browning. The upper surface was leached of carbonates to a depth of 5-8 feet before deposition of the overlying silt (Roxana Silt and Peoria Loess), the thickness of which is shown on the small inset map. (Glasford Formation)

Terraces. Silt and clay deposited in slackwater lakes in the Illinois Valley and tributary valleys. Preserved in terrace remnants generally 20-30 feet above the modern floodplain. Largely interbedded silt and silty clay, but locally contain beds of fine to medium sand and, rarely, gravel. Deposits commonly 10-25 feet thick, overlain by 5-10 feet of massive tan silt (Peoria Loess). (Equality Formation)

Pc or c — Shale, sandstone, clay, coal, and thin limestone beds; as much as 200 feet thick. No. 2 Coal and overlying strata. Small areas are marked c and pattern is omitted. (Carbondale Formation)

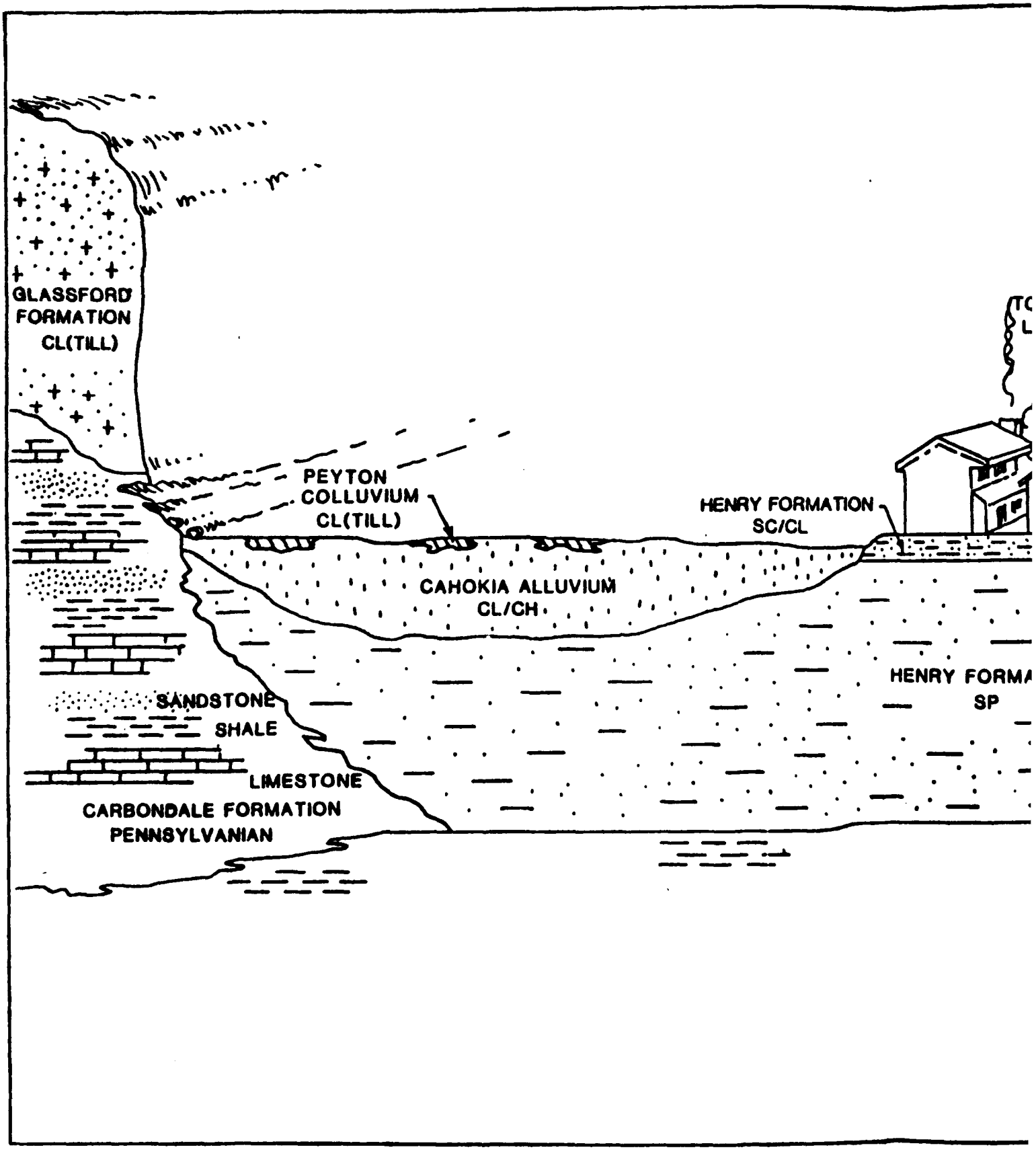
Ps or s — Sandstone, shale, clay, and thin coal and limestone beds; 75-125 feet thick. Strata underlying No. 2 Coal. Small areas are marked s and pattern is omitted. (Spoon Formation)

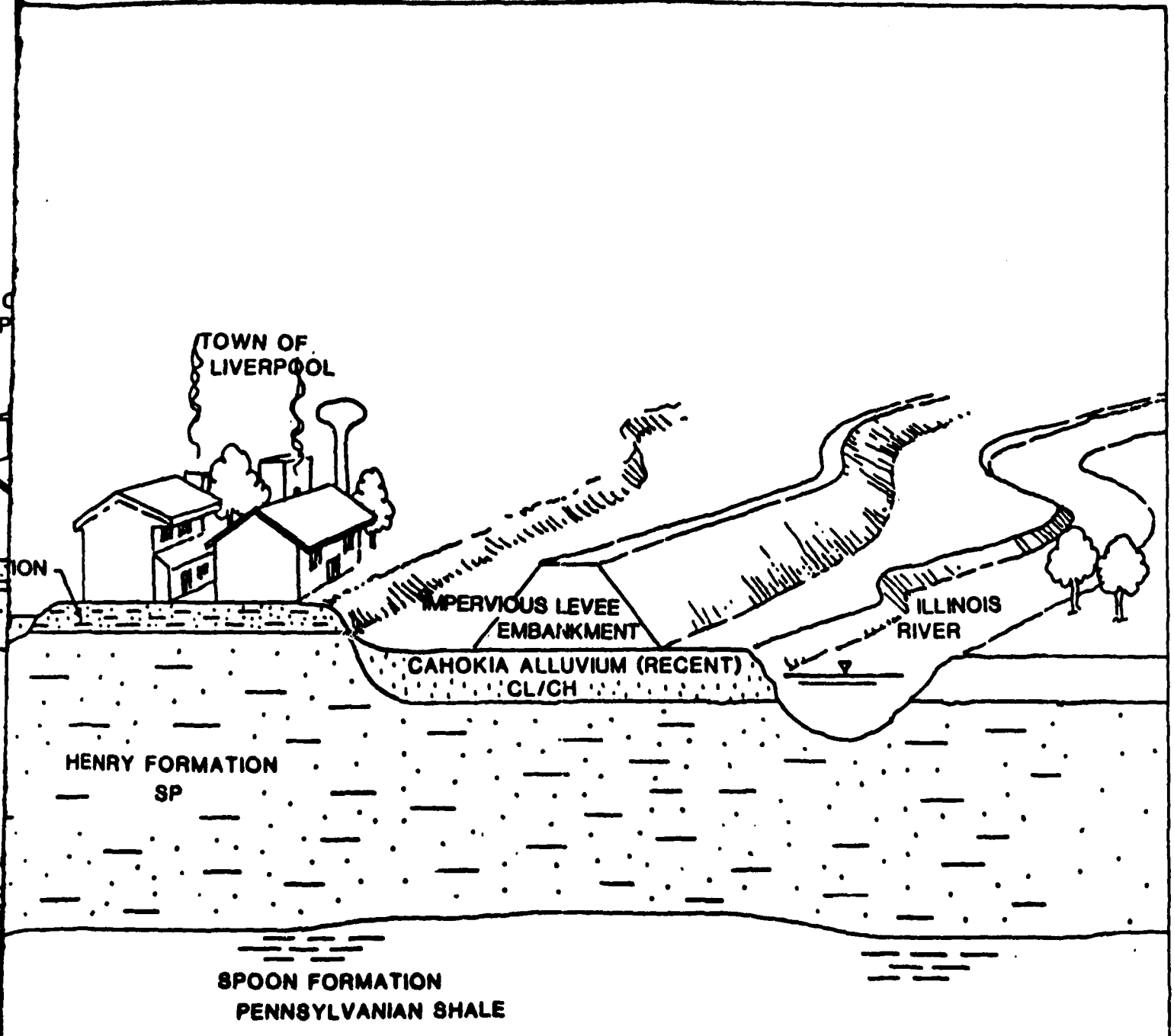
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

ILLINOIS RIVER
LIVERPOOL, ILLINOIS
GEOLOGIC MAP

PLATE

PLATE B-1

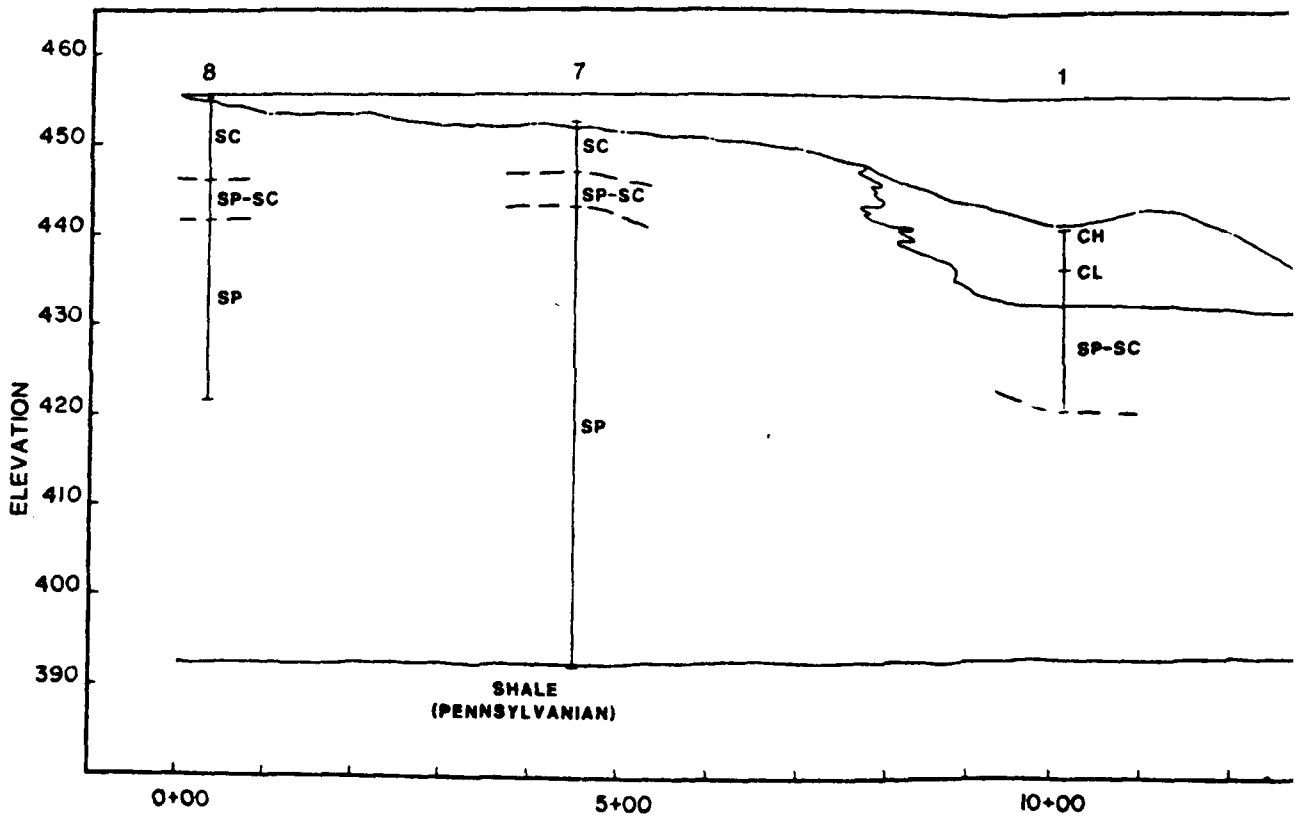

GLASSFORD
FORMATION
CL(TILL)
PEYTON
COLLUVIUM
CL(TILL)
HENRY FORMATION
SC/CL
CAHOKIA ALLUVIUM
CL/CH
HENRY FORMA
SP
SANDSTONE
SHALE
LIMESTONE
CARBONDALE FORMATION
PENNSYLVANIAN

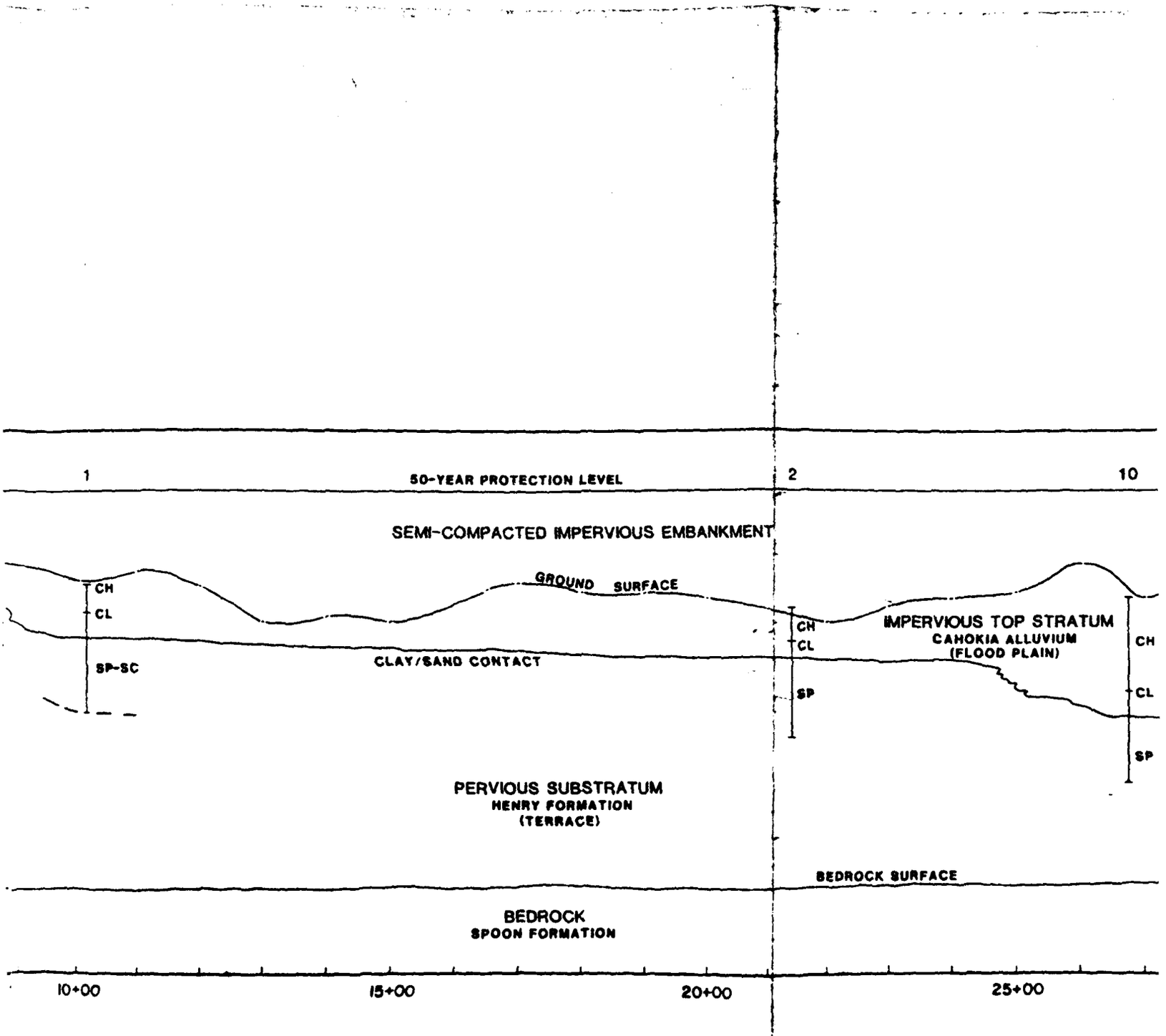


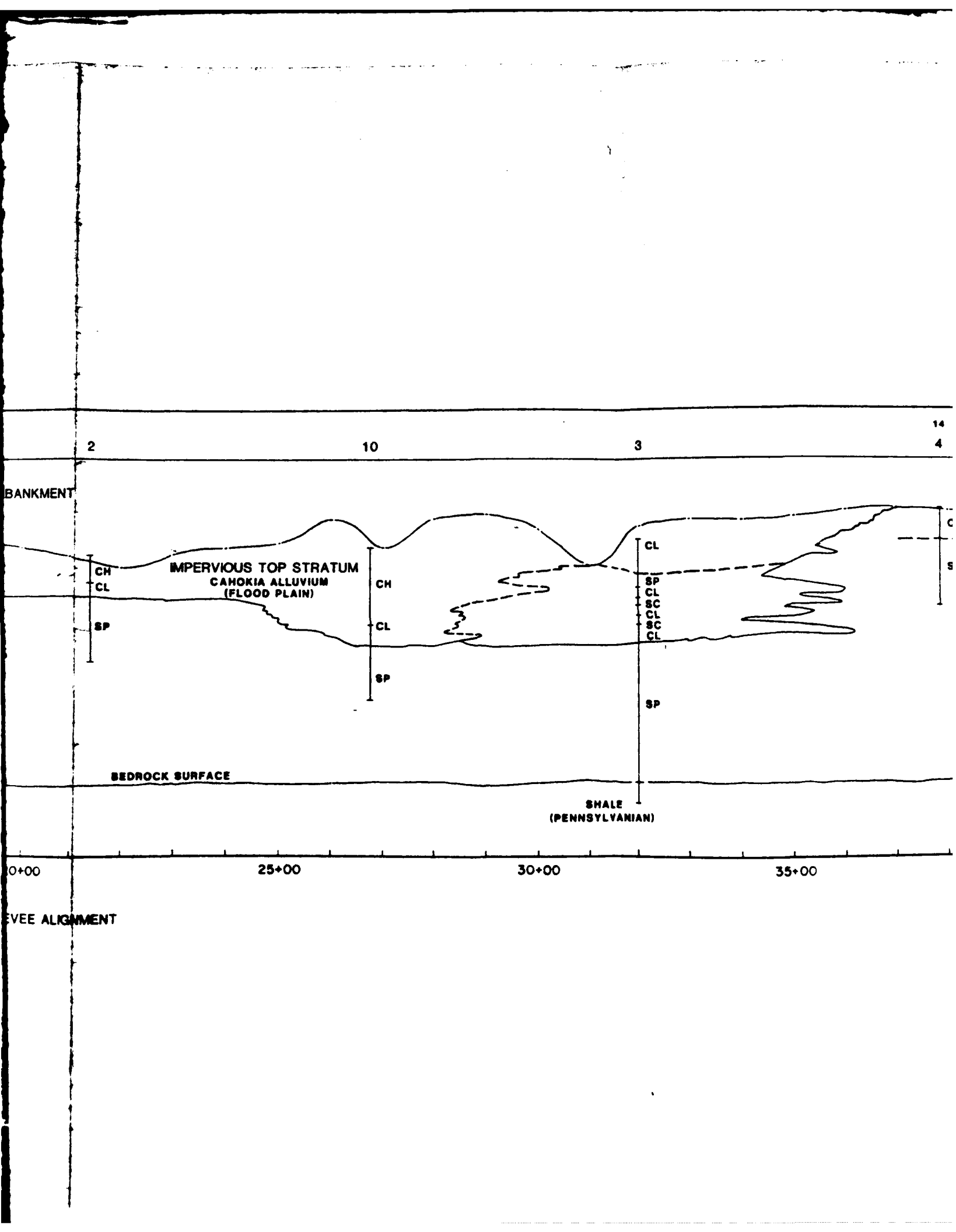
ILLINOIS RIVER
LIVERPOOL, ILLINOIS

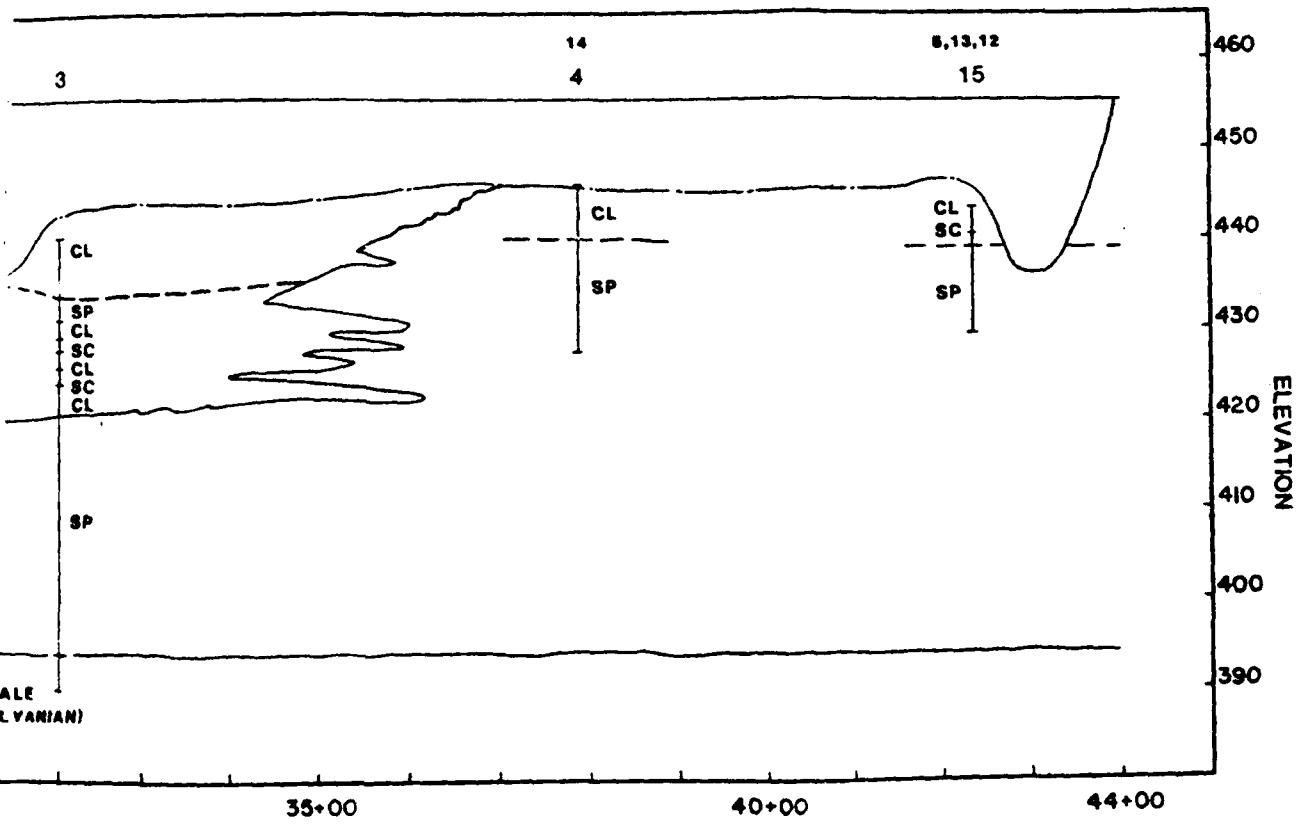
THE LIVERPOOL MORPHOLOGY

PLATE B-2


460
450
440
430
420
410
400
390
ELEVATION
8
7
1
SC
SP-SC
SP
SC
SP-SC
SP
CH
CL
SP-SC
SHALE
(PENNSYLVANIAN)
0+00
5+00
10+00

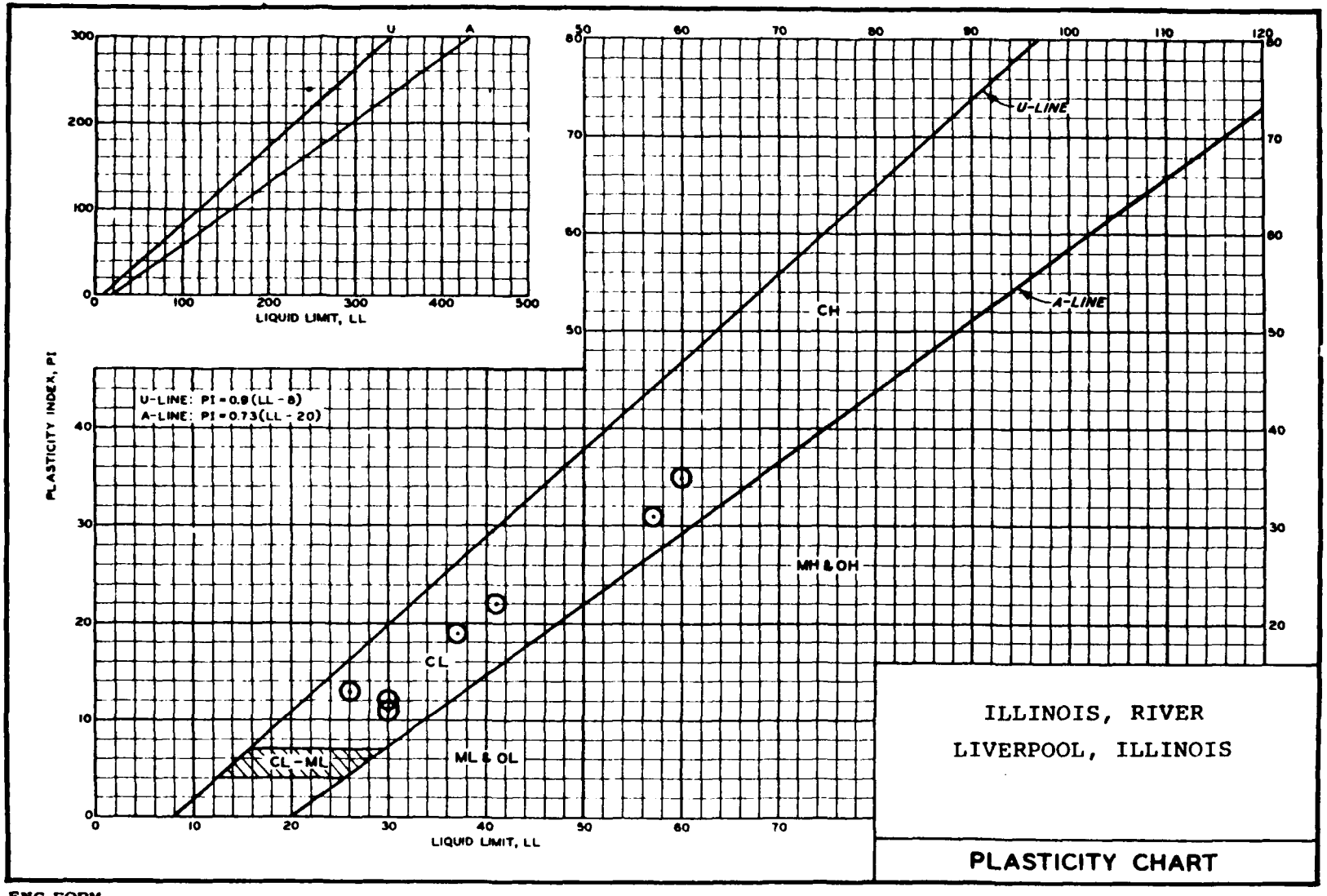

1
50-YEAR PROTECTION LEVEL
2
10
SEMI-COMPACTED IMPERVIOUS EMBANKMENT
GROUND SURFACE
CH
CL
SP-SC
CLAY/SAND CONTACT
CH
CL
SP
IMPERVIOUS TOP STRATUM
CAHOKIA ALLUVIUM
(FLOOD PLAIN)
CH
CL
SP
PERVIOUS SUBSTRATUM
HENRY FORMATION
(TERRACE)
BEDROCK SURFACE
BEDROCK
SPOON FORMATION
10+00
15+00
20+00
25+00
STATIONING ALONG PROPOSED LEVEE ALIGNMENT


2
10
3
14
4
BANKMENT
CH
CL
SP
IMPERVIOUS TOP STRATUM
CAHOKIA ALLUVIUM
(FLOOD PLAIN)
CH
CL
SP
CL
SP
SC
CL
SC
CL
SP
BEDROCK SURFACE
SHALE
(PENNSYLVANIAN)
0+00
25+00
30+00
35+00
EVEE ALIGNMENT



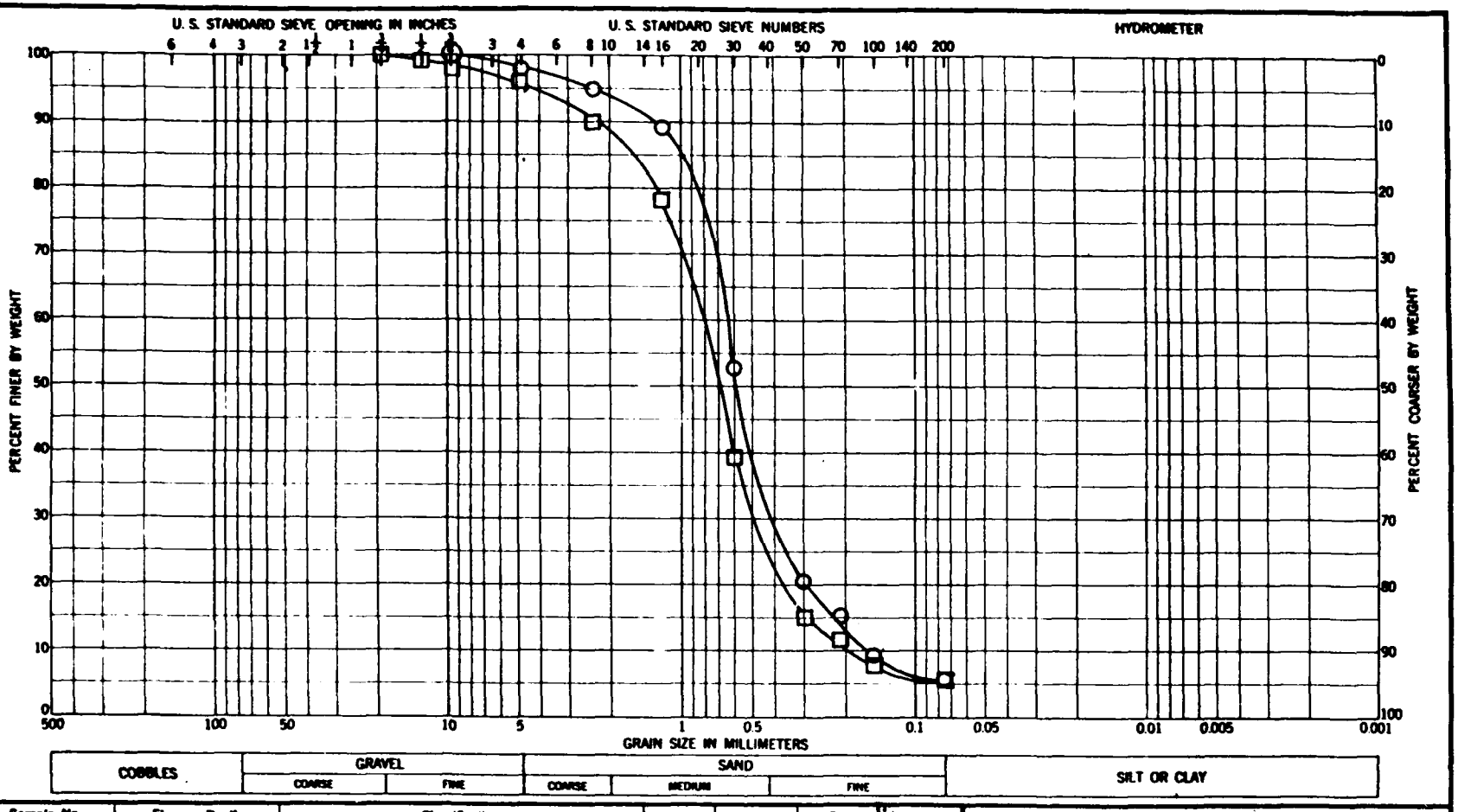
ILLINOIS RIVER
LIVERPOOL, ILLINOIS
GEOLOGIC PROFILE

PLATE B-3



ENG FORM 4334 JUN 70 (EM 1110-2-1906) TRANSLUCENT

PLATE B-4



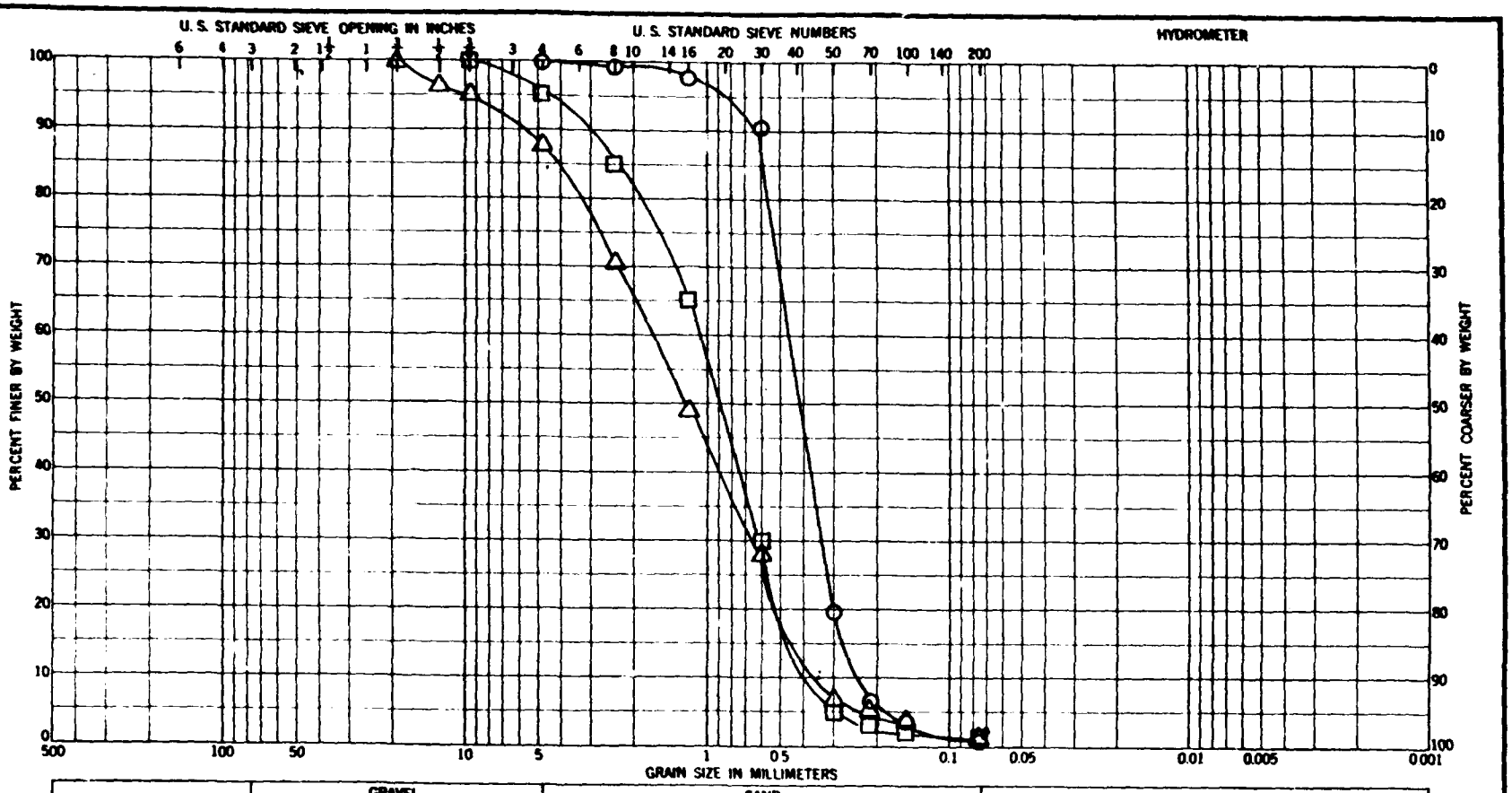
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	D_{10}	PI
L-84-1-6	12.0	SP-SC Br. clayey med. to fine sand				0.17	
L-84-1-9	18.0	SP-SC Br. clayey coarse to fine sand with trace of gravel				0.20	

GRADATION CURVES

Project LIVERPOOL, ILLINOIS
LOCAL FLOOD PROTECTION
Area
Boring No. L-84-1
Date December 14, 1984

PLATE B-5

ENG FORM 1 MAY 83 2087



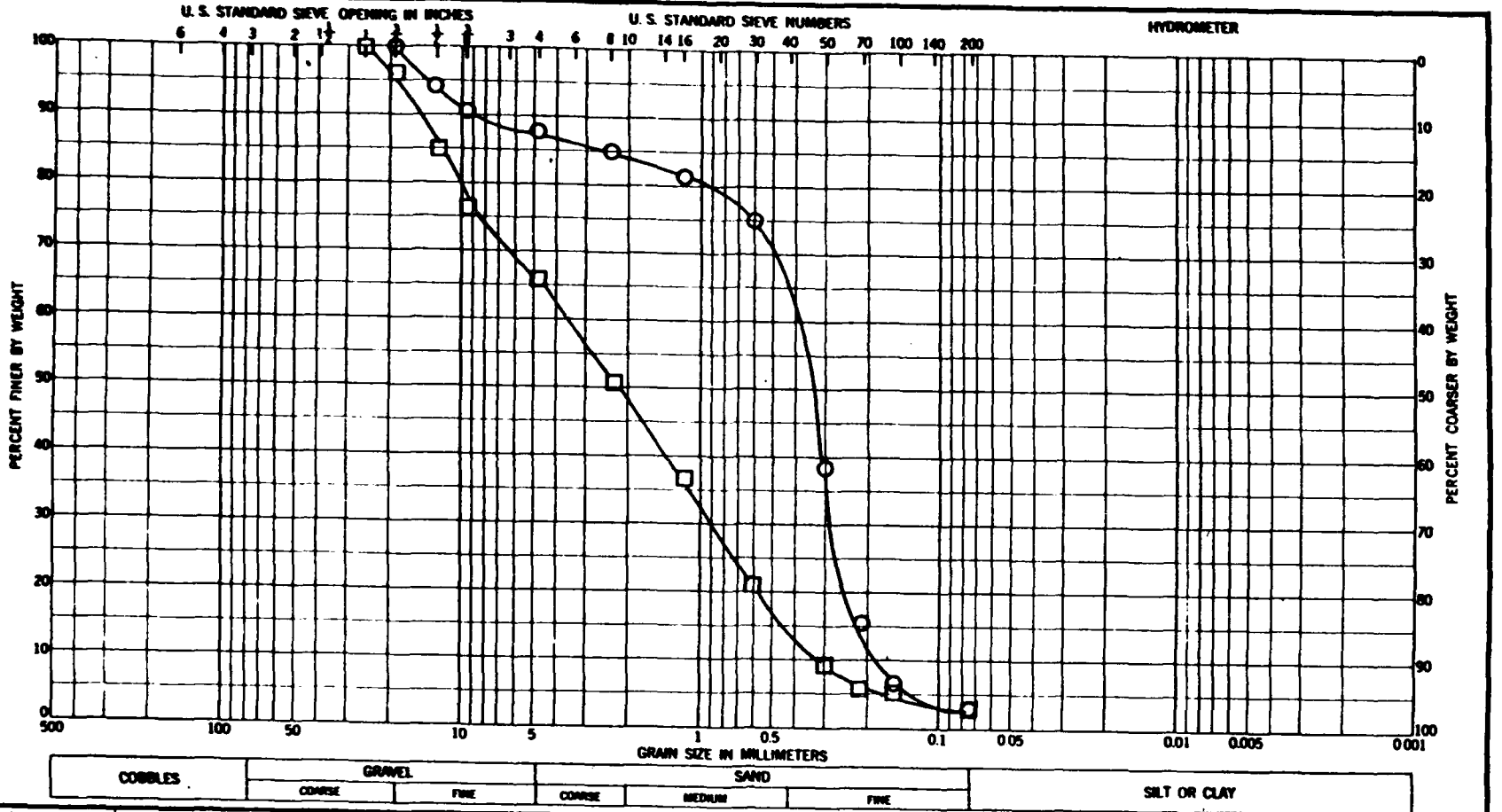
	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	D_{10} PI
○	L-84-3-11	23.0-24.0	SP Br. med. to fine sand				0.25
□	L-84-3-13	30.5-31.0	SP Br. coarse to fine sand with gravel				0.40
△	L-84-3-14	35.5-36.5	SP Br. gravelly coarse to fine sand				0.37

GRADATION CURVES

Project: LIVERPOOL, ILLINOIS
LOCAL FLOOD PROTECTION
Area:
Boring No. L-84-3
Date: December 14, 1984

PLATE B-6

ENG FORM 1 MAY 83 2087



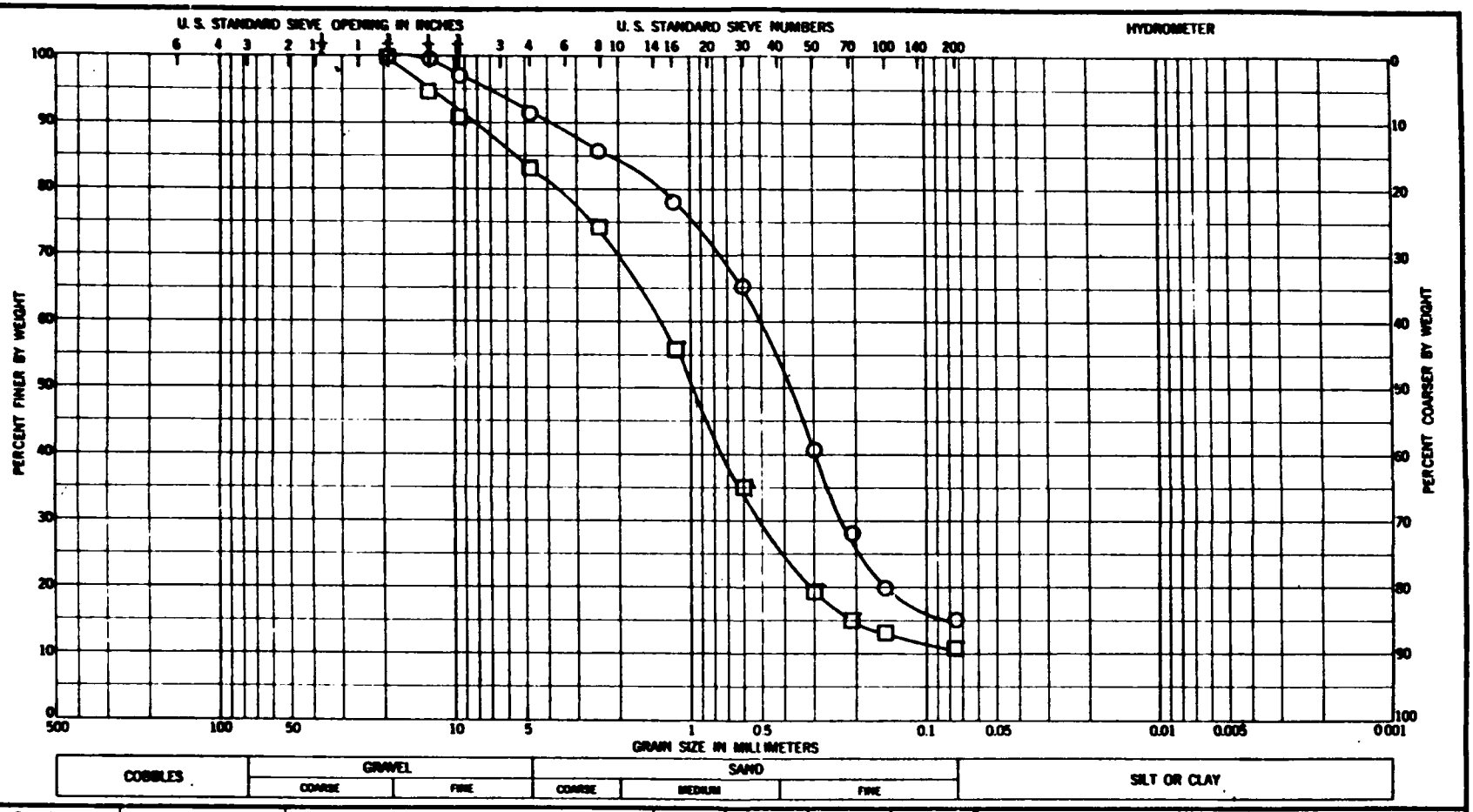
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	D_{10}
L-84-3-15	40.5-41.5	SP Br. gravelly med.to fine sand				0.19
L-84-3-16	45.0-46.0	SP Br. gravelly coarse to fine sand				0.31

GRADATION CURVES

Project LIVERPOOL, ILLINOIS
LOCAL FLOOD PROTECTION
Area
Boring No. L-84-3
Date December 14, 1984

ENG FORM 1 MAY 63 2087

PLATE B-7



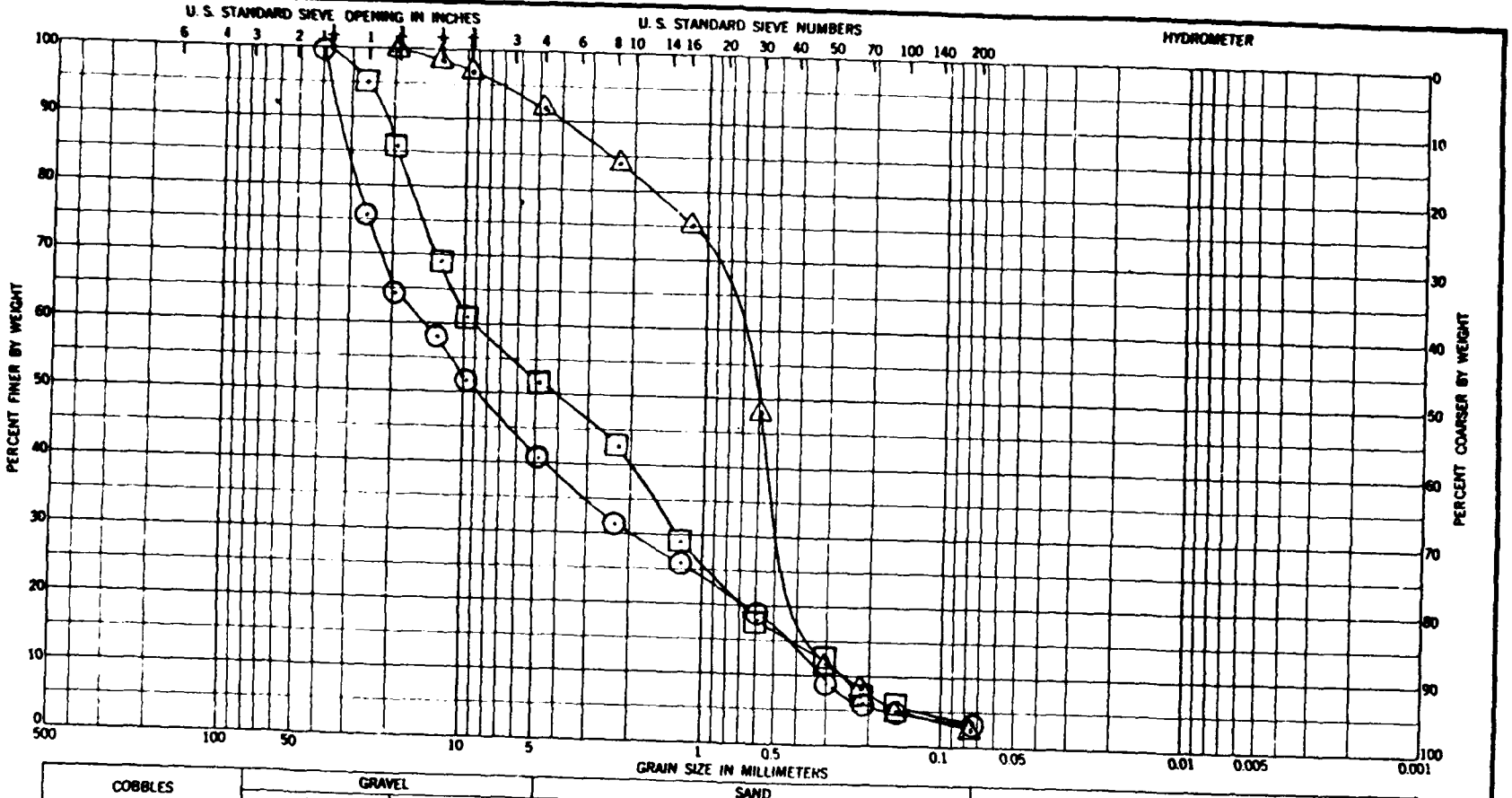
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
L-84-5-3	5.0-6.0	SC Br. clayey sand with gravel				
L-84-5-6	12.0	SP-SC Br. clayey gravelly coarse to fine sand				

GRADATION CURVES

Project LIVERPOOL, ILLINOIS
LOCAL FLOOD PROTECTION
Area
Boring No. L-84-5
Date December 14, 1984

ENG FORM 1 MAY 63 2087

PLATE B-8



Sample No.	Depth	Classification	Nat w %	LL	PL	D 10
⊙ 5	13.0-14.0	GP Br. sandy gravel				0.31
⊡ 6	15.5-16.5	SP Br. gravelly coarse to fine sand				0.26
△ 8	30.5-31.5	SP Br. coarse to fine sand, with grave				0.26

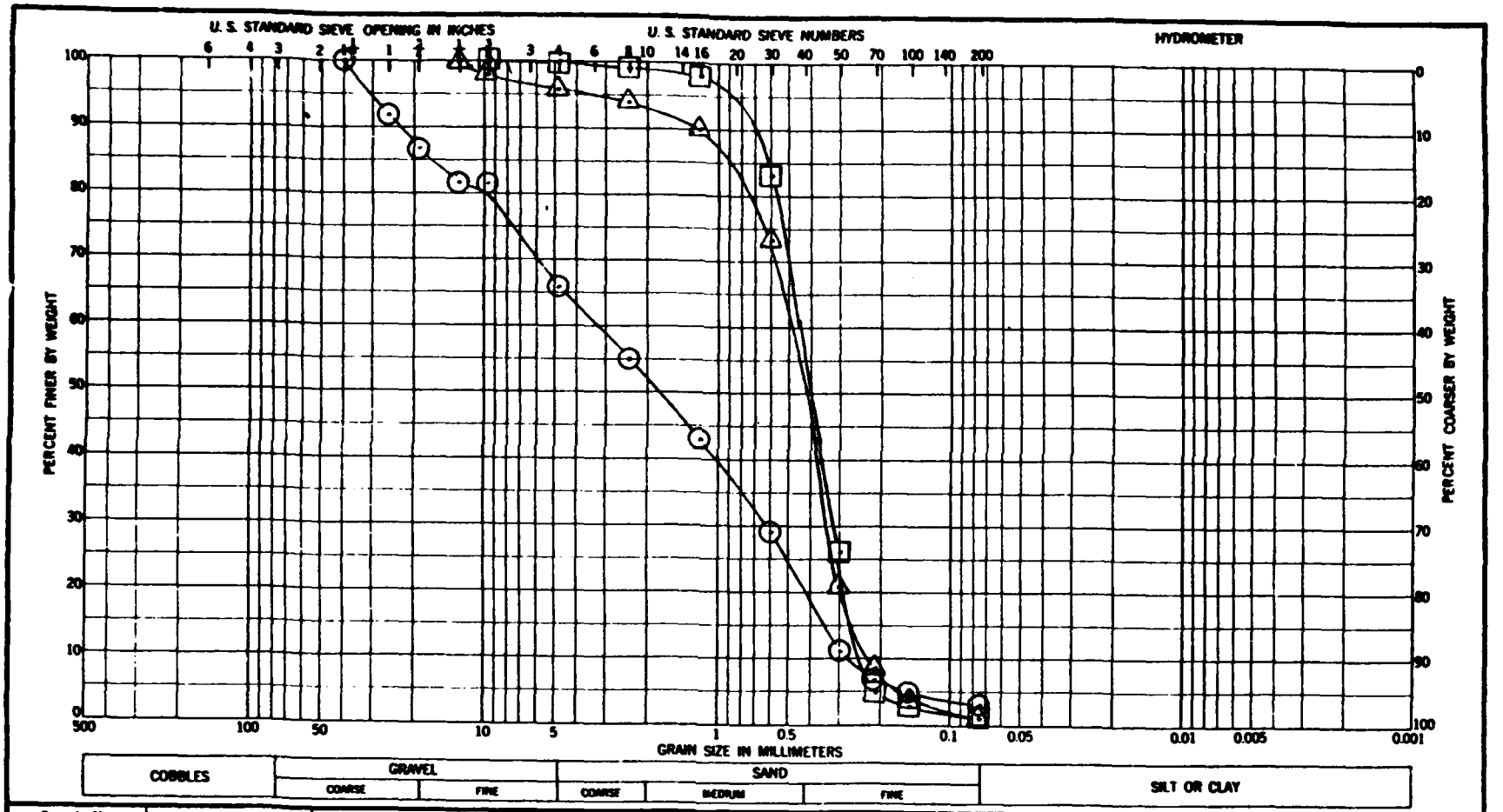
GRADATION CURVES

Project Liverpool, Illinois
DPR
Area
Boring No. L-85-7
Date 15 October 1985

ENG FORM 1 MAY 83 2087

GPO 926-260

PLATE B-9



Sample No.	Depth	Classification	Nat w %	LL	PL	D 10
⊙ 10	40.5-41.5	SP Br. gravelly coarse to fine sand, with broken rock				0.28
⊡ 11	45.5-46.5	SP Br. medium to fine sand				0.25
△ 12	50.5-51.5	SP Br. medium to fine sand, trace grave				0.23

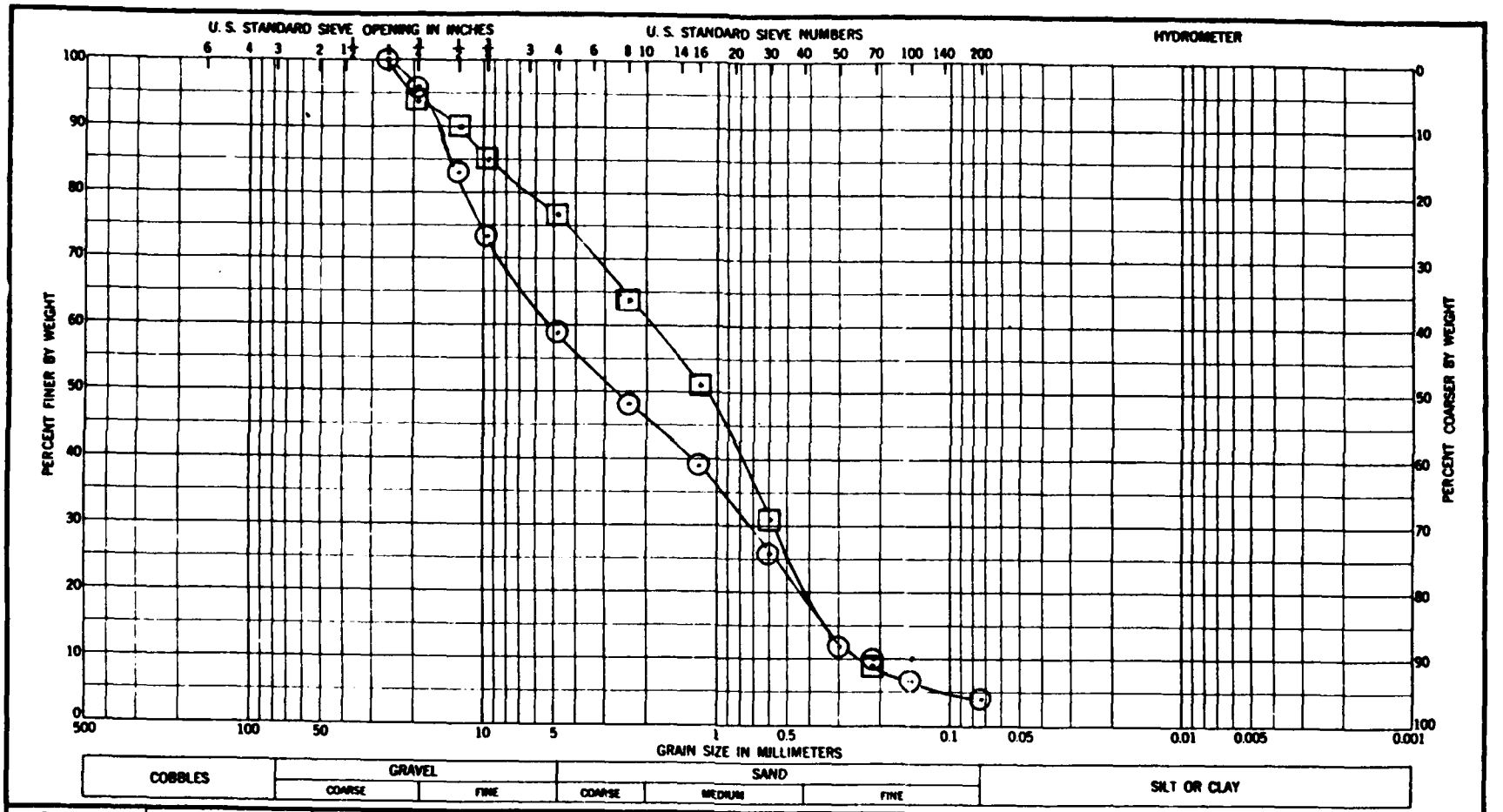
GRADATION CURVES

Project: Liverpool, Illinois DPR
Area:
Boring No.: L-85-7
Date: 15 October 1985

ENG FORM 1 MAY 83 2087

GPO 928-250

PLATE B-10



Sample No.	Depth	Classification	Nat w %	LL	PL	D 10
⊙ 7	20.5-21.5	SP Br. gravelly coarse to fine sand, with broken rock				0.25
⊡ 9	25.5-26.5	SP Br. gravelly coarse to fine sand				0.25

GRADATION CURVES

Project: Liverpool, Illinois DPR

Area:

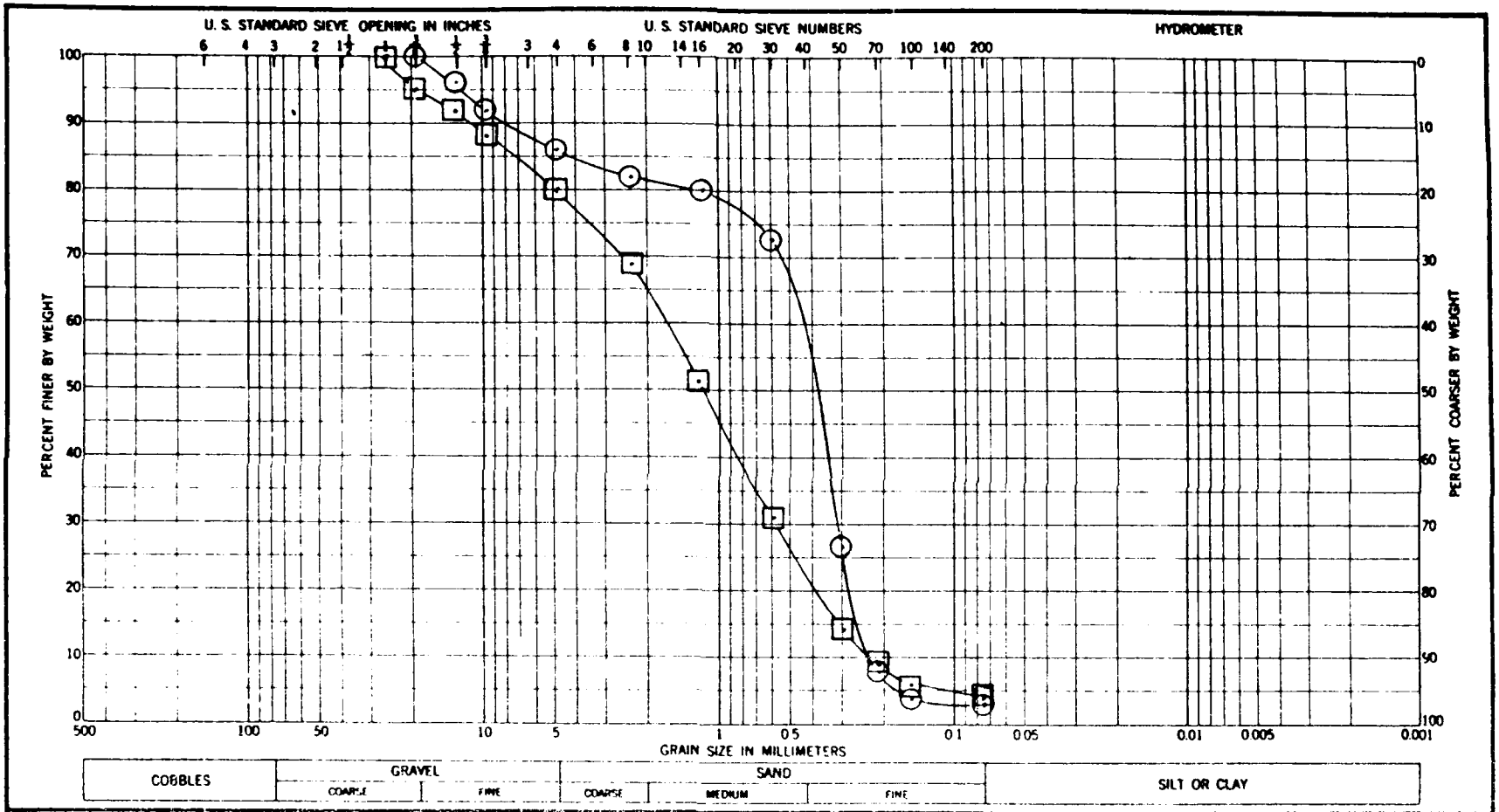
Boring No.: L-85-8

Date: 15 October 1985

ENG FORM 1 MAY 63 2087

GPO 926-250

PLATE B-11



Sample No	Depth	Classification	Nat w %	LL	PL	D 10
⊙ 4	10.5-11.5	SP Br. gravelly medium to fine sand				0.24
⊡ 8	20.5-21.5	SP Br. gravelly coarse to fine sand				0.24

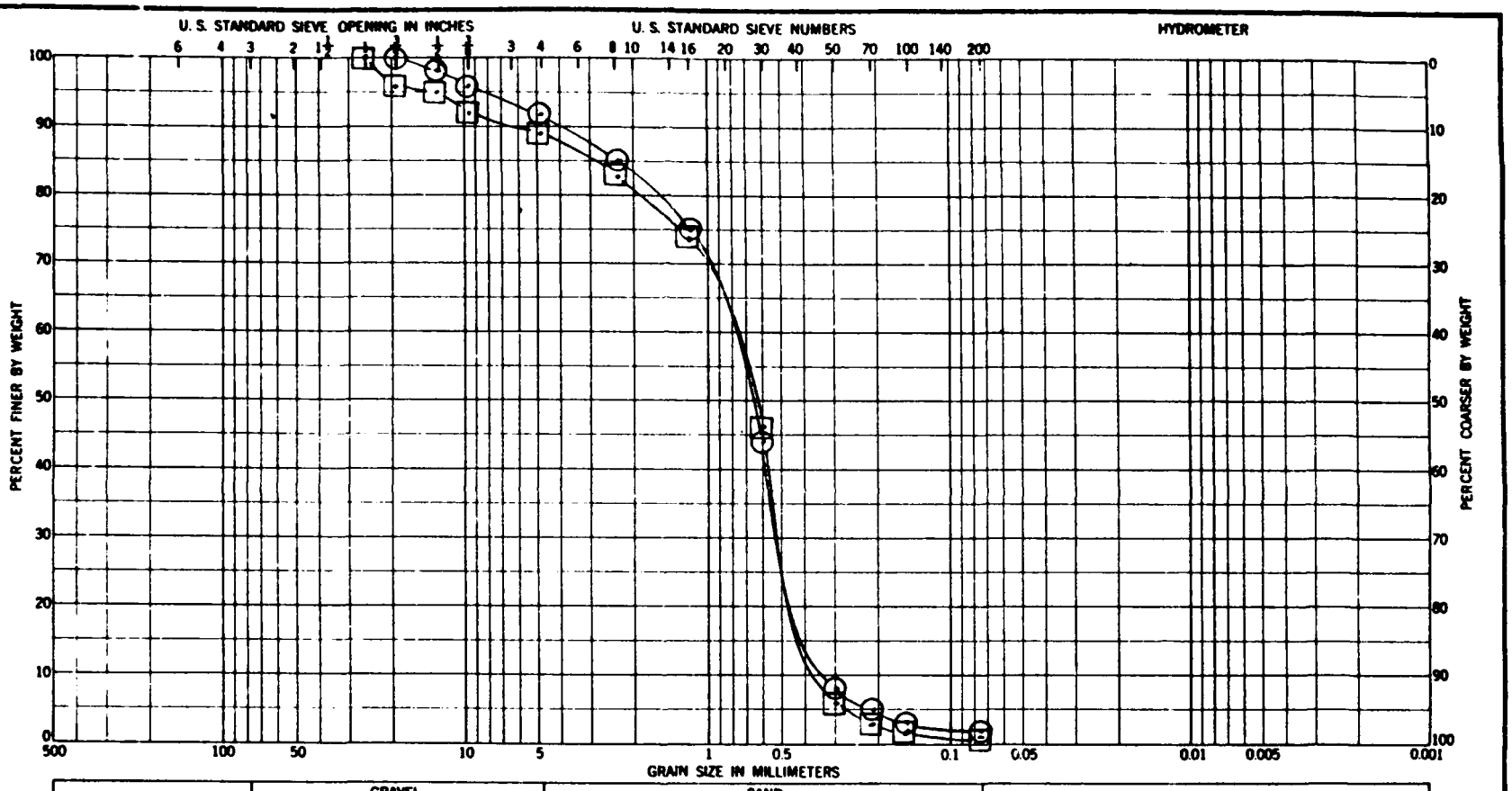
GRADATION CURVES

Project: Liverpool, Illinois DPR
Area:
Boring No.: L-85-9
Date: 15 October 1985

ENG FORM 1 MAY 63 2087

GPO 926-250

PLATE B-12



Sample No.	Depth	Classification	Nat w %	LL	PL	D 10
⊙ 9	23.0-24.0	SP Br. medium to fine sand, with gravel				0.35
⊡ 7	18.0-19.0	SP Br. gravelly medium to fine sand				0.38

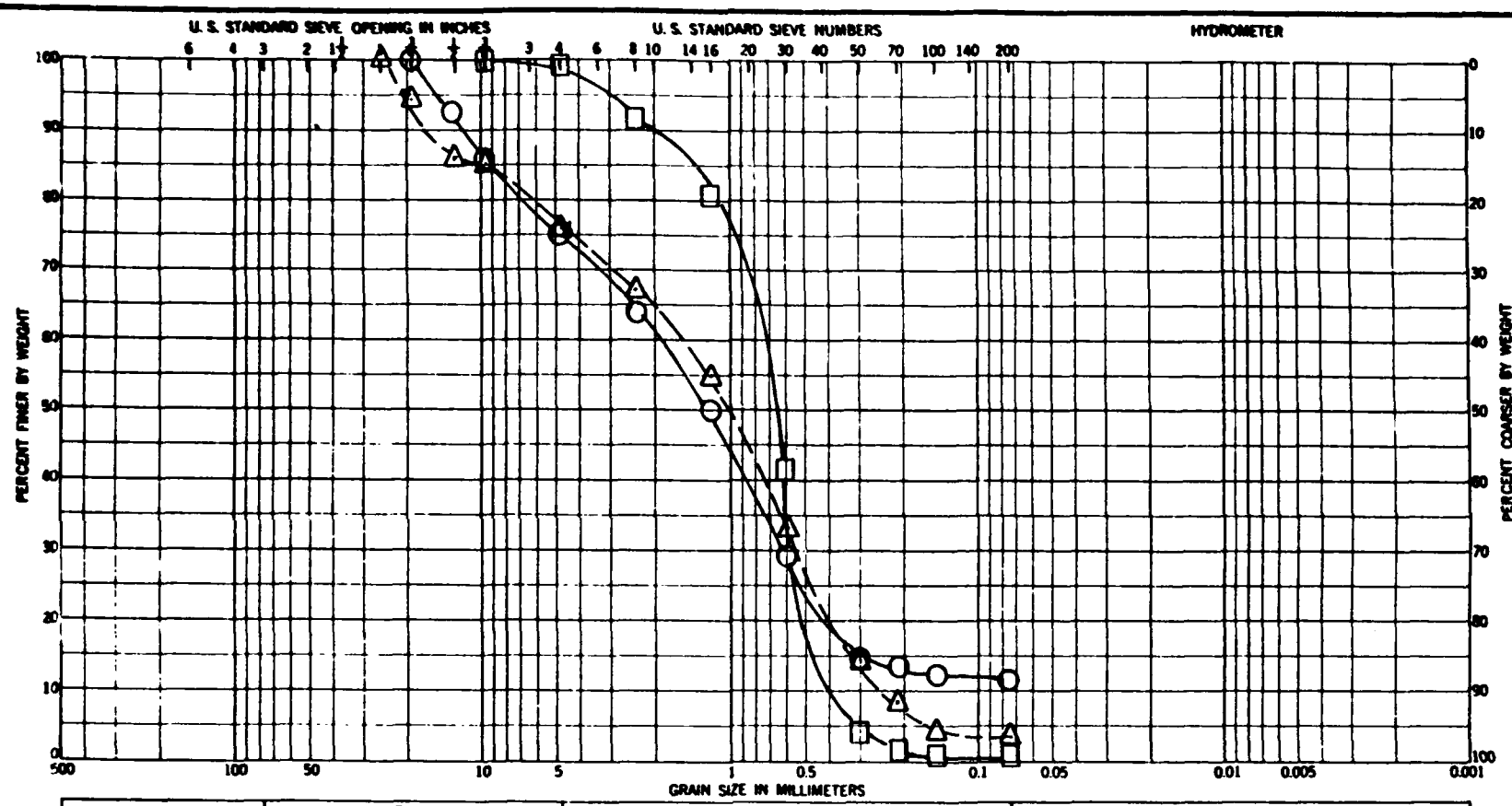
GRADATION CURVES

Project: Liverpool, Illinois
DPR
Area
Boring No. L-85-10 #9; L-85-11 #7
Date: 15 October 1985

ENG FORM 1 MAY 63 2087

GPO 926-280

PLATE B-13



Sample No.	Elev or Depth	Classification	Nat w %	LL	-#200	D10
○ L-13-2	6.0-6.5'	SC BR. GRAVELLY CLAYEY SAND			11.9%	
□ L-13-6	15.5-16.5'	SP BR. COARSE TO FINE SAND				0.40
△ L-14-4	10.5-11.5'	SP BR. GRAVELLY COARSE TO FINE SAND				0.25

GRADATION CURVES

Project LIVERPOOL, ILLINOIS

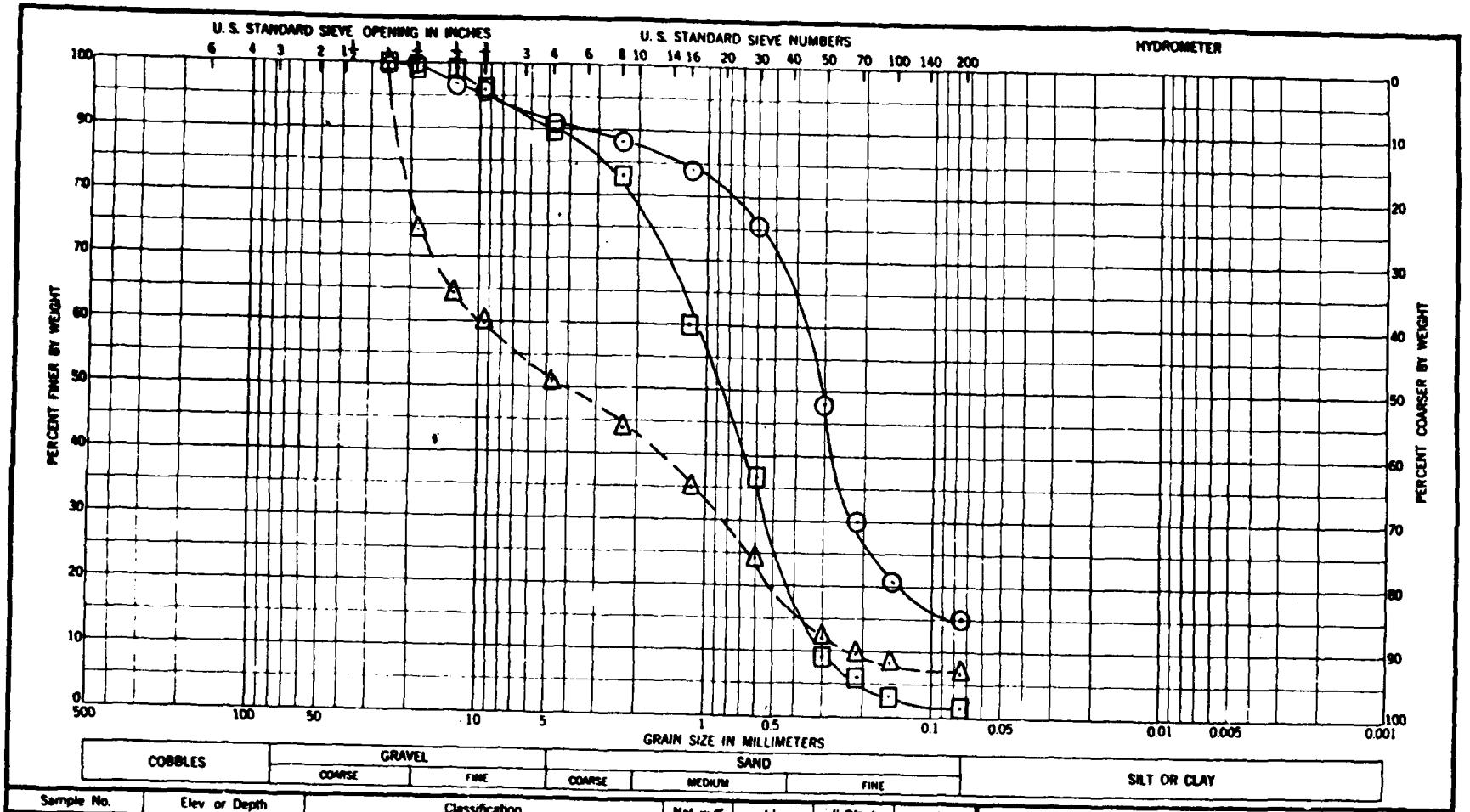
Area

Boring No. L-13 and L-14

Date 26 November 1986

ENG FORM 1 MAY 83 2087

PLATE B-14



Sample No.	Elev or Depth	Classification	Nat w %	LL	-#200	D 10
○ L-15-2	3.0-4.0'	SC BR. CLAYEY SAND WITH GRAVEL			15.0%	
□ L-15-5	10.5-11.5'	SP BR. GRAVELLY COARSE TO FINE SAND				0.31
△ L-16-3	8.0-9.-'	SP-SC BR. CLAYEY GRAVELLY MED. TO FINE			6.8%	0.25

GRADATION CURVES

SAND

Project LIVERPOOL, ILLINOIS

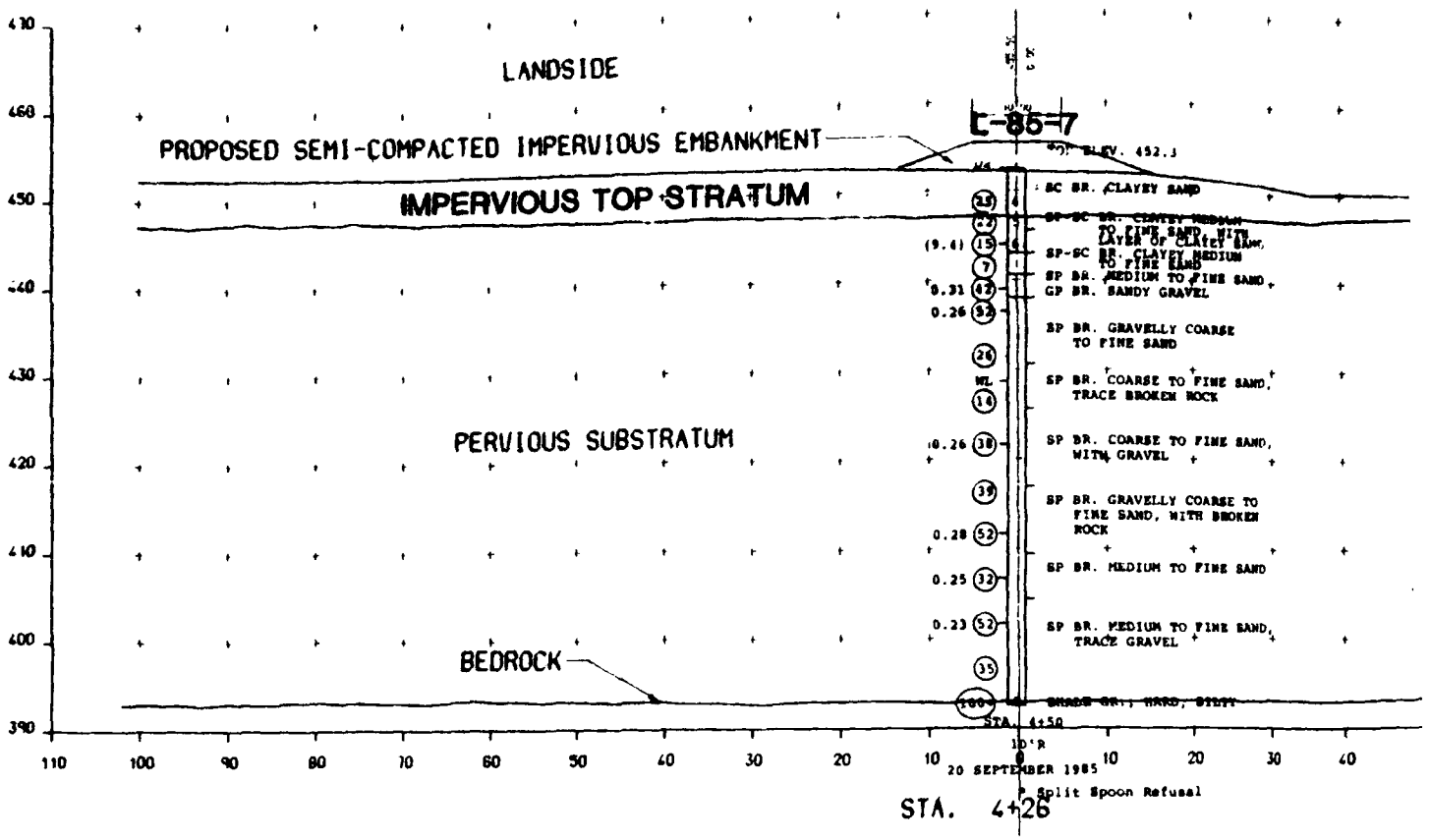
Area

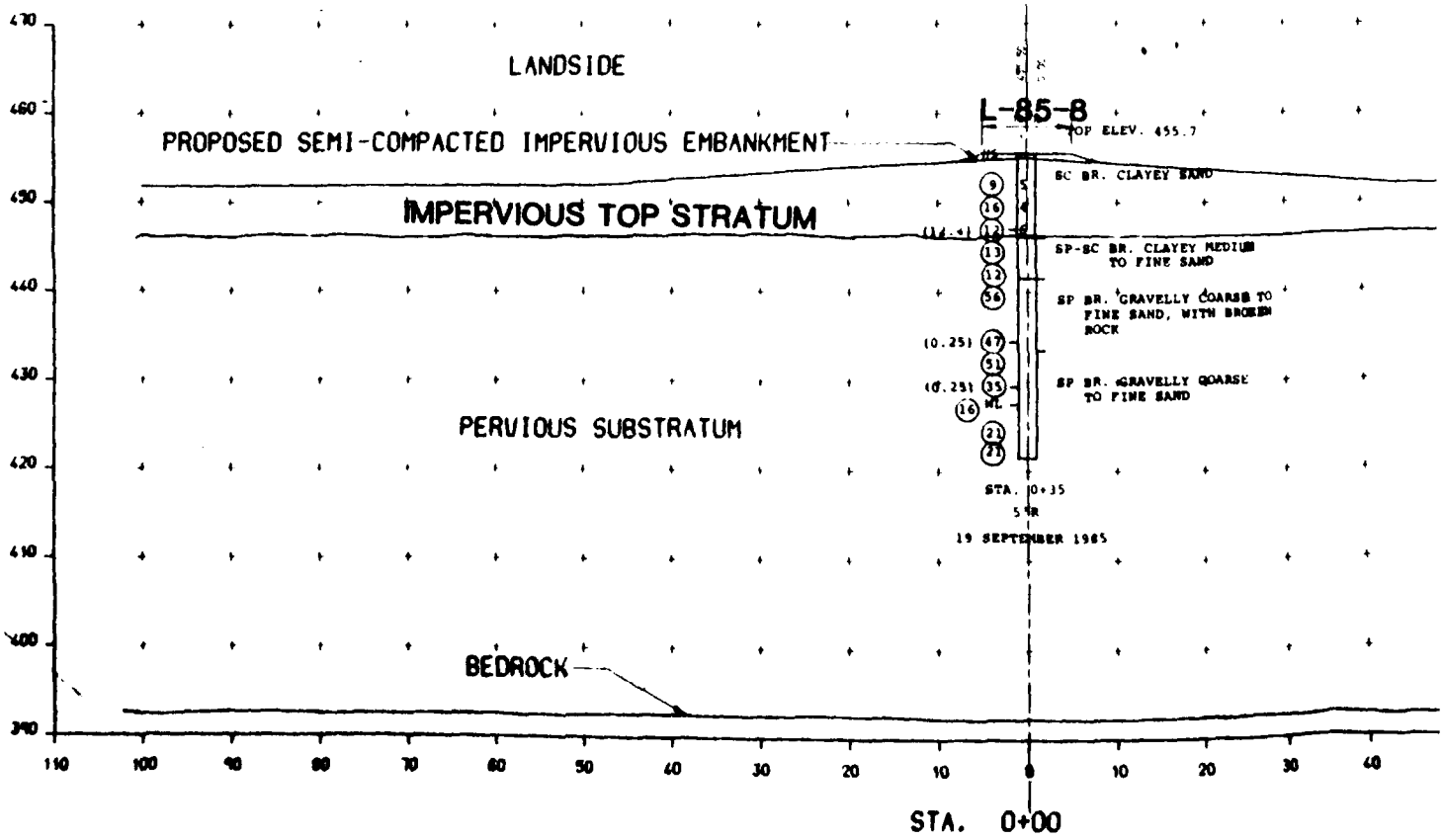
Boring No. L-15 and L-16

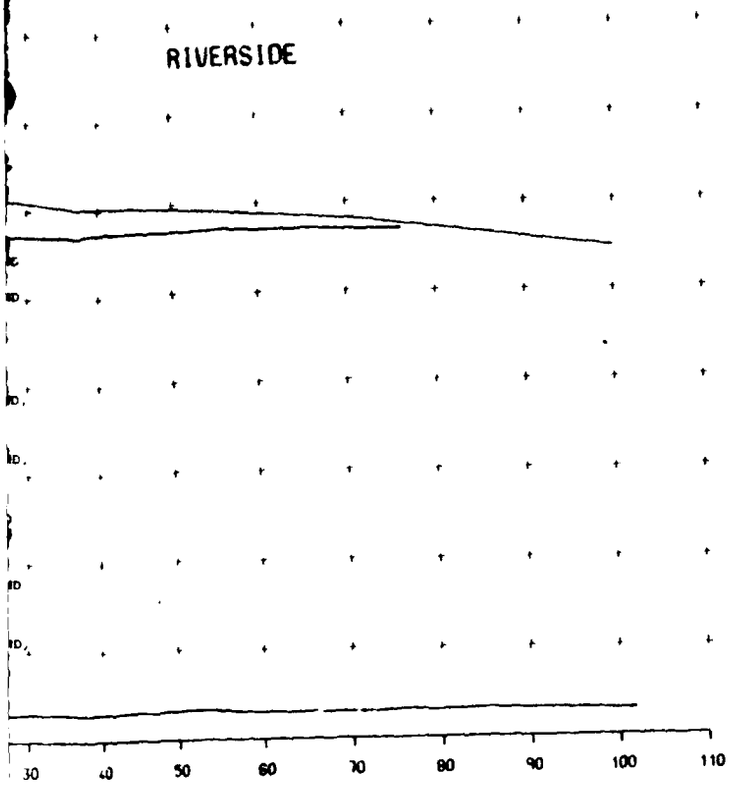
Date 26 November 1986

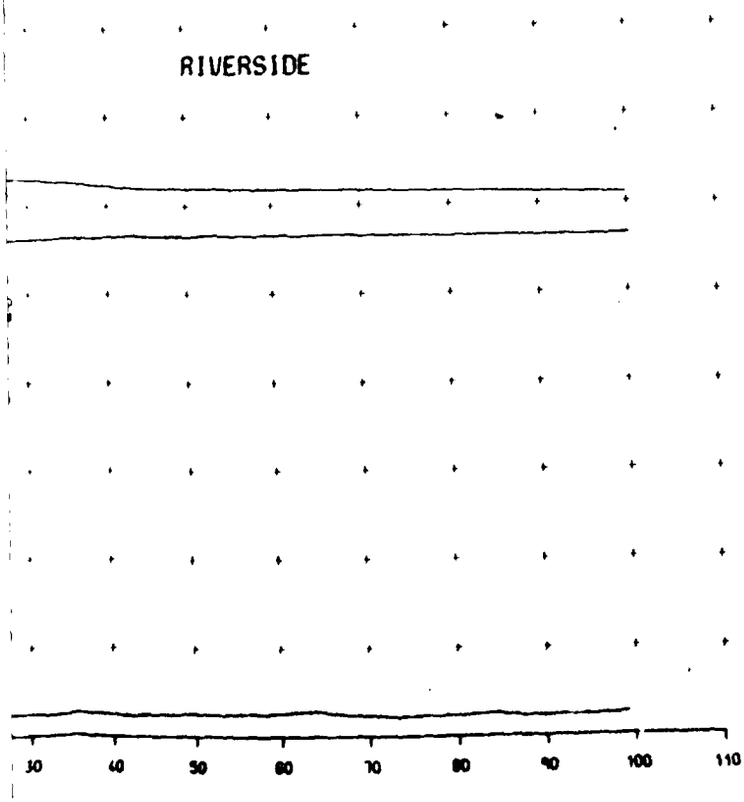
ENG FORM 1 MAY 63 2087

PLATE B-15


LANDSIDE
PROPOSED SEMI-COMPACTED IMPERVIOUS EMBANKMENT
IMPERVIOUS TOP STRATUM
PERVIOUS SUBSTRATUM
BEDROCK
ELEVATION
L-85-7
TOP ELEV. 452.3
SC BR. CLAYEY SAND
SP-SC BR. CLAYEY MEDIUM TO FINE SAND
SP BR. MEDIUM TO FINE SAND
GP BR. SANDY GRAVEL
SP BR. GRAVELLY COARSE TO FINE SAND
SP BR. COARSE TO FINE SAND, TRACE BROKEN ROCK
SP BR. COARSE TO FINE SAND, WITH GRAVEL
SP BR. GRAVELLY COARSE TO FINE SAND, WITH BROKEN ROCK
SP BR. MEDIUM TO FINE SAND
SP BR. MEDIUM TO FINE SAND, TRACE GRAVEL
STA. 4+50
10'R
20 SEPTEMBER 1985
P Split Spoon Refusal
STA. 4+26


LANDSIDE
PROPOSED SEMI-COMPACTED IMPERVIOUS EMBANKMENT
IMPERVIOUS TOP STRATUM
PERVIOUS SUBSTRATUM
BEDROCK
ELEVATION
L-85-8
TOP ELEV. 455.7
SC BR. CLAYEY SAND
SP-SC BR. CLAYEY MEDIUM TO FINE SAND
SP BR. GRAVELLY COARSE TO FINE SAND, WITH BROKEN ROCK
SP BR. GRAVELLY COARSE TO FINE SAND
STA. 0+35
5'R
19 SEPTEMBER 1985
STA. 0+00





NOTES:

1. ALL LEVEE CROWN WIDTHS ARE 10 FEET.
2. ALL LEVEE SLOPES, BOTH LANDSIDE AND RIVERSIDE, ARE 1V ON 3H EXCEPT WHERE NOTED.
3. ALL DEPRESSIONS WITHIN 100 FEET OF THE LANDWARD TOE OF THE LEVEE WILL BE FILLED TO ELEVATION SHOWN FOR LANDSIDE TOE.

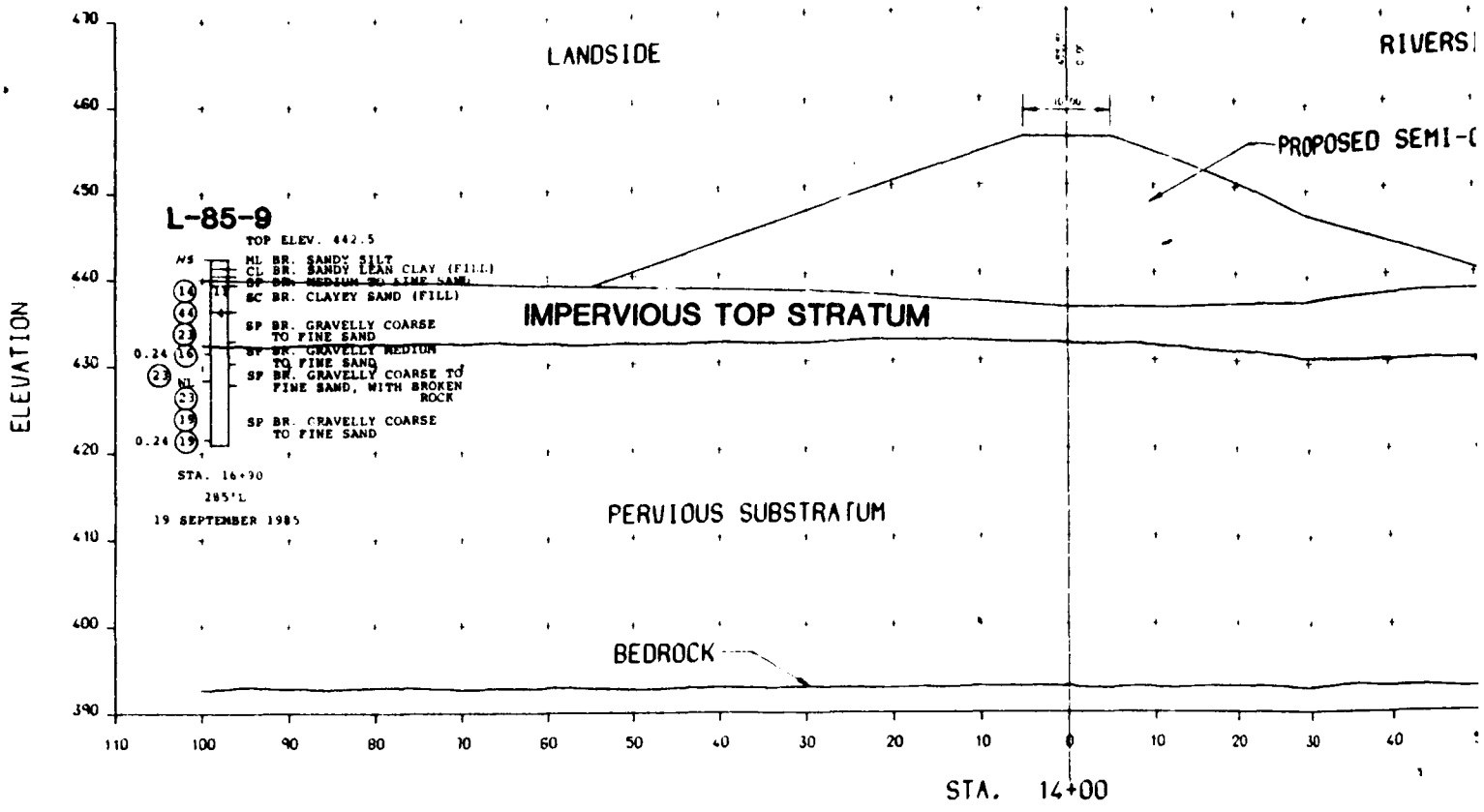
ILLINOIS RIVER

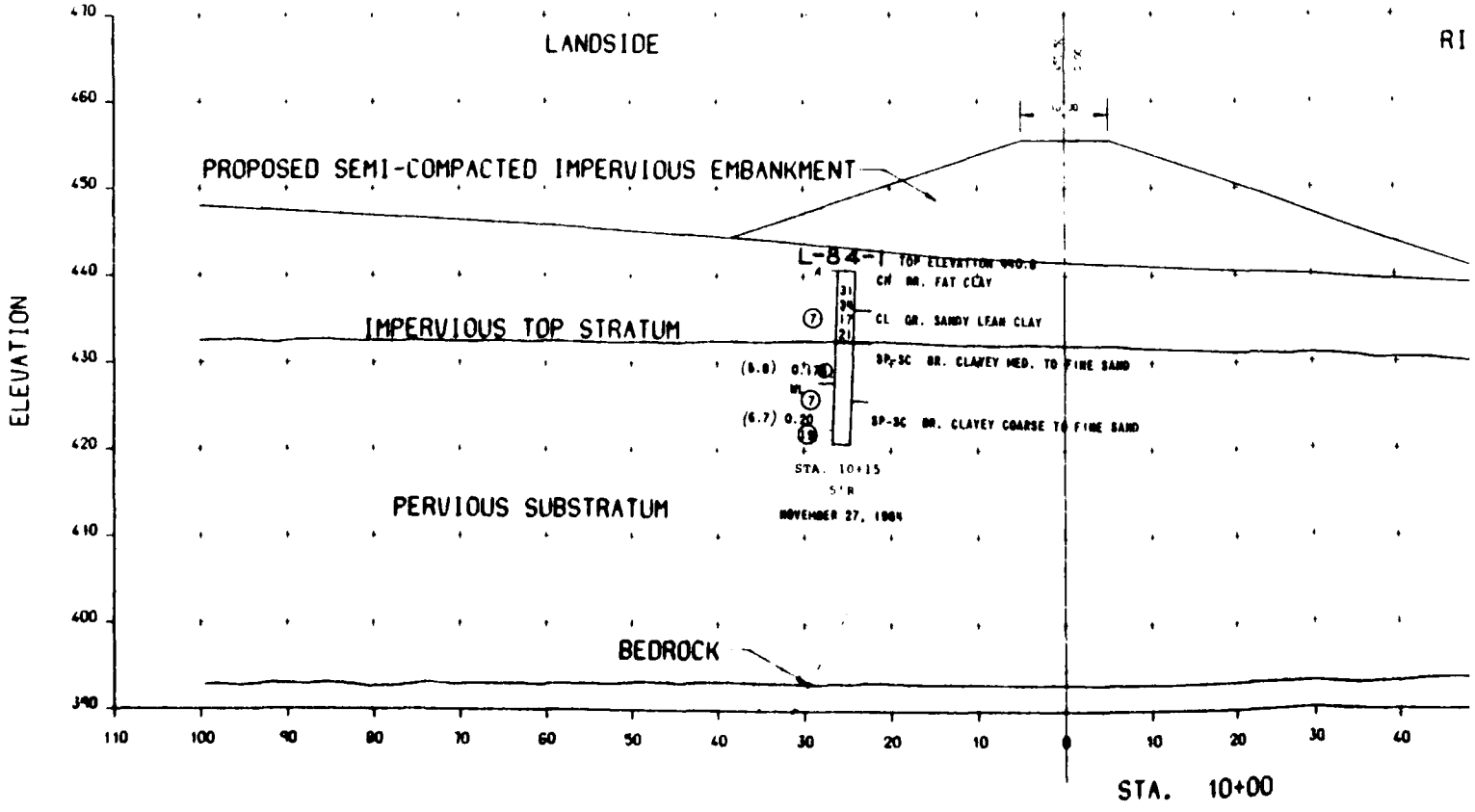
LIVERPOOL, ILLINOIS

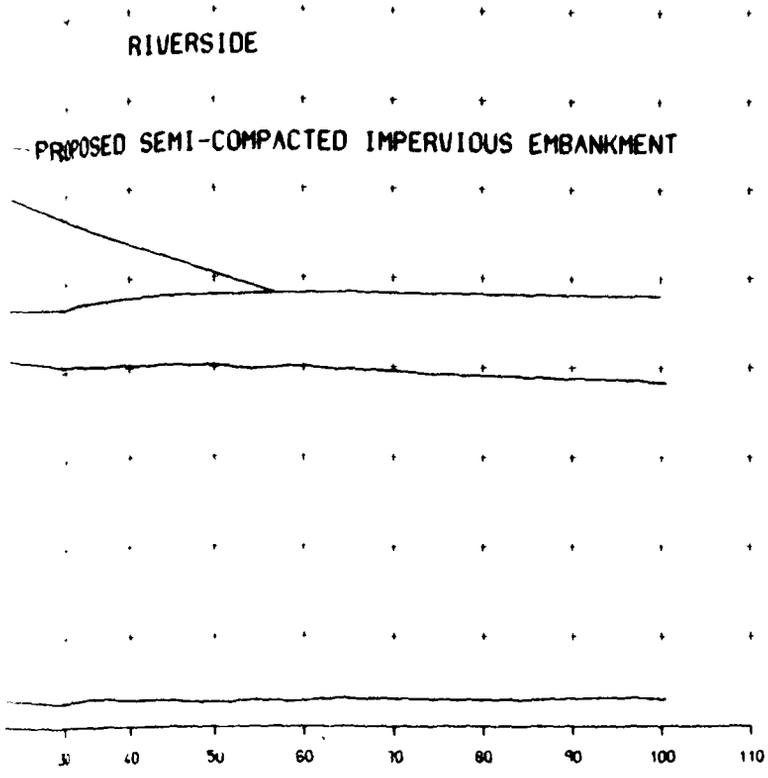
TYPICAL SECTIONS

STA. 0+00 & 4+26

PLATE B-16

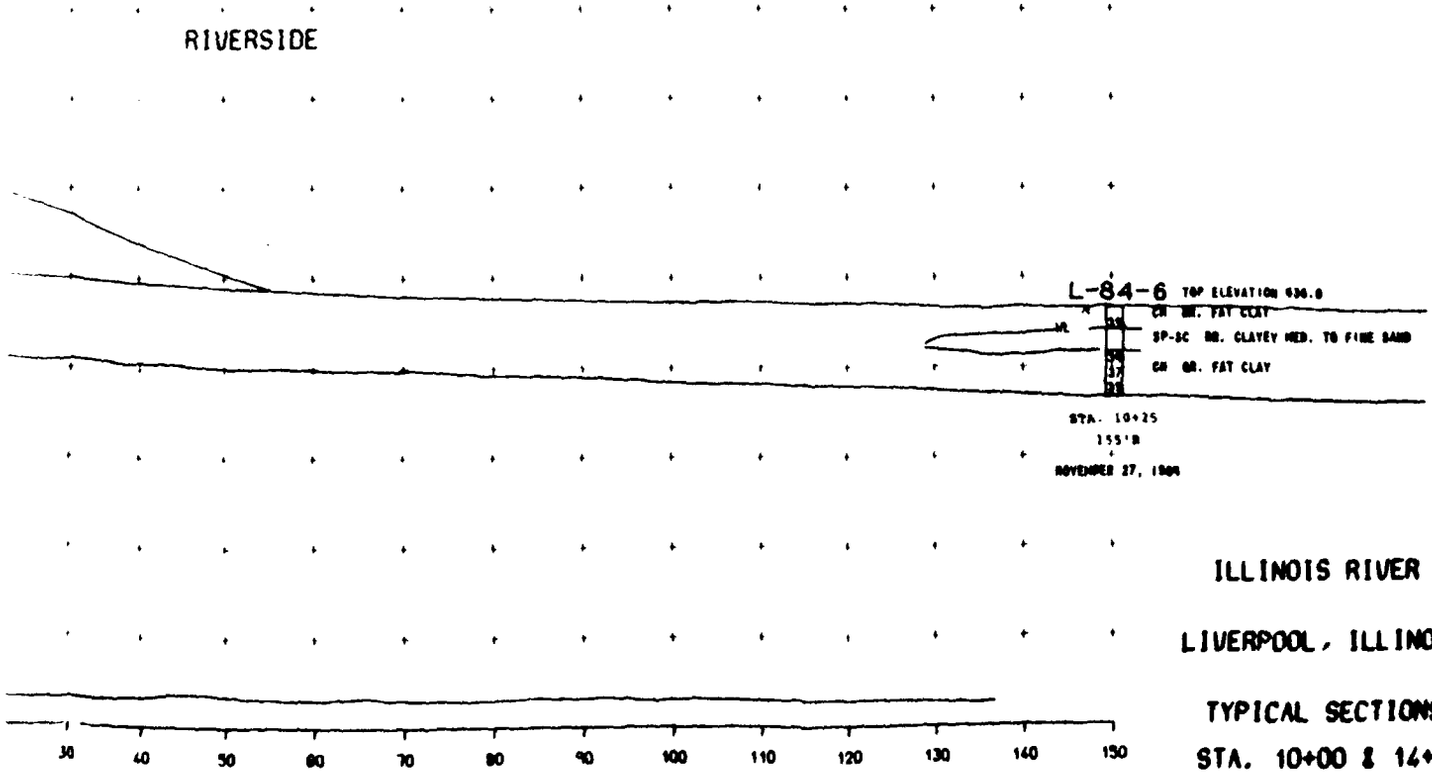

LANDSIDE
RIVERSI
PROPOSED SEMI-C
L-85-9
TOP ELEV. 442.5
ML BR. SANDY SILT
CL BR. SANDY LEAN CLAY (FILL)
SC BR. CLAYEY SAND (FILL)
SP BR. GRAVELLY COARSE TO FINE SAND
SP BR. GRAVELLY MEDIUM TO FINE SAND
SP BR. GRAVELLY COARSE TO FINE SAND, WITH BROKEN ROCK
SP BR. GRAVELLY COARSE TO FINE SAND
IMPERVIOUS TOP STRATUM
PERVIOUS SUBSTRATUM
BEDROCK
STA. 16+90
285'L
19 SEPTEMBER 1985
ELEVATION
STA. 14+00


LANDSIDE
RI
PROPOSED SEMI-COMPACTED IMPERVIOUS EMBANKMENT
L-84-1
CH BR. FAT CLAY
CL GR. SANDY LEAN CLAY
SP-SC BR. CLAYEY MED. TO FINE SAND
SP-SC BR. CLAYEY COARSE TO FINE SAND
IMPERVIOUS TOP STRATUM
PERVIOUS SUBSTRATUM
BEDROCK
STA. 10+15
5'R
NOVEMBER 27, 1984
ELEVATION
STA. 10+00



NOTES:

1. ALL LEVEE CROWN WIDTHS ARE 10 FEET.
2. ALL LEVEE SLOPES, BOTH LANDSIDE AND RIVERSIDE, ARE 1V ON 3H EXCEPT WHERE NOTED.
3. ALL DEPRESSIONS WITHIN 100 FEET OF THE LANDWARD TOE OF THE LEVEE WILL BE FILLED TO ELEVATION SHOWN FOR LANDSIDE TOE.



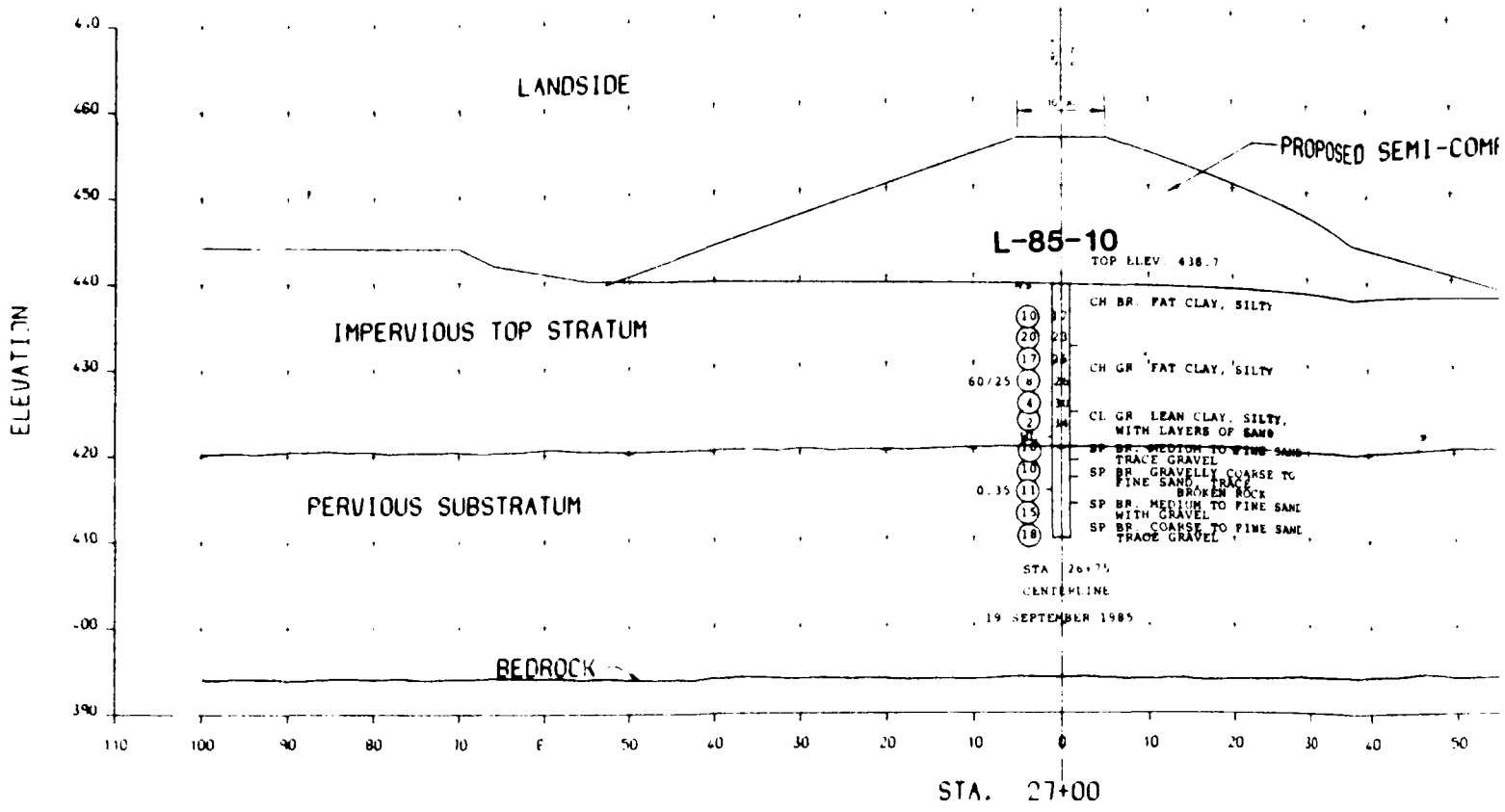
ILLINOIS RIVER

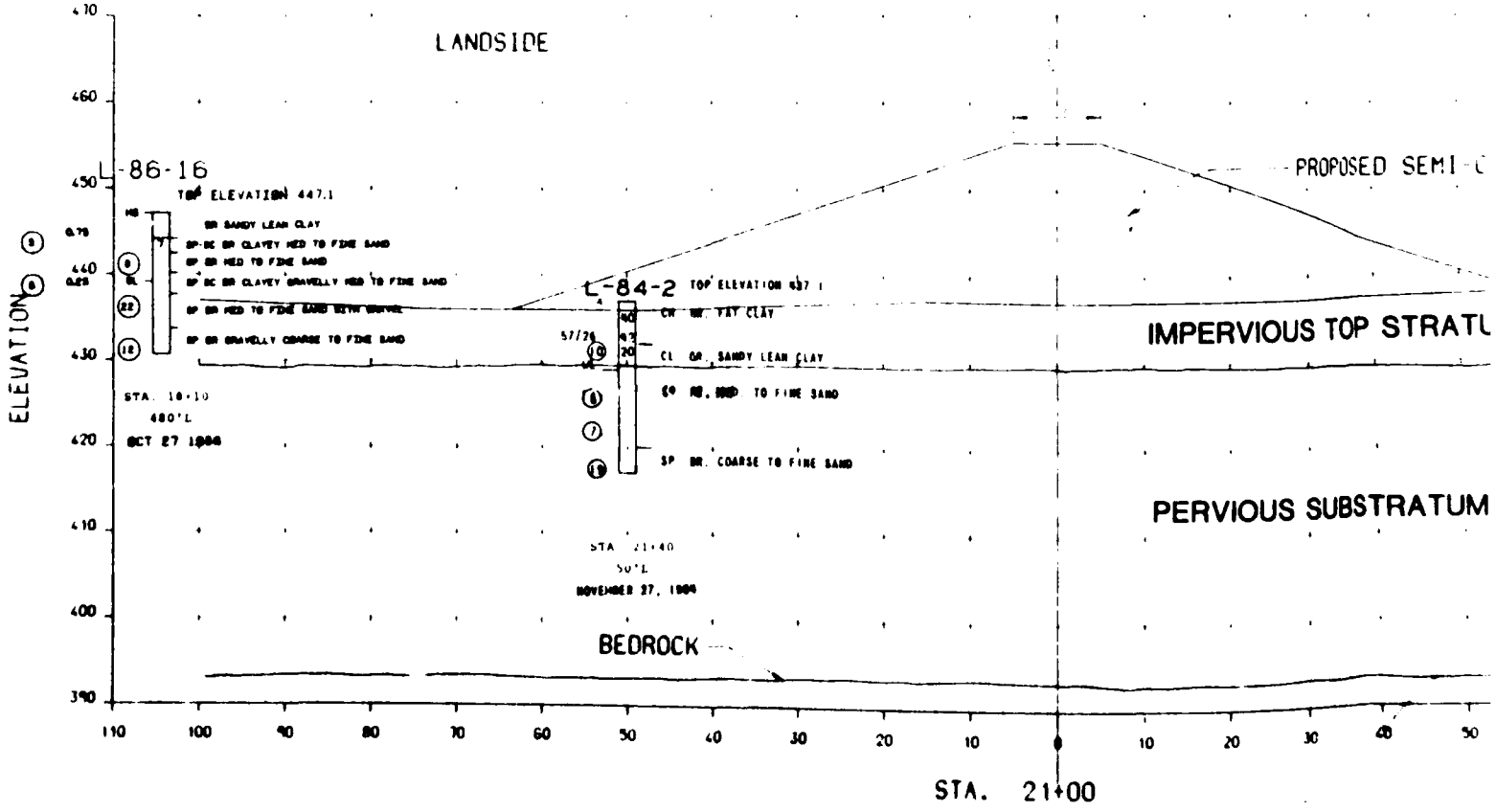
LIVERPOOL, ILLINOIS

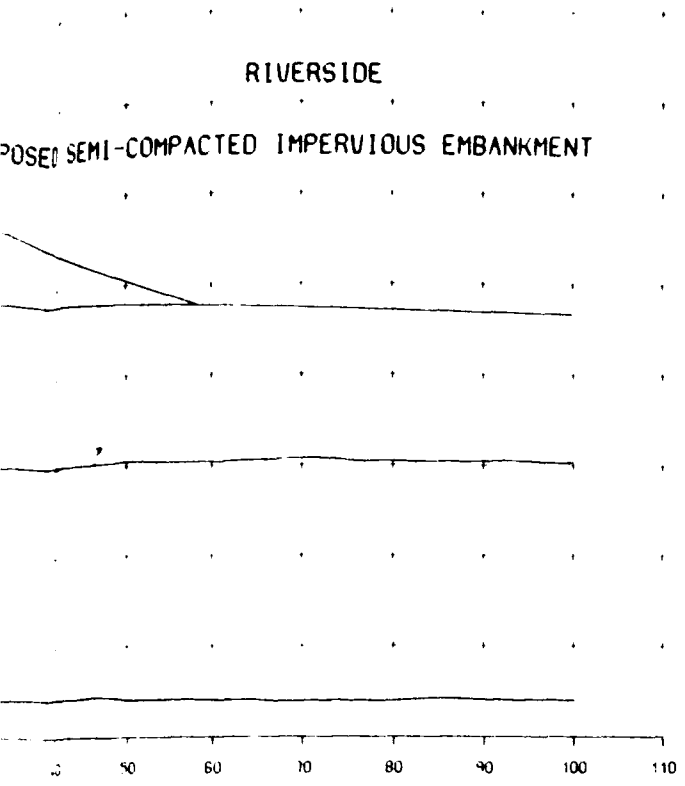
TYPICAL SECTIONS

STA. 10+00 & 14+00

PLATE B-17

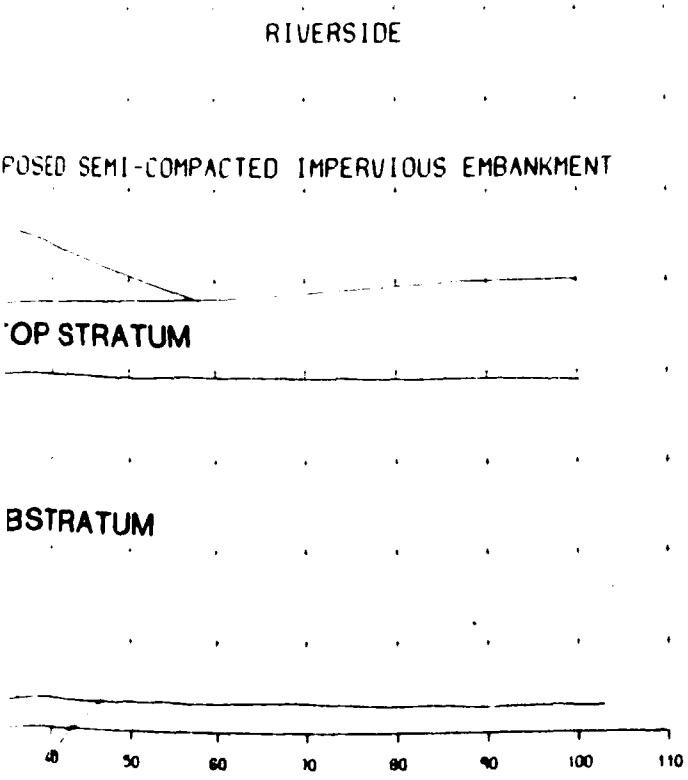

LANDSIDE
PROPOSED SEMI-COMP
L-85-10
TOP ELEV. 438.7
IMPERVIOUS TOP STRATUM
PERVIOUS SUBSTRATUM
BEDROCK
ELEVATION
CH BR. FAT CLAY, SILTY
CH GR FAT CLAY, SILTY
CL GR LEAN CLAY, SILTY, WITH LAYERS OF SAND
SP BR. MEDIUM TO FINE SAND, TRACE GRAVEL
SP BR. GRAVELLY COARSE TO FINE SAND, TRACE BROKEN ROCK
SP BR. MEDIUM TO FINE SAND WITH GRAVEL
SP BR. COARSE TO FINE SAND TRACE GRAVEL
60/25
0.35
STA 26+75
CENTERLINE
19 SEPTEMBER 1985
STA. 27+00


LANDSIDE
L-86-16
TOP ELEVATION 447.1
PROPOSED SEMI-C
L-84-2
IMPERVIOUS TOP STRATU
PERVIOUS SUBSTRATUM
BEDROCK
ELEVATION
CL GR. SANDY LEAN CLAY
SP BR. COARSE TO FINE SAND
57/26
STA. 18+10
480'L
OCT 27 1986
STA 21+40
50'L
NOVEMBER 27, 1984
STA. 21+00



NOTES:

1. ALL LEVEE CROWN WIDTHS ARE 10 FEET.
2. ALL LEVEE SLOPES, BOTH LANDSIDE AND RIVERSIDE, ARE 1V ON 3H EXCEPT WHERE NOTED.
3. ALL DEPRESSIONS WITHIN 100 FEET OF THE LANDWARD TOE OF THE LEVEE WILL BE FILLED TO ELEVATION SHOWN FOR LANDSIDE TOE.



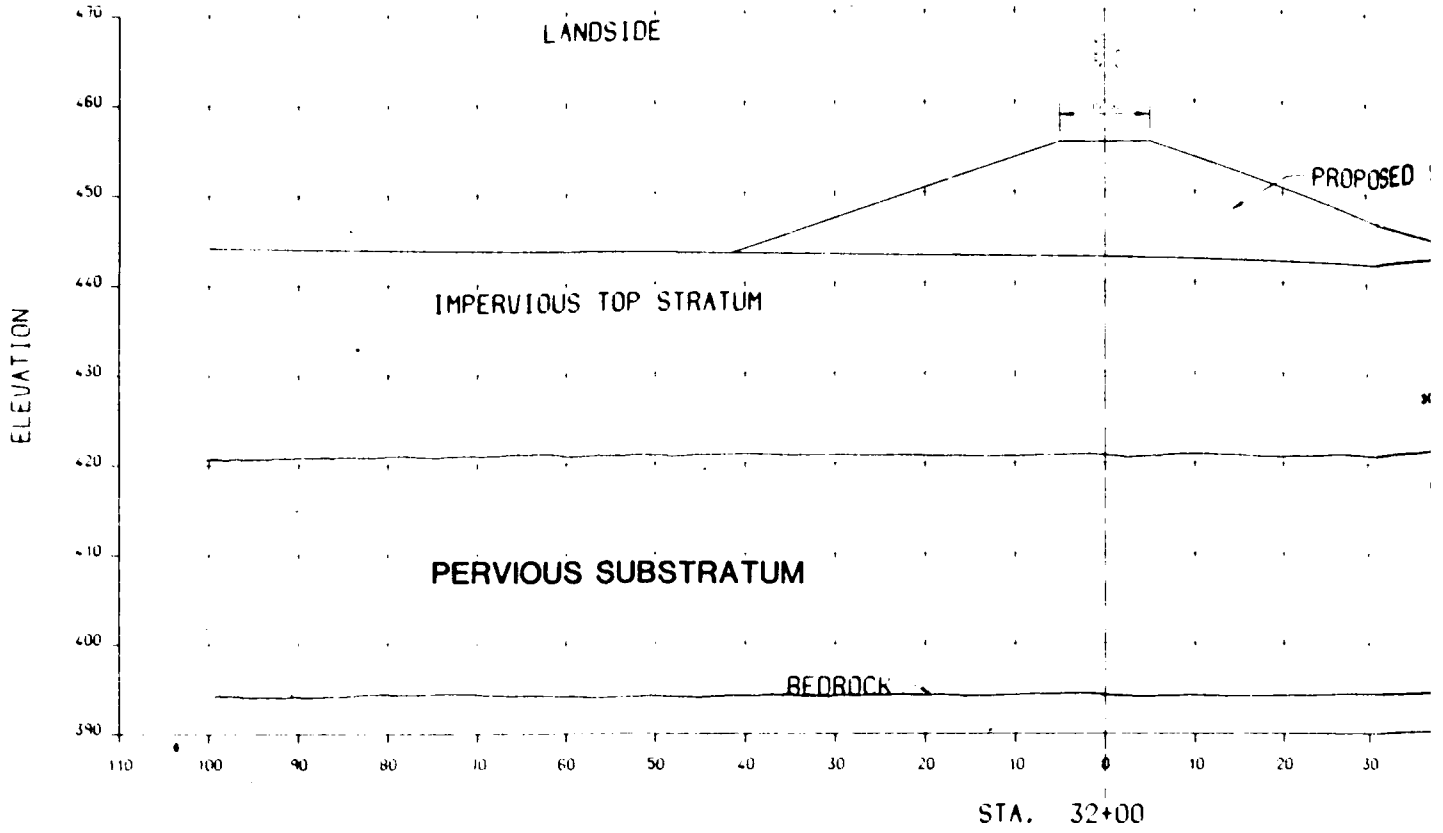
ILLINOIS RIVER

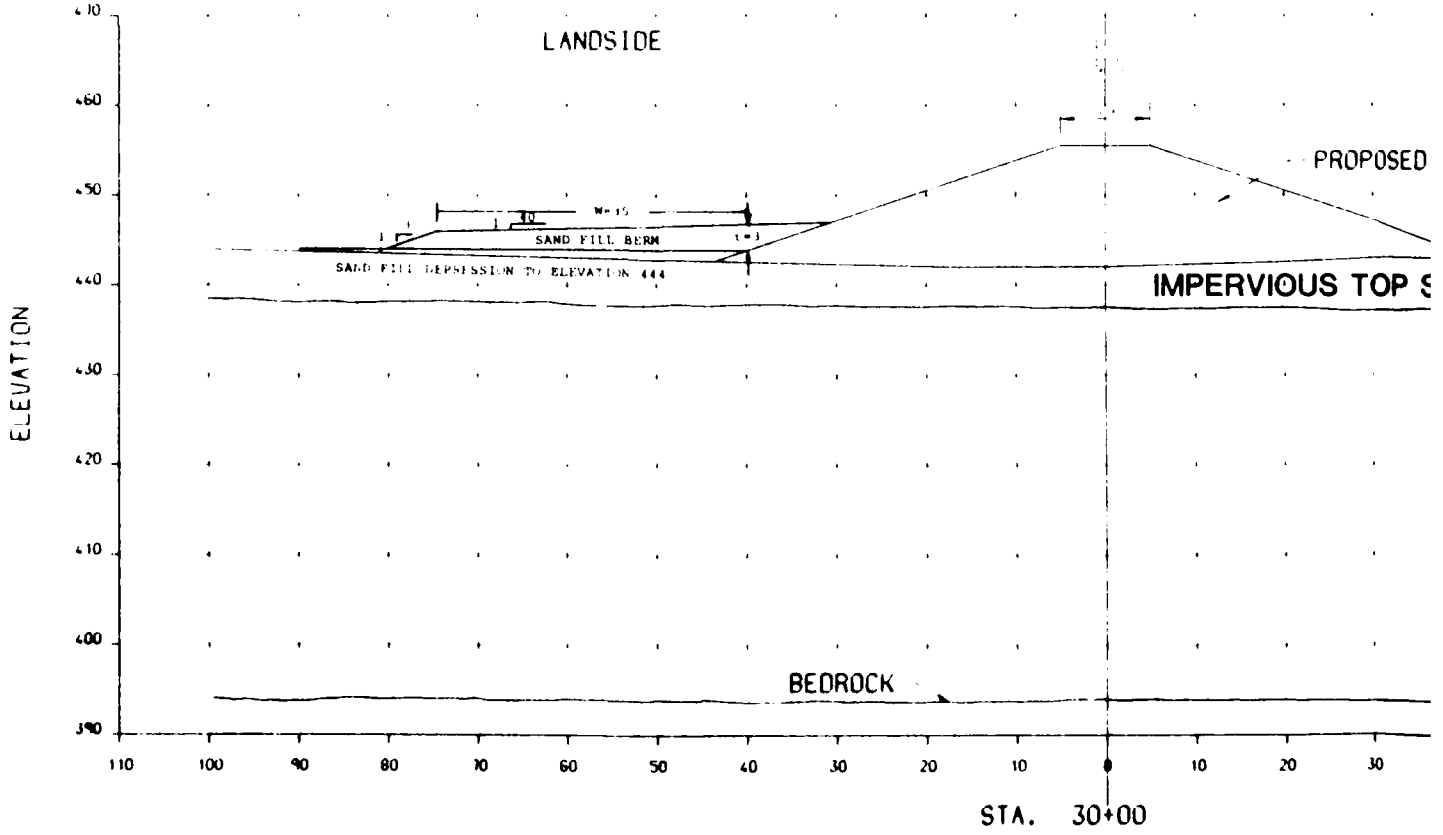
LIVERPOOL, ILLINOIS

TYPICAL SECTIONS

STA. 21+00 & 27+00

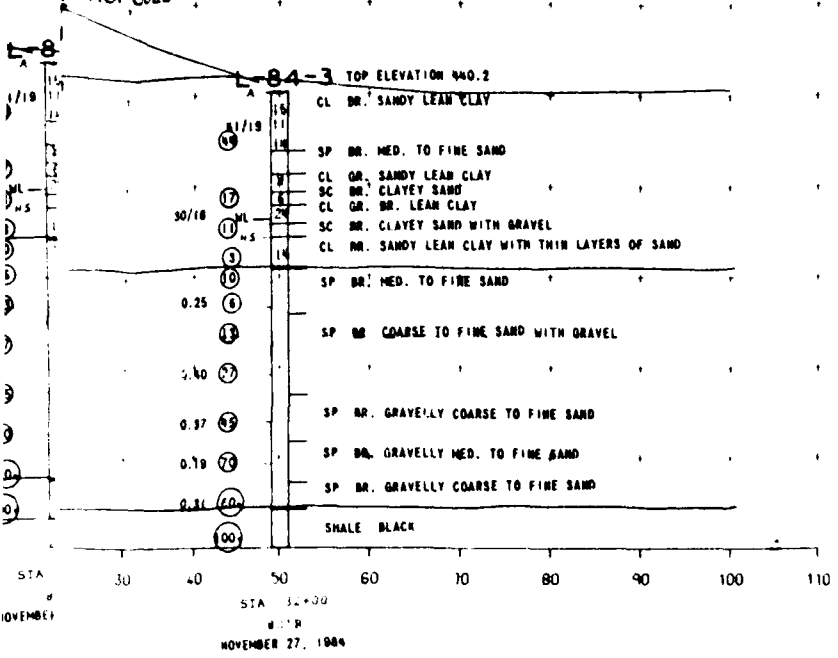
PLATE B-18


LANDSIDE
PROPOSED
IMPERVIOUS TOP STRATUM
PERVIOUS SUBSTRATUM
BEDROCK
ELEVATION
460
450
440
430
420
410
400
390
110
100
90
80
70
60
50
40
30
20
10
0
10
20
30
STA. 32+00


LANDSIDE
PROPOSED
SAND FILL BERM
IMPERVIOUS TOP S
BEDROCK
ELEVATION
460
450
440
430
420
410
400
390
110
100
90
80
70
60
50
40
30
20
10
0
10
20
30
STA. 30+00

RIVERSIDE

PROPOSED SEMI-COMPACTED IMPERVIOUS EMBANKMENT



NOTES:

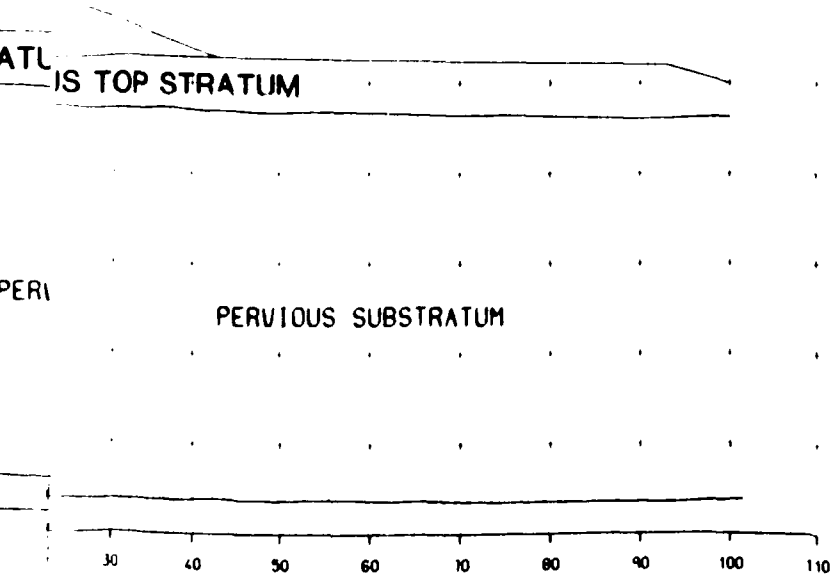
1. ALL LEVEE CROWN WIDTHS ARE 10 FEET.
2. ALL LEVEE SLOPES, BOTH LANDSIDE AND RIVERSIDE, ARE 1V ON 3H EXCEPT WHERE NOTED.
3. ALL DEPRESSIONS WITHIN 100 FEET OF THE LANDWARD TOE OF THE LEVEE WILL BE FILLED TO ELEVATION SHOWN FOR LANDSIDE TOE.

RIVERSIDE

PROPOSED SEMI-COMPACTED IMPERVIOUS EMBANKMENT

IS TOP STRATUM

PERVIOUS SUBSTRATUM



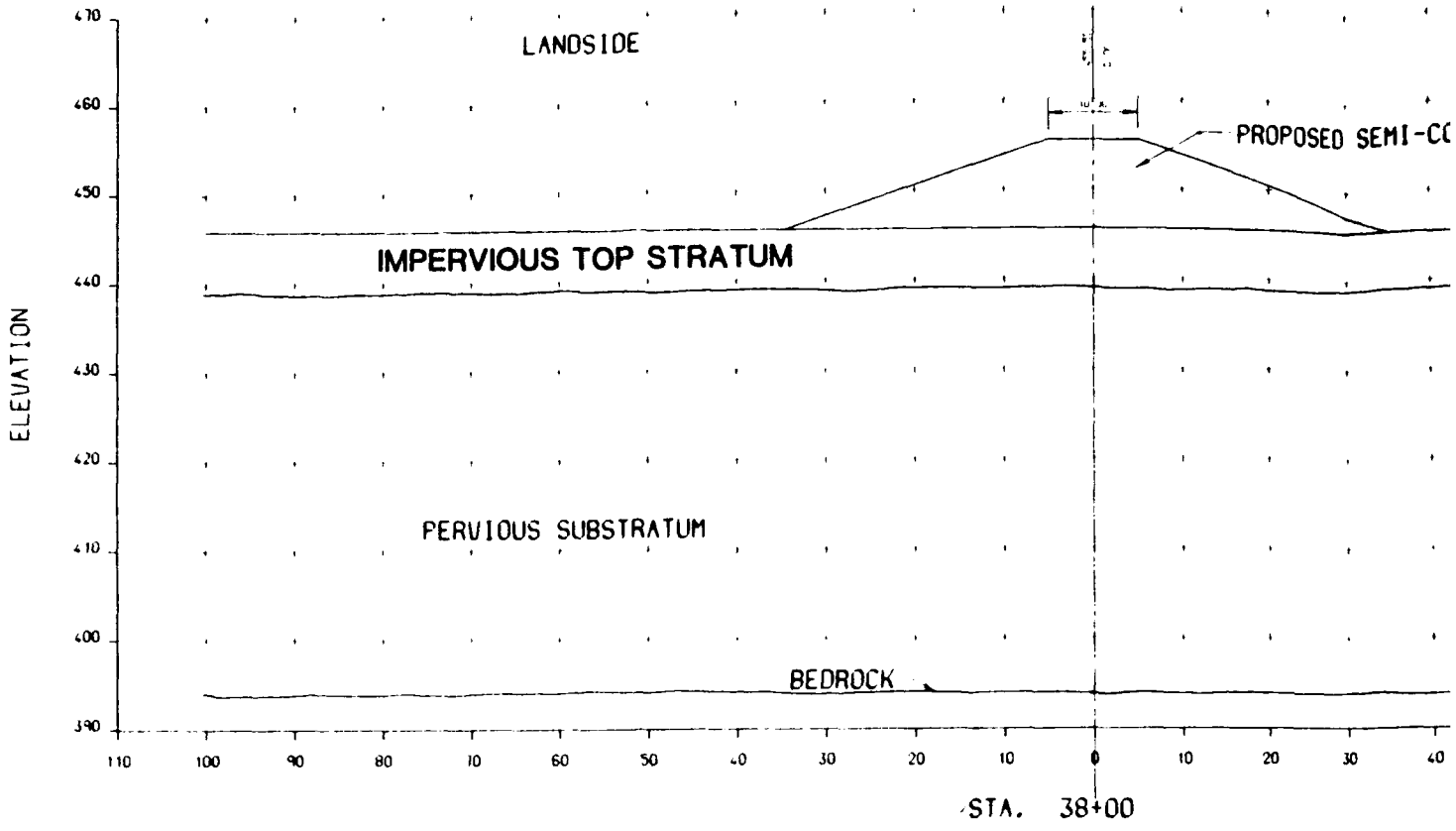
ILLINOIS RIVER

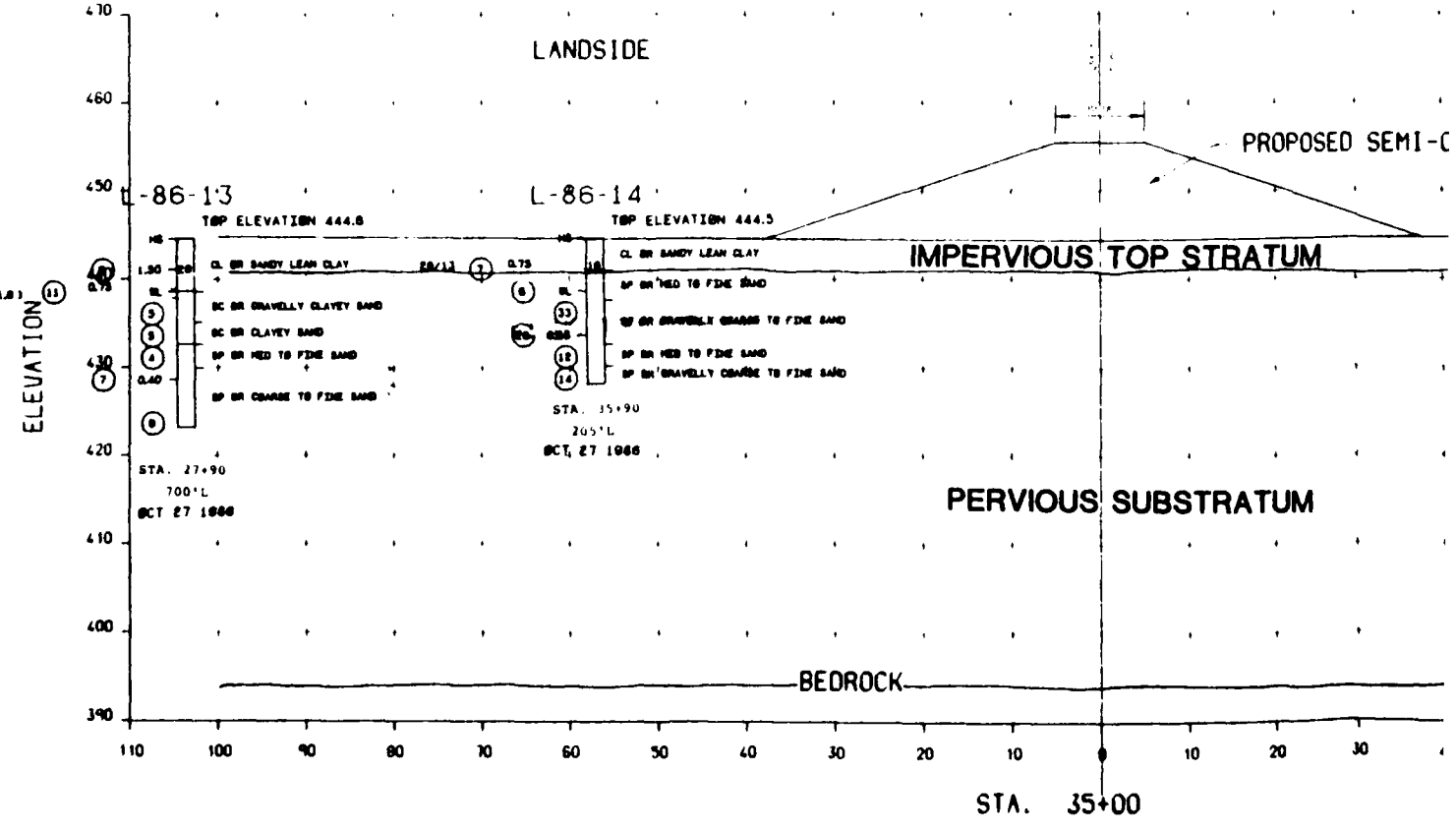
LIVERPOOL, ILLINOIS

TYPICAL SECTIONS

STA. 30+00 & 32+00

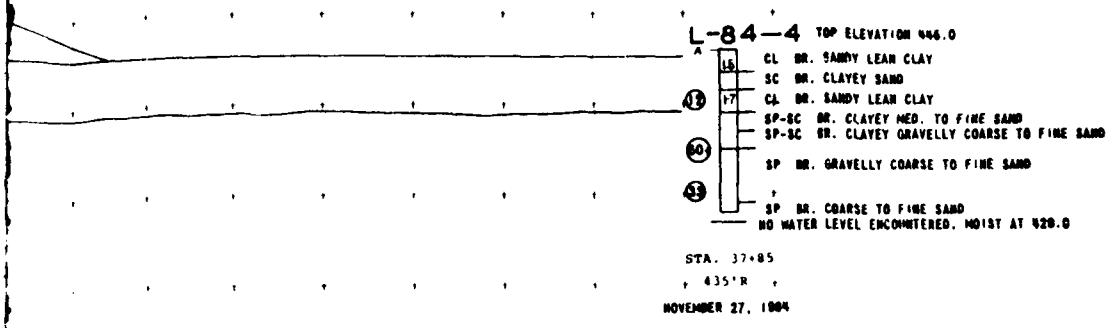
PLATE B-19

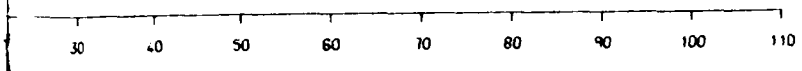

LANDSIDE
PROPOSED SEMI-C
IMPERVIOUS TOP STRATUM
PERVIOUS SUBSTRATUM
BEDROCK
ELEVATION
STA. 38+00


LANDSIDE
PROPOSED SEMI-C
L-86-13
L-86-14
TOP ELEVATION 444.8
TOP ELEVATION 444.5
IMPERVIOUS TOP STRATUM
PERVIOUS SUBSTRATUM
BEDROCK
ELEVATION
STA. 27+90
700'L
OCT 27 1986
STA. 35+90
205'L
OCT, 27 1986
STA. 35+00

RIVERSIDE

OSED SEMI-COMPACTED IMPERVIOUS EMBANKMENT



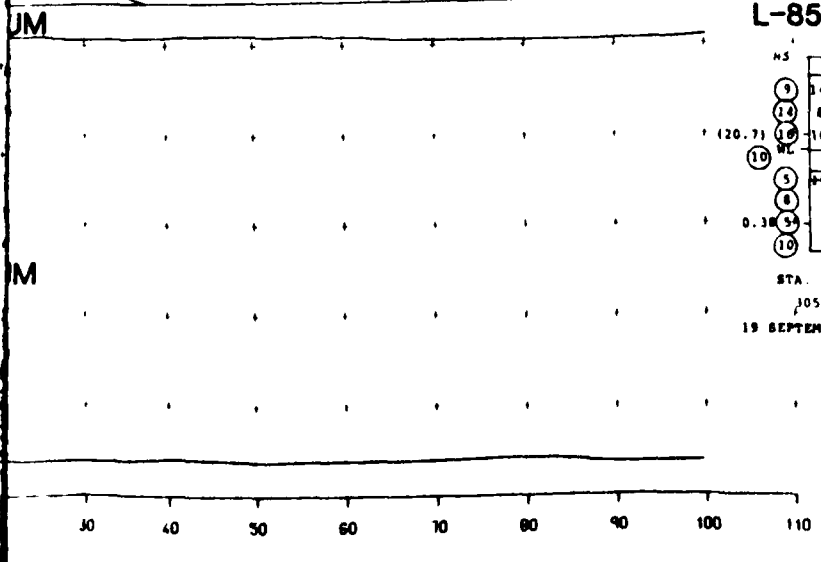


NOTES:

1. ALL LEVEE CROWN WIDTHS ARE 10 FEET.
2. ALL LEVEE SLOPES, BOTH LANDSIDE AND RIVERSIDE, ARE 1V ON 3H EXCEPT WHERE NOTED.
3. ALL DEPRESSIONS WITHIN 100 FEET OF THE LANDWARD TOE OF THE LEVEE WILL BE FILLED TO ELEVATION SHOWN FOR LANDSIDE TOE.

RIVERSIDE

POSED SEMI-COMPACTED IMPERVIOUS EMBANKMENT





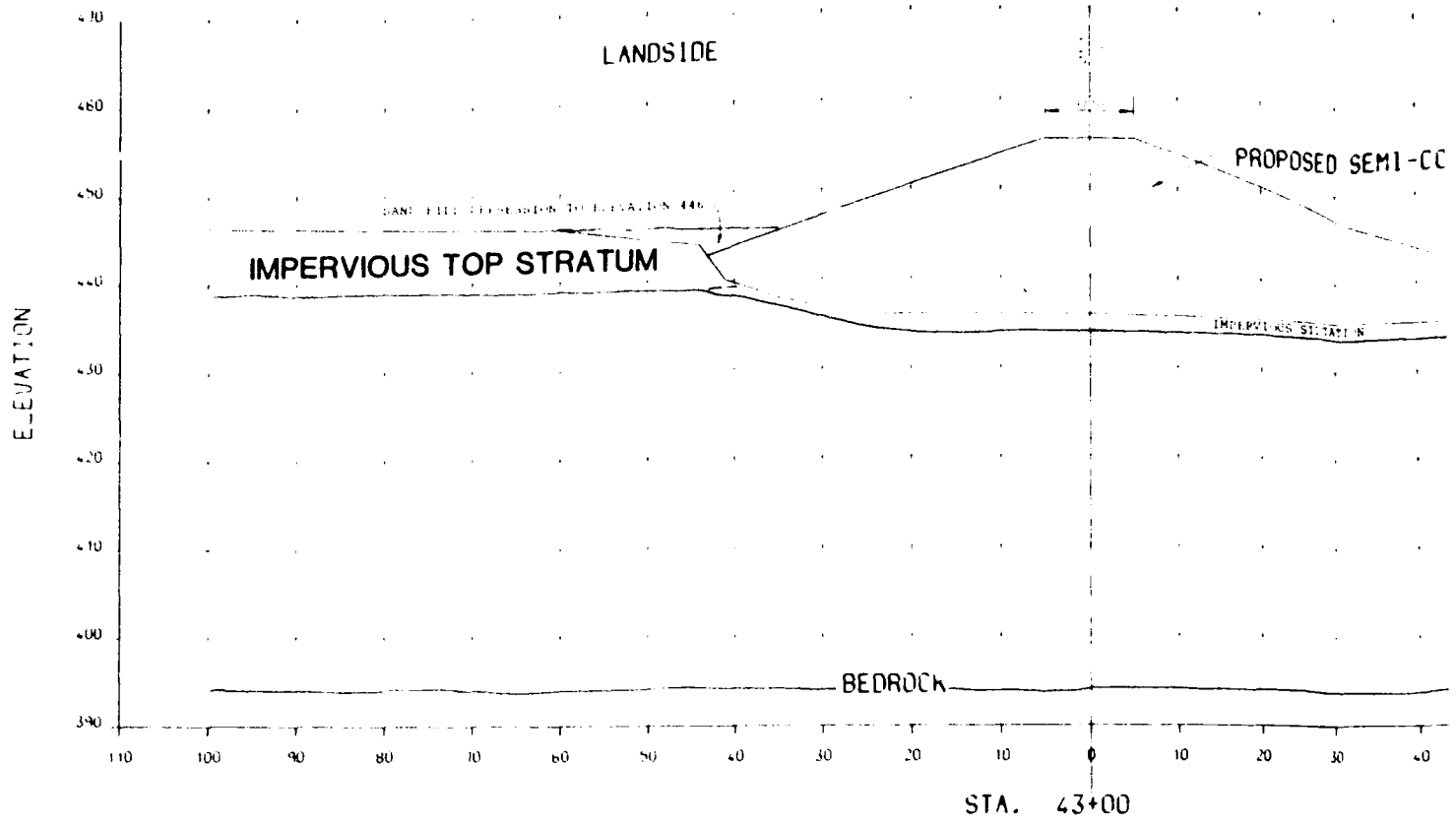
ILLINOIS RIVER

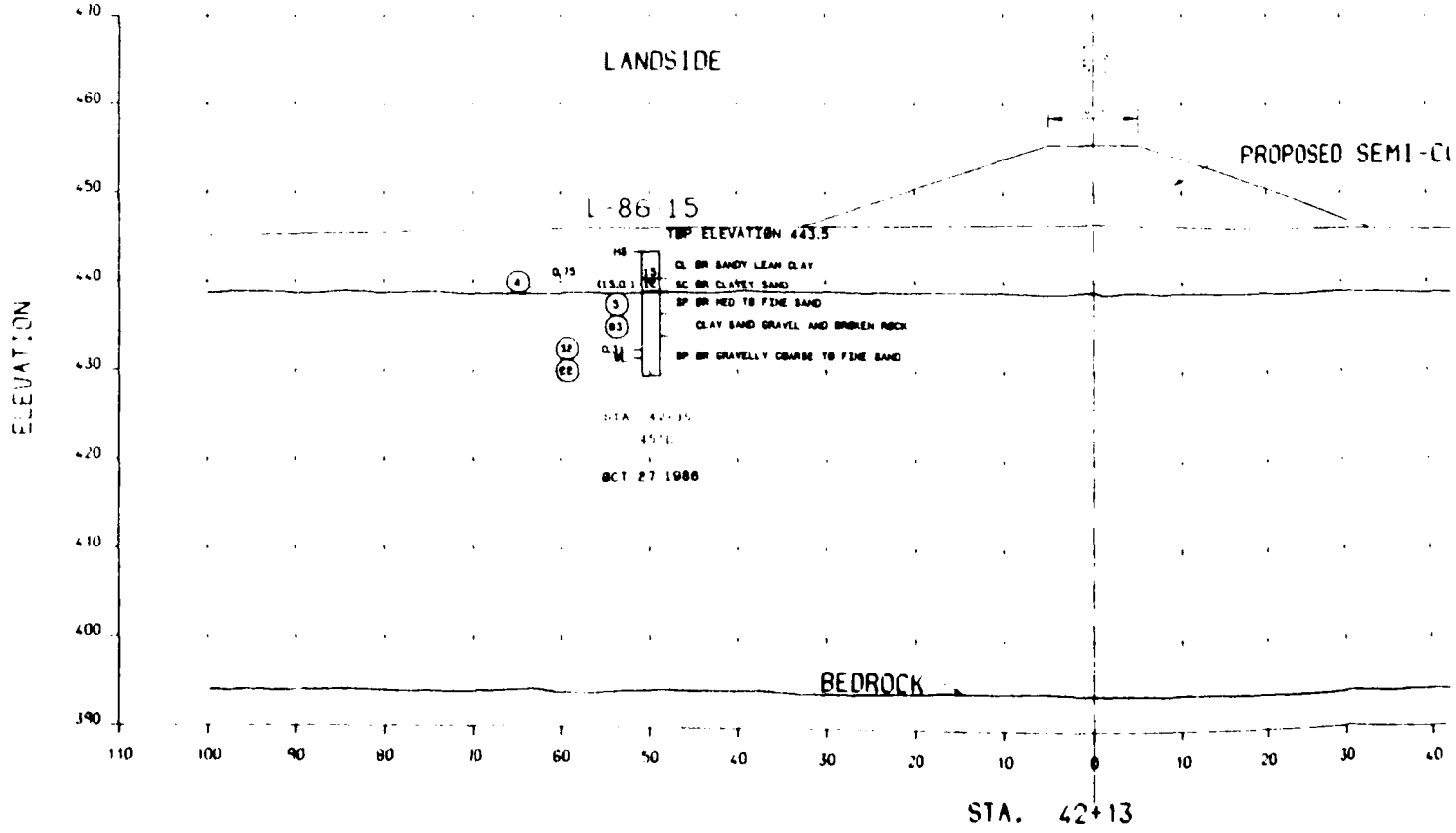
LIVERPOOL, ILLINOIS

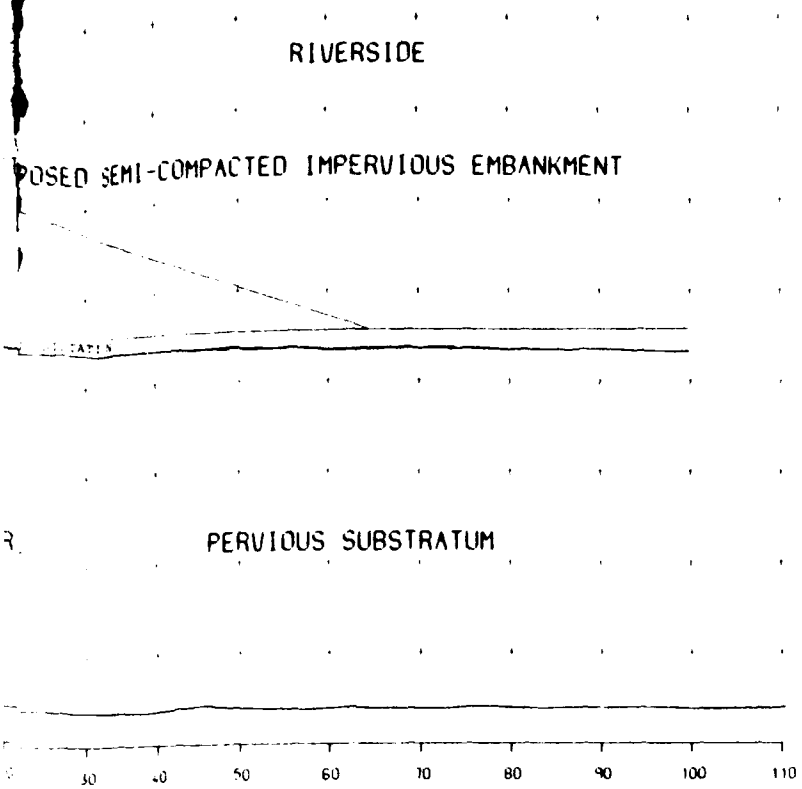
TYPICAL SECTIONS

STA. 35+00 & 38+00

PLATE B-20

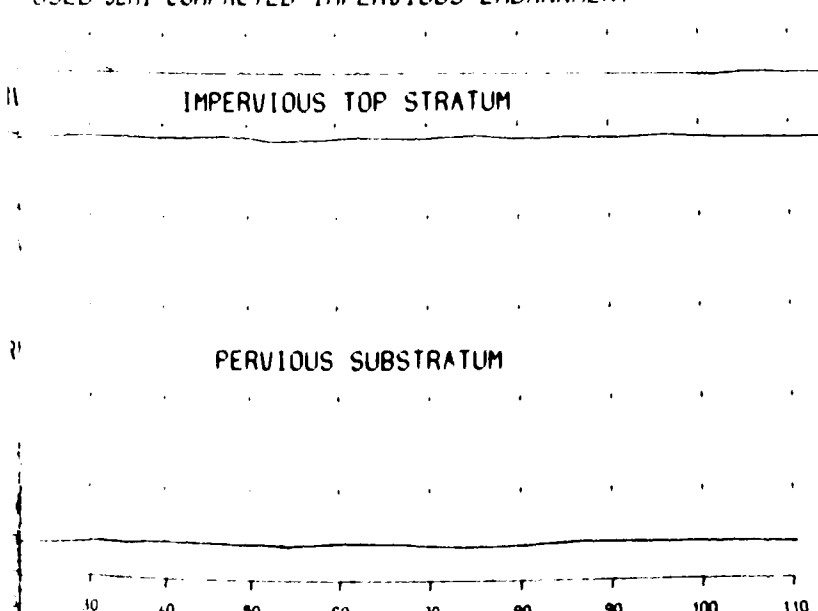

LANDSIDE
PROPOSED SEMI-CC
IMPERVIOUS TOP STRATUM
BEDROCK
ELEVATION
480
470
460
450
440
430
420
410
400
390
110
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
STA. 43+00

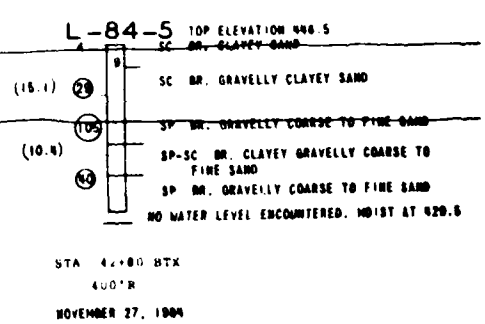

LANDSIDE
PROPOSED SEMI-C
L-86-15
TOP ELEVATION 443.5
CL BR SANDY LEAN CLAY
SC BR CLAYEY SAND
SP BR MED TO FINE SAND
CLAY SAND GRAVEL AND BROKEN ROCK
SP BR GRAVELLY COARSE TO FINE SAND
OCT 27 1986
BEDROCK
ELEVATION
480
470
460
450
440
430
420
410
400
390
110
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
STA. 42+13



NOTES:

1. ALL LEVEE CROWN WIDTHS ARE 10 FEET.
2. ALL LEVEE SLOPES, BOTH LANDSIDE AND RIVERSIDE, ARE 1V ON 3H EXCEPT WHERE NOTED.
3. ALL DEPRESSIONS WITHIN 100 FEET OF THE LANDWARD TOE OF THE LEVEE WILL BE FILLED TO ELEVATION SHOWN FOR LANDSIDE TOE.





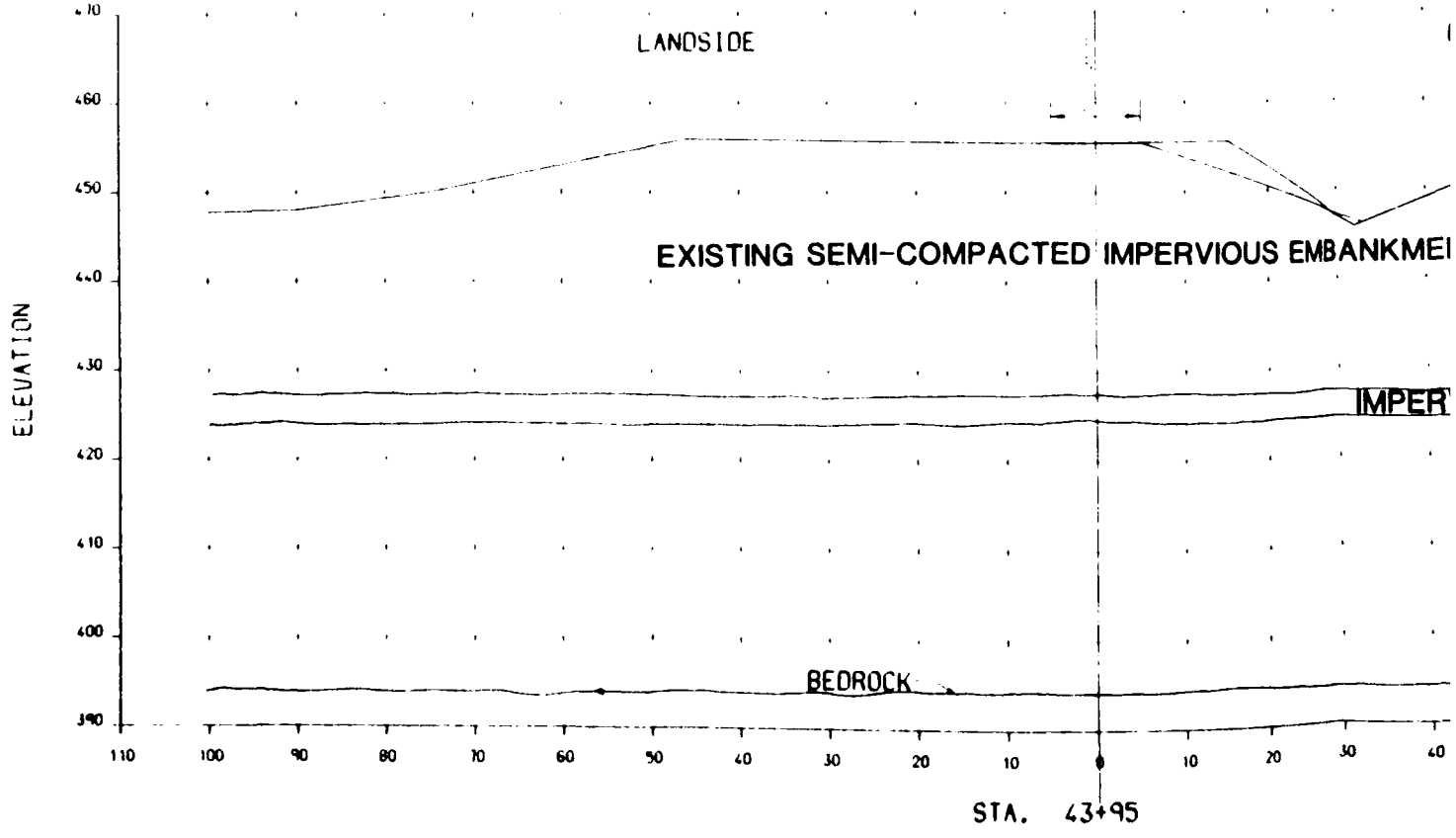
ILLINOIS RIVER

LIVERPOOL, ILLINOIS

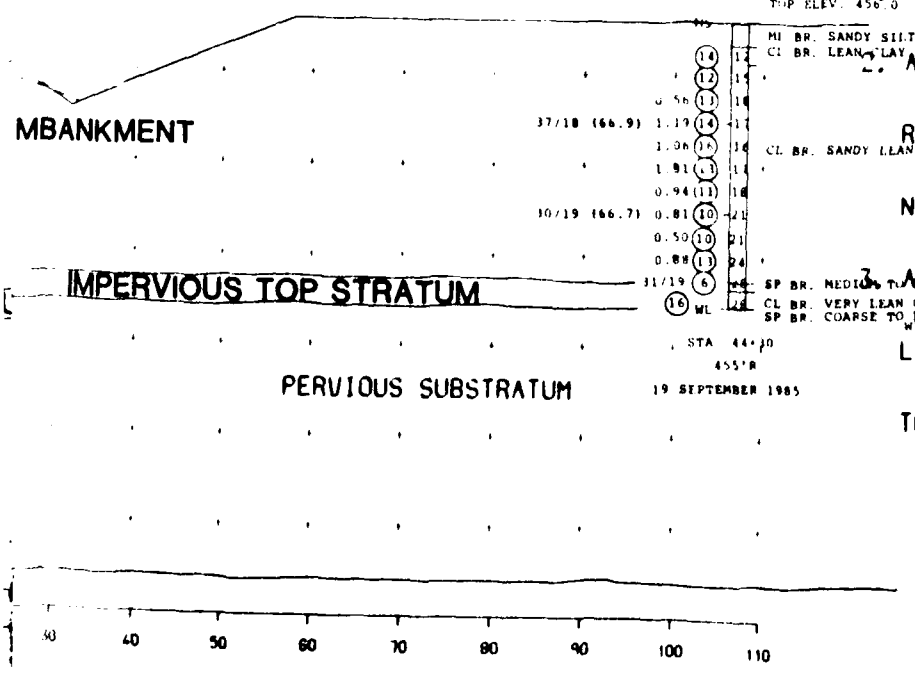
TYPICAL SECTIONS

STA. 42+13 & 43+00

PLATE B-21


LANDSIDE
EXISTING SEMI-COMPACTED IMPERVIOUS EMBANKMEI
IMPER
BEDROCK
ELEVATION
460
450
440
430
420
410
400
390
110
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
STA. 43+95

RIVERSIDE



NOTES:

1. ALL LEVEE CROWN WIDTHS ARE 10 FEET.
2. ALL LEVEE SLOPES, BOTH LANDSIDE AND RIVERSIDE, ARE 1V ON 3H EXCEPT WHERE NOTED.
3. ALL DEPRESSIONS WITHIN 100 FEET OF THE LANDWARD TOE OF THE LEVEE WILL BE FILLED TO ELEVATION SHOWN FOR LANDSIDE TOE.

ILLINOIS RIVER

LIVERPOOL, ILLINOIS

TYPICAL SECTIONS

STA. 43+95 **PLATE B-22**

ZERO AIR VOIDS G=2.70
DRY DENSITY, lbs / cu ft
110
108
106
104
102
100
98
96
94
92
90
88
86
84
5
4
3

Specimen Number	Dry density, pcf	Optimum moisture, %	Type Curve	Type Standard Proctor	Liquid limit	Plasticity index	Classification Group symbol	Description	Location Source	Boring	Depth, ft	Sample No.
①	94.0	23.0	5-pt.	A.S.T.M. Standard Proctor	32/25	9/21	CL-CH	Br. Medium Clay	Pitmans Knoll Quarries Site No. 2	LB-85-3	11 to 13	A-2-6
②	93.1	23.2	5-pt.	"	55/26	29/5	CL-CH	Br. Medium Clay	"	LB-85-4	9 to 11	A-2-6
③	102.4	21.2	5-pt.	"	33/23	9/3	CL	Br. Clay	Bluffland Brick Plant	LB-85-4	0 to 2	A-4(8)
④	99.2	22.2	5-pt.	"	44/22	24/12	CH	Gr. Fat Clay	"	LB-85-4	5 to 7	A-7-6(20)
⑤	102.4	18.4	5-pt.	"	54/20	29/11	CL-CH	Br. Sandy Medium Clay (Till)	"	LB-85-5	4 to 6	A-7-6(13)
⑥	100.0	21.6	5-pt.	"	46/22	24/12	CL-CH	Br. Medium Clay	"	LB-85-6	0 to 2	A-7-6(15)
⑦	108.8	15.5	5-pt.	"	22/21	9/2	ML	Br. Silt	Empire Mine Pit, Site No. 5	LB-85-7	2 to 4	A-4(8)

LIVERPOOL, ILLINOIS

FAMILY OF COMPACTION CURVES

ILLINOIS RIVER

PLATE B-23

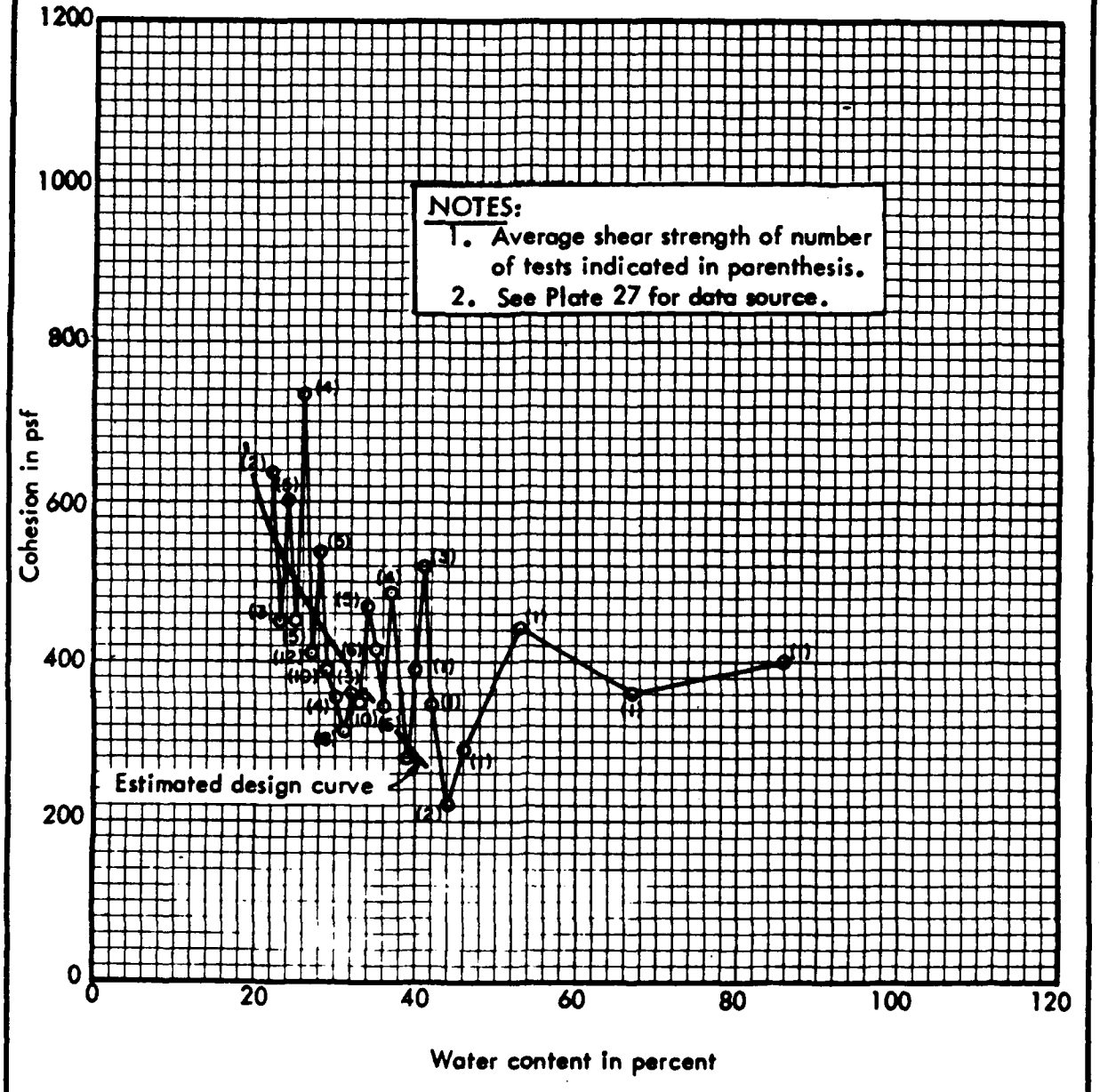
15 January 1986
BAWMANN Geotech Branch

LIVERPOOL, ILLINOIS
PROPOSED BORROW SOURCES
MOISTURE CONTROL EVALUATION

CURVE NUMBER	DESIRED PERCENT OPTIMUM MOISTURE CONTROL LIMITS	ALLOWABLE RANGE OF MOISTURE CONTENTS %	OPTIMUM MOISTURE CONTENT %	ALLOWABLE DEVIATION FROM OPTIMUM MOISTURE CONTENT % (-)	ALLOWABLE DEVIATION FROM OPTIMUM MOISTURE CONTENT % (+)	SELECTED DEVIATION FROM OPTIMUM MOISTURE CONTENT % (-)	SELECTED DEVIATION FROM OPTIMUM MOISTURE CONTENT % (+)	RANGE OF NATURAL MOISTURE CONTENTS %	AVERAGE OF NATURAL MOISTURE CONTENTS %	DEVIATION OF AVERAGE NATURAL MOISTURE CONTENT FROM OPTIMUM MOISTURE CONTENT %	OPTIMUM DRY DENSITY p.c.f.	TYPE OF MIXED SOILS FROM SACK SAMPLE	BORROW SITE NO.
1	90-120	20.7-27.6	23.0	2.3	4.6	2	4	19	19.0	- 4	94.0	CL-CH	2
2	90-120	20.9-27.8	23.2	2.3	4.6	2	4	27-38	31.6	+ 8½	93.1	CL-CH	2
3	90-120	19.1-25.4	21.2	2.1	4.2	2	4	32-33	32.5	+11½	102.4	CL	1
4	90-120	24.5-32.6	27.2	2.7	5.4	2	4	33-39	35.7	+ 8½	93.2	CH	1
5	90-110	16.7-20.5	18.6	1.9	1.9	2	2	24-26	24.5	+ 6	107.4	CL-CH(T)	1
6	90-120	18.9-25.2	21.0	2.1	4.2	2	4	26-31	28.8	+ 8	100.0	CL-CH	1
7	90-120	13.8-18.4	15.3	1.5	3.1	2	3	9-15	11.0	- 4½	110.8	ML	3

PLATE B-24

875-006



COHESIVE SHEAR STRENGTH FOR CL SOILS VS WATER CONTENT

PLATE B-25

875-006

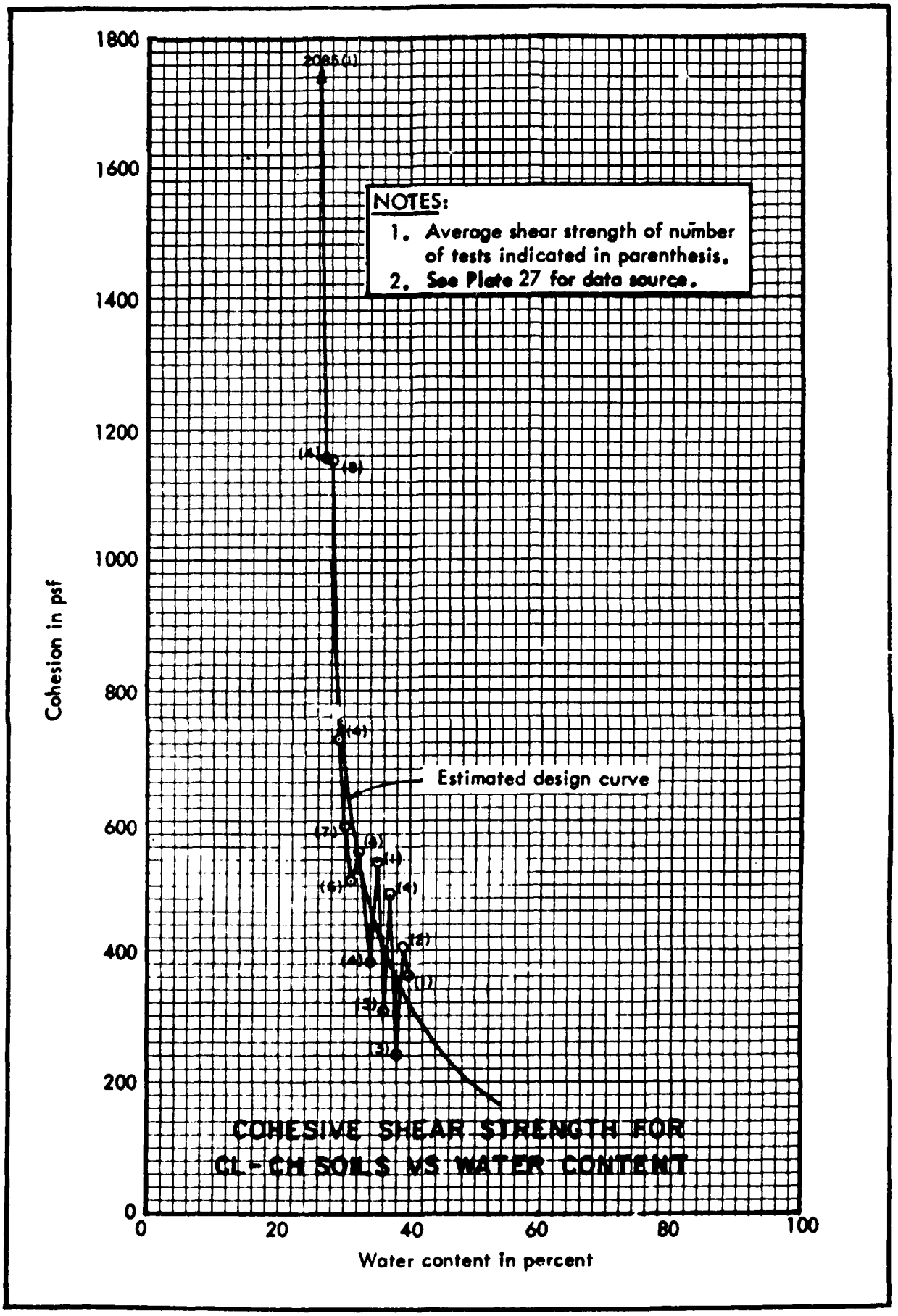
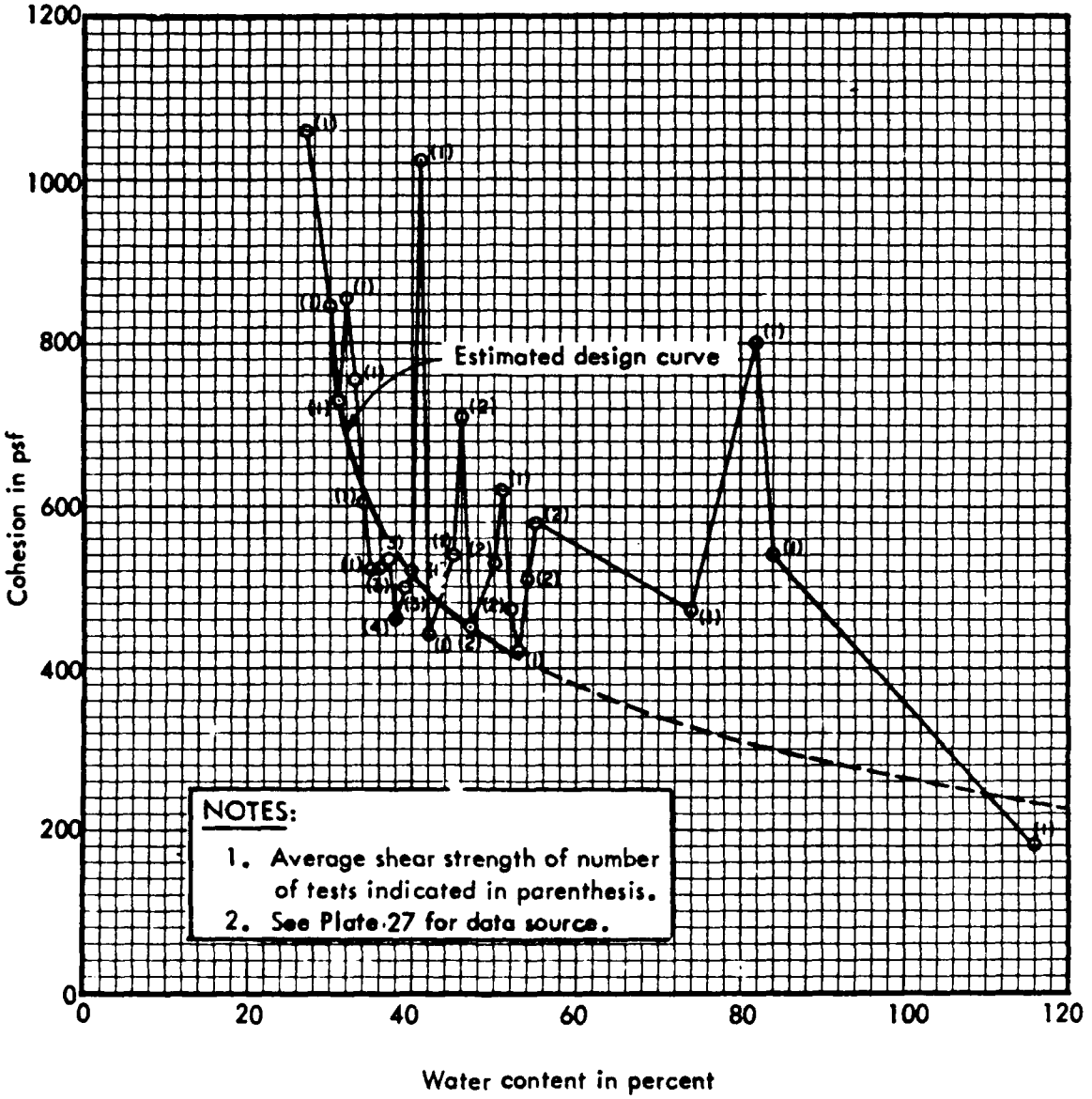


PLATE B-26

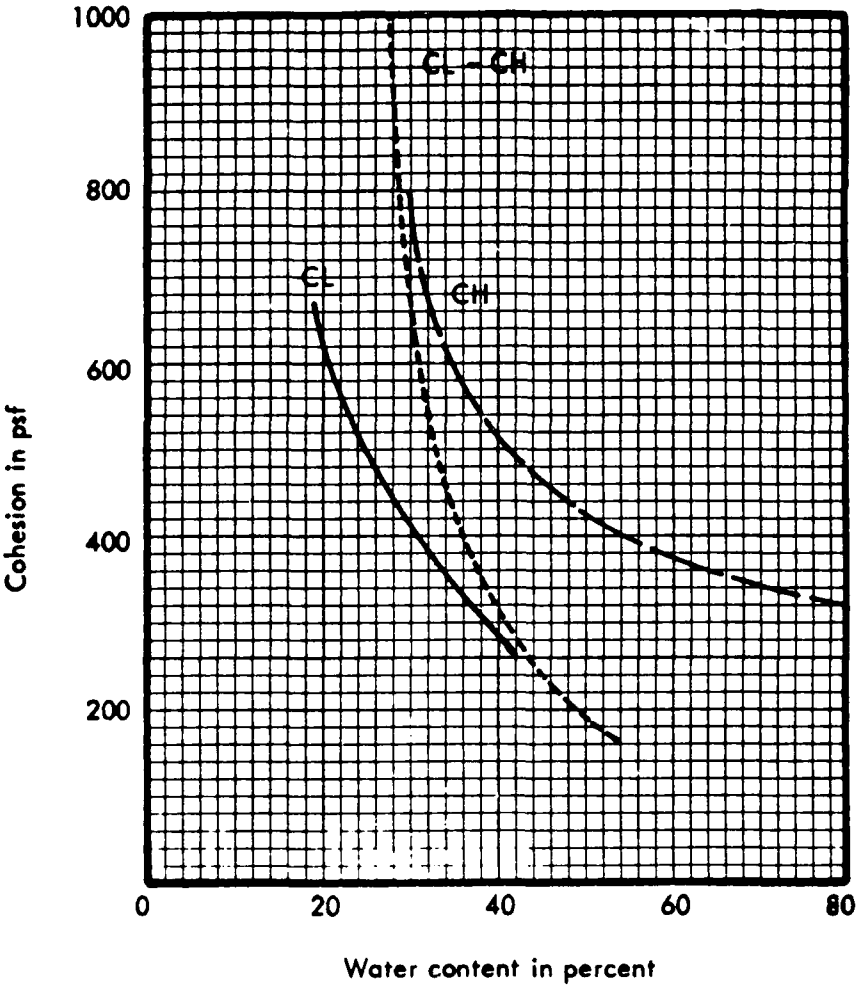
.575-006



COHESIVE SHEAR STRENGTH FOR CH SOILS VS WATER CONTENT

PLATE B-27

375-006

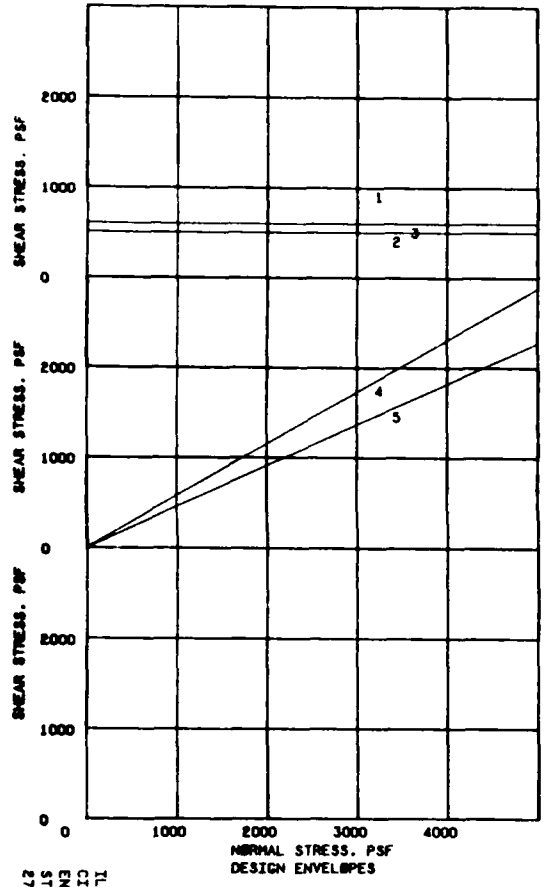


NOTE:

1. Cohesive shear strength curves derived from shear strength data supplied by Rock Island District for Mississippi River alluvial soils in the District, and shown on Plates B-25, B-26, and B-27.

COHESIVE SHEAR STRENGTH VS WATER CONTENT

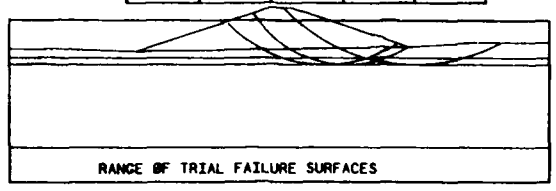
PLATE B-28



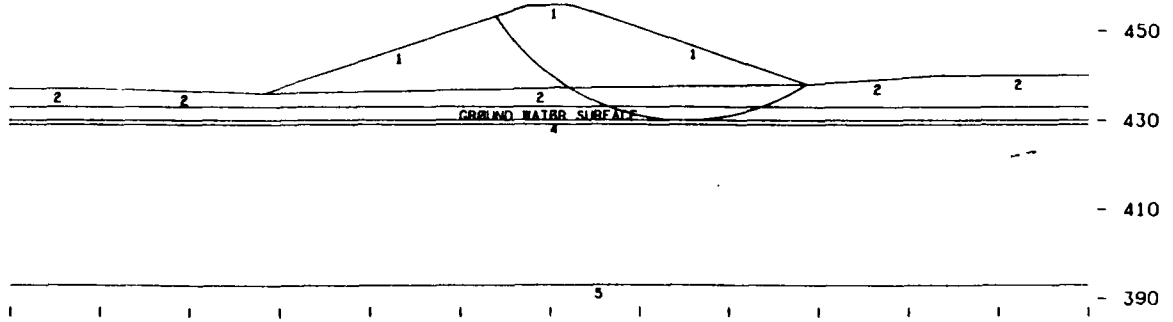
MATERIAL		SOIL WT. LBS./CUFT		SHEAR STRENGTH							
				Q		R		S		(R+S)/2	
		MOIST	SAT.	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF
SEMI-COMP IMPR EMBANK EL 438 TO EL 455.5	1	125.00	130.00	0.00	1000.00	13.00	1000.00	28.00	0.00	19.76	500.00
IMPERV TOP STRATUM CH EL 433 TO EL 440	2	117.00	120.00	0.00	500.00	12.00	500.00	30.00	0.00	21.55	250.00
IMPERV TOP STRATUM CL EL 430 TO EL 433	3	123.00	125.00	0.00	800.00	12.00	500.00	28.00	0.00	20.41	250.00
PERV SUBSTRATUM SP EL 393 TO EL 430	4	130.00	135.00	30.00	0.00	30.00	0.00	30.00	0.00	30.00	0.00
BEDROCK SHALE BELOW EL 393	5	150.00	150.00	24.50	0.00	24.50	0.00	24.50	0.00	24.50	0.00

CIRCLE FAILURE SURFACE
RESULTS BY HARRIS-500
COMPUTER PROGRAM 741-H5-F424A
TANGENT TO ELEV 430.11
TRIAL ARCS

RADIUS OF CIRCLE	CENTER OF CIRCLE DISTANCE FROM Q	CENTER OF CIRCLE ELEV	F.S. Q k_h= 0.00	
50.00	30.00	480.00	2.39	
60.00	20.00	490.00	3.41	
80.00	60.00	510.00	4.52	
40.00	30.00	470.00	2.81	
90.00	50.00	520.00	3.18	
50.00	20.00	480.00	3.39	



NOTES
1- ANALYSES WERE RUN ACCORDING TO EM 1110-2-1902 DATED APRIL 1970
2- THE SIDE EARTH FORCE DIRECTION WAS TAKEN AS THE AVERAGE OF THE EMBANKMENT SLOPES IMMEDIATELY ADJACENT TO THE SLICE INTERFACE
3- PSI-SIESMIC COEFFICIENT USED IN ANALYSES



ILLINOIS RIVER, LIVERPOOL, IL DPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 21+00 RIVERSIDE
27 JANUARY 1987 DMB

PLATE B-29

INPUT DATA

MINIMUM ELEVATION OF CIRCLE= 430.1 X-START= 50.0 Y-START= 510.0 SEARCH INCREMENT= 1[illegible].0 F.S. MIN.= 0.000

NUMBER OF LINES= 11 MINIMUM NO. OF SLICES= 20 SEISMIC COEFF.= 0.000

EMBANKMENT AND FOUNDATION PROFILE--

XTOEL	YTOEL	XTOPL	YTOPL	XTOER	YTOER	XTOPR	YTOPR
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

X1(I)	Y1(I)	X2(I)	Y2(I)	TYPE
-5000.0	437.0	-100.0	437.0	2
-100.0	437.0	-63.5	436.0	2
-63.5	436.0	-5.0	455.5	1
-5.0	455.5	5.0	455.5	1
5.0	455.5	57.5	438.0	1
57.5	438.0	87.0	440.0	2
87.0	440.0	5000.0	440.0	2
-63.5	436.0	57.5	438.0	2
-5000.0	433.0	5000.0	433.0	3
-5000.0	430.0	5000.0	430.0	4
-5000.0	393.0	5000.0	393.0	5

SOIL CONSTANTS--

NUMBER OF SOIL TYPES= 5

TYPE NO.	WT.MOIST	WT.SAT.	C(1)	PHI(1)	C(2)	PHI(2)
1	125.0	130.0	1000.0	0.0	0.0	0.0
2	117.0	120.0	500.0	0.0	0.0	0.0
3	123.0	125.0	600.0	0.0	0.0	0.0
4	130.0	135.0	0.0	32.0	0.0	0.0
5	150.0	150.0	0.0	24.5	0.0	0.0

PIEZOMETRIC SURFACE DATA--

NUMBER OF POINTS FOR PEIZOMETRIC SURFACE= 2

XPIEZ(I)	YPIEZ(I)
-5000.0	429.0
5000.0	429.0

DRAWDOWN SURFACE DATA--

NUMBER OF POINTS FOR DRAWDOWN SURFACE= 0

ILLINOIS RIVER, LIVERPOOL, IL DPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 21+00 RIVERSIDE
27 JANUARY 1987 DHB

PLATE B-30

X-COORDINATE OF CENTER	Y-COORDINATE OF CENTER	FACTOR OF SAFETY
50.00	510.00	3.180
50.00	520.00	3.181
60.00	510.00	4.518
40.00	509.99	2.694
30.00	509.99	2.725
39.99	519.99	2.813
40.01	499.99	2.584
40.01	489.99	2.539
40.02	479.99	2.580
30.01	489.99	2.438
20.01	489.98	3.412
30.01	499.99	2.574
30.02	479.99	2.390
30.03	469.99	2.610
20.02	479.98	3.388
40.02	479.99	2.580
25.02	479.98	2.753
35.02	479.99	2.394
30.03	474.99	2.474
30.02	484.99	2.405

****

MINIMUM FACTOR OF SAFETY = 2.390 LOCATED AT X= 30.02 Y= 479.99

NUMBER OF SLICES USED = 24 RADIUS OF CIRCLE = 49.89

****

ILLINOIS RIVER, LIVERPOOL, IL DPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 21+00 RIVERSIDE
27 JANUARY 1987 DHB

PLATE B-31

CHECK DATA FOR CRITICAL ARC

FACTOR OF SAFETY= 2.398

LOCATION OF CENTER-- X= 30.02 Y= 479.99

RADIUS= 49.89

TABULATION OF SLICE DATA--

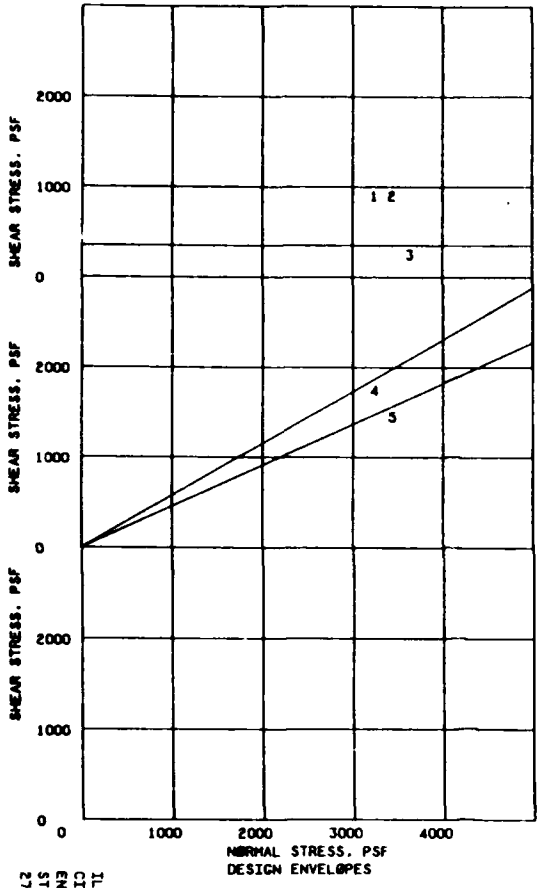
SLICE NO.	X-COORD. OF SLICE	SLICE WIDTH	TOTAL WT.	WATER FORCE	DIR. OF W.FORCE	C-FORCE DEVEL.	PHI DEVEL.	DIR. OF C-FORCE	NORMAL STRESS	NORMAL FORCE	ALPHA TOP	ALPHA BOTM.	E1	E2
1	-10.86	2.34	0.63	0.00	0.00	1.71	0.00	-55.04	0.09	0.36	0.0	0.0	0.00	0.00
2	-8.52	2.34	1.76	0.00	0.00	1.55	0.00	-50.58	0.30	1.12	0.0	0.0	0.00	0.00
3	-6.17	2.34	2.77	0.00	0.00	1.43	0.00	-46.52	0.74	2.52	0.0	0.0	0.00	0.85
4	-3.42	3.17	4.96	0.00	0.00	1.79	0.00	-42.09	1.19	5.07	0.0	0.0	0.85	2.92
5	-0.25	3.17	6.00	0.00	0.00	1.67	0.00	-37.36	1.58	6.28	0.0	0.0	2.92	5.41
6	2.92	3.17	6.88	0.00	0.00	1.58	0.00	-32.91	1.90	7.18	0.0	0.0	5.41	7.99
7	4.75	0.50	1.16	0.00	0.00	0.12	0.00	-30.44	-0.33	-0.19	0.0	-9.2	7.99	7.89
8	6.38	2.75	6.51	0.00	0.00	0.65	0.00	-28.29	1.56	4.87	-9.2	-18.4	7.89	10.03
9	9.13	2.75	6.64	0.00	0.00	0.63	0.00	-24.76	2.07	6.26	-18.4	-18.4	10.03	12.19
10	11.88	2.75	6.70	0.00	0.00	0.62	0.00	-21.32	2.14	6.33	-18.4	-18.4	12.19	14.01
11	14.94	3.35	8.16	0.00	0.00	0.88	0.00	-17.60	2.20	7.75	-18.4	-18.4	14.01	15.59
12	18.29	3.35	8.07	0.00	0.00	0.87	0.00	-13.60	2.25	7.76	-18.4	-18.4	15.59	16.63
13	21.64	3.35	7.89	0.00	0.00	0.85	0.00	-9.67	2.27	7.70	-18.4	-18.4	16.63	17.11
14	24.99	3.35	7.61	0.00	0.00	0.85	0.00	-5.79	2.25	7.59	-18.4	-18.4	17.11	17.02
15	28.35	3.35	7.23	0.00	0.00	0.84	0.00	-1.93	2.21	7.40	-18.4	-18.4	17.02	16.40
16	31.70	3.35	6.76	0.00	0.00	0.84	0.00	1.93	2.13	7.15	-18.4	-18.4	16.40	15.26
17	35.05	3.35	6.20	0.00	0.00	0.85	0.00	5.79	2.03	6.83	-18.4	-18.4	15.26	13.65
18	38.40	3.35	5.54	0.00	0.00	0.85	0.00	9.67	1.89	6.41	-18.4	-18.4	13.65	11.62
19	41.75	3.35	4.79	0.00	0.00	0.87	0.00	13.60	1.71	5.90	-18.4	-18.4	11.62	9.27
20	45.11	3.35	3.93	0.00	0.00	0.88	0.00	17.60	1.49	5.25	-18.4	-18.4	9.27	6.71
21	48.48	3.39	3.01	0.00	0.00	0.76	0.00	21.71	1.20	4.38	-18.4	-18.4	6.71	4.26
22	51.87	3.39	1.93	0.00	0.00	0.79	0.00	25.97	0.89	3.34	-18.4	-18.4	4.26	1.97
23	55.25	3.39	0.73	0.00	0.00	0.82	0.00	30.38	0.51	2.00	-18.4	-18.4	1.97	0.16
24	57.85	0.20	0.00	0.00	0.00	0.10	0.00	32.80	0.54	0.13	-18.4	-18.4	0.16	0.00

NOTE-ALL ANGLES MEASURED FROM POSITIVE X-AXIS,FORCES ARE IN KIPS

**NOTE HORIZONTAL EARTHQUAKE FORCE MAY BE CALCULATED BY MULTIPLYING THE TOTAL SLICE WT. BY THE E.Q. COEFF.

ILLINOIS RIVER, LIVERPOOL, IL DPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 21+00 RIVERSIDE
27 JANUARY 1987 DHB

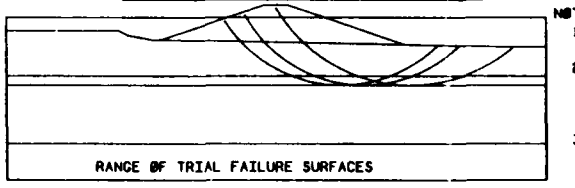
PLATE B-32



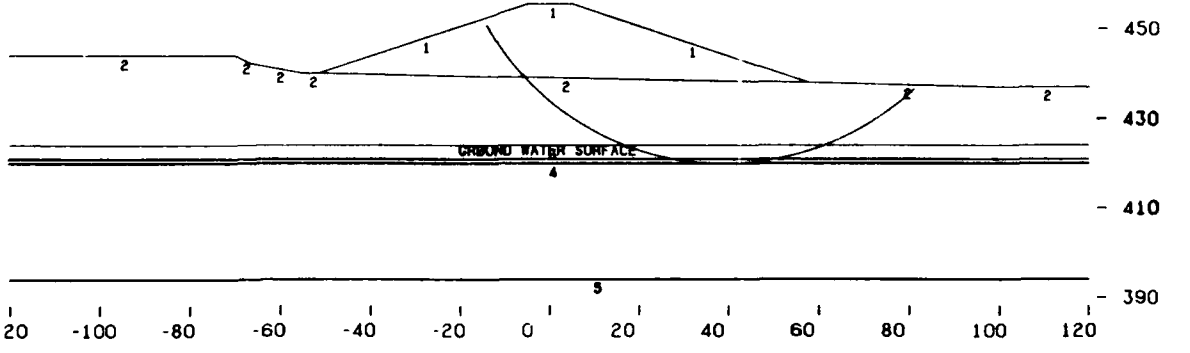
MATERIAL		SOIL WT. LBS./CUFT		SHEAR STRENGTH Q		R		S		(R+S)/2	
		MOIST	SAT.	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF
SEMI-COMP IMPR EMBANK EL 438 TO EL 455.5	1	125.00	130.00	0.00	1000.00	13.00	1000.00	26.00	0.00	19.76	500.00
IMPERV TOP STRATUM CN EL 424 TO EL 444	2	117.00	120.00	0.00	1000.00	12.00	500.00	30.00	0.00	21.55	250.00
IMPERV TOP STRATUM CL EL 420 TO EL 424	3	123.00	125.00	0.00	350.00	12.00	500.00	28.00	0.00	20.41	250.00
PERV SUBSTRATUM SP EL 394 TO EL 420	4	130.00	135.00	30.00	0.00	30.00	0.00	30.00	0.00	30.00	0.00
BEDROCK SHALE BELOW EL 394	5	150.00	150.00	24.50	0.00	24.50	0.00	24.50	0.00	24.50	0.00

CIRCLE FAILURE SURFACE
RESULTS BY HARRIS-500
COMPUTER PROGRAM 741-HS-F424A
TANGENT TO ELEV 420.10
TRIAL ARCS

RADIUS OF CIRCLE	CENTER OF CIRCLE DISTANCE FROM ℄	CENTER OF CIRCLE ELEV	F.S. Q ϕ= 0.00
61.00	39.00	481.00	2.58
62.00	29.00	482.00	2.92
70.00	60.00	490.00	3.13
51.00	38.00	471.00	2.66
81.00	41.00	501.00	2.65
60.00	49.00	480.00	2.74



NOTES
1- ANALYSES WERE RUN ACCORDING TO EM 1110-2-1902 DATED APRIL 1970
2- THE SIDE EARTH FORCE DIRECTION WAS TAKEN AS THE AVERAGE OF THE EMBANKMENT SLOPES IMMEDIATELY ADJACENT TO THE SLICE INTERFACE
3- PSI-SIESMIC COEFFICIENT USED IN ANALYSES



ILLINOIS RIVER, LIVERPOOL, IL DPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 27+00 RIVERSIDE
27 JANUARY 1987 DHB

PLATE B-33

INPUT DATA

MINIMUM ELEVATION OF CIRCLE= 420.1 X-START= 50.0 Y-START= 490.0 SEARCH INCREMENT= 10.0 F.S. MIN.= 0.000

NUMBER OF LINES= 13 MINIMUM NO. OF SLICES= 20 SEISMIC COEFF.= 0.000

EMBANKMENT AND FOUNDATION PROFILE--

XTOEL	YTOEL	XTOPL	YTOPL	XTOER	YTOER	XTOFR	YTOFR
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

X1(I)	Y1(I)	X2(I)	Y2(I)	TYPE
-5000.0	444.0	-70.0	444.0	2
-70.0	444.0	-66.0	442.0	2
-66.0	442.0	-55.0	440.0	2
-55.0	440.0	-51.5	440.0	2
-51.5	440.0	-5.0	455.5	1
-5.0	455.5	5.0	455.5	1
5.0	455.5	57.5	438.0	1
-51.5	440.0	57.5	438.0	2
57.5	438.0	100.0	437.0	2
100.0	437.0	5000.0	437.0	2
-5000.0	424.0	5000.0	424.0	3
-5000.0	420.0	5000.0	420.0	4
-5000.0	394.0	5000.0	394.0	5

SOIL CONSTANTS--

NUMBER OF SOIL TYPES= 5

TYPE NO.	WT.MOIST	WT.SAT.	C(1)	PHI(1)	C(2)	PHI(2)
1	125.0	130.0	1000.0	0.0	0.0	0.0
2	117.0	120.0	1000.0	0.0	0.0	0.0
3	123.0	125.0	350.0	0.0	0.0	0.0
4	130.0	135.0	0.0	30.0	0.0	0.0
5	150.0	150.0	0.0	24.5	0.0	0.0

PIEZOMETRIC SURFACE DATA--

NUMBER OF POINTS FOR PEIZOMETRIC SURFACE= 2

XPIEZ(I)	YPIEZ(I)
-5000.0	421.0
5000.0	421.0

DRAWDOWN SURFACE DATA--

NUMBER OF POINTS FOR DRAWDOWN SURFACE= 0

ILLINOIS RIVER, LIVERPOOL, IL OPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 27+00 RIVERSIDE
27 JANUARY 1987 OHB

PLATE B-34

X-COORDINATE OF CENTER	Y-COORDINATE OF CENTER	FACTOR OF SAFETY
50.00	490.00	2.652
50.00	500.00	2.613
60.00	490.00	3.129
40.75	490.41	2.591
30.37	491.61	2.971
40.34	500.77	2.650
39.23	490.84	2.578
38.42	470.87	2.659
29.26	481.65	2.923
49.18	480.03	2.739
34.24	481.24	2.690
44.21	480.44	2.593
38.32	475.86	2.590
39.63	485.82	2.582

MINIMUM FACTOR OF SAFETY = 2.578 LOCATED AT X= 39.23 Y= 480.84

NUMBER OF SLICES USED = 24 RADIUS OF CIRCLE = 60.74

ILLINOIS RIVER, LIVERPOOL, IL DPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 27+00 RIVERSIDE
27 JANUARY 1987 DHB

PLATE B-35

CHECK DATA FOR CRITICAL ARC

FACTOR OF SAFETY= 2.578

LOCATION OF CENTER-- X= 39.23 Y= 480.94

RADIUS= 69.74

TABULATION OF SLICE DATA--

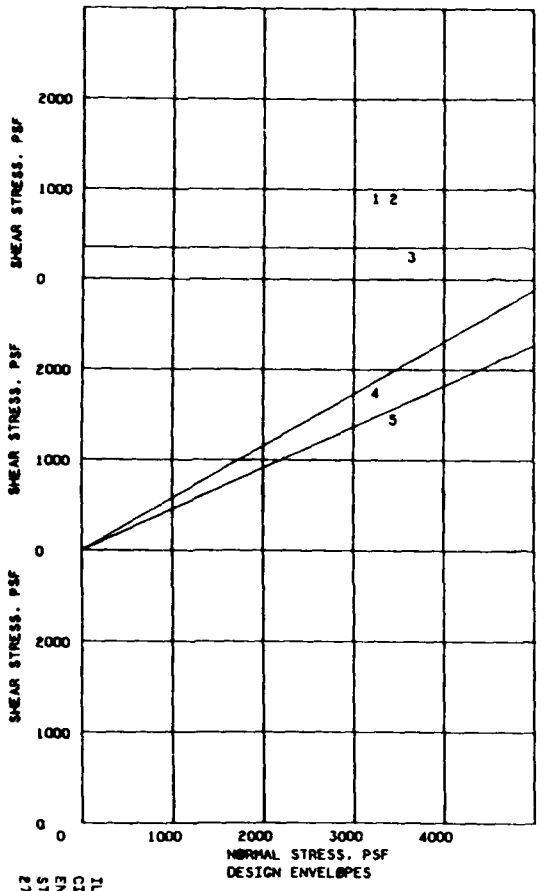
SLICE NO.	X-COORD. OF SLICE	SLICE WIDTH	TOTAL WT.	WATER FORCE	DIR. OF W.FORCE	C-FORCE DEVEL.	PHI DEVEL.	DIR. OF C-FORCE	NORMAL STRESS	NORMAL FORCE	ALPHA TOP	ALPHA BOTM.	E1	E2
1	-12.07	4.71	2.95	0.00	0.00	3.41	0.00	-57.62	0.17	1.52	0.0	0.0	0.00	0.00
2	-7.36	4.71	7.57	0.00	0.00	2.85	0.00	-50.08	1.14	8.39	0.0	0.0	0.00	4.61
3	-4.97	2.06	0.11	0.00	0.00	0.03	0.00	-46.69	1.63	0.13	0.0	0.0	4.61	4.69
4	-3.29	3.31	7.43	0.00	0.00	1.88	0.00	-44.42	1.86	8.64	0.0	0.0	4.69	9.45
5	0.03	3.31	8.60	0.00	0.00	1.68	0.00	-40.19	2.27	9.84	0.0	0.0	9.45	14.51
6	3.34	3.31	9.62	0.00	0.00	1.59	0.00	-36.21	1.76	7.23	0.0	-9.2	14.51	17.73
7	7.14	4.27	13.29	0.00	0.00	1.55	0.00	-31.89	1.90	9.58	-9.2	-18.4	17.73	22.04
8	11.41	4.27	13.75	0.00	0.00	1.86	0.00	-27.26	2.69	12.91	-18.4	-18.4	22.04	26.52
9	15.68	4.27	13.99	0.00	0.00	1.80	0.00	-22.81	2.84	13.17	-18.4	-18.4	26.52	30.16
10	19.95	4.28	14.09	0.00	0.00	0.61	0.00	-18.51	2.96	13.37	-18.4	-18.4	30.16	34.62
11	24.24	4.28	14.00	0.00	0.00	0.60	0.00	-14.29	3.02	13.36	-18.4	-18.4	34.02	36.88
12	28.52	4.28	13.72	0.00	0.00	0.59	0.00	-10.15	3.04	13.24	-18.4	-18.4	36.88	38.73
13	32.80	4.28	13.29	0.15	90.00	0.58	0.00	-6.07	2.99	12.89	-18.4	-18.4	38.73	39.55
14	37.08	4.28	12.69	0.23	90.00	0.58	0.00	-2.02	2.91	12.49	-18.4	-18.4	39.55	39.40
15	41.51	4.57	12.69	0.24	90.00	0.62	0.00	2.16	2.81	12.85	-18.4	-18.4	39.40	38.24
16	46.08	4.57	11.63	0.15	90.00	0.62	0.00	6.48	2.68	12.30	-18.4	-18.4	38.24	36.12
17	50.65	4.57	10.37	0.00	0.00	0.63	0.00	10.84	2.50	11.63	-18.4	-18.4	36.12	33.16
18	55.22	4.57	8.91	0.00	0.00	0.64	0.00	15.26	3.26	15.44	-18.4	-9.9	33.16	27.18
19	59.07	3.14	5.35	0.00	0.00	0.45	0.00	19.07	3.07	10.18	-9.9	-1.3	27.18	23.03
20	62.75	4.21	6.43	0.00	0.00	1.77	0.00	22.78	1.71	7.84	-1.3	-1.3	23.03	18.36
21	66.96	4.21	5.41	0.00	0.00	1.84	0.00	27.17	1.51	7.16	-1.3	-1.3	18.36	13.46
22	71.17	4.21	4.19	0.00	0.00	1.92	0.00	31.74	1.26	6.25	-1.3	-1.3	13.46	8.53
23	75.39	4.21	2.73	0.00	0.00	2.03	0.00	36.54	0.96	5.04	-1.3	-1.3	8.53	3.90
24	79.60	4.21	0.99	0.00	0.00	2.19	0.00	41.65	0.60	3.40	-1.3	-1.3	3.90	0.00

NOTE-ALL ANGLES MEASURED FROM POSITIVE X-AXIS,FORCES ARE IN KIPS

* NOTE HORIZONTAL EARTHQUAKE FORCE MAY BE CALCULATED BY MULTIPLYING THE TOTAL SLICE WT. BY THE E.Q. COEFF.

ILLINOIS RIVER, LIVERPOOL, IL OPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 27+00 RIVERSIDE
27 JANUARY 1987 DHB

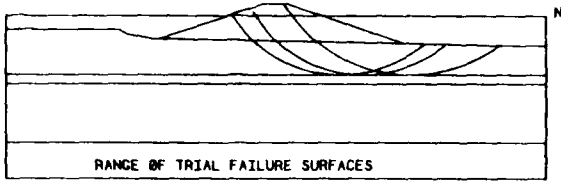
PLATE B-36



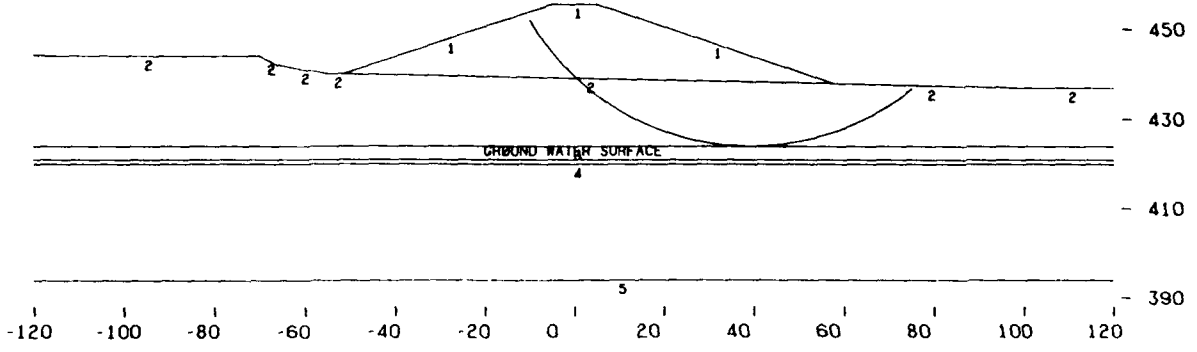
MATERIAL		SOIL WT. LBS./CUFT		SHEAR STRENGTH Q		R		S		(R+S)/2	
		MOIST	SAT.	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF	PHI DEGREES	COHESION PSF
SEMI-COMP IMPR EMBANK EL 438 TO EL 455.5	1	125.00	130.00	0.00	1000.00	13.00	1000.00	26.00	0.00	19.78	500.00
IMPERV TOP STRATUM CH EL 424 TO EL 444	2	117.00	120.00	0.00	1000.00	12.00	500.00	30.00	0.00	21.55	250.00
IMPERV TOP STRATUM CL EL 420 TO EL 424	3	123.00	125.00	0.00	350.00	12.00	500.00	28.00	0.00	20.41	250.00
PERV SUBSTRATUM SP EL 394 TO EL 420	4	130.00	135.00	30.00	0.00	30.00	0.00	30.00	0.00	30.00	0.00
BEDROCK SHALE BELOW EL 394	5	150.00	150.00	24.50	0.00	24.50	0.00	24.50	0.00	24.50	0.00

CIRCLE FAILURE SURFACE
RESULTS BY HARRIS-500
COMPUTER PROGRAM 741-H5-F424A
TANGENT TO ELEV 424.10
TRIAL ARCS

RADIUS OF CIRCLE	CENTER OF CIRCLE DISTANCE FROM ℄	CENTER OF CIRCLE ELEV	F.S. Q Q= 0.00	
57.00	39.00	481.00	3.38	
58.00	29.00	482.00	3.87	
66.00	80.00	490.00	4.75	
47.00	38.00	471.00	3.53	
77.00	41.00	501.00	3.54	
56.00	49.00	480.00	3.82	



NOTES
1- ANALYSES WERE RUN ACCORDING TO EM 1110-2-1902 DATED APRIL 1970
2- THE SIDE EARTH FORCE DIRECTION WAS TAKEN AS THE AVERAGE OF THE EMBANKMENT SLOPES IMMEDIATELY ADJACENT TO THE SLICE INTERFACE
3- PSI-SIESMIC COEFFICIENT USED IN ANALYSES



ILLINOIS RIVER, LIVERPOOL, IL DPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 27+00 RIVERSIDE
27 JANUARY 1987 DHB

PLATE B-37

INPUT DATA

MINIMUM ELEVATION OF CIRCLE= 424.1 X-START= 50.0 Y-START= 490.0 SEARCH INCREMENT= 10.0 F.S. MIN.= 0.000

NUMBER OF LINES= 13 MINIMUM NO. OF SLICES= 20 SEISMIC COEFF.= 0.000

EMBANKMENT AND FOUNDATION PROFILE--

XTOEL	YTOEL	XTOPL	YTOPL	XTOER	YTOER	XTOPR	YTOPR
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

X1(I)	Y1(I)	X2(I)	Y2(I)	TYPE
-5000.0	444.0	-70.0	444.0	2
-70.0	444.0	-66.0	442.0	2
-66.0	442.0	-55.0	440.0	2
-55.0	440.0	-51.5	440.0	2
-51.5	440.0	-5.0	455.5	1
-5.0	455.5	5.0	455.5	1
5.0	455.5	57.5	438.0	1
-51.5	440.0	57.5	438.0	2
57.5	438.0	100.0	437.0	2
100.0	437.0	5000.0	437.0	2
-5000.0	424.0	5000.0	424.0	3
-5000.0	420.0	5000.0	420.0	4
-5000.0	394.0	5000.0	394.0	5

SOIL CONSTANTS--

NUMBER OF SOIL TYPES= 5

TYPE NO.	WT.MOIST	WT.SAT.	C(1)	PHI(1)	C(2)	PHI(2)
1	125.0	130.0	1000.0	0.0	0.0	0.0
2	117.0	120.0	1000.0	0.0	0.0	0.0
3	123.0	125.0	350.0	0.0	0.0	0.0
4	130.0	135.0	0.0	30.0	0.0	0.0
5	150.0	150.0	0.0	24.5	0.0	0.0

PIEZOMETRIC SURFACE DATA--

NUMBER OF POINTS FOR PEIZOMETRIC SURFACE= 2

XPIEZ(I)	YPIEZ(I)
-5000.0	421.0
5000.0	421.0

DRAWDOWN SURFACE DATA--

NUMBER OF POINTS FOR DRAWDOWN SURFACE= 0

ILLINOIS RIVER, LIVERPOOL, IL DPR
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 27+00 RIVERSIDE
27 JANUARY 1987 DHB

PLATE B-38

X-COORDINATE OF CENTER	Y-COORDINATE OF CENTER	FACTOR OF SAFETY
50.00	490.00	3.723
50.00	500.00	3.626
60.00	490.00	4.749
40.04	490.94	3.421
30.09	491.88	3.775
40.98	500.90	3.537
39.10	480.98	3.378
38.17	471.03	3.532
29.15	481.92	3.673
49.06	480.04	3.822
34.13	481.45	3.432
44.08	480.51	3.541
38.64	476.01	3.431
39.57	485.96	3.395

****

MINIMUM FACTOR OF SAFETY = 3.378 LOCATED AT X= 39.10 Y= 480.98

NUMBER OF SLICES USED = 23 RADIUS OF CIRCLE = 56.88

****

ILLINOIS RIVER, LIVERPOOL, IL DPH
CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 27+00 RIVERSIDE
27 JANUARY 1987 DHB

CHECK DATA FOR CRITICAL ARC

FACTOR OF SAFETY= 3.378

LOCATION OF CENTER-- X= 39.10 Y= 480.98

RADIUS= 56.88

TABULATION OF SLICE DATA--

SLICE NO.	X-COORD. OF SLICE	SLICE WIDTH	TOTAL WT.	WATER FORCE	DIR. OF W.FORCE	C-FORCE DEVEL.	PHI DEVEL.	DIR. OF C-FORCE	NORMAL STRESS	NORMAL FORCE	ALPHA TOP	ALPHA BOTM.	E1	E2
1	-9.31	2.87	1.06	0.00	0.00	1.62	0.00	-58.33	0.10	0.55	0.0	0.0	0.00	0.00
2	-6.44	2.87	2.92	0.00	0.00	1.42	0.00	-53.19	0.62	2.97	0.0	0.0	0.00	1.53
3	-3.58	2.84	4.30	0.00	0.00	1.27	0.00	-48.63	1.18	5.06	0.0	0.0	1.53	4.49
4	-0.74	2.84	5.36	0.00	0.00	1.18	0.00	-44.47	1.60	6.36	0.0	0.0	4.49	8.10
5	2.84	4.32	9.85	0.00	0.00	1.66	0.00	-39.61	1.57	8.79	0.0	-9.2	8.10	12.59
6	7.13	4.26	10.94	0.00	0.00	1.53	0.00	-34.20	1.60	8.26	-9.2	-18.4	12.59	16.66
7	11.39	4.26	11.58	0.00	0.00	1.44	0.00	-29.15	2.22	10.83	-18.4	-18.4	16.66	20.89
8	15.66	4.26	11.82	0.00	0.00	1.39	0.00	-24.34	2.38	11.13	-18.4	-18.4	20.89	24.39
9	19.92	4.26	11.92	0.00	0.00	1.34	0.00	-19.71	2.49	11.28	-18.4	-18.4	24.39	27.08
10	24.18	4.26	11.84	0.00	0.00	1.31	0.00	-15.21	2.56	11.32	-18.4	-18.4	27.08	28.88
11	28.45	4.26	11.57	0.00	0.00	1.28	0.00	-10.80	2.59	11.25	-18.4	-18.4	28.88	29.77
12	32.71	4.26	11.14	0.00	0.00	1.27	0.00	-6.45	2.58	11.07	-18.4	-18.4	29.77	29.75
13	36.97	4.26	10.55	0.00	0.00	1.26	0.00	-2.15	2.53	10.79	-18.4	-18.4	29.75	28.84
14	40.94	3.68	8.50	0.00	0.00	1.09	0.00	1.85	2.44	9.00	-18.4	-18.4	28.84	27.39
15	44.62	3.68	7.83	0.00	0.00	1.09	0.00	5.57	2.33	8.62	-18.4	-18.4	27.39	25.36
16	48.30	3.68	7.07	0.00	0.00	1.10	0.00	9.31	2.19	8.15	-18.4	-18.4	25.36	22.82
17	51.98	3.68	6.19	0.00	0.00	1.12	0.00	13.08	2.01	7.57	-18.4	-18.4	22.82	19.87
18	55.66	3.68	5.20	0.00	0.00	1.14	0.00	16.92	2.50	9.63	-18.4	-9.9	19.87	15.18
19	59.34	3.67	4.36	0.00	0.00	1.16	0.00	20.83	1.94	7.61	-9.9	-1.3	15.18	11.17
20	63.01	3.67	3.65	0.00	0.00	1.20	0.00	24.85	1.15	4.66	-1.3	-1.3	11.17	8.12
21	66.68	3.67	2.82	0.00	0.00	1.24	0.00	29.00	0.95	3.99	-1.3	-1.3	8.12	5.10
22	70.35	3.67	1.82	0.00	0.00	1.30	0.00	33.32	0.71	3.12	-1.3	-1.3	5.10	2.30
23	74.02	3.67	0.66	0.00	0.00	1.38	0.00	37.87	0.42	1.97	-1.3	-1.3	2.30	0.00

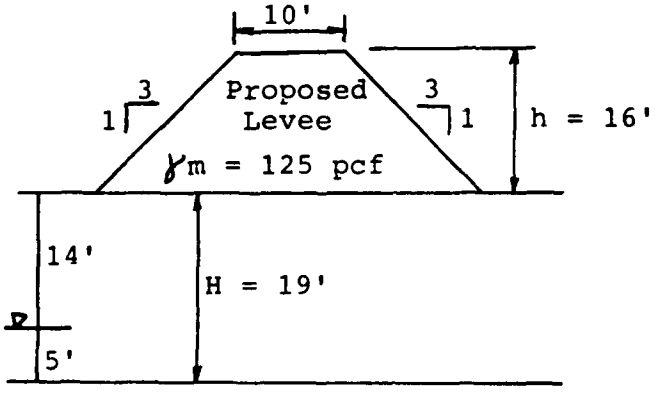
NOTE-ALL ANGLES MEASURED FROM POSITIVE X-AXIS,FORCES ARE IN KIPS

**NOTE HORIZONTAL EARTHQUAKE FORCE MAY BE CALCULATED
BY MULTIPLYING THE TOTAL SLICE WT. BY THE E.Q. COEFF.

CIRCLE SLOPE STABILITY ANALYSIS
END OF CONSTRUCTION CONDITION
STATION 27+00 RIVERSIDE
27 JANUARY 1987 DHB

PLATE B-40

ILLINOIS RIVER
LIVERPOOL, ILLINOIS
SETTLEMENT ANALYSIS



Assumptions:
Comp. stratum consists of 14 feet of CH with average moisture (Wn) = 22.8%, W_L = 60, & moist = 117 pcf and 5 feet of CL with average moisture = 32%, W_L = 41, & saturated = 125 pcf

$$\Delta S = \frac{C_c}{1+e_o} H \log 10 \frac{p_o+\Delta p}{p_o}$$

Void Ratio, e_o:

$$\frac{W_w}{W_s} = Wn \qquad W_w+W_s = W_T \Rightarrow W\% \; W_{ws}+W_s = W_T$$

$$V_s = \frac{W_s}{G_s \gamma_w} \qquad V_v = 1-V_s \qquad e_o = \frac{V_v}{V_s}$$

Compression Index, C_c:

$$C_c = 0.37 \, (e_o+0.003W_L+0.0004W_n-0.34)$$

Reference: "Foundation Analysis & Design, 3rd edition," by Joseph E. Bowles

p_o = Initial Body Stress

Δp = Boussinesq Coefficient x h x γ_m

Boussinesq Coefficient from Tables of Boussinesq Coefficients for Vertical Stress Induction, published by New Orleans District, Corps of Engineers, dated March 1969

Depth, feet	p_o psf	Δp psf	C_c	e_o	H feet	Δs inches
0						
	7	819	1835	0.228	0.767	14	11
14						
	16.5	1795	1760	0.223	0.808	5	2
19						

Total Settlement = 13 inches

PLATE B-41

PROJECT Liverpool, IL Illinois River Date February 1987

Computed by D.H.B. Checked by S.A.Z.

SUMMARY UNDERSEEPAGE ANALYSIS DATA BERM ANALYSIS

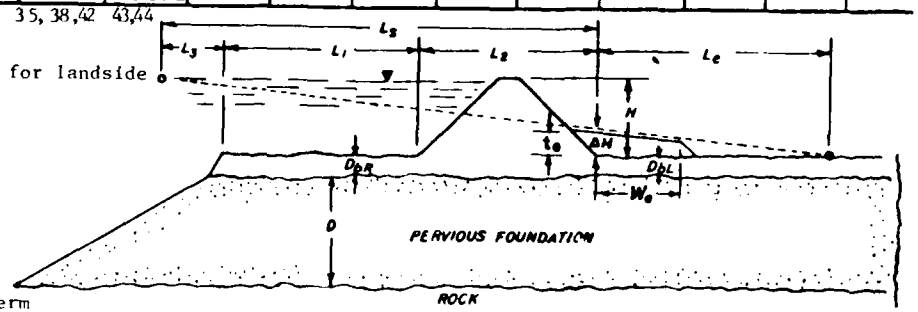
Sheet 1 of 1

STATIONS		0+00 to 7+50	7+50 to 12+50	12+50 to 15+50	15+50 to 22+50	22+50 to 27+50	27+50 to 30+50	30+50 to 32+50	32+50 to 42+50	42+50 to 44+00
LEVEE DESIGN GRADE		455.5	455.5	455.5	455.5	455.5	455.5	455.5	455.5	455.5
ELEV L.S. TOE or TAILWATER		452	444(b)	438(c)	438(c)	440	444(b)	440	445	446(b)
GROSS HEAD	H	3.5	11.5	17.5	17.5	15.5	11.5	15.5	10.5	9.5
TRANS. PERVIOUS FOUNDATION	D	70	70	70	70	40	40	40	70	70
TRANS. BLANKET THICKNESS L.S.	D_{BL}/D_{BL_2}	6(e)	8(f)	6(f)	8(f)	19(f)	5(e)	17/20(f)	5(e)	7(e)
TRANS. BLANKET THICKNESS R.S.	D_{BR}	6(e)	8(f)	8(f)	8(f)	17(f)	6(e)	17(f)	7(e)	2(h)
NAT. BLANKET LENGTH L.S.	L_L	∞	20	50	150	15	800	10	600	800
NAT. BLANKET LENGTH R.S.	L_R	100(a)	250(a)	300(d)	100(d)	75(d)	50(g)	30(d)	500(g)	1000(g)
K_f/K_{BL} LANDSIDE	A	200	200	200	200	200	200	200	200	200
K_f/K_{BR} RIVERSIDE	B	800	800	800	800	800	800	800	800	400
$C_L = \sqrt{A \cdot D_{BL} \cdot D}$	C_L	290	335	290	335	390	200	369	265	313
$C_R = \sqrt{B \cdot D_{BR} \cdot D}$	C_R	580	669	669	669	738	438	738	626	237
$L_1 = C_R \cdot \tanh L_R/C_R$	L_1	99	239	281	99	75	50	30	415	237
$L_3 = 0.44D$	L_3	31	31	31	31	18	18	18	31	31
L_2 = BASE WIDTH LEVEE	L_2	30	80	115	115	105	80	105	75	65
$L_s = L_1 + L_2 + L_3$	L_s	160	350	427	245	198	148	153	521	333
$L_e = C_L(\frac{t}{2}) \tanh L_L/t_L$	L_e	290	20	50	141	15	200	10	259	309
$L_s + L_e$		450	370	477	386	213	348	163	780	642
$\Delta H = H \cdot L_e/L_s + L_e$	ΔH	2.3	0.6	1.8	6.4	1.1	6.6	1.0	3.5	4.6
$F.S. = 0.85 D_{BL}/\Delta H$	F.S.	2.2	11.3	2.8	1.1	14.7	0.6	17.0	1.2	1.3
PROBABLE CONTROL		NONE	NONE	NONE	NONE	NONE	BERM	NONE	NONE	NONE
BERM WIDTH $W_o = 10H - L_2$	W_o						35			
COMPUTED $t_o = \frac{94\Delta H - 4D_{BL} \cdot D_{BR}}{D_{BL} + 94}$	t_o				1.2		2.4		0.4	0.4
SELECTED t	t				NONE		3.0		NONE	NONE
STATION OF TYPICAL SECTION		0,4	10	14	21	27	30	32	35, 38, 42	43,44

REMARKS:

(a) Riverside docking inlet is entrance.
(b) Fill landside depressions, ditches, and sloughs with sand to elevation shown for landside toe for a distance of 100 feet beyond the landside toe of levee or berm.
(c) Landside ponding area
(d) Illinois River is entrance
(e) Terrace clay
(f) Flood plain clay
(g) Riverward edge of terrace clay is entrance
(h) Assumed clay siltation

Station 0+00 to 27+50 clay, 1V on 3H r.s. & l.s. slopes, 10' crown width, no berm
Station 27+50 to 30+50 clay, 1V on 3H r.s. & l.s. slopes, 10' crown width, with berm
Station 30+50 to 44+00 clay, 1V on 3H r.s. & l.s. slopes, 10' crown width, no berm



TRANSFORMED SOIL SECTION

PLATE B-42

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

January 1987
D.H.B.

Transformation of Pervious Stratum

Elev.	D_{10} mm	$\Delta D'$ ft.	k_h cm/sec	$\Delta D' k_h$ ft cm/sec	k_h/k_v	k_v cm/sec	$\Delta D'/k_v$
Boring L-84-3 STA. 32+00							
440-421	Sand lean clay and clayey sand top stratum						
421-416	0.25	5	0.15	0.75	2	0.075	67
416-407	0.40	9	0.28	2.52	1	0.280	32
407-402	0.37	5	0.26	1.30	1	0.260	19
402-397	0.19	5	0.09	0.45	3	0.030	167
397-394	0.31	3	0.20	0.60	1	0.200	15
394-390	Pennsylvanian shale bedrock						
				5.62			300

$$D = \sqrt{\Delta D' k_h \times \Delta D'/k_v} = \sqrt{5.62 \times 300} = \underline{41 \text{ feet}}$$

$$k_f = \sqrt{\frac{\Delta D' k_h}{\Delta D'/k_v}} = \sqrt{\frac{5.62}{300}} = \underline{0.14 \text{ cm/sec}} = \underline{0.28 \text{ft/min}}$$

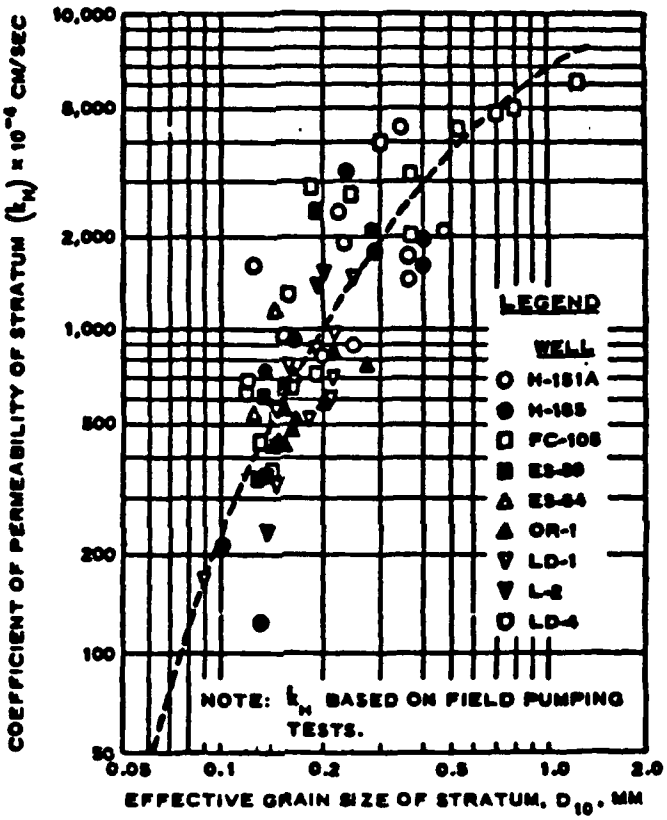
Boring L-85-7 STA. 4+50

452-442	clayey sand and clayey m-f sand top stratum						
442-440	(0.25)	2	0.15	0.30	2	0.075	27
440-438	0.31	2	0.20	0.40	1	0.200	10
438-430	0.26	8	0.15	1.20	2	0.075	107
430-425	(0.25)	5	0.15	0.75	2	0.075	67
425-417	0.26	8	0.15	1.20	2	0.075	107
417-409	0.28	8	0.17	1.36	2	0.085	94
409-404	0.25	5	0.15	0.75	2	0.075	67
404-393	0.23	11	0.13	1.43	2	0.065	169
Below 393	Pennsylvanian shale bedrock						
				7.39			648

$$D = \sqrt{\Delta D' k_h \times \Delta D'/k_v} = \sqrt{7.39 \times 648} = \underline{69 \text{ feet}}$$

$$k_f = \sqrt{\frac{\Delta D' k_h}{\Delta D'/k_v}} = \sqrt{\frac{7.39}{648}} = 0.11 \text{ cm/sec} = \underline{0.22 \text{ ft/min.}}$$

PLATE B-43



(b) Effective grain size, D_{10}, versus coefficient of permeability, k_H (from WES TM No. 3-424, ref. A-3b(2)

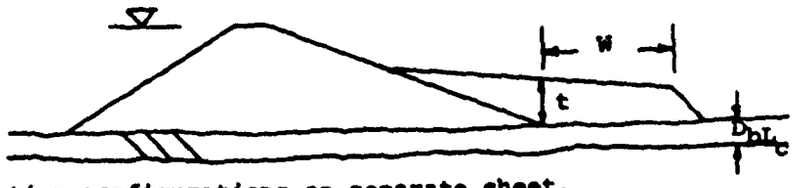
30 April 1976

A Method to Estimate the Thickness and Width of Sand Berms for Sand Levees

		Notes*	Stations
	Elev. top of levee		
	Elev. landside toe (tailwater)		
H	Gross head		
L_2	Base width of levee	(a)	
W_o	$10H - L_2$	(b)	
D	Trans. thickness perv. found.	(c)	
L_L	Landside blanket - width	(d)	
D_{bL}	- thickness	(e)	
D_{bL_c}	- cover	(f)	
A	- perm. ratio	(g)	
C_L	$\sqrt{A \cdot D_{bL} \cdot D}$		
L_R	Riverside blanket - width	(h)	
D_{bR}	- thickness	(i)	
B	- perm. ratio	(j)	
C_R	$\sqrt{B \cdot D_{bR} \cdot D}$		
L_3	Entrance: $0.44D$	(k)	
$L_{l(o)}$	Riverside: $C_R \cdot (\tanh L_R/C_R)$ (or)	(l)	
$L_{l(x)}$	$C_R/(\tanh L_R/C_R)$	(m)	
$L_{e(o)}$	Landside: $C_L \cdot (\tanh L_L/C_L)$ (or)	(n)	
$L_{e(x)}$	$C_L/(\tanh L_L/C_L)$	(o)	
$L_s + L_e$	Total: $L_2 + L_3 + L_1 + L_e$		
ΔH	$H \cdot L_e/(L_s + L_e)$		
F.S.	$(\gamma_{bL} \cdot D_{bL_c})/(\Delta H \cdot \gamma_W)$	(p)	
t_o	$(1.5\gamma_W \cdot \Delta H - D_{bL_c} \cdot \gamma_{bL})/(1.5\gamma_W + \gamma_{bL})$	(q)	
Probable Control		(r)	
t	Selected berm thickness	(s)	
W	Selected berm width	(t)	

All dimensions in feet.

*Notes on separate sheet.

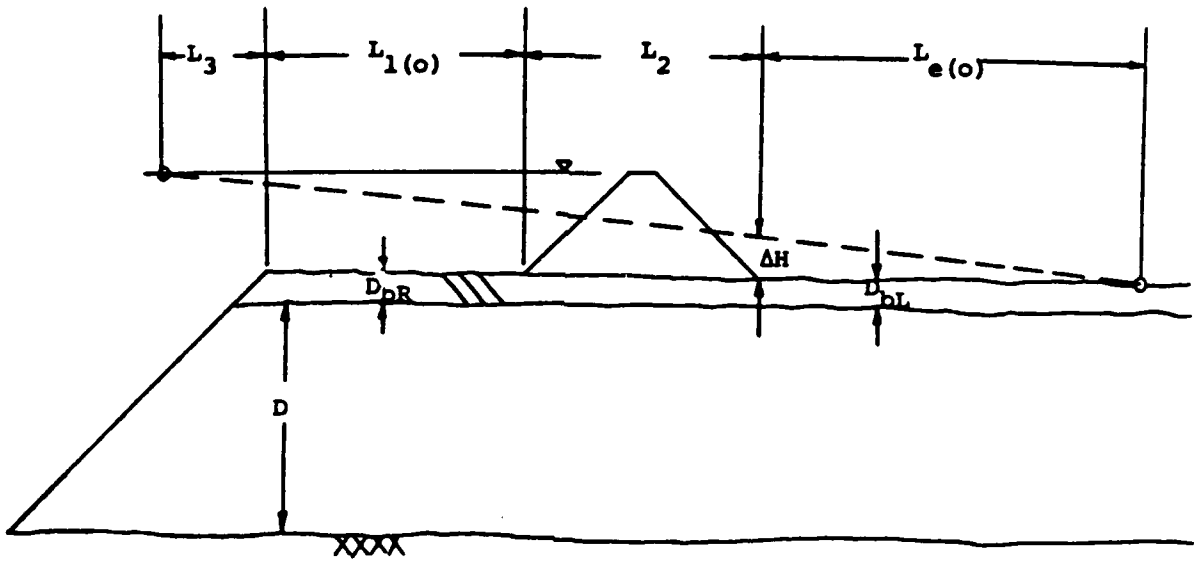


Sketch of levee and foundation configurations on separate sheet.

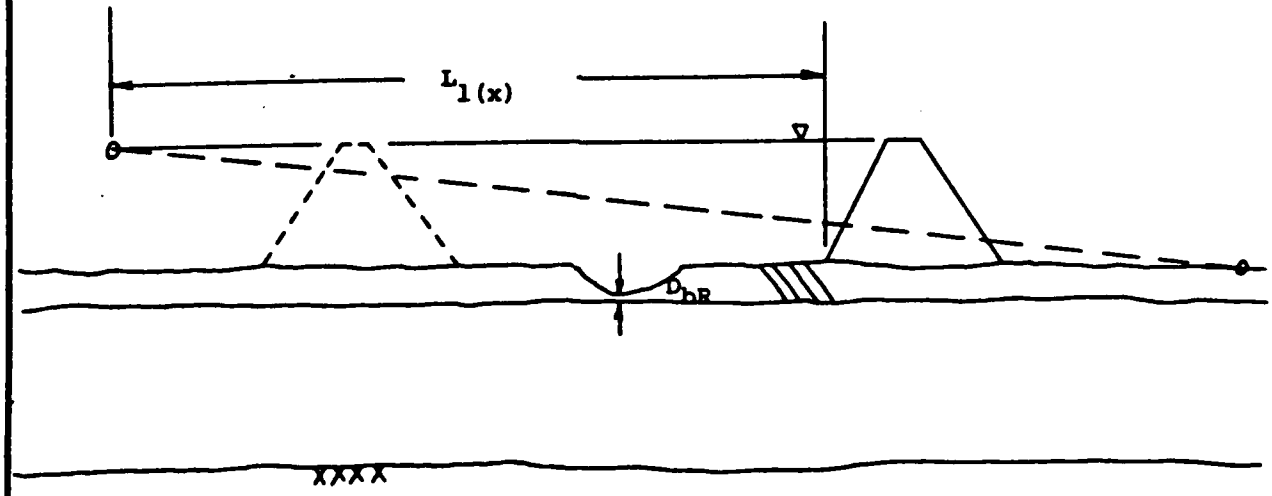
PLATE B-45

30 April 1976

A Method to Estimate the Thickness and Width
of Sand Berms for Sand Levees



Open entrance - Infinite L.S. blanket



Blocked entrance - Infinite L.S. blanket

TRANSFORMED SECTIONS

PLATE B-46

30 April 1976

A Method to Estimate the Thickness and Width of Sand Berms for Sand Levees

Notes:

(a) Measured from cross section at elev. of landside toe.

(b) Computed berm width. If base width equals or exceeds 10H no berm required.

(c) Procedure and computation on separate sheets.

(d) If L_L is less than 100 ft. provide berm and/or fill depressions to elev. of landside toe for a distance of 100 ft. beyond toe of levee or berm.

(e) If D_{bL} is zero provide berm as for (d). Transformed thickness if blanket includes semipervious soils. Use 0.5 of natural thickness for ML, 0.1 for SM, 0.0 for sand and 1.0 for impervious.

(f) Transformed thickness as for (e) except, when impervious blanket is overlain with pervious or semipervious soils, then the natural total thickness is used for the overlying soils.

(g) For D_{bL} equal to or less than 4, A = 100: for D_{bL} equal to or greater than 5, A = 200, = K_f/K_{bL}.

(h) For parallel diversion levees with blocked entrance, use 1/2 distance between riverside toes of levees.

(i) Transformed thickness as for (e).

(j) For D_{bR} equal to or less than 4, B = 400: for D_{bR} equal to or greater than 5, B = 800, = K_f/K_{bR}.

(k) For parallel diversion levees with clay in thalweg, use L_3 = 0.

(l) Use $L_{l(o)}$ for an open (o) entrance.

(m) Use $L_{l(x)}$ for blocked (x) entrance.

(n) Use $L_{e(o)}$ for finite open (o) exit or infinite blanket.

(o) Use $L_{e(x)}$ for blocked (x) exit.

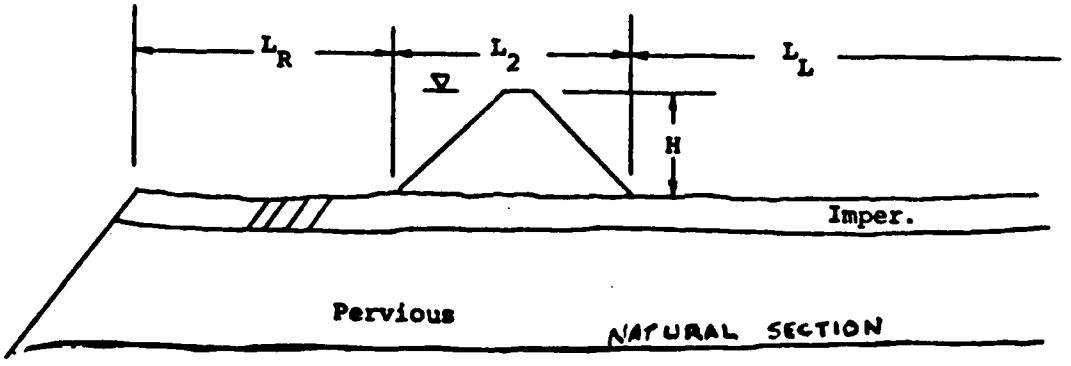
(p) γ_{bL} is submerged unit weight of landside blanket cover and berm (use 53 p.c.f.). γ_w is 62.4 p.c.f.

(q) Computed berm thickness for a factor of safety of 1.5 at landside toe of levee.

(r) For factor of safety computed at the landside toe of the levee, a berm is not required if F.S. greater than 1.5. Berm required if F.S. is equal to or less than 1.0. If F.S. greater than 1.0 and less than 1.5, and if computed berm thickness (q) is greater than 2.0, berm required. If F.S. greater than 1.0 and less than 1.5, and if computed berm thickness (q) is less than 2.0, judgment will determine whether a berm is required.

(s) Minimum 3.0 ft.

(t) Minimum 30 ft.



NATURAL SECTION

PLATE B-47

30 April 1976

Procedure for Transformation of Pervious Foundation

$$D = \sqrt{\Sigma(d_{(n)}K_{h(n)})\ \Sigma\ (d_{(n)}/K_{v(n)})}$$

$$K_f = \sqrt{\Sigma(d_{(n)}K_{h(n)})/\Sigma\ (d_{(n)}/K_{v(n)})}$$

where

d (1,2,3....n) = increment (1,2,3....n) of depth of pervious strata

K_h (1,2,3....n) = horizontal permeability for corresponding increment (1,2,3....n) of pervious strata*

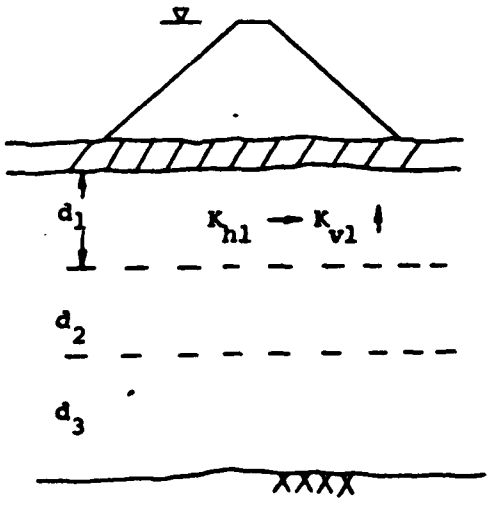
K_v (1,2,3....n) = vertical permeability for corresponding increment (1,2,3....n) of pervious strata

K_h (1,2,3....n)/K_v (1,2,3....n) = 1 if $D_{10} > 0.30$

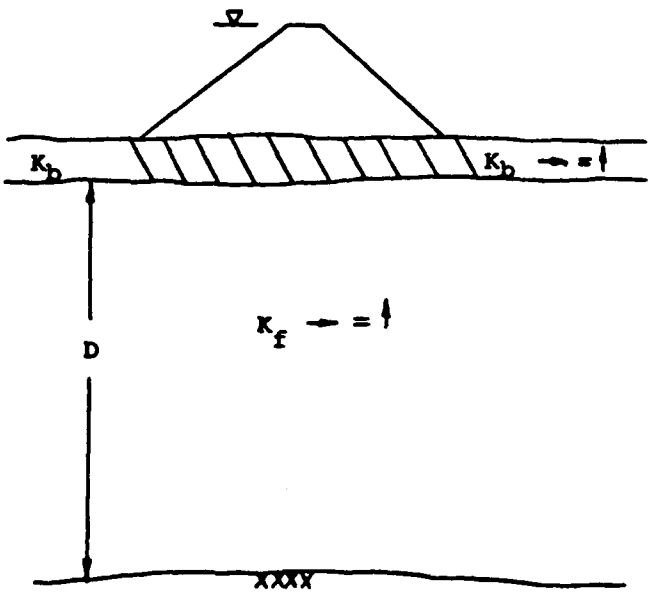
= 2 if $0.20 < D_{10} \leq 0.30$

= 3 if $D_{10} < 0.20$

*The value of K_h is estimated from the D_{10} size and the graph shown in Transactions of A.S.C.E., Vol. 126, 1961, Part 1, p. 1449, Figure 12.



NATURAL



TRANSFORMED

PLATE B-48

Illinois River
Liverpool, Illinois
Underseepage Analyses

6 February 1987

Seepage Quantities in accordance with EM 1110-2-1913 Design and Construction of levees 31 Mar 78.

General Levee Alignment Condition

Case 7 - Semipervious top strata both riverside and landside.

Seepage per unit length of levee,

$$Q_s = \$K_f H \qquad \text{Eq. B-11, Page B-12}$$

$$\$ = \frac{d}{X_1 + L_2 + X_3} \qquad \text{Eq. B-25, Page B-17}$$

or

$$\$ = \frac{D}{[(L_1 + L_3) + L_2] + L_e} = \frac{D}{L_s + L_e} \qquad \text{RID Nomenclature}$$

K_f = Average (transformed) horizontal permeability

H = Head form design levee grade

Station Lineal Feet	D Feet	Ls+Le Feet	Ff Ft./Min.	H Feet	L Feet	Q x 7.48 GPM/Lin. Ft.
0+00 to 7+50	70	450	0.22	3.5	1	0.90
7+50 to 12+50	70	370	0.22	11.5	1	3.58
12+50 to 15+50	70	477	0.22	17.5	1	4.23
15+50 to 22+50	70	386	0.22	17.5	1	5.22
22+50 to 27+50	40	213	0.28	15.5	1	6.10
27+50 to 30+50	40	348	0.28	11.5	1	2.77
30+50 to 32+50	40	163	0.28	15.5	1	7.97
32+50 to 42+50	70	780	0.22	10.5	1	1.55
42+50 to 44+50	70	642	0.22	9.5	1	1.70

Total Q (4400 lineal feet) = 14,668 GPM/4400 lin. ft.

Average Q = 3.33 GPM/lin. ft. = 0.45 cfm = 26.7 cfs

Average H = 11.8 feet

Average Q, gpm/ft. head/lineal ft. levee = 0.28

PLATE B-49

APPENDIX C

DETAILED COST ESTIMATE

DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX C
DETAILED COST ESTIMATE

50-Year Levee
Liverpool, Illinois
(January 1987 price levels)

Item	Quantity	Unit	Unit Price($)	Project Construction Costs ($)	Lands, Easements Rights-of-Way, & Relocations ($)
LANDS & DAMAGES					$200,000.00 a/
RELOCATIONS					
Natural Gas Line					
(1-1/4-inch polyethylene)	280	lin ft	2.75		770.00
Road Ramps					
Removal of pavement	2,395	yd2	3.50		8,382.50
Semi-compacted fill	9,470	yd3	4.80		45,456.00
Asphalt pavement	2,395	yd2	5.00		11,975.00
Parking Lot Raise					
Scarifying existing surface	2,070	yd2	0.50		1,035.00
Random fill	3,555	yd3	3.75		13,331.25
Granular surfacing	32	ton	16.50		528.00
LEVEES & FLOODWALLS					
Clearing	3	acre	4,700.00	14,100.00	
Structures Removal	1	job	sum	20,000.00	
Stripping					
1 ft., remove, stockpile, and reuse as topsoil	13,360	yd3	1.65	22,044.00	
Inspection Trench	13,673	yd3	1.65	22,560.45	
Impervious Fill					
Semi-compacted	118,115	yd3	4.40	519,706.00	

Item	Quantity	Unit	Unit Price($)	Project Construction Costs ($)	Lands, Easements Rights-of-Way, & Relocations ($)
Seeding	24	acre	950.00	22,800.00	
Bedding Material					
6-inch	337	yd3	20.00	6,740.00	
Riprap					
18-inch	1,011	yd3	18.00	24,264.67	
Maintenance Ramp					
Remove asphalt pavement	30	yd2	3.50	105.00	
Semi-compacted fill	45	yd3	4.80	216.00	
Granular surfacing	18	ton	16.50	297.00	
INTERIOR DRAINAGE					
Gatewell	1	job	sum	20,000.00	
Reinforced Concrete Pipe					
24-inch	150	ft	65.00	9,750.00	
Pump Station	1	job	sum	127,822.00	
Subtotal				810,405.00	281,478.00 a/
Contingencies (20%)				155,695.00	16,522.00 b/
				966,000.00	298,000.00
CULTURAL RESOURCES MITIGATION				60,000.00	
Engineering and Design (10%)				96,000.00 c/	8,000.00 b/
Supervision and Administration (8%)				77,000.00	6,000.00 b/
TOTAL				1,199,000.00	312,000.00 a/

a/ Includes $35,000 for Relocation Assistance (P.L. 91-646).
b/ Contingencies, E&D, S&A applied to relocation costs. Figure for LER is inclusive of those types of costs.
c/ Includes cost for preparation of detailed flood preparedness and evacuation plan.

FEDERAL VERSUS NON-FEDERAL COSTS

1.	Lands, Easements, Rights-of-Way, and Relocations (LERR) (Non-Federal Costs)	
	a. Value of lands to be acquired from private landowners (including relocation assistance of $35,000)	$ 200,000
	b. Relocation of utilities and other facilities	112,000
	TOTAL CREDITS FOR LERR	$ 312,000
2.	Non-Federal Share of Total Project Costs	
	a. Estimated total project costs	$1,511,000
	b. Non-Federal 5 percent cash contribution requirement	75,550
	c. Credit for value of LERR	312,000
	d. Total non-Federal cost	$ 387,550
	TOTAL NON-FEDERAL SHARE	$ 387,550

ECONOMIC AND SOCIAL ANALYSIS

APPENDIX

DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX D
ECONOMIC AND SOCIAL ANALYSIS

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FINAL
DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX D
ECONOMIC AND SOCIAL ANALYSIS

DEVELOPMENT AND ECONOMY

The village of Liverpool is located in Fulton County, Illinois, adjacent to the Illinois River. The village is situated approximately 30 miles southwest and within commuting distance of Peoria, Illinois, the manufacturing and commercial center of the area. There are no local manufacturing establishments in the village. The developed portion of the area, most of which is residential, is located on a low-lying river terrace between elevations 440 and 450 feet NGVD 1/ and is subject to flooding from the Illinois River.

It should be noted that the village is located on the riverside of an agricultural levee which was constructed by the Federal Government in the late 1930's and early 1940's. Access to the village is provided by a two-lane county highway which runs off U.S. Route 47 through the Liverpool Agricultural and Drainage District. The drainage district is provided flood protection by a 50-year levee for almost its entire 7.0-mile length, except for a portion of the levee directly behind the Liverpool village which is lower and has steeper sideslopes. If this levee should overtop, access to the village would be limited to boats for an extended period until the Illinois River could recede and the agricultural district would be allowed to drain. This potential flood problem exists with or without the flood protection project recommened in this report. Village and drainage district residents sandbag the low areas of the agricultural levee behind Liverpool village during significant flood events (greater than 20-year) to protect the agricultural district from flooding. In 1983, when the Rock Island District initiated its first phase of study, Liverpool had approximately 250 residents, 60 occupied houses 12 occupied trailers, 13 unoccupied

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1/ National Geodetic Vertical Datum of 1929.

trailers. The property (structures and contents) in the village was insured for $1,953,000 under the National Flood Insurance Program.

Ten special use properties were located in the village, as identified below:

Riverview Inn Restaurant
Turk's Wheel Alignment Shop
Tire Repair Shop
Body Repair Shop
Church
Vacant Brick Building
Fire Department
Boat Ramp and Parking Area
Village Hall
City Park Shelter and Equipment

Several major floods have occurred in the last few years. Because of these floods, many residents have moved from the community, leaving behind vacant residences. In May 1986, there were 34 occupied houses and 15 occupied trailers. The vacant properties included 36 houses and 7 trailers. The 10 special use properties identified in 1983 remain, in addition to a small convenience-type grocery store which was opened in the village. Flood insurance currently in effect stands at $1,267,000 for 53 policies.

The commercial businesses of Liverpool (the Riverview Inn, Turk's Alignment Shop, the tire shop, and the body repair shop) provide services to the village, the surrounding agricultural area, and nearby towns. These businesses also serve the many duck hunters in the region and the recreational boaters who use the Fulton County boat ramp at Liverpool.

Liverpool has access to U.S., State, and county highway systems which, as shown on table D-1, place the community within commuting distance of a number of larger Illinois cities.

TABLE D-1

Illinois Cities Within Commuting Distance of Liverpool, Illinois

City	Approximate Distance from Liverpool (miles)
Canton	15
Peoria	30
Macomb	40
Galesburg	50
Springfield	55
Bloomington-Normal	70
Decatur	95
Rock Island	105

Commercial airports are located in Peoria, Springfield, and Bloomington-Normal. Amtrack passenger rail service is provided at Galesburg.

It is difficult to predict what will happen if there is no Federal (Corps of Engineers) involvement through a flood control plan. During the 1978-1983 period, the community suffered severe flooding several times and the residents remained in the village, collecting flood insurance benefits and reinvesting the funds in their homes and businesses. Many residents raised their homes to a level above the 100-year flood. Based on the events of this period, it could be assumed that residents would continue living in the village, perhaps extending the trend of floodproofing (raising) homes.

The situation appears to have changed since 1984 when 88 flood insurance policies were in effect. In March and November 1985, high water occurred. By June 1986, only 53 flood insurance policies remained in effect. Based on this recent trend, it could be assumed that if flooding continues, vacating properties in the village also may continue. However, most people who have moved out continue to maintain a Liverpool mailing address, and vacant residences tend to become reoccupied once floodwaters recede and there is a flood-free period.

The future is likely to be somewhere between these two trends. If frequent flooding continues, vacating of properties will probably continue and rehabilitating of some of the properties also is likely. If flooding does not occur for several years, it is likely that people will move into Liverpool again. Although severe unemployment plagues the county and the economy is depressed, many persons find Liverpool an attractive community because property can be acquired inexpensively and property taxes are very low. Most of the residents also enjoy the recreational opportunities, the quiet atmosphere, and the slower pace that the village affords.

Those persons remaining in the village will continue to receive flood insurance benefits. Access during flood events also will continue to be a problem. The Illinois River has a very flat slope and therefore floodwaters recede very slowly. In the past, residents have been forced to use boats to access their properties or to vacate their properties for periods up to 3 months.

SOCIO-ECONOMIC CONDITIONS

This section of the report presents a profile of the village of Liverpool, Illinois, and its residents. The socio-economic presentation is divided into three major components: (1) the Area Demographic Analysis provides a look at population trends in the community and the region; (2) the Residential ZIP Code Demographic Analysis develops a socio-economic profile of the community as compared to the surrounding region or sectional center; and (3) the Survey Questionnaire Analysis summarizes the results of the surveys administered to Liverpool residents and non-resident property owners by the Rock Island District.

Data utilized to develop this community profile are derived from four sources: U.S. Department of Commerce, Bureau of the Census 2/; State of Illinois, Bureau of the Budget 3/; Claritas, REZIDE, Residential ZIP Code Demographic Encyclopedia 4/; and questionnaires.

AREA DEMOGRAPHIC ANALYSIS

The study includes the village of Liverpool, Fulton County, Illinois, as shown on plate 1 of the main report. The village is situated in southern Fulton County about 30 miles southwest of Peoria. Liverpool is contained within Liverpool Township and is part of the Peoria Illinois Sectional Center.

2/ U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Vol. 1, "Characteristics of Population," Ch. A, "Number of Inhabitants," Part 15, Illinois.

3/ State of Illinois, Bureau of the Budget, Illinois Population Trends from 1970 - 2025, 1984 Ed., July 1984.

4/ Claritas, REZIDE, 1980 & 1985, The National Encyclopedia of Residential ZIP Code Demography.

In 1980, 243 persons resided in Liverpool, an 11.5 percent increase from 1970. This trend has reversed in recent years as residents have been unable or unwilling to repair flood damage and have moved away from Liverpool. Although the 1986 population of Liverpool fell below 200, vacant properties are now being reoccupied by owners and tenants. Population trends for the affected area are summarized in table D-2.

TABLE D-2

Population Trends for Liverpool, Illinois, and Surrounding Area

Population Area	Population 1970	Population % Change 1970-1980	Population 1980	Population % Change 1980-1985	Population Estimate 1985	Population % Change 1985-1990	Population Projection 1990
Village of Liverpool, Illinois	218	11.5	243	<-17.7	<200	----	----
Liverpool Township, Illinois	844	9.5	924	----	----	----	----
Peoria Illinois Sectional Center, Illinois	----	----	198,123	-1.6	195,006	-1.7	191,739
Fulton County, Illinois	41,883	4.3	43,702	4.3	45,582	0.8	45,947
State of Illinois	11,134,873	2.7	11,430,610	1.3	11,584,906	0.9	11,687,749

RESIDENTIAL ZIP CODE DEMOGRAPHIC ANALYSIS

The 1980 population of the Liverpool ZIP code area (ZIP code - 61543, 1980 population = 291) was slightly greater than for the village of Liverpool (1980 population = 243). However, the characteristics of the ZIP code area are assumed to be representative of the village of Liverpool itself. The Claritas, REZIDE, Residential ZIP Code Demographic Encyclopedia was used to obtain a socio-economic profile of Liverpool residents. 5/ A socio-economic profile of the Peoria Illinois Sectional Center is provided for comparison.

5/ Ibid.

Age Distribution

The 1984 median age of Liverpool residents was approximately 29 years, while the median age of the Peoria Illinois Sectional Center population was 30. A breakdown of the age distribution for both the community and the sectional center is presented below:

Age	Percent of Liverpool Population, 1984	Percent of Sectional Center Population, 1984
under 6 yrs	13.1	9.6
6-17 yrs	22.3	20.8
18-44 yrs	39.5	40.0
45-64 yrs	13.4	18.9
over 64 yrs	11.7	10.7

Race and Ethnicity

Liverpool is a very homogeneous community, with its entire population being Caucasian. One percent of the Peoria Illinois Sectional Center population is of minority status. The dominant ethnic groups in both the community and the sectional center are English, German, and Irish.

Household Composition

Non-family households are defined as either households with one person living alone or households with two or more unrelated individuals living together. In 1984, approximately 18 percent of Liverpool's households did not contain families, as compared to 20 percent of the sectional center households.

Ten percent of the village's households contained a single female parent family (female householder with no spouse present) with children under 18 years of age. Only 4 percent of the sectional center's households fit into this category.

A distribution of households by number of persons occupying the unit is provided below:

Household Size	Percent of Liverpool Households, 1984	Percent of Sectional Center Households, 1984
1	17.2	17.2
2	30.3	31.2
3-4	32.3	36.5
5 +	20.2	13.5

Family Life Cycle Code

Family life cycle codes are a means of classifying ZIP code areas, according to the predominant patterns of individuals' social composition, by family or non-family categories of living arrangements. Liverpool is categorized as a family-type child-bearing ZIP code area. This indicates that at least two-thirds of the households contain families (persons related by blood or marriage). It further indicates that the proportion of children in Liverpool under 6 years of age exceeds average expectations more than the other age groups of children.

No family life cycle code was available for the Peoria, Illinois, Sectional Center. As a consequence of the diversity in population for such a large area, a family life cycle code would have little meaningful discrimination.

Educational Attainment

Educational attainment is measured by the number of years of school or college completed. Years of school completed by the Liverpool and sectional center populations age 25 and over are presented below.

Schooling Completed	Percent of Liverpool Population, 1984	Percent of Sectional Center Population, 1984
0-8 yrs elem.	32.7	17.2
1-3 yrs high school	24.1	13.9
4 yrs high school	40.1	43.4
1-3 yrs college	1.9	13.9
4 + yrs college	1.2	11.6

Labor Force

The 1984 civilian labor force in Liverpool and the Peoria Illinois Sectional Center was comprised of 52.5 and 62.3 percent of the population, respectively. The unemployment rate in the community was approximately 14.4 percent, 7.4 percent higher than the 7.0 percent unemployment rate in the sectional center.

Occupation

The White/Blue Collar Index shows the number of white collar workers for every 100 blue collar workers in the area. White collar workers are occupied in the following categories: executives, administrators and managers, professionals, technical, sales, and clerical and support services. Blue collar workers have occupations of craftsman, operatives, and laborers.

The White/Blue Collar Index reported for Liverpool in 1984 was 28; the index reported for the sectional center was 124. Occupational distribution percentages for Liverpool and the sectional center are provided below:

Occupation	Percent of Employed Labor Force by Occupation, 1984 Liverpool	Percent of Employed Labor Force by Occupation, 1984 Sectional Center
Executive, administrator, and manager	4.5	8.2
Professional	0.0	10.7
Technical	2.3	2.6
Sales	3.4	9.3
Clerical and support	6.7	15.8
Private household services	0.0	0.3
Other services	19.1	12.2
Crafts, precision production	12.4	15.0
Machine, transport operator	33.6	17.5
Laborer and handler	14.6	5.0
Farm, forest, fishing	3.4	3.4

Household Income

Household income means total money income received by all household members for wages, salaries, net self-employment income, social security income, income from public assistance, and unearned income from all other sources including rents, royalties, dividends, and interest. Liverpool's estimated 1984 median household income was $17,292. The Peoria Illinois Sectional Center's estimated 1984 median household income was $27,172. The household income distribution percentages presented below represent the percent of total households within the Liverpool and sectional center ZIP code areas whose household incomes fall in the specified category.

1984 Household Income	Percentage of Liverpool Households	Percentage of Sectional Center Households
over $75,000	0.0	2.4
$50,000 - $74,999	1.3	10.0
$30,000 - $49,999	9.0	30.4
$20,000 - $29,999	34.8	24.1
$15,000 - $19,999	11.0	8.9
$10,000 - $14,999	17.0	9.1
under $10,000	26.9	15.1

Housing

The 1984 housing data for both the village of Liverpool and the Peoria Illinois Sectional Center are provided below:

	Liverpool	Sectional Center
Percent owner-occupied residential structures	72.0	76.8
Percent renter-occupied residential structures	28.0	23.2
Percent of mobile home residential structures	18.8	3.5
Percent of seasonal residential structures	9.0	0.3
Median home value	$23,201	$52,398
Median monthly rent	$275	$307

ZIP Quality Rating

The ZIP Quality Rating (ZQ) is a four-component socio-economic status score that rates a ZIP code area by applying a weight to each element of the following four distributions:

a. Household income (17 intervals)
b. Educational attainment or years of school completed by persons 25 years and older (5 intervals)
c. Occupation of civilian labor force (13 categories)
d. Home value (13 intervals)

The ZQ represents a highly sensitive tool for distinguishing lower, middle, and upper class areas. The ZQ indicates whether a ZIP code area is higher, lower, or equal to the U.S. quality norm, which is 50. The range of the ZQ is from 1 to 100; however, a ZQ over 50 represents relative affluence. The distribution of the ZQ is skewed toward the low end in terms of number of ZIPs; thus, about two-thirds of the ZIPs have ZQs between 30 and 50. The ZQ's distribution is normal in terms of population, however. About two-thirds of the U.S. population lies between 40 and 60 (plus or minus one standard deviation of 10 from the U.S. mean of 50).

In 1984, the ZQ calculated for Liverpool was 36. In terms of social rank or status, this can be interpreted as lower middle class. Approximately 16.4 percent of all U.S. households fall within this range.

The ZQ for the Peoria Illinois Sectional Center was 52, which represents a middle class population. Nearly 69 percent of all U.S. households fall within this range.

Analysis of Residential ZIP Code Data

Utilizing the data presented in this section, a socio-economic comparison of Liverpool and the Peoria Illinois Sectional Center can be made.

The composition of these two areas is similar. The median age of their populations is the same even though Liverpool has a slightly greater proportion of young children. Both areas are very homogeneous in terms of racial or minority status, with nearly 100 percent of their populations being Caucasian. In regard to household composition, Liverpool has more households with five or more residents than the sectional center. This is not surprising since larger and extended families are generally more predominant in rural areas. The number of single female parent households is relatively high in Liverpool, representing 10 percent of the village's households.

A large difference in educational attainment exists between the populations of the two areas. Few of Liverpool's residents over 25 years of age have obtained any college education. Further, one-third of the village's residents did not enter high school, nearly double the number in the sectional center.

In terms of economic conditions, the disparities between Liverpool and the sectional center become more apparent. The labor force in Liverpool is comprised of a much greater percentage of blue collar workers. These workers are more affected by industrial and manufacturing plant shutdowns and layoffs than white collar workers. This may explain why in 1984 Liverpool's unemployment rate (14.4 percent) was double that of the sectional center's.

In 1984, median household income in Liverpool was about $10,000 less than in the Peoria Illinois Sectional Center. Liverpool's household income level and overall ZQ indicate that it has a lower middle class population. However, a large number (26.9 percent) of the community's households had incomes below $10,000, 12 percent more than in the sectional center.

The distribution of residents that own versus rent their homes is very similar in both communities. The median home value in Liverpool is very low, nearly $30,000 less than in the sectional center. This is partially explained by the larger number of mobile homes and seasonal homes in the village. Low home values also may be due to the risk of flood damage in the village or to the village's commuting distance to larger urban areas.

SURVEY QUESTIONNAIRE ANALYSIS

Survey questionnaires were developed to secure information about the opinions and values of Liverpool residents and non-resident property owners. The major objective was to assess the degree of support that the proposed project has from both residents and non-residents. The questionnaires were designed to identify flood problems which have been experienced and to request opinions along the following dimensions:

* The seriousness of floods on the Illinois River
* Potential solutions to the flood problem in Liverpool
* Social and economic impacts

An additional set of questions was included for those individuals who evacuated their homes during the March 1985 flood. These questions focused on the additional expenses and inconveniences incurred by these residents and property owners. The questionnaires also served as a means of acquiring demographic data about the community.

The questionnaires were administered in November 1986 by Corps of Engineers' employees. Both Liverpool residents and non-resident property owners were surveyed: residents were surveyed door-to-door, while non-resident property owners were surveyed by telephone. Non-resident property owners were surveyed using a modified resident questionnaire. The survey administrators tried to contact each Liverpool household and each non-resident property owner. In order to obtain responses from as many residents as possible, additional survey forms were left at the U.S. Post Office in Liverpool. Residents who were not reached at home were then able to complete and mail a questionnaire to the Rock Island District.

A total of 19 residents was contacted door-to-door, 4 residents completed questionnaires and mailed them to the Rock Island District, and 10 non-resident property owners were contacted and surveyed via telephone. The exact number of occupied housing units at the time of the survey was unknown. In May 1986, 49 of the village's 92 dwellings were occupied (53 percent). Names and addresses of non-resident property owners were obtained from the county assessor's office. The records kept by the assessor document that a total of 42 Liverpool property owners resided outside of the community. Therefore, approximately 47 percent of resident households and 24 percent of non-residents were reached through this surveying effort.

Socio-Economic Profile of Liverpool Residents and Non-Resident Property Owners

By utilizing the mean and median answers for items in the questionnaire, general descriptive statements can be made about community residents and non-resident property owners.

Residents

Liverpool appears to be a rather stable community. The number of residents residing in Liverpool since birth accounts for approximately 65 percent of the current population. The remainder of the population moved to Liverpool primarily for increased recreational opportunities, lower living costs, or to avoid the higher incidence of crime in larger cities. Seventy-four percent of residents surveyed own their homes, and the majority have lived at their current address for more than 10 years.

Residents seem well-informed about the Corps of Engineers' ongoing flood control study. The majority have attended public meetings, talked with public or Corps officials, read news articles about the study, and/or discussed the study with friends and relatives. However, 57 percent of residents think they have not received enough information from the Corps of Engineers. Residents would prefer more public meetings and mailings. Residents have experienced a number of problems as a result of flooding. Problems reported by most residents include: cracks in basement walls, floors, or foundations; disrupted transportation/access to homes; and lowered property values. In addition, 74 percent of residents have evacuated their home at least once. 6/

During the past 5 years, many residents have taken action to reduce the impacts of flooding to their property. The majority have purchased flood insurance during this time (78 percent currently carrying a policy). While 43 percent of residents have participated in emergency flood-fighting efforts within the past 5 years, only 30 percent have raised their houses or mobile homes.

6/ During the March 1985 flood, 52 percent of residents interviewed had to evacuate their homes. These residents were away from their homes for a period ranging from a few days to as long as 3 months.

Most residents agree that a permanent levee is the best alternative for flood control. Most residents (61 percent) have no concerns about a levee being constructed; however, some residents expressed concerns related to safety, property values, and/or the type of levee construction.

Non-Residents

Non-resident property owners are not as well-informed about the ongoing flood control study as residents; for example, only 20 percent have attended public meetings. Our survey indicates that approximately 10 percent of non-resident property owners are unaware of the ongoing flood control study. In general, none of the non-resident property owners believe that they have received enough information from the Corps of Engineers. Eighty percent of non-resident property owners would prefer to be kept informed about the study by mailings.

Sixty percent of non-resident property owners own land but no residential or commercial structures. The remainder own weekend or seasonal cottages or mobile homes. Forty percent of the non-resident property owners do not use their property at the present. Generally, those non-resident property owners who do use their Liverpool property use it for recreational activities. The average length of property ownership in Liverpool is between 11 and 20 years. Only 20 percent of non-resident property owners have lived in Liverpool as their primary residence, and of these, half chose to move their primary residence because of frequent flooding.

Most of the non-resident property owners expressed no preference for the best alternative to Liverpool's flood problem; they supported the preferences of the village residents.

FLOOD DAMAGE HISTORY

Recently, flood problems have occurred almost annually on the Illinois River at Liverpool. It has been reported by village residents that the frequency and depth of flooding has been increasing in recent years. Some measures, such as raising mobile homes and permanent structures, have been taken by village residents to reduce the damage from annual floods. Table D-3 illustrates this floodproofing history. According to many residents, this practice has apparently been discontinued because of the inconvenience of climbing stairs for many older residents and the potential of structural collapse, especially during winter floods.

TABLE D-3

Floodproofing Trends

Year	Number of Structures Raised: Mobile Homes	Permanent Structures
1986	-	-
1985	-	-
1984	-	-
1982 - 1983	2	5
1981	-	-
1980	2	-
1979	2	1

Nearly the entire village of Liverpool is currently enrolled in the Federal flood insurance program. Over the years, the National Flood Insurance Program has paid a significant amount of claims for flood damage. The record of payments is shown in table D-4.

TABLE D-4

Flood Insurance Claims and Insurance in Force
Liverpool, Illinois

Year	Claims	Amount Paid ($): Actual	1986 Prices	No. of Policies	Total Insurance ($)
1978	-	-	-	58	962,000
1979	50	502,200	733,200	87	1,656,100
1980	-	-	-	82	1,656,800
1981	-	-	-	71	1,627,800
1982	126	589,200	783,600	87	Unavailable
1983	25	70,800	75,000	80	1,952,700
1984	2	15,300	15,600	88	2,061,000
1985	85	300,100	303,100	55	1,331,000
1986	Unavailable	Unavailable	-	53	1,266,800

The Federal Emergency Management Agency (FEMA) has been active in the Liverpool area under its 1362 Program. The program provides for the acquisition of properties damaged severely in one flood (50 percent of insured value) or in each of three floods (25 percent of insured value). Following a severe flood in 1982, FEMA proposed a 1362 Program for the village which included the purchase of 21 properties. The village then would have been responsible for demolishing the structures, assuming title to the property, and assuming ultimate responsibility for maintenance of the property. The village turned down the FEMA proposal

because, although some residents would be moved from the floodplain, a majority would remain and would incur additional costs of supporting village services with a reduced tax base.

Post-flood damage estimates were made for major floods by village and county officials and are shown in table D-5. The March 1985 figures are based on a post-flood damage survey conducted by the Rock Island District.

TABLE D-5

Post-Flood Damage Estimates
Liverpool, Illinois

Flood Date	Estimated Cost to Village ($) Actual	Jan 87 Price Levels	Estimated Private Loss ($) Actual	Jan 87 Price Levels
Apr 79	36,000	54,000	502,000	758,000
Mar 82	21,000	24,600	200,000	234,000
Dec 82	7,000	7,700	500,000	550,000
Mar 85	11,000	11,600	658,000	690,900

It is important to note that none of these floods exceeded a 40-year event. The estimated cost to the village includes grants from the State of Illinois and Federal Government used for flood-fighting and cleanup. The village of Liverpool budget amounts to $12,000 per year, of which $5,000 is allocated to flood-fighting and cleanup.

Both historical flood damages and flood insurance payments are primarily for structures, since the Illinois River rises slowly and gives residents time to move their possessions. Once at flood stage, the Illinois River tends to stay up for an extended period.

In December 1982, several homes had water on the first floor, leaving an estimated 59 families homeless. Several families received assistance grants from the Illinois Department of Public Health to help cover this cost. The Riverview Inn was closed for 2 months; Turk's Alignment and the tire shop were closed for 5 weeks.

Following the March 1985 flood, all village businesses were closed for an extended period. As shown in table D-6, all businesses had significant water levels above the first floor of their structures.

TABLE D-6

Businesses Out of Operation
March 1985 Flood

Business	Days Closed	Water Level Above 1st Floor (feet)
Body Repair Shop	30	6.0
Turk's Alignment Shop	44	3.5
Tire Repair Shop	30	4.5
Riverview Inn Restaurant	60	3.0

The village post office was moved to a temporary location outside the floodplain. The Red Cross and Salvation Army set up stations just outside the village to assist residents. Thirty-nine (39) households were evacuated for an average of 37 days each.

A boat tour of the village conducted during the flood by Rock Island District personnel revealed that many residents moved in with neighbors in Liverpool who had raised their homes 8 to 12 feet as a flood protection measure. During the flood, all phone and electrical service was out of operation.

AVERAGE ANNUAL DAMAGES

VILLAGE

Following a flood event in Liverpool, FEMA adjusters make an initial inspection to determine the extent of damage. At this time the homeowner is required to produce receipts from repairs resulting from the previous flood or names of contractors who did the repair work.

After the adjuster has adequate documentation of previous repair work, a partial settlement is made with the homeowners. If there is a mortgage on the home, the check is made out jointly to the homeowner and the bank that holds the mortgage. The adjuster says that banks generally make sure that repairs are made to protect their interest. Following actual repairs, the adjuster reinspects the property and makes a final settlement with the homeowner. Actual records are the property of FEMA and individual homeowners and are therefore not available. Insurance payments are therefore a true reflection of flood damages.

The average annual damages are the expected value of flood damages for any given year. To compute these damages, flood insurance payments in the village of Liverpool were obtained for various years from the FEMA regional office and the Illinois Department of Transportation, Division of Water Resources. Post-flood damage data compiled by the village and county officials also were obtained. Over the past 5 years, there has been an average of 68 occupied residential structures. Total average annual residential damages and benefits thus were calculated to account for all 68 occupied residences. Flood frequencies were then assigned to floods corresponding to these payments. The payments were increased by $68,000 for the 30-year and less frequent floods to account for the $500 deductible for content damage and the $500 deductible for structure damage as specified in local flood insurance policies (68 policies in the village x $1,000 deductible = $68,000). These data were used to develop the existing condition damage-frequency curve for the village of Liverpool (plate D-1).

The zero damage point was determined to be the 2-year flood event, based on a comparison of elevation-damage relationships established during the field survey for the lowest structures in the village and elevation-frequency data established for this study. This exercise confirmed the zero damage elevation used in previous Corps studies at Liverpool.

The damages associated with the 30-year flood were estimated based on historical insurance payments per household for 30-year flood events.

Total flood insurance in force for 68 occupied residences plus total deductible amount ($1,000/policy) were used to establish maximum damage corresponding to the 100-year flood event. At the 100-year flood elevation, the agricultural levee behind Liverpool would be overtopped by as much as 2 feet in some areas and within 1 foot of being overtopped at several other lengths along its alignment, making sandbagging ineffective. Once the agricultural levee behind Liverpool is overtopped, damages in the village of Liverpool would be expected to increase substantially. All access to the village would be cut off for a significant period until the Illinois River went down and the agricultural district was allowed to drain.

A detailed post-March 1985 flood damage survey was conducted by the Rock Island District. As shown on plate D-1, this survey confirmed a point on the elevation damage curve corresponding to a 37-year flood event.

The existing average annual damages derived from this damage-frequency relationship amount to $130,800 for the village of Liverpool, for 68 residences and 4 commercial businesses.

Total annual damages were apportioned between residential and commercial categories based on the relative value of residential and commercial structures in the village. Future residential content damages were projected using the 1980 OBERS projections for the non-SMSA part of BEA Economic Area 087 Peoria, Illinois, forecast for constant dollar per

capita income. Content value is currently 19 percent of structure value based on insurance records, and that percentage is projected to increase over time to a maximum projected of 75 percent of structure value. Content damage is projected to increase at the same rate and for the same period as content value. Table D-7 shows that future residential content damages amount to $9,100.

TABLE D-7

Without-Project
Average Annual Damages ($)
April 1988 Price Levels
8-5/8 Percent Interest Rate
100-Year Project Life

	Existing	Future	Total	
Liverpool Village				
Flood Damage				
Residential				
Strurture	97,700	-	97,700	
Content	20,100	9,100	29,200	
Commercial	13,000	-	13,000	
Family Assistance				
Plus Cleanup Costs	10,100	-	10,100	Agricultural District
Flood Damage	114,000	-	114,000	
TOTAL	254,900 a/	9,100 a/	264,000 a/	

a/ Damages are inclusive of freeboard damages.

In addition to flood insurance payments, Liverpool residents have received individual and family assistance grants from the Illinois Department of Public Health. Also, the village received public assistance grants following flood events. Data were collected regarding cleanup costs for various flood events.

Flood frequencies were assigned to floods corresponding to these payments and cleanup costs, and a damage-frequency curve was developed for individual/family and public assistance and cleanup costs (plate D-2). As table D-7 shows, the existing average annual damages derived from the damage-frequency relationship amounted to $10,100.

AGRICULTURAL DISTRICT

A detailed damage survey was conducted for the Liverpool Levee and Drainage District. An inventory of damageable property is included below:

Inventory of Damageable Property
in Agricultural District

Auto Repair Shop with Equipment	
12 Residential Structures	
3 Farm Buildings	
Fences	
Cleanup Cost	
Farm Machinery & Equipment	
Grain in Bins/Cribs	
Silos and Unloading Equipment	
Pump Station	
Crop Damage (2,600 Acres)	
Road Repair/Replacement	
25 Campers	
Total Damageable Property	$3,738,800

Determining damages and benefits to the agricultural district involves assigning an effective protection level or assigning a probable non-failure point. One method of determining a probable non-failure is to use a template method. Most of the levee behind Liverpool is built to at least elevation 455.5 feet NGVD but there is a low area at elevation 453.2. In applying a template to the levee section, the top elevation of 455.5 was used. For 1,100 feet behind the village, the levee has a top width of 5 feet and side slopes of 1.5 feet horizontal to 1 foot vertical (1.5:1) and 2 feet horizontal to 1 foot vertical (2:1). Fitting an effective levee section with an 8-foot top width and 3:1 side slopes, a top elevation of 450.5 feet NGVD is obtained.

The second method is to use the existing elevation of the low area as a probable failure point and subtract 3 feet for freeboard. The lowest elevation behind Liverpool is 451.8 feet NGVD where the road into Liverpool crosses the levee. This road has been sandbagged effectively during past floods, so the low section of 453.2 feet NGVD was used as the probable failure point. Elevation 450.2 was assigned as the probable non-failure point, accounting for 3 feet of freeboard.

The two methods are comparable to one another. Damages and benefits to the agricultural district were based on the use of 453.2 minus 3 feet. Half of the damages in the freeboard zone are credited in this analysis.

As shown on table D-7, the without-project average annual damages attributed to the agricultural district amount to $114,000.

ALTERNATIVES CONSIDERED

FLOOD CONTROL ALTERNATIVES

The Rock Island District examined two alternatives throughout its study of the flooding problem in Liverpool: levee protection and permanent evacuation.

Levee Protection

The levee protection alternative examined in the reconnaissance study phase included three protection levels: the 25-year levee, which would tie into the existing agricultural levee; the 44-year levee, also tying into the agricultural levee but at the same elevation as the agricultural levee (recent information shows the levee to be at the 50-year level rather than the 44-year); and the 100-year ring levee which included raising that portion of the agricultural levee directly behind the community. All levels were analyzed with freeboard.

The 100-year ring levee was not recommended for further evaluation because it was not economically feasible. In addition, the 25-year ring levee was not recommended because of safety concerns, specifically, the low level of protection provided by the urban levee.

In this detailed phase of the study, a 50-year levee around the village has been evaluated. The levee would be constructed to a 50-year level of protection plus 3 feet of freeboard. The levee alignment is shown on plate 3 of the main report.

In response to requests from the Liverpool Drainage District as well as in the interest of developing a complete plan, raising the agricultural levee to a 100-year protection level, including 100-year protection around the village, was considered in this Definite Project Report.

This plan involves raising the existing agricultural levee to a 100-year level of protection plus freeboard and constructing a 100-year village levee (plus freeboard). The 100-year agricultural levee alignment is shown on plate 2 of the main report. Note that the portion of the agricultural levee behind the village would not be raised. The village levee, therefore, becomes the main line of protection.

The freeboard requirements used in this analysis are 4 feet along the upper flank and around the village. Downstream of the village, at river mile 217.0, the freeboard is transitioned to 2 feet. These requirements were obtained from the Rock Island District's Hydraulics Branch. The levee slopes would be 3 feet horizontal to 1 foot vertical, and the top width would be 10 feet. The levee raise would be accomplished entirely within the levee district. Approximately 14 acres are needed for this purpose. The village portion of the levee would follow the alignment previously described for the 50-year plan. Real estate requirements include the 14 acres needed for the agricultural levee raise, 11.5 acres for the village levee, and 2.5 acres for ponding.

Permanent Evacuation

The other alternative the District has evaluated through its study is permanent evacuation of the residents. In the reconnaissance study, the plan involved acquiring and demolishing all properties in the village. The land then would be cleared and seeded for use in conjunction with the existing county boat ramp in Liverpool. This plan was not recommended for further study because it was not economically feasible.

The plan has been evaluated in the current detailed study due to inquiries from FEMA and changed conditions of the village. The changed conditions include the vacating of residences, the potential acceptance of an evacuation plan by residents, and a reevaluation of real estate values in the village.

AVERAGE ANNUAL BENEFITS

Benefit categories considered in this analysis include: existing and future flood damage reduction; individual/family and public assistance and cleanup costs; employment benefits; evacuation-transition-reoccupation costs avoided; flood insurance overhead savings; and the value of floodplain land in new use and other benefits.

FLOOD DAMAGE REDUCTION

Village and Agricultural District

Flood damage reduction benefits are calculated taking the difference between average annual flood damage without and with project construction. A summary of existing and future flood damage reduction benefits for the various plans considered is presented in table D-14. Benefits in the freeboard range equal to one-half the area under the damage-frequency curve between the design level of protection and the largest flood that might be carried within the freeboard are accounted for in the flood damage reduction benefits.

Individual and Family Assistance and Cleanup Costs

Benefits in this category are calculated in the same manner as flood damage reduction, taking the difference between average annual costs/payments with and without project construction. A summary of assistance and cleanup costs benefits is presented in table D-14.

Employment of Previously Unemployed Labor Resources

Table D-8 lists historical unemployment rates for Fulton County, Illinois, and the criteria for qualifying for area redevelopment benefits. As shown, Fulton County qualifies under both criteria 1 and 2.

TABLE D-8

Unemployment Data, Fulton County and the United States

	Unemployment Rate		Unemployment rate criteria for qualifying for area redevelopment benefits.		
Year	Fulton County (%)	U.S. (%)	(1) 150% of U.S. 3 of last 4 Years	(2) 175% of U.S. 2 of last 3 Years	(3) 200% of U.S. 1 of last 2 Years
1981	9.2	7.6	11.4	13.3	15.2
1982	14.1	9.7	14.55	16.98	19.4
1983	14.7	9.6	14.4	16.8	19.2
1984	14.9	7.5	11.25	13.13	15.0
1985	14.6	7.2	10.8	12.6	14.4
1986	12.1	7.0	10.5	12.25	14.0
1987	11.0	6.2	9.3	10.85	12.4

Therefore, within Fulton County it is appropriate to include benefits from use of otherwise unemployed or underemployed labor for proposed Corps of Engineers projects. Calculation of these benefits for the plans considered in this report are shown in tables D-9 through D-11 which follow.

TABLE D-9

Redevelopment Benefits
50-Year Levee - Village

1. Estimated On-Site Labor Costs:

Construction Cost a/ $1,147,000
Percent to Labor 50

2. Allocation of On-Site Labor by Category:

Labor Category	On-Site Labor Cost ($)	Percent Allocation b/	Amount of Wages ($)
Skilled	573,500	40	229,400
Semi-Skilled	573,500	50	286,800
Other	573,500	10	57,400

3. Allocation of Wages to Locally Unemployed or Underemployed Labor:

Labor Category	Amount Wages ($)	Percent to Locally Hired Unemployed Labor b/	Wages to Previously Unemployed Local Labor ($)
Skilled	229,400	75	172,100
Semi-Skilled	286,800	90	258,100
Other	57,400	25	14,400
Total	573,600		444,600

a/ Includes total construction costs, less costs for engineering and design, supervision and administration, and lands and damages.

b/ Estimates based on previous experience with similar local protection projects.

1.04314 x $444,100 = $463,300 x .08627 = $40,000

TABLE D-10

Redevelopment Benefits
100-Year Levee - Village and Agricultural District

1. Estimated On-Site Labor Costs:

Construction Cost a/ $3,543,100
Percent to Labor 50

2. Allocation of On-Site Labor by Category:

Labor Category	On-Site Labor Cost ($)	Percent Allocation b/	Amount of Wages ($)
Skilled	1,771,500	40	708,600
Semi-Skilled	1,771,500	50	885,800
Other	1,771,500	10	177,100

3. Allocation of Wages to Locally Unemployed or Underemployed Labor:

Labor Category	Amount Wages ($)	Percent to Locally Hired Unemployed Labor b/	Wages to Previously Unemployed Local Labor ($)
Skilled	708,600	75	531,500
Semi-Skilled	885,800	90	797,200
Other	177,100	25	44,300
Total	1,771,500		1,373,000

a/ Includes total construction costs, less costs for engineering and design, supervision and administration, and lands and damages.

b/ Estimates based on previous experience with similar local protection projects.

1.04314^3 x $686,500 = $ 779,200
1.04314 x $686,500 = $ 716,100

$1,495,300 x .08627 = $129,000

TABLE D-11

Redevelopment Benefits
Permanent Evacuation Plan

1. Estimated On-Site Labor Costs:

Construction Cost a/	$361,000
Percent to Labor	50

2. Allocation of On-Site Labor by Category:

Labor Category	On-Site Labor Cost ($)	Percent Allocation b/	Amount of Wages ($)
Skilled	180,500	40	72,200
Semi-Skilled	180,500	50	90,300
Other	180,500	10	18,000

3. Allocation of Wages to Locally Unemployed or Underemployed Labor:

Labor Category	Amount Wages ($)	Percent to Locally Hired Unemployed Labor b/	Wages to Previously Unemployed Local Labor ($)
Skilled	72,200	75	54,200
Semi-Skilled	90,300	90	81,300
Other	18,000	25	4,500
Total	180,500		140,000

a/ Includes total construction costs, less costs for engineering and design, supervision and administration, and lands and damages.

b/ Estimates based on previous experience with similar local protection projects.

$1.04314^3 \times \$70,000 = \$ 79,500$
$1.04314 \times \$70,000 = \$ 73,000$

$\$152,500 \times .08627 = \$13,200$

Evacuation Costs Avoided

Evacuation-transition-reoccupation costs were reevaluated using the methodology used in the flood damage report for Frankfort, Kentucky, prepared by the Louisville District in July 1981. Added costs for the average

household in Liverpool were estimated as follows, considering there are currently an average of 2.9 persons per household in Liverpool.

Hotel	$20/day
Meals	$30/day
Storage	$100/month
Laundry	$5/week
Transportation Costs	$52/week

The total is $60 per day per household plus a $150 cost to move out and move back in following the flood.

The length of evacuation was based on duration of historical floods above elevation 446.5 feet NGVD. At that elevation, floodwater would be above the first floor of three of the residences in Liverpool. Also, the March 1985 post-flood survey indicated that, on the average, residents were living away from their homes for 37 days. (Note Table D-12 - February 1985 flood was up 23 days, add 14 days for cleanup and repair).

TABLE D-12

Data on Historical Floods

Flood Date	Number of Days Above Elevation 446.5	Maximum Flood Elevation
27 Mar 62	2	446.5
18 May 70	8	448.0
25 Apr 73	17	449.0
03 Feb 74	2	446.8
31 May 74	2	446.7
24 Jun 74	10	448.9
12 Mar 79	57	450.9
16 Mar 82	18	450.4
20 Apr 82	4	447.2
07 Dec 82	13	450.5
06 Apr 83	19	448.8
28 Feb 85	23	451.3
22 Nov 85	21	450.1

The elevation-damage relationships were constructed based on the above information and are shown in table D-13. The resulting average annual benefits for the 50-year levee plan amount to $5,300 and $6,600 for the 100-year plan.

TABLE D-13

Elevation Damage Relationship
for Evacuation-Transition-Reoccupation Costs

Elevation	No. of Residents w/Floodwater Above First Floor	Days Evacuated ($60/day)	Evacuation Costs ($)	Total Cost Plus Moving Expenses($)
446.5	3	16	2,900	3,300
447.5	4	18	4,300	4,900
448.5	10	33	19,800	21,300
449.5	19	35	39,900	42,800
450.5	30	35	63,000	67,500
451.5	41	37	91,000	97,200
452.5	45	38	102,600	109,400
453.5	69	60	248,400	258,800
454.5	69	60	248,400	258,800
462.5	69	60	248,400	258,800

Flood Insurance Overhead Savings

The national cost of the flood insurance program is its administration. The cost of servicing flood insurance policies is determined based upon the average cost per policy, including agency commission, and the cost of servicing and claims adjusting. The administrative costs have been estimated by FEMA to be $85.00 per policy. For the benefit calculation, it was assumed that all 68 residences and 4 commercial businesses would come under the flood insurance program. The resulting average annual savings amounts to $6,120 ($85 x 72 policies = $6,120), as shown in table D-14.

Value of Floodplain's Land in New Use

This benefit category applies to the permanent evacuation plan only. The new use of the land following evacuation is passive recreation compatible with the existing Fulton County boat ramp. The land is appraised at $2,500 per acre, which is the estimated remaining value of this land after it is acquired and the evacuation plan is implemented. An annual benefit equal to the remaining value of this land is claimed for the permanent evacuation plan ($2,500/acre x 55 acres x .08627 = $11,900).

Other Benefits

The following benefits were not claimed in the benefit-to-cost ratio, but are mentioned to lend further support for the project.

Recreation benefits amounting to approximately $3,000 would result from the raising of the boat ramp parking area. This would allow for use of the boat ramp during low-level or non-threatening flooding.

Intensification benefits amounting to $9,000 annually would result from the levee project as existing businesses are projected to expand and residential structures would be renovated.

AVERAGE ANNUAL COSTS

The first costs developed in this report, interest during construction, and annual operation and maintenance costs are displayed in table D-15. Annual costs for all plans considered were computed using an 8-5/8 percent interest rate, a 100-year project life, and January 1987 price levels. Interest during construction was calculated based on a 1-year construction period for the 50-year village levee and a 2-year construction period for other plans considered.

ECONOMIC SUMMARY

A summary of average annual benefits and costs for the alternative plans considered is shown in table D-15. As illustrated, the 50-year village levee is the only economically justified plan and is the NED alternative.

TABLE D-14

Summary of Average Annual Benefits
8-5/8 Percent Interest Rate, April 1988 Price Levels
100-Year Project Life

Category	50-Year Levee-Village			100-Year Levee Ag. District and Village			Permanent Evacuation [c]		
	Existing	Future	Total	Existing	Future	Total	Existing	Future	Total
Flood Damage Reduction [a]									
Residential									
Contents	16,800	7,600	24,400	18,100	8,100	26,200	13,200	6,000	19,200
Structure	81,600	-	81,600	88,000	-	88,000	64,500	-	64,500
Commercial	10,900	-	10,900	11,800	-	11,800	11,500	-	11,500
Family Assistance Plus Cleanup Costs	9,100	-	9,100	9,500	-	9,500	10,100	-	10,100
Value of Floodplain's Land in New Use	-	-	-	-	-	-	11,900	-	11,900
Employment	40,000	-	40,000	129,000	-	129,000	13,200	-	13,200
Flood Insurance Overhead Savings	-	-	-	6,100	-	6,100	6,100	-	6,100
Evacuation Costs Avoided	5,300	-	5,300	6,600	-	6,600	8,400	-	8,400
Agricultural District Flood Damage Reduction [b]	65,400	-	65,400	87,000	-	87,000	-	-	-
Total [d]	229,100	7,600	236,700	356,100	8,100	364,200	138,900	6,000	144,900

[a] Flood damage reduction within the village only.

[b] Flood damage reduction within ag. district only.

[c] Deductible amount of insurance loss, premiums, and uninsured property are not included in benefit analysis for the evacuation plan.

[d] Totals include benefits in the freeboard range.

TABLE D-15

Summary of First Costs, Interest During Construction and Annualized Costs
8-5/8 Percent Interest Rate, April 1988 Price Levels, 100-Year Life ($)

Alternative	First Cost a/	Interest During Construction b/	Investment Cost	Annualized Investment	Annual O&M	Total Annual Cost
50-Year Village Levee	1,486,500	64,100	1,550,600	133,800	800	134,600
100-Year Levee Agricultural District and Village	4,319,500	384,800	4,704,300	405,800	2,000	407,800
Permanent Evacuation	1,887,500	65,300	1,952,800	168,500	-	168,500

a/ First cost includes 30 percent of Public Law 91-646 costs, assumed to be betterments.

b/ 1-year construction period for the 50-year village levee.
2-year construction period for 100-year levee.
1-year period for acquisition of all property in Liverpool. IDC based on acquisition costs.

TABLE D-16

Summary of Average Annual Benefits and Costs
8-5/8 Percent Interest Rate, April 1988 Price Levels,
100-Year Project Life

Alternative	Average Annual Benefits ($)	Average Annual Costs ($)	B/C Ratio	Net Benefits ($)
50-Year Village Levee	236,700	134,600	1.8	102,100
100-Year Levee Agricultural District and Village	364,200	407,800	.89	-
Permanent Evacuation	144,900	168,500	.86	-

FINANCIAL ANALYSIS

A detailed accounting of financial capability is not provided because the village of Liverpool is not financially capable of providing the non-Federal portion of the cost. The State of Illinois Department of Transportation has indicated that they will finance the non-Federal share of the proposed 50-year levee project. The village of Liverpool will work with the State of Illinois in contacting landowners to obtain the real estate requirements for the proposed 50-year levee project.

RISK AND UNCERTAINTY

Without the proposed project, there is a risk that the agricultural district levee will fail or overtop at flood levels less than the 50-year event, leaving the village isolated in the Illinois River approximately 2 miles from high ground. Should the agricultural district overtop, the depth of floodwater within the district would be 15 feet on average at the 50-year event. With the proposed 50-year village levee, there is a remaining risk that the existing agricultural district levee and the proposed 50-year village levee will fail or overtop at flood levels exceeding the 50-year event. With many older residents, children, and others who prefer to stay in their raised homes during flood events, the potential for loss of life remains if there is not an effective and mandatory evacuation plan.

SENSITIVITY ANALYSIS FOR AGRICULTURAL BENEFITS

As documented on page D-19 of the report, the low section of the levee behind the village of Liverpool 453.2 feet NGVD (86-year event was used as the probable failure point. Elevation 450.2 (12-year event) was assigned as the probable non-failure point, accounting for 3 feet of freeboard.

Given that a flood event of a certain magnitude (or greater) will occur in any year with a probability p, then the probability that this event occurs for the first time in exactly N years from a particular point in time is given by:

$$(1-P)^{N-1} * P$$

Hence the expected value for the random variable N can be calculated as:

$$E(N) = \sum_{N=1}^{\infty} N * (1-P)^{N-1} * P$$

Summing this series, one can easily derive (see attachment) the result that:

$$E(N) = 1/p$$

Therefore, from any given point in time, we can expect 12 years until the first occurrence of a 12 year-flood event. We can expect 86 years until the first occurrance of an 86 year-flood event.

Agricultural benefits in this sensitivity analysis are claimed for 12 years assuming agricultural levee failure at elevation 450.2 (.08 probability) and they are claimed for 86 years assuming failure at 453.2 (.0115 probability).

The results of two assumptions regarding agricultural levee failure were averaged to arrive at $53,300, the most probable average annual agricultural benefits assuming that the low spot in the agricultural levee would be repaired after a failure. The analysis has the effect of reducing the benefit-to-cost ratio for the 50-year levee plan from 1.8 to 1.7.

	Present Worth of 1 Per Period		Partial Payment 100 Periods		Average Annual Agricultural Benefits (50-Yr. levee plan)		Benefits
(12 Yrs)	7.2980	*	.0863	*	$65,400		$41,200
(86 Yrs)	11.5848	*	.0863	*	$65,400	+	$65,400
							$106,600 / 2 = $53,300

SOCIO-ECONOMIC IMPACT ASSESSMENT

This section presents an assessment of socio-economic impacts that would be associated with the proposed flood control alternative for Liverpool, Illinois. Impacts assessed include the following categories: community impacts; life, health and safety factors; and displacement.

COMMUNITY AND REGIONAL GROWTH

Short-term and long-term impacts to community growth would be positive. The existing flood problem in the village discourages the rehabilitation of existing residential structures, especially those that are currently vacant and abandoned. With the provision of flood protection, non-resident property owners, and others seeking an inexpensive and safe place to live, may establish permanent residence in Liverpool.

It should be noted that, even with flood protection, community growth would be limited by FEMA regulations which require the first floor elevation of new constructions to be above the 100-year flood elevation. This essentially eliminates new construction starts in Liverpool, as structures would have to be raised more than 10 feet above ground level.

During the past 3 years, there has been some migration of residents due to the flood hazard. In 1983, there were approximately 250 residents, 72 occupied dwellings, and 31 unoccupied dwellings; in 1986, there were 49 occupied dwellings, 43 unoccupied dwellings, and an estimated population of fewer than 200 residents. However, if the current cycle of flooding declines, historic trends indicate that former residents may move back to Liverpool. In addition, new residents looking for an inexpensive place to live may move to the village. Vacated properties already are being reoccupied through immigration. This process would occur more readily following the construction of the proposed levee.

DISPLACEMENT OF PEOPLE

The project would require the relocation of residents of two occupied residential structures. The number of residents to be relocated would not be of a large enough size to significantly affect the population of the project area. One of the occupied structures is a mobile home which could be moved to a different lot. Further, there are opportunities in the local area for relocation of these residents to similar structures, even within the protected area of the village, as proposed.

In addition to the required relocations, the alignment would leave three upstream properties unprotected. These year-round residences are vacant, however.

COMMUNITY COHESION

The proposed 50-year levee would improve community cohesion by reducing the threat of flooding. As stated previously, the project would make the community more attractive for residential renovation and reoccupation of abandoned structures. Non-resident property owners (and other non-residents) may choose to move to Liverpool following project completion, either as seasonal or year-round residents. Growth in community population and improvement in economic viability would enhance social cohesion and community pride.

Without the proposed flood control measure, community cohesion may deteriorate. The number of resident property owners leaving (or entering) Liverpool at any point in time serves as an indicator of the village's social stability. Past trends in the village indicate that following a major flood some Liverpool residents (especially renters) migrate out of the village. After a period of time with no floods, homes tend to be reoccupied through immigration.

The recent downward shifts in population demonstrate some degree of instability which would relate to declining community cohesion. However, a solid base of residents committed to the village of Liverpool does exist.

PROPERTY VALUES AND TAX REVENUES

Property values could increase with the proposed levee. However, property values are not expected to reach the value of comparable, protected property for at least 5 years. Property values would reach their potential following the reoccupation of abandoned residences and the renovation of deteriorating structures within the community.

Tax revenues could increase as a result of elevated property values following project construction. With the greater protection from flooding provided by the project, businesses in the village (e.g., restaurant, auto repair shop) might experience an increase in business and resulting tax revenues.

PUBLIC FACILITIES AND SERVICES

The proposed levee construction would positively impact public facilities and services. Improved access to the village during flood events would be especially noticeable. The Illinois River has a very flat slope, and,

therefore, floodwaters recede slowly. Past floods have forced residents to use boats to access their properties for periods ranging up to 2 months. Further, residents would experience fewer delays in emergency vehicle service during flood events.

The village of Liverpool had an average annual budget of $12,000. As part of its budget, an average of $5,000 was allocated for emergency flood-fighting/ cleanup costs each year. In 1985, emergency costs totaled $11,000 and required from the state not only the village's entire budgeted money, but also funds from the State and Federal governments. With provision of flood protection, flood-fighting and cleanup costs would be reduced. The money the village saved could be utilized for other needed services, such as road repair. Federal and State monies allocated to the village for emergency costs also could be used more efficiently.

As part of the proposed project, the parking area for a public boat ramp would be raised and an access over the levee to the ramp would be provided. Improved access would increase ramp usage during minor floods (less than 10-year event). Additional benefits would accrue from reduced damage potential to one park, the Liverpool Village Hall, the fire station, the U.S. Post Office, and a church.

LIFE, HEALTH, AND SAFETY

The provision of flood protection would greatly reduce the life, health, and safety risks faced by residents of Liverpool. Currently, many residential structures are raised and are therefore susceptible to structural collapse, especially if they were struck by floating debris or ice. Many residents move in with neighbors who have raised structures when major flood events occur. Occupants in these raised structures live without electricity, heat, water, sanitary facilities, or phone service during the duration of the flood. Often, water levels reach the roof tops of smaller homes and do not recede for weeks or even months due to the flat slope of the Illinois River. This results in evacuation of many residents to less desireable, temporary housing. Older residents could find it difficult to evacuate by themselves if they were in poor physical condition. Further, several residents have physical handicaps and require extra care and time to evacuate. The present potential for loss of life or injury for residents is great.

In addition to the obvious health and safety risks, residents would find it difficult to summon ambulence or other emergency vehicle service. Emergency vehicle response times would be very slow since emergency crews would have to use boats to access properties.

Other impacts include damage to the restaurant in the village. During floods, the restaurant is totally inundated. It therefore requires complete remodeling in order to meet public health codes. This imposes an economic hardship on the owners while the restaurant has to remain closed after the floodwaters have receded. Also, with the restaurant closed, village residents

and persons using the public boat ramp in the village have no place to meet. The prolonged shutdown of the restaurant and other businesses in Liverpool impacts not only the village, but also the surrounding agricultural area and nearby communities.

EMPLOYMENT AND LABOR FORCE

Construction of the proposed project would have a small, short-term impact on employment in the Liverpool area. Based on the small scale of the project and the high unemployment rate in Fulton County, the area's labor pool would absorb project needs without noticeable impact.

No direct long-term impacts on employment in the Liverpool area would be realized from the project. The project would indirectly impact long-term employment in the community, however. The village would remain a viable community for operating and expanding its existing businesses, and would be a more attractive site for new commercial businesses.

Without provision of flood protection, existing commercial establishments might begin migrating out of the floodplain. This would impact Liverpool's employment by reducing the number of available positions.

BUSINESS AND INDUSTRIAL DEVELOPMENT

The project would enhance the commercial viability of the study area, avoiding potential commercial migration to areas outside of the floodplain. Following provision of 50-year flood protection, renovation of existing businesses would likely occur. In ad ition, new businesses might be attracted to the community. For example, a nearby scrap metal industry has expressed interest in reopening if Liverpool obtains flood protection. Currently, this business is shut down because of local economic conditions and continued access problems during flood events.

Without provision of flood protection, the instability in the village population size would continue. The economic viability of maintaining a commercial establishment in the community may decrease such that some existing establishments would be forced either to close or to relocate outside of the floodplain. Further, the village would not appear attractive for the establishment of new commercial businesses. In recent years, several individuals have considered opening small stores in Liverpool, but have not located there because of the flood hazard.

FARM DISPLACEMENT

No farms would be displaced by the proposed levee construction. However, .5 acre of farm field would be required for project right-of-way, and 5 acres farmland would be displaced by the borrow site.

NOISE LEVELS

Both the study area and the borrow site would experience a temporary increase in noise during the project construction. Heavy trucks also would generate an increase in noise levels as borrow material is transported from the borrow site to the project area. No sensitive receptors (e.g., schools) are located within the project vicinity. Therefore, noise-related impacts during the construction phase of the project would not be significant. The completed project would have no effect on current noise levels in the community.

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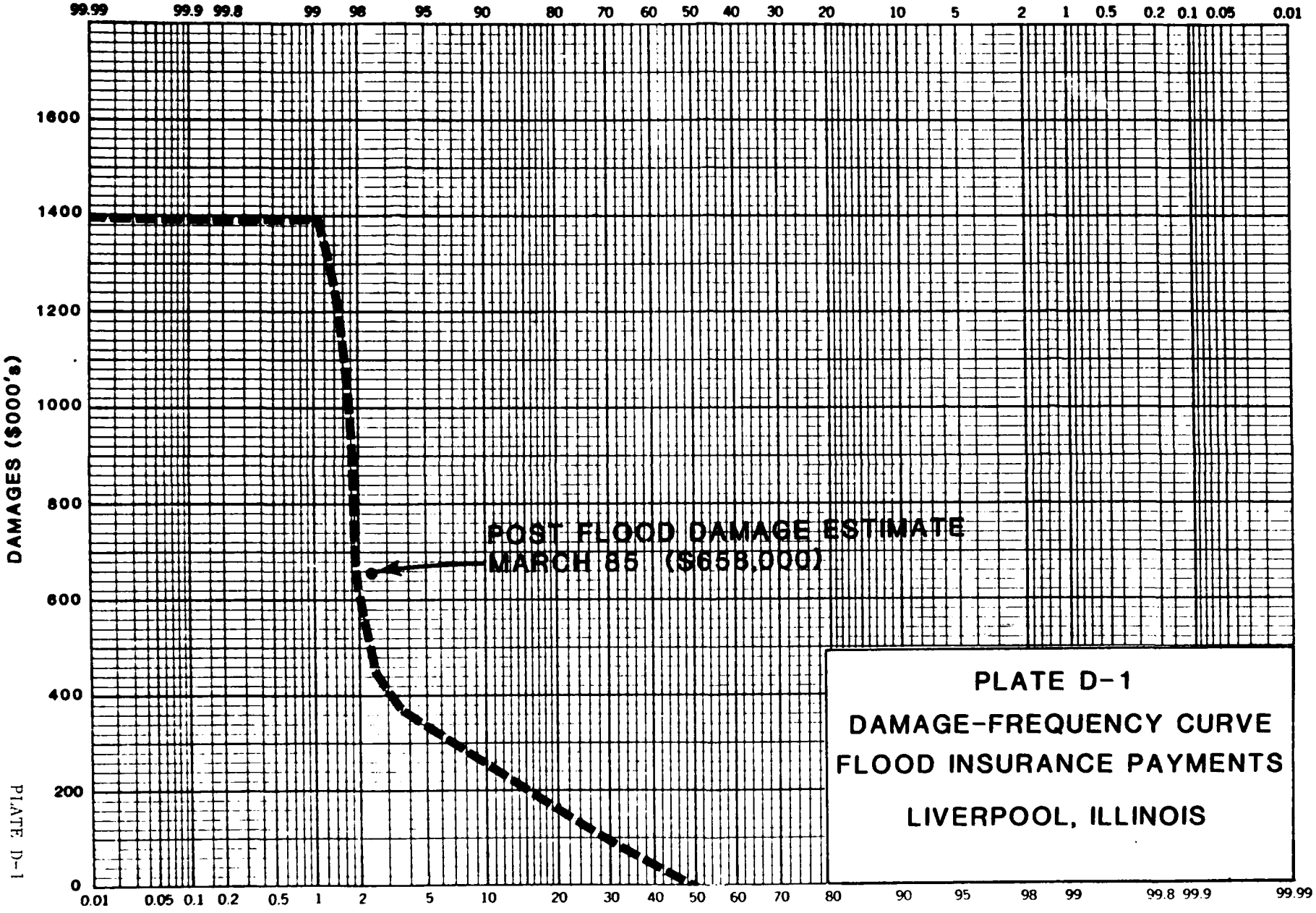
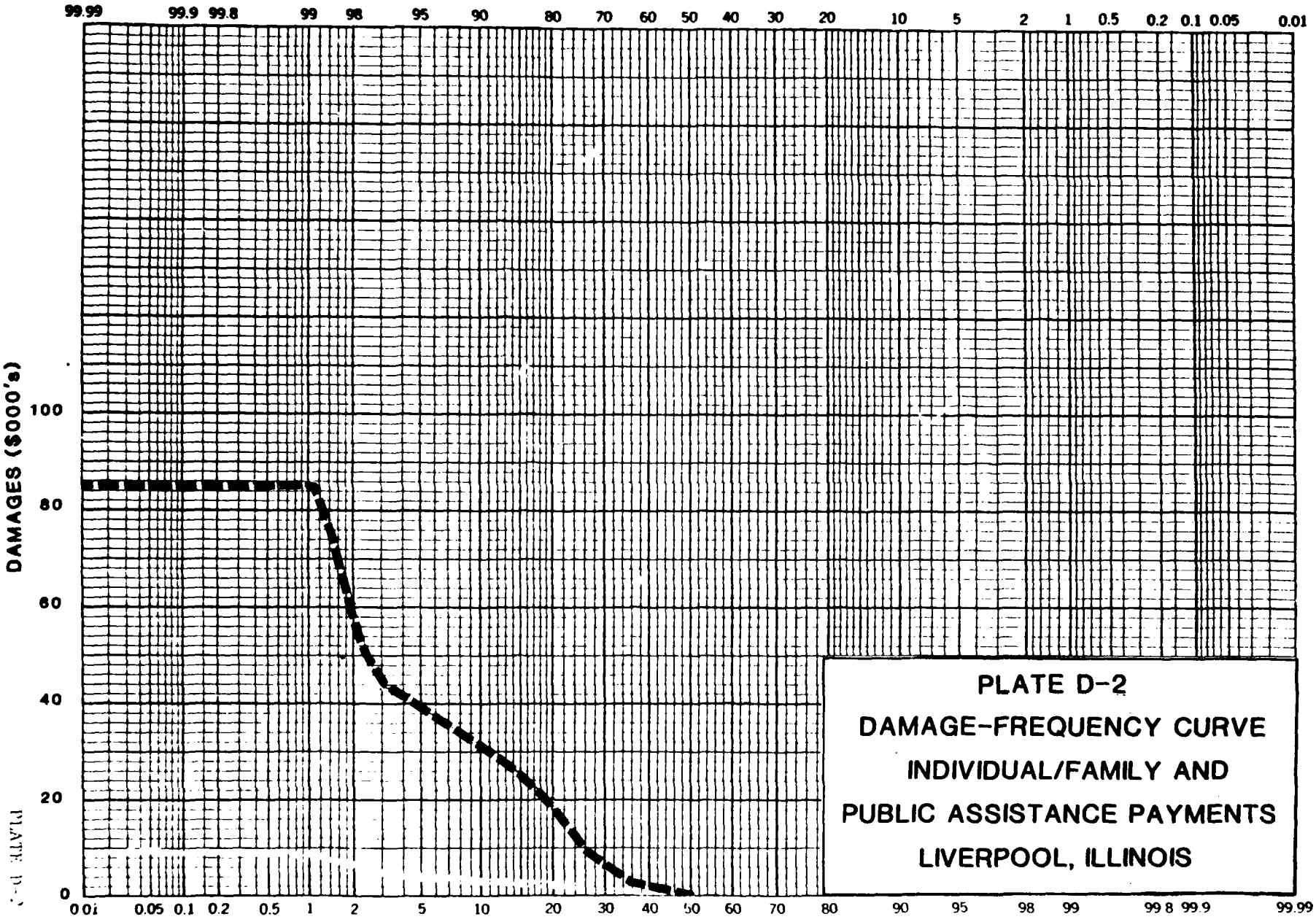


PLATE D-1

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CULTURAL RESOURCES

APPENDIX E

DRAFT DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX E
CULTURAL RESOURCES

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DRAFT DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX E
CULTURAL RESOURCES

INTRODUCTION

The village of Liverpool is located in an area of high prehistoric site density. Fulton County in general and the Liverpool region in particular contain numerous nationally recognized "type" sites for the Archaic and Woodland periods. The local place names -- Liverpool, Sister Creek, Tampico, Rice Lake and Maples Mill (all within 20 miles) -- have all been used to designate ceramic styles spanning the Early through Late Woodland periods (significant in Illinois and Midwestern prehistory). Of particular concern are the substantial numbers of village sites with associated mound groups. One of the residential structures constructed within the village is located on top of the largest mound in the Whitehead Mound Group (11-F-22). Information on this site was first published by Cole and Deuel (1937:132). The Liverpool Mound Group (Illinois Archeological Survey Site Number 11-F-24; Illinois State Museum Mound Numbers Fo 77, 78, 79, 80, and 87) and village site (11-F-25; Fv 88) lie immediately west of the village of Liverpool. Much of the Liverpool Mound and village site was destroyed in the early 1930's when they were borrowed for levee fill (McGimsey et al. 1985:11).

Previous historical research in the village of Liverpool is restricted to two architectural surveys funded by the Illinois Department of Conservation (Illinois Historic Structures Survey 1977; Illinois Historic Landmarks Survey 1976; Illinois River Survey n.d.). The Illinois Historic Landmarks Survey lists one structure in Liverpool: the Methodist Church located on Chestnut Street. The Illinois Historic Structures Survey does not list any buildings in Liverpool. It is possible that the structures survey did not visit Liverpool, as communities with populations under 500 were not routinely included in the survey (Illinois Historic Structures Survey 1977). An architectural survey was conducted by the Illinois Rural Survey in 1983. Three residences, one barn, and one abandoned store building are listed as being architecturally interesting (Department of Conservation survey records). None of the structures identified during these surveys are located within potential construction areas. No structures in the village are currently listed on the National Register of Historic Places.

Recently the Illinois State Museum, under contract with the Rock Island District, Corps of Engineers, has conducted investigations designed to evaluate the impact of the proposed levee project to cultural resources.

These investigations have located and recorded seven new sites in the Liverpool vicinity. Details of the investigations can be found in the Illinois State Museum reports (McGimsey et al. 1985; McGimsey and Wiant 1987) and in the Draft Environmental Impact Statement attached to this report. The following cultural resource discussion draws heavily from the Illinois State Museum reports.

The evaluation of Federal project impacts on cultural resources is in accordance with the National Historic Preservation Act (as amended in 1980), the Archeological and Historic Preservation Act of 1974, Executive Order 11593, the Archeological Resources Protection Act of 1979 (as amended in 1984), and Title 36 of the Code of Federal Regulations, Parts 60-66 and 800, as appropriate.

PREHISTORIC BACKGROUND

The prehistoric cultural history of the Liverpool area is not known to be substantially different from the regional cultural history as it is presently understood. Several reviews of the regional prehistory have recently been presented in the literature (Brown 1977; Ford 1974, 1977; Stoltman 1977), and information on the prehistory of the central Illinois River Valley can be obtained from Downer, et al. (1980:51-62) and Wiant (1983:13-24). Sites dating from the PaleoIndian (ca. 10,000 B.C.) through Mississippian period (ca. 1,200 A.D.) are known (table E-1).

This prehistoric Liverpool mound group and village site lie immediately west of the present village of Liverpool. The Liverpool mounds were first investigated in 1927 by Frank Solomon, a private commercial artifact collector. He excavated most of two mounds and recovered a large quantity of burials and artifacts. From the description of the mound construction and recovered materials, these mounds dated to the Middle Woodland period (Cole and Deuel 1937:143-144; Moorehead 1929:169).

In the same year, Ernest and Marion Dickson excavated a portion of a third mound and uncovered log tomb structures, burials, and artifacts indicative of a Middle Woodland period construction. Subsequent excavations in this same mound were undertaken in 1930 by the University of Chicago (Cole and Deuel 1937:136). Although additional Middle Woodland structures and artifacts were recovered from the mound fill, this excavation is notable for exposing a pre-Middle Woodland cemetery below the mound. These burials, together with a quantity of artifacts, including stemmed bifaces and sherds, lie below the base of the mound in a "black sand" which is interpreted as the original ground surface of the terrace. Artifacts recovered and illustrated by Cole and Deuel (1937:Fig. 28 and 29) indicate that Middle Archaic through Early Woodland occupations are represented by this deposit. Cole and Deuel (1937:139) suggest that a village site is present in the black sand with the burial population probably dating to the Early Woodland period.

TABLE E-1

PREHISTORIC CULTURAL CHRONOLOGY

15,000 B.C.

Paleo Indian

8,000

Early Archaic

6,000

Middle Archaic

3,000

Late Archaic

1,000

Early Woodland

400

Middle Woodland

400 A.D.

Late Woodland

900

Mississippian

1,500

The Whitehead mound group (11-F-22) includes four mounds lying on a sand dune at the northeastern edge of the present village of Liverpool (Cole and Deuel 1937:132). One of the four mounds had been destroyed by ditch construction prior to the University of Chicago report, and its precise location is unknown. A house stood on a second mound, a barn on a third, and the fourth was located in a yard. No excavations were conducted in any of these mounds by the University of Chicago party. Artifacts recovered from one of the mounds include "arrowheads, pottery, and bones plowed up by Mr. Whitehead," the landowner (Illinois Archaeological Survey site survey form 1930). Similar artifacts are reported by Mr. Whitehead to have been uncovered during the excavation of a basement for his house located on the largest mound. A tunnel excavated into the basement by Ernest and Marion Dickson, amateur archeologists based in Lewistown, Illinois, apparently did not recover any artifacts, but a profile of the lower portion of the mound sediments was obtained (notes on Illinois Archaeological Survey site form). A 2.5 cm (1-inch) thick band of sand is described as lying over the original ground surface with a very hard mixture of sand and clay forming the bulk of the mound fill. The entire profile was approximately 1.6 m (5.5 feet) in height.

Information on the Historic Native American occupations of the central Illinois River Valley is very limited. Only a single village, an Illini village of 80 cabins, is reported from the area and it was located at the south end of Lake Peoria (Temple 1966). Additional groups, including the Kickapoo, Sauk, and Fox, are known to have been present in the Illinois Valley (Temple 1966), but sites dating to this time period have not yet been identified.

HISTORIC BACKGROUND

The first European visitors to the Illinois River area passed through in the 1670's. Explorers who may have traveled through the area include Nicholas Perrot in 1671, Marquette and Joliet in 1673, and LaSalle in 1680 (History of Fulton County 1879, Bateman and Selby 1901, Dwyer et al. 1982). There is no evidence that any of the early explorers stopped in the Liverpool area, and any sites dating from that period would be short-term encampments.

Liverpool is located within the Military Tract, an expanse of land which includes all territory between the Illinois and Mississippi Rivers, and south of the Tier sixteen north line. This land was set aside by the Federal Government for veterans of the War of 1812. Most of the Military Tract was surveyed by General Land Office (GLO) surveyors during 1815-1816 for this purpose. However, very few of the veterans settled on their land grants (Pooley 1968:111).

Fulton County was organized in 1823 with the county seat located at Lewistown (Bateman and Selby 1901:179-180). The earliest settlers tended to avoid the bottomlands of the Illinois and other large streams, although a few did locate themselves on the Illinois River in order to

take advantage of the small amount of commerce on the river (Pooley 1968:113-114). Settlement of the Illinois River floodplain began to increase after the beginning of steamboat traffic on the river in 1828 (Tweet 1983:64, Schroeder 1985).

The first settlers entered Liverpool township in 1826 (Clark 1969:204). The village of Liverpool was founded in 1836 by Robert E. Little, Theodore Tarleton, E. D. Rice, and Roger Veits (Fulton County Historical Society 1973:194). The name was given because the founders hoped to set up a river port "that might be as vital to central Illinois as the original Liverpool is to northern England" (Drury 1954:10). Hopes ran high for the new village. John Peck in his 1837 edition of "A Gazetteer of Illinois" described Liverpool as:

> ... a town site on the right bank of the Illinois River, in Fulton County, six miles above the mouth of Spoon River. The site has been called Bailie's Island, from being surrounded in the rear by a slough at high water, over which a causeway or levee is about to be constructed. It is the landing place for Canton, and the termination of the Liverpool, Canton, and Knoxville Rail Road. (Peck 1837:241-242)

The name "Balie's Island" presumably comes from the original purchaser of the northeast fractional quarter of section 25, Benard Baley (Public Domain Landsales Records, Illinois State Archives). It is not known whether Baley lived on the site, and he is not listed in the Fulton County Tract index for Liverpool Village. The Liverpool, Canton, and Knoxville Railroad was chartered in 1837, with Theodore Tarleton, Robert E. Little, and Thomas Maple as officers (Illinois Public Acts, 1837). The line was never built. The 1904 USACE map (Woermann 1904) indicates a short length of "old railroad grade" just north of the village (plate E-1), but there are no records of any lines reaching Liverpool.

A plank road was constructed in 1850 connecting Liverpool with Canton, a distance of about 13 miles. Three toll gates were located along the road, one of which was in the village of Liverpool. The road ran for 6 years, but operated at a loss as there was a free road from Canton to Copperas Creek landing (Fulton County Historical Society 1973:198-199). Local informants state that the Liverpool tollgate was located at Exchange and North Streets.

The Federal censuses (U.S. Bureau of the Census 1850, 1860, 1880, 1900, 1910) indicate a relatively homogeneous ethnic makeup for Liverpool township. Very few of the individuals were foreign-born, and almost none of those were from non-English speaking countries. Most of the American-born individuals came from the old northwest, particularly Ohio, and from the old southwest, particularly Kentucky. The racial makeup of the population is also homogeneous. There are a few households listed as mulatto (one in 1850 and 1860, two in 1870) and the traveling quartet in 1880 is listed as black. The mulatto households were located in upland areas of Liverpool township.

The Federal censuses also were examined for the occupations of the inhabitants of Liverpool township. Table E-2 shows the occupations listed for Liverpool township from 1850-1910. Like most of the United States, rural Illinois of the nineteenth and early twentieth centuries was predominantly agricultural. This is reflected in the large number of farmers listed in the censuses as well as the many laborers, most of which were probably farm workers. None of the censuses, with the exception of 1860, list the village of Liverpool separately from the rural township. From the 1860 census it appears that roughly two-thirds of the individuals with occupations other than farmer lived within the village of Liverpool.

The diversity of occupations for Liverpool township ranged from 15 occupation types listed in 1850 to 33 types listed in 1870. The diversity drops in 1880, then climbs slightly in 1900 and 1910. In general, it appears that transportation, shipping, and storage type occupations (for example: cooper, teamster, warehouseman, merchant, boatman) predominate in the period of 1850-1870. Extractive occupations begin to replace the other occupations about 1870 with the increase in lumbering and wood cutting activities. It is possible that the large number of woodchoppers listed in 1870 reflects the heavy steamboat traffic on the Illinois.

Also evident by 1870 is the increasing importance of fishing to the Liverpool economy; fishing continues to increase until in 1910 the village appears to be essentially a single economy community. The county histories for the Liverpool area list another important economic type of the area: recreation and hunting. The 1910 census lists a single individual as hunter/guide, otherwise the census records give little indication of the importance of these occupation types. Detailed census data are not open to the public after 1910. The fishing industry has apparently declined during the past 70 years, leaving agriculture essentially as the only local business.

Although maps of the Illinois River exist from the seventeenth century, and the Spoon River and Quiver Creek are shown on maps as early as 1790 (Storm 1944), the Liverpool area was probably not individually mapped until 1817 when the GLO surveyors came through the area. At the time of the original survey the Illinois River was apparently flooding, and Section 25 was not platted out until 1841 or 1842 (Illinois Land Plats, Vol. 23, p.4, #5). In general, the GLO plats only occasionally show cultural features, particularly in the southern and central areas of the state. The 1817 plat shows no evidence of settlement in the area. The 1844 plat shows the location of Liverpool, a small portion of road along the bluffline, and a plowed field at the point where Buckheart Creek enters the Illinois River floodplain. No structures are indicated within the limits of Liverpool village.

Fulton County was mapped four times by commercial land ownership map publishers in the nineteenth and early twentieth centuries. Maps exist for 1871 (Andreas, Lyter & Co.), 1895 (American Atlas Co.), 1912 (Ogle, Geo. & Co.), and 1916 (Fulton County News). These maps were examined for evidence of structures, but buildings within village limits were not usually mapped. The original plat of the village of Liverpool has not been located, but the 1912 Fulton County atlas shows what is probably a

TABLE E-2

Occupations Reported for Liverpool Township from 1850 to 1910

	1850	1860	1870	1880	1900	1910
Carpenter	12	9	5	4		1
Cooper	7	9	1	2		
Blacksmith	3	7	2	1	1	1
Merchant	1	7	1	2		3
Clerk	1		1	1		1
Doctor	2	2	2	1	1	
Teacher		5	5	7	3	12
Teamster	5	4	4			1
Wagon-Maker	3	4				
Clergyman				2	1	1
Painter		1	1	2	2	
Steamboat Engineer		2	3		1	
Plasterer			1			
Hotel Keeper/Bar Keeper		2	1			1
Miller		1	1			
Dressmaker					1	3
Miner	4	6	5		2	7
Sawyer		3	9	3	1	
Woodchopper			16			
Boat Builder					1	1
Fisherman		1	3	7	8	35
Hunter			1	1	1	1
Ships Caulker			1			
Grocer	1		2			
Boat Pilot/Captain	1	2	2			
Warehouseman	2					
Boatman	4		7			
Distiller		2				
Peddler/Salesman			2	1	3	1
Ships Carpenter			1			
R. R. Laborer			1			
Washerwoman			1			1
Potter			3			
Cigar Maker			1			
Harness Maker			1			
Well Digger			1			
Traveling Quartet of Singers				4		
Seed Dealer					1	
Landlord					1	
Postmaster					1	
Gardner					2	
Cook						2
Weaver						1
Feed Stable						1
Telegraph Lineman						1
Farmer	116	115	136	170	190	173
Laborer	17	52	96	77	187	142
Servant		17	17	6	98	15

copy of the original village plat with H. B. Evans' later addition north of town (George Ogle & Co. 1912). This plat indicates the locations of the school, hotel, Methodist church, and post office.

The 1904 USACE map (Woermann 1904) (plate E-1) indicates some of the structures in Liverpool, as well as the street pattern at that time. Four structures are indicated on this map: Stanley Whitehead's house located at the northeast end of town, Warren's boathouse at the south end of Exchange Street, and Geo. Warren's house at the west end of town with an unlabeled structure nearby.

PRESENT INVESTIGATIONS

The levee alignment was examined briefly by Corps of Engineers staff in October of 1984. This check confirmed the suspicion that several feet of recent alluvium covers much of the affected areas. Several local residents reported finding artifacts when digging foundations or working gardens. A Middle Archaic Godar Point was reportedly recovered from within the village limits.

After advertising for competitive bids, the Rock Island District, on 22 August 1985, awarded a purchase order to Illinois State Museum to conduct a Reconnaissance Archeological and Geomorphological Survey of the Proposed Liverpool Levee construction area. Michael Wiant was designated Principal Investigator for the project. A report on the results of the reconnaissance with recommendations for Intensive Archeological Survey (Phase II testing) was prepared by Charles R. McGimsey, Erich K. Schroeder, and Edwin R. Hajic.

McGimsey (et al. 1985) summarized their findings as follows:

> A geological assessment and Phase I cultural resource survey of the proposed Liverpool flood control levee and borrow areas was conducted. The potential for buried cultural deposits was evaluated through an examination of the geological units and depositional environments identified in the project area. Backhoe trenches and sediment cores were employed to determine the geological stratigraphy and to locate archaeological sites in potentially buried contexts. Sites in surface contexts were identified by surface survey and shovel testing methods.
>
> Eight sites were located during this survey and six of these are located within the project boundaries. Four of the sites contain prehistoric and historic components, two contain only prehistoric components and two contain only historic components. Four of the six sites located in the project area are exposed in surface or near-surface sediments. Buried components were identified at two sites in the project area, one of which is buried by historic fill. The remaining site exhibits stratified paleosols in the Illinois River floodplain which may date to the Middle Archaic and Late Woodland periods, respectively.

The six sites recommended for additional investigations are described in the Illinois State Museum report (McGimsey et al. 1985).

Following completion of the original archeological reconnaissance, social and economic factors in Liverpool created a need to shorten the proposed levee alignment. The revised alignment will avoid three of the six sites previously recommended for additional testing. Because the boat ramp will not be relocated under the present plan, a fourth site located in the previously proposed relocated parking lot also will be avoided (table E-3).

A fifth site (Illinois State Museum 11-F-2178A; State Site No. 11-F-2716) consisted of two chert flakes located in a buried soil horizon. The Illinois State Historic Preservation Officer (SHPO), in a letter dated 21 November 1985, indicated that Site 11-F-2178A was not significant and therefore required no additional archeological investigations.

Based on the revised levee alignment, only the proposed borrow area (Site 11-F-2180A; IAS 11-F-25) and the revised eastern portion of the alignment between stations 31+00 and 43+95 required additional archeological investigations (table E-3).

After advertising for competitive bids, a second contract was awarded to the Illinois State Museum on 21 October 1986. The major work elements to be performed under the contract were: (1) intensive testing of Site 11-F-2180A (borrow area) to determine if it is eligible for inclusion in the National Register of Historic Places (NRHP); (2) reconnaissance survey of the revised, eastern portion of the proposed levee alignment; and (3) intensive testing of any site found in the revised alignment to determine the eligibility of the site(s) for inclusion in the NRHP.

The reconnaissance survey of the revised portion of the levee alignment and borrow area testing were completed in the late fall of 1986. Borrow area testing consisted of the excavation of 10 backhoe trenches, three 1- by 2-meter excavation units, and two 2- by 2-meter excavation units. All trench and excavation unit wall profiles were carefully trowel scraped to determine the presence of cultural artifact-bearing strata and features. Detailed profile maps also were prepared.

TABLE E-3

Archeological Sites and Project Impacts
50-Year Flood Protection, Liverpool, Illinois

Site (IAS #)	Location in Alignment	Size	Depth	Cultural Affiliation	Recommendation
11-F-2174A (11-F-22)	outside project area	ca. 1.5 hectares	LT 1.0m	Woodland	no project impact
11-F-2175A (11-F-2713)	within levee alignment	limits unknown ca. 1 block in alignment	LT 1.0m	M. Woodland L. Woodland Mississippian	eligible NRHP; data recovery necessary
11-F-2176A (11-F-2714)	outside project area	unknown	ca. 2m	Middle Archaic Late Woodland	no project impact
11-F-2177A (11-F-2715)	outside project area	unknown	unknown	historic grist mill	no project impact
11-F-2178A (11-F-2716)	within alignment	isolated find	ca. 2m	prehistoric	not significant
11-F-2179A (11-F-2717)	outside project area	isolated find	surface	Late Woodland	no project impact
11-F-2180A (11-F-25)	adjacent to borrow area	limits unknown ca. 4000 m^2 adjacent to borrow	ca. 2m	E. Woodland M. Woodland L. Woodland Mississippian	eligible NRHP; borrow area designed to avoid impacts
11-F-2181A (11-F-2718)	outside project area	unknown	unknown	historic	no project impact
ISM-F-2182A	outside project area	ca. 2275 m^2	unknown	historic toll booth	no project impact

LT = Less than
NRHP = National Register of Historic Places

Based on these investigations, it was discovered that a National Register quality prehistoric archeological site (ISM-F-2180A; IAS 11-F-25) is present in the western field of the proposed borrow area. The site occupies an approximate 4,000-square-meter (1 acre) area adjacent to the paved road and including a cattle lot (plate E-2). Three relatively distinct buried soil horizons were found to contain in situ archeological remains. The limited excavations also identified nine prehistoric pit features, a small dense lithic debitage concentration, and a concentration of igneous cobbles. Diagnostic ceramic sherds attributable to the Early, Middle, and Late Woodland periods, as well as the Mississippian period, were recovered from the site. No diagnostic artifacts were recovered from a feature context.

Plate E-2 is a representative profile through a portion of Site ISM-F-2180A (IAS 11-F-25). The majority of the site area is covered by from .30 to 1.50 meters of modern spoil. Below the spoil is the original pre-1950 plowzone. Two modern historic features originate in the plowzone and intrude into the soil horizons below (features 4 and 7). The vast majority of historic artifacts recovered during the test excavations came from the plowzone and spoil. None of the historic artifacts predate the 20th century, and no further consideration of the historic component is warranted.

Chert debitage and 24 prehistoric ceramic sherds were recovered from the plowzone level. Identifiable sherds from this horizon date to the Mississippian and Late Woodland periods. None of the prehistoric features appear to originate from the plowzone.

Below the plowzone an undisturbed buried A horizon is present. Artifacts recovered from this horizon include 1,762 lithic flakes, 13 retouched artifacts, and 19 ceramic sherds. Identifiable ceramic artifacts can be assigned to various Early, Middle, and Late Woodland types. All prehistoric features appear to originate in this soil horizon.

The third artifact-bearing zone was observed in only one of the excavation units. A chert biface, uniface, and several flakes were encountered 80 cm below the base of the plowzone. It is preliminarily defined as a separate cultural horizon due to the presence of a 20 cm zone containing no artifacts separating this artifact-bearing zone from the cultural strata above. The artifact zone may be contemporaneous with the B horizon illustrated on plate E-2. No diagnostic artifacts were recovered from this deepest zone.

Site 11-F-2180A (Illinois State Museum number) discovered in the proposed borrow area for the Liverpool flood protection levee appears to be a preserved remnant of the Liverpool village site first reported by Cole and Deuel in 1937 (142-150). Therefore, the state site number 11-F-25 first assigned to the Liverpool village site also has been assigned to the cultural deposits in the borrow area. Investigations on the site in the 1920's and 1930's dealt primarily with burial mounds and burial features. The limited early investigations conducted in the village area failed to identify any cultural pit features or establish data on internal site structure. Although we learned much about their death and burial, these investigations discovered little about how the people lived.

The preserved remnant of 11-F-25 discovered in the borrow area is considered to be a significant cultural resource based on its ability to contribute to our understanding of cultural processes operating in the Illinois River Valley during the Woodland periods. Excavations designed to identify the distribution of cultural horizons and features and to determine the site's function during the various cultural phases represented could add significantly to our understanding of the prehistory of the region.

The Illinois SHPO reviewed the results of the Phase II archeological investigations conducted in the borrow area and by letter dated 17 March 1987 indicated that in their opinion the site is eligible for listing in the NRHP. Borrow area design plans have been modified to assure that Site 11-F-25 will not be impacted.

A Phase I archeological reconnaissance survey of the revised eastern end of the proposed levee alignment from stations 31+00 to 43+95 located a potentially significant prehistoric archeological site. (IAS 11-F-2713; ISM 11-F-2175A). Thirty-eight (38) small shovel test pits were excavated along the proposed alignment. All but four shovel tests produced prehistoric artifacts. Three garden areas in the alignment also contained prehistoric artifacts. Artifacts recovered from Site 11-F-2713 indicate early Middle Woodland, Middle Woodland, Late Woodland and Mississippian components.

The contractor returned to Site 11-F-2713 in April and May 1987 for Phase II test excavations to determine if the site is eligible for listing on the NRHP. One-by-two-meter test unit excavations, combined with backhoe block excavations, revealed that a 75-meter portion (one city block) of the alignment contained intact prehistoric deposits dating to the Late Woodland and Mississippian periods.

The remains of a Mississippian house was discovered, along with a number of pit features and associated artifacts (plate E-3). Portions of 16 distinct ceramic vessels indicate that the remains date to the Eveland Phase (approximately 1200 A.D.). Carbonized botanical remains were well preserved in the pit features.

Two Late Woodland pit features attributable to a Maples Mill component also were discovered near the Mississippian house structure. These features represent the first examples of <u>in situ</u> Maples Mill habitation remains to be excavated in the Central Illinois River Valley.

Future excavations (mitigation) designed to identify the distribution of cultural features and determine the site's function in the subsistence-settlement system of terminal Late Woodland and Mississippian populations using this portion of the Illinois River Valley will make a significant contribution to our understanding of the prehistory of the region.

After reviewing the draft report on Phase II archeological testing at Liverpool (McGimsey and Wiant 1987), the Illinois SHPO, by letter dated July 22, 1987, indicated that the site was eligible for listing on the

NRHP. Investigations conducted outside the proposed levee indicate that Site 11-F-2713 has an extensive distribution which precludes avoidance of the site through moving the levee alignment. Therefore, it will be necessary to develop and execute a Data Recovery Plan for the portion of the site to be impacted by the proposed Liverpool levee project. This plan will be coordinated with the Illinois SHPO and the Advisory Council on Historic Preservation (ACHP) pursuant to the ACHP's guidelines for the implementation of Section 106 of the National Historic Preservation Act.

SUMMARY

Investigations conducted to evaluate the effect of the proposed Liverpool flood protection project on significant cultural resources have identified a significant prehistoric archeological site (11-F-25) adjacent to the proposed borrow area. A second site (11-F-2713) located at the eastern end of the proposed levee alignment also meets the requirements for listing in the NRHP. The development and execution of plans to mitigate the adverse effects of project construction to Site 11-F-2713 is required prior to project construction. In addition to the above investigations, an archeologist will be required to monitor construction activities at selected sensitive locations in the alignment and borrow areas.

The Rock Island District intends to avoid impacts to Site 11-F-25 located adjacent to the proposed borrow area. Special attention to this area during the design and construction phase is required to assure no impacts to this significant resource.

Plans to mitigate significant cultural resources will be coordinated with the Illinois SHPO and the ACHP pursuant to the ACHP's guidelines for the implementation of Section 106 of the NRHP.

Cultural resources are being fully considered only within the project impact zone of the 50-year flood protection plan. Other alternatives have not been fully evaluated and would require further coordination and evaluation prior to execution.

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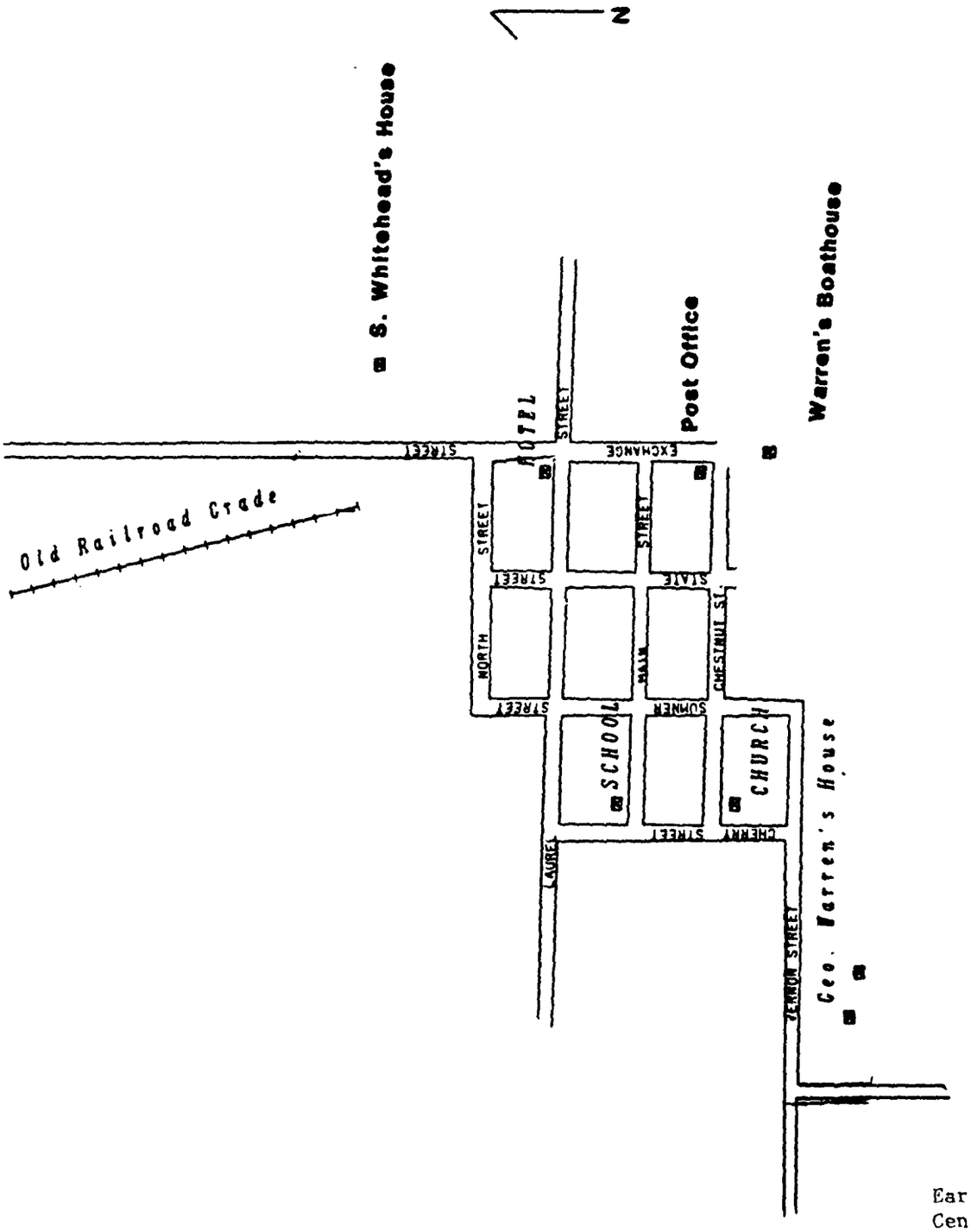
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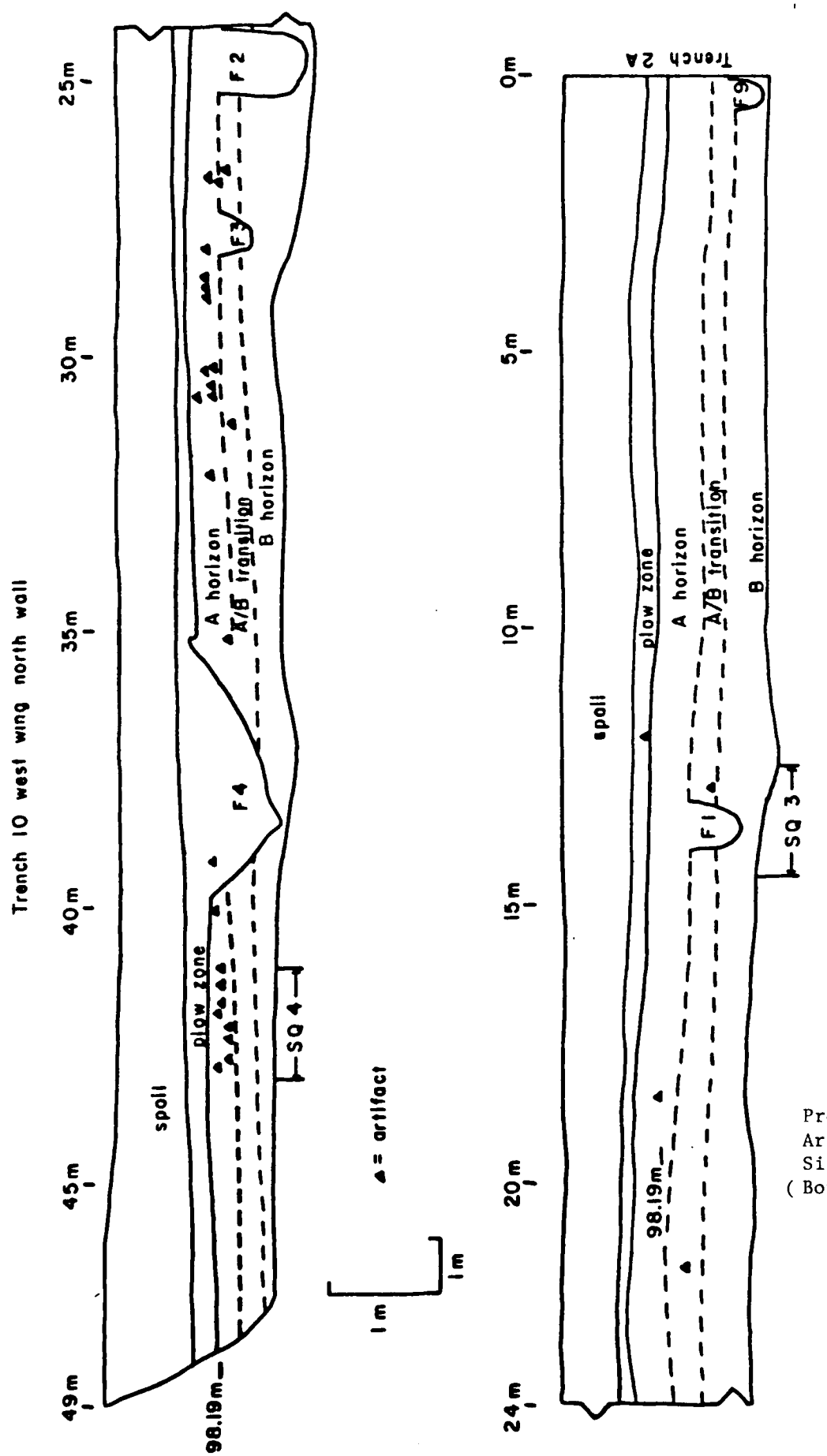
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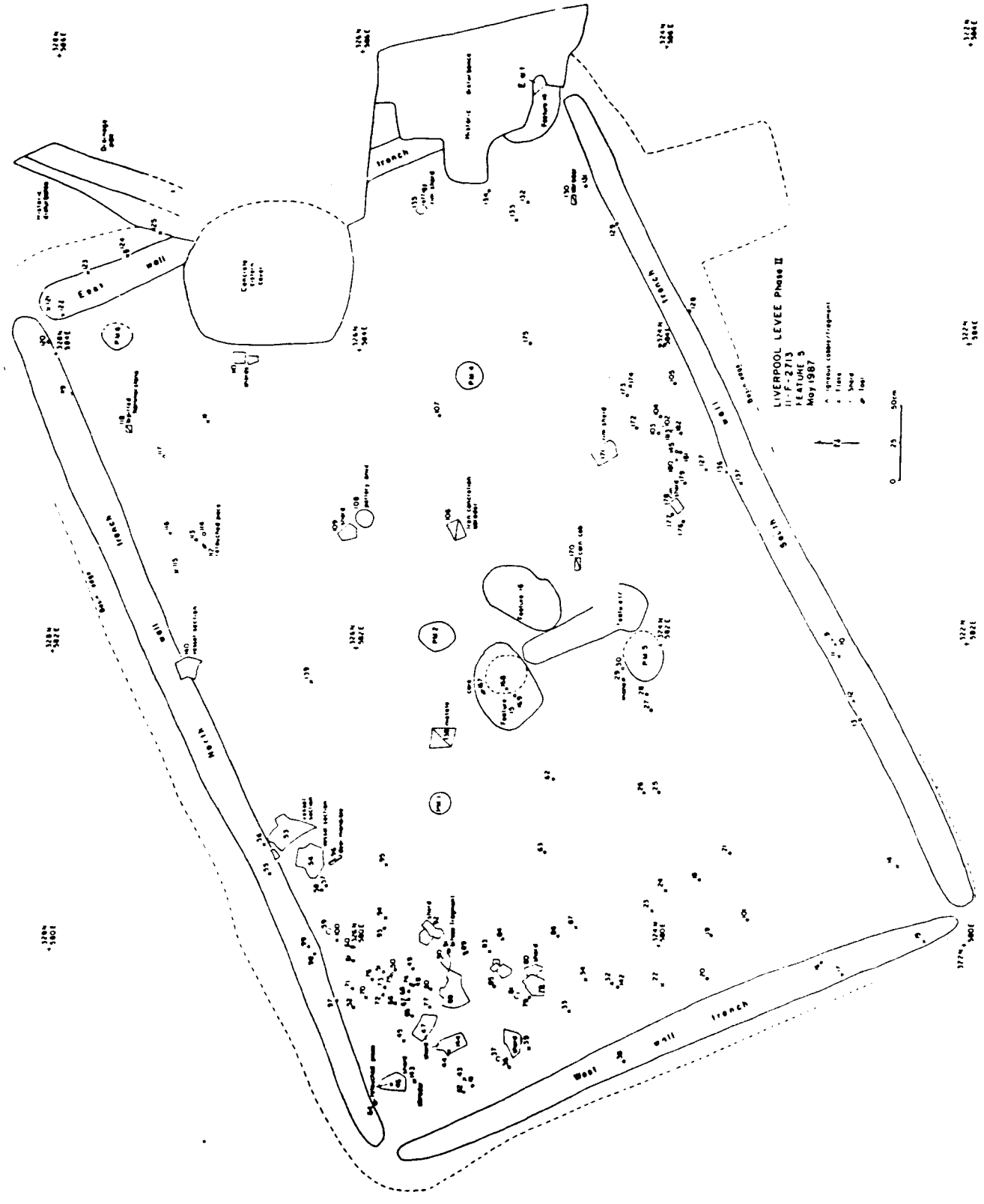
Early Twentieth Century Plan of Liverpool

Plate E-1



Profile of Archeological Site 11-F-25 (Borrow Area)

Plate E-2



Mississippian House
11-F-2713

Plate E-3

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F

PERTINENT CORRESPONDENCE -
PROJECT-RELATED INFORMATION

DEFINITE PROJECT REPORT
FOR
SECTION 205 FLOOD CONTROL

ILLINOIS RIVER
LIVERPOOL, ILLINOIS

APPENDIX F
PERTINENT CORRESPONDENCE - PROJECT-RELATED INFORMATION

This appendix contains correspondence concerning the Liverpool, Illinois, project, beginning with the village's official request in 1983 for a Corps of Engineers' reevaluation for flood control. It includes pertinent letters from Federal offices, State agencies, and the general public through 1989, as well as newspaper articles regarding the study process.

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(309) 547 2275

GEORGE P. PROCTOR (1914-1980)
TOM B. EWING
DIANE M. LAGOSKI

AVON OFFICE
TOMPKINS STATE BANK
AVON, ILLINOIS 61415
(309) 465-7518

January 18, 1983

District Engineer
Rock Island District
Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Re: Liverpool, Illinois

Dear Sir:

The Village of Liverpool met in a special meeting on January 17, 1983, and voted to authorize me as their attorney to request from the Corps of Engineers under Section 205 of the 1948 Flood Control Act as amended, that the Corps initiate a reconnaissance study for the long term solution for the flooding of Liverpool by the Illinois River, including the possibility of levee construction. I hereby make that request.

Please let me know if you need anything further.

Very truly yours,

TOM B. EWING

TBE:m.c

CC: John Westerfield

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:

29 JUL 1983

Planning Division
Plan Formulation Branch

NOTICE OF INITIATION

Reconnaissance Study
for
Flood Damage Reduction

Illinois River
Liverpool, Illinois

The Rock Island District, Corps of Engineers, has initiated a reconnaissance study for flood damage reduction on the Illinois River at Liverpool, Illinois. Authority for the study is granted under Section 205 of the 1948 Flood Control Act.

Liverpool is located in Fulton County and lies within the Illinois River watershed. Frequent flooding by the river has been the cause of flood damage to properties and structures within the village.

The Corps will examine Liverpool flooding problems to determine if there is justification for a detailed flood damage reduction study. Throughout the investigation process, you will be kept informed of significant study progress.

Bernard P. Slofer
Colonel, Corps of Engineers
District Engineer

Liverpool residents hope for flood remedy

By STEVE BAUER
of the Journal Star

LIVERPOOL — Village residents are hoping the Army Corps of Engineers will come up with a flood plan that will hold water.

Meanwhile, they continue to take a bath, having suffered through nine major floods in the past 13 years.

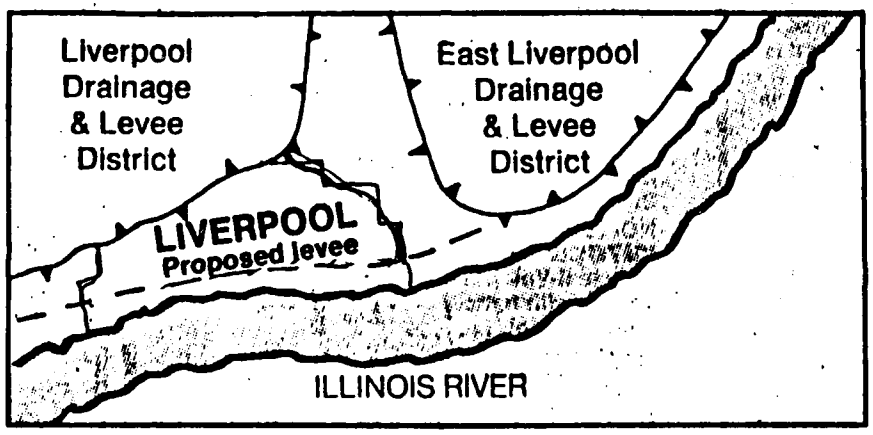
The Corps' Rock Island District recently finished a reconnaissance study for flood-damage reduction at Liverpool, but officials said an additional analysis won't be available until 1985. Preliminary estimates put the cost of protection at more than $1.6 million. That's more than $10,000 apiece to protect every house in this town of 243 people.

Only two weeks ago, when the Illinois River crested at 21.8 feet, overflow levels brought traffic to a standstill and forced residents to don hipboots on their way to the grocery store.

The village's last major flood hit in December 1982, when 33 Liverpool families had to be relocated from flooded homes. Only 2½ years earlier, the river threatened to put the entire village underwater.

"We have had nine what you would call 'major' floods since 1971," said Mayor John Westerfield.

All of this flooding comes despite protection provided by agricultural levees adjoining the village which are adequate for floods having an average recurrence interval of about 44 years.



The levees form the Liverpool Drainage and Levee District and the East Liverpool Drainage and Levee District and still appear to be the key to future village and Corps of Engineers plans.

"If the present levee wasn't there, it would be very costly to construct a new one," said civil engineer Teresa Kirkeeng-Kincaid.

She said the Corps would see if there is federal interest in a proposal to tie the village into the agricultural levees.

Currently, the agricultural levees outline much of the village, running between Liverpool's drainage districts and the river. If a tie-in is approved, a land wall would be built along the riverfront, connecting the agricultural levees at the northeast and southwest corners of the village.

A narrow tract along Buckheart Creek, which flows between the agricultural levees northwest of town, will be left open.

"It (the levee tie-in) would encircle it (the village), so a tie-in would be part of the agricultural levee and the whole town would be protected," Kirkeeng-Kincaid said.

Dangers inherent in creating a bathtub out of the floodplain area will be thoroughly examined in the additional study, Kirkeeng-Kincaid said.

Such a tie-in project could be undertaken at a federal cost of $1.37 million, she said. The non-federal cost would be $242,000.

"The local people would have to pay for that," said Kirkeeng-Kincaid. "The cost would also include parts like obtaining right of way."

Consensus seems to favor a tie-in, as opposed to more extensive levee construction or floodplain evacuation.

According to Kirkeeng-Kincaid, however, another study phase will have to be completed before any construction could take place, and that phase won't be wrapped up for another six to 12 months.

Village Board member Bill Merrill would like to see something done immediately, before his town becomes a floating sponge. But he said he is willing to wait out the study process if it brings results.

"I realize the government doesn't work like that (fast), so I'll take it anytime I can."

Please see LIVERPOOL, Page A4

F-3

LIVERPOOL

Continued from Page A1

get it," Merrill said.

Merrill took matters into his own hands recently by raising his home on Laurel Street.

"Out of 150 homes, I'd say only about 12 have been raised," Merrill said. "People just don't have the means to do it. It cost me $3,500 just to raise it and another $1,500 to put a wall underneath, and the government comes along and says it's still not flood-proof."

Mayor Westerfield, who has lived in Liverpool since 1955, said most people have decided to make do with their present homes rather than pack up and move on.

"I built a new house in 1973 and I've got my money invested in property here," Westerfield said. "There's just no way you can sell the property and get your money back. There are no easy alternatives."

Shifting tides of fortune have not been kind to the village on the west bank of the Illinois River about 35 miles south of Peoria.

A levee in front of the village was rejected by residents in the 1930s to save their duck-hunting and fishing environments.

Since 1979, the three major floods have caused close to $1.3 million worth of personal and public property damage in the village. Relocation of flood victims in 1982 cost $7,000, and damage repairs to a restaurant, the Riverview Inn, reached $40,000.

Despite this flood of bad news, Merrill said the community continues to hold its ground.

"I'm not going to preach to you that this is a fabulous town, but we like it and we think it's a safe place for our children," Merrill said. "People have told me they'd rather stay, so we're going to stay."

United States Department of the Interior

FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

ROCK ISLAND FIELD OFFICE (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

COM: (309) 793-5800
FTS: 386-5800

December 7, 1984

Colonel William C. Burns, Jr.
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Burns:

This constitutes our Planning Aid Report for your flood protection study at Liverpool, Illinois. Your study is being conducted under the authority of Section 205 of the 1948 Flood Control Act.

Resource Description

The project is located on the west bank of the Illinois River at river mile 128. Liverpool is a small town (less than 275 people) surrounded by agricultural land and the river. Directly across the river is the Chautauqua National Wildlife Refuge.

The Illinois River is sluggish resulting from a nearly level channel and a relatively low volume of water. It carries a heavy silt load from agricultural runoff and much sediment settles to the bottom. Commercial barge traffic as well as recreational boat traffic resuspends the sediments and keeps turbidity levels high. The high degree of suspended sediments limits light penetration in the water and thus reduces the growth of aquatic flora. Bottom sediments in the LaGrange pool tend to be course sand in the main channel and flocculent false bottom in sloughs and side channels.

Benthic invertebrates in the LaGrange pool consist primarily of burrowing mayfly larvae (Ephemeroptera), midge larvae (Chironomidae) and aquatic earthworms (Oligochaeta). The mussel population is low and in 1966, only 36 living specimens were collected (Starrett, 1971). Table 1 lists the mussel species that were collected. Some fingernail clams (Musculuim sp. and Sphaerium sp.) may be found, but this group has been virtually extirpated between river mile 89.0 and 182.0 (Havera, et.al., 1980).

The Illinois Environmental Protection Agency (EPA) classifies streams according to their macroinvertebrate assemblage. In general, if more than 50% of the species collected are characterized as intolerant of polluted conditions (i.e. high B.O.D., low dissolved oxygen, low pH), then it is classified as a balanced stream. That is, it is one that conditions are

capable of supporting a variety of organisms, mostly intolerant species, from various taxanomic groups. The Illinois EPA classifies the Illinois River as being balanced in the Liverpool area (Havera, et.al., 1980).

The most common fish species in the LaGrange pool are the shortnose gar, gizzard shad, carp, golden shiner, emerald shiner, spottail shiner, red shiner, bluntnose minnow, fathead minnow, blacknose dace, bullhead minnow, river carpsucker, quillback, smallmouth buffalo, bigmouth buffalo, white bass, green sunfish, bluegill, largemouth bass, white crappie, black crappie, and freshwater drum. (Havera, et.al.). An expanded list of fish and their abundance is found in Table 2.

Terrestrial habitat along the riverfront in Liverpool is greatly disturbed by man's activities. The vegetation consists of a mixture of bottomland forest (cottonwood, willow, pin oak) and weedy forbs (cockleburs, heath asters). This floodplain area is classified by this Service as a palustrine forested or palustrine scrub shrub wetland (Cowardin, et.al.). A portion of the area is grazed by horses. Because of its limited area and human disturbance, it is of marginal value to wildlife except for a few songbirds, squirrels and an occasional raccoon or deer and perhaps wood ducks.

Endangered and Threatened Species

Two species protected under the Endangered Species Act of 1973 as amended, are listed as occurring in the project area. The bald eagle (Haliaeetus leucocephalus) winters along the Illinois River, roosting at night in ravines leading away from the river and feeding on fish during the daytime. The project site, however, does not contain any daytime or nightime roosts for this species and there will be no impact on the bald eagle due to project implementation.

The Indiana bat (Myotis sodalis) is listed as being statewide in distribution. It generally inhabits small stream corridors with a well developed riparian zone of mature trees. During the daytime, it roosts or rears its young under the loose bark of dead or dying trees generally greater than 16 inches d.b.h. At night it feeds over the water under the enclosed forest canopy. The project site does not fit the preferred habitat of this species, and therefore, no impact on Indiana bat is expected.

This precludes the need for further action on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Should this project be modified or new information indicates endangered species may be affected, consultation should be initiated.

Project Plans

At the time of the writing, the Corps is considering constructing a levee around the south and east sides of Liverpool, tieing in with the existing agricultural levees on the north and west. Approximately 3000 feet of the 5000 foot levee will be in the bottomland, riverfront area. An existing boat ramp and parking lot will be moved approximately 500 feet upstream.

Borrow areas for the levee material have not been finalized but one possibility is in the bottomland area on the river side of the levee.

Another alternative is to take the material from abandoned mine lands located on the nearby bluff to the northwest.

Project Impacts

Project implementation will result in the conversion of approximately 3.75 acres of floodplain to levee assuming a bottom width of 75 feet. The levee will offer no habitat values to wildlife.

In addition, the excavation material from outside the levee will create holes around its perimeter. Depending on how deep these holes are, they may be wet enough to support aquatic or emergent vegetation. If this is the case, wildlife values could be enhanced by providing some diversity in habitat types. We would expect that these borrow areas would fill with water during high water overflows and perhaps some fish would become entrapped in them. While this is not necessarily beneficial to fish, it could provide feeding areas for some species of piscivorous birds such as herons and egrets, at least during the spring migration.

Impacts of taking material from the abandoned mine lands cannot be assessed at this time because of the lack of information regarding the site.

Mitigation

A. Policy

The Service's mitigation policy is published in the January 23, 1981 Federal Register (FR Vol. 46, No. 15, p. 7644). It is based upon the quality and scarcity of the habitat being impacted and the value of that habitat to the species of fish and wildlife which depend upon it for their life requirements. The various habitat types involved are placed in one of four Resource Categories providing a range of mitigation goals. These goals are then used to guide the Service's recommendations to the project sponsor.

The Resource Categories and their Mitigation Goals are as follows:

Resource Category 1 - habitat is of high value and is unique and irreplaceable in the nation or ecoregion. Goal - no loss of existing habitat value. Guideline - the Service will recommend that all losses of existing habitat be prevented as these one-of-kind areas cannot be replaced. Insignificant changes are acceptable provided they will have no cumulative impact.

Resource Category 2 - habitat is of high value and is relatively scarce or becoming scarce in the nation or ecoregion. Goal - no net loss of in-kind habitat value. Guideline - losses that cannot be otherwise avoided, minimized, rectified or eliminated over time can be compensated by replacement with the same kind of habitat so that the total or net loss is zero.

Resource Category 3 - habitat is of high to medium value and is relatively abundant in the nation. Goal - no net loss of habitat value while minimizing loss of in-kind habitat value. Guideline - losses that

cannot be otherwise avoided, minimized, rectified, eliminated over time or compensated by in-kind replacement can be compensated by replacement with other habitat types so that the total or net loss is zero.

Resource Category 4 - habitat is of medium to low quality. Goal - minimize loss of habitat value. Guideline - the Service will make recommendations to avoid, minimize, rectify or eliminate losses over time depending on the significance of the potential loss. Such areas are good candidates for mitigation of Resource Category 2 and 3 losses by management or enhancement to increase their habitat value.

B. Assignment of Resource Categories

Because of the relatively small acreage of floodplain habitat involved and its reduced value due to disturbance, we have assigned all project site habitat to Resource Category 3.

C. Recommendation

We suggest the Corps consider designing borrows sites to benefit fish and/or wildlife. We would prefer the material be taken from outside the levee and that the sites be deepened enough to allow moist soil or emergent aquatic vegetation to establish. We would also prefer to see some open water attract waterfowl, herons, egrets and other wildlife to the area. Perhaps the borrow sites could be connected to the old boat channel that joins the river near the center of the site.

Summary

We have no objection to the implementation of project plans as have been detailed at this time provided some measures are taken to compensate for the loss of floodplain habitat. We look forward to working with you as your planning progresses.

This letter provides comment under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, as amended, and in accordance with the Fish and Wildlife Service's Mitigation Policy.

Sincerely,

Thomas M. Groutage

Thomas M. Groutage
Field Supervisor

Enclosure

cc: Illinois Dept. of Conservation - Mr. Lutz

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Starrett, William C. 1971. A survey of the mussels (Unionacea) of the Illinois River, a polluted stream. Illinois Natural History Survey Bulletin. Vol. 30, Article 5. Urbana, IL.

Table 1. Mussels collected in the LaGrange Pool (Starrett, 197).

Common Name	Scientific Name	No. Collected
Floater	Anodonta grandis corpulenta	10
Maple leaf	Quadrula quadrula	8
Three-ridge	Amblema plicata	5
Fragile heelsplitter	Proptera laevissima	5
Rock pocketbook	Arcidens confragosus	4
Paper pond shell	Anodonta imbecillis	2
White heelsplitter	Lasmigona complanata	1
Slough sand shell	Lampsilis anodontoides fallaciosa	1
		36

Table 2. Fish that occur in the Lagrange Pool of the Illinois River (Havera, et al., 1980).

Common Name	Scientific Name	Status
Chestnut lamprey	Ichthyomyzon castaneus	U
Lake sturgeon	Acipenser fulvescens	U
Shovelnose sturgeon	Scaphirhynchus platorhynchus	U
Paddlefish	Polyodon spathula	U
Spotted gar	Lepisosteus oculatus	U
Longnose gar	Lepisosteus osseus	U
Shortnose gar	Lepisosteus platostomus	C
Bowfin	Amia calva	R
Skipjack herring	Alosa chrysochloris	U
Gizzard shad	Dorosoma cepedianum	A
Goldeye	Hiodon alosoides	U
Rainbow trout	Salmo gairdneri	R
Smelt	Osmerus mordax	R
Grass pickerel	Esox americanus	R
Northern pike	Esox lucius	R
Stoneroller	Campostoma anomalum	U
Goldfish	Carassius auratus	U
Carp	Cyprinus carpio	C
Silvery minnow	Hybognathus nuchalis	U
Speckled chub	Hybopsis aestivalis	U
Silver chub	Hybopsis storeriana	U
Horneyhead chub	Nocomis biguttatus	R
Golden shiner	Notemigonus crysoleucas	C
Emerald shiner	Notropis atherinoides	A
River shiner	Notropis blennius	U
Striped shiner	Notropis chrysocephalus	R
Bigmouth shiner	Notropis dorsalis	U
Pugnose shiner	Notropis anogenus	R
Spottail shiner	Notropis hudsonius	C
Red shiner	Notropis lutrensis	C
Silverband shiner	Notropis shumardi	R

Table 2. cont.

Common Name	Scientific Name	Status
Sand shiner	Notropis stramineus	U
Suckermouth minnow	Phenacobius mirabilis	U
Redbelly dace	Phoxinus eryghrogaster	R
Bluntnose minnow	Pimephales notatus	C
Fathead minnow	Pimephales promelas	C
Bullhead minnow	Pimephales vigilax	C
Blacknose dace	Rhinichthys atratulus	C
Creek chub	Semotilus atromaculatus	U
River carpsucker	Carpiodes carpio	C
Quillback	Carpiodes cyprinus	C
Highfin carpsucker	Carpiodes velifer	R
White sucker	Catastomus commersoni	U
Blue sucker	Cycleptus elongatus	R
Lake chubsucker	Erimyzon sucetta	R
Northern hogsucker	Hypentelium nigricans	R
Smallmouth buffalo	Ictiobus bubalus	C
Bigmouth buffalo	Ictiobus cyprinellus	C
Spotted sucker	Minytrema melanops	R
Golden redhorse	Moxostoma erythrurum	U
Shorthead redhorse	Moxostoma macrolepidotum	U
White catfish	Ictalurus catus	R
Black bullhead	Ictalurus melas	U
Yellow bullhead	Ictalurus natalis	U
Brown bullhead	Ictalurus nebulosus	R
Channel catfish	Ictalurus punctatus	U
Tadpole madtom	Noturus gyrinus	R
Flathead catfish	Pylodictic olivaris	R
Trout perch	Percopsis omiscomaycus	R
Burbot	Lota lota	R
Black striped topminnow	Fundulus notatus	R
Starhead topminnow	Fundulus dispar	U

Table 2. cont.

Common Name	Scientific Name	Status
Mosquitofish	Gambusia affinis	R
Brook silversides	Labideshtes sicculus	R
White bass	Morone chrysops	C
Yellow bass	Morone mississippiensis	R
Rock bass	Ambloplites rupestris	R
Green sunfish	Lepomis cyanellus	C
Pumpkinseed	Lepomis gibbosus	R
Warmouth	Lepomis gulosus	R
Orangespotted sunfish	Lepomis humilis	R
Bluegill	Lepomis macrochirus	C
Redear sunfish	Lepomis microlophus	R
Spotted sunfish	Lepomis punctatus	R
Smallmouth bass	Micropterus dolomieui	R
Largemouth bass	Micropterus salmoides	C
White crappie	Pomoxis annularis	C
Black crappie	Pomoxos nigromaculatus	C
Mud darter	Etheostoma asprigene	R
Bluntnose darter	Etheostoma chlorosomum	R
Slough darter	Etheostoma gracile	R
Orangethroad darter	Etheostoma spectabile	R
Yellow perch	Perca flavescens	R
Logperch	Percina caprodes	R
Blackside darter	Percina maculata	R
Slenderhead darter	Percina phoxocephala	R
River darter	Percina shumardi	R
Sauger	Stizostedium canadense	R
Freshwater drum	Aplodinotus grunniens	C

Key: A - abundant
C - common
U - uncommon
R - rare

Chicago Tribune Thurs Mar 7, 1985



AP Laserphoto

ding from the Illinois River [bottom, right] covers Liverpool, Ill.: "Water is 6 foot high inside all the houses, higher in some."

Illinois River floods 1,000 homes

By Jean Davidson

More than 1,000 homes along the Illinois River were submerged Wednesday, and hundreds of people were forced to evacuate as the steadily rising water neared 1943 record flood levels.

"We're kind of losing track of the evacuations right now," said Chris Lofgren of the Peoria Red Cross. He estimated that at least 300 families had fled their homes by early Wednesday afternoon—double the morning estimate.

Lofgren said some riverfront families who mistakenly thought they would escape the water's wrath were hurriedly moving out of their homes.

Gov. James Thompson, just before he viewed the area by helicopter, declared 10 counties disaster areas, allowing residents to have their flood-damaged property reassessed for tax purposes.

State Emergency Services Director Chuck Jones, who flew over much of the Illinois' 272-mile length late Wednesday morning, said Rome and Chillicothe, 12 miles north of Peoria, and Liverpool appeared the worst hit by flooding.

In Liverpool, about 18 miles south of Peoria, all 40 houses were flooded, according to Nancy Stockov of the Fulton County Red Cross. Emergency shelter has been provided for about 30 families in apartments and hotels throughout the county.

"The whole town is under water," Stockov said. "Water is 6 feet high inside all the houses and even higher in some."

Last weekend's 24-hour deluge caused the Illinois River's already-high waters to sweep over its banks, continuing to rise as tributaries emptied into the Illinois, according to Tom Dietrich of the National Weather Service. And although scant new rainfall or snow runoff is predicted this week, Dietrich said additional water from the tributaries is expected to cause the river to crest at 30.5 feet on Friday.

Flood waters also coursed over the banks of the Spoon River, which crested at 27 feet Tuesday night in London Mills, and of the Lamoine River, which reached nearly 30 feet on Wednesday, according to the weather service.

Flood level on the Illinois is 18 feet, and the all-time flood record, set in 1943, is 28.8 feet, according to National Weather Service officials.

"I imagine up and down the [Illinois River there's probably 1,000 homes in the river right now," said Angelo Zerboinia of the Peoria Area Army Corps of Engineers.

Emergency shelters and food stations were established by the Red Cross in Chillicothe, Rome and Spring Bay, just north of Peoria, where riverfront flood waters reached rooftops and many residents faced the danger of being cut off by rising waters.

"Some of the older folks are ignoring the warning and they will be stranded by Friday," said Dennis Perry, assistant fire chief in Spring Bay.

CHICAGO, IL
SUN-TIMES
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HICAGO METROPOLITAN AREA

Town in a puddle of trouble

verpool is no longer
n Illinois River—it's in it

y Tom McNamee
un-Times Correspondent

VERPOOL, Ill.—John
18, paddled his 14-foot-
boat down Main Street,
ing away from stop
and submerged picket
s.
like this town, I like the
," he said, raising his
over the squeaking of
and the roar of a nearby
ard. "Nobody's around
ther you like they do in
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erpool, a town of 240
le, usually can be found
of Peoria along the
bank of the Illinois Riv-

t at the *moment*, this
is not on the river. It is
e river.
ery store, every wooden
e and every mobile
e is surrounded—some-
s covered—by at least 10
of muddy water.
rniture floats in the
ts. Water laps at roof-
Children go to school in
oats.
erpool is one of several
l river towns hit hard
week by the third worst
l in recorded history to
p down the Illinois.
he bloated river has
nped homes from La
to Beardstown. Before the water stopped rising late Friday, it was at 88.4 feet at Peoria—almost 10.5 feet above flood stage and just five inches short of the 1943 record.

Yesterday, the river fell 3.6 feet, but remains dangerously high.

More than 1,000 houses are flooded. And more than 2,000 people have had to abandon their homes for higher ground. In Liverpool, all but eight of the town's 65 homes are deserted.

"Now we can pray there will not be rain," Angelo Zerbonia, of the Army Corps of Engineers, said. "The water has to drop two or three feet before you can even start to clean up."

Liverpool may have been hardest hit. Only the cemetery, on high ground east of town, was spared.

But even as they cursed their fate yesterday, almost nobody in Liverpool talked about pulling up stakes.

Instead, they sat on sandbags near what used to be Main Street and sunned themselves. And they speculated on the cleanup.

"It's gonna be slow this time," Floyd Belleas, 37, said. "The Mississippi is high. It has to drop before the Illinois can drop."



SUN TIMES Rich Hein

Liverpool Mayor John Westerfield motors through town Friday, surveying the height of the Illinois River that submerged all but the cemetery in Liverpool, a small town of 240 residents south of Peoria.

Ed "Popeye" Kuznier, 65, frowned. "When I was younger I didn't mind it," he said. "Hell, you have to go down and really scrub."

Norma Rilea, 55, wondered aloud when the Riverview Inn, the town's only restaurant, might reopen.

"We all like to sit in there in the supper club and watch the river, watch the barges go by," she said. "But right now they've got water coming right in the windows."

Many "Liverpudlians" said they won't be leaving town because they like it here—when it's dry. Besides, they said, who's dumb enough to buy houses on a flood plain?

"You can't sell these houses, so you have to raise 'em," said Bill Warren, pointing across the water to the cinder blocks that keep his home dry.

According to history buffs, Liverpool was started in the 1830s as a commercial fishing port. By 1900, it boasted five fish wholesale houses. But commercial fishing fell on hard times as the river grew more polluted and the fish became less plentiful.

In the 1920s, Liverpool was a popular overnight stop for hunters, including Chicago's Al Capone. The hunters, who scoured the river banks for ducks, rabbits and deer, kept five hotels in business.

But Liverpool's glory days, such as they were, are gone.

The fish wholesalers and hotels are closed. Nearby factories and strip mines are hurting. Unemployment in town exceeds 50 percent.

Making matters worse, the danger of serious flooding increases each year.

"The river's filling in more every year with erosion and more land is being paved over," Mayor John Westerfield explained. "The water has nowhere to go but up."

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SUN-TIMES/Rich Hein



SUN-TIMES/Rich Hein

Big puddle in 'Liverpudlia'

Anxiously awaiting the onslaught in his sand and plastic fortress (left), Dale Hinderman watches floodwaters at Liverpool, Ill. In another part of town (above), Mayor John Westerfield surveys damage. But despite their troubles, the "Liverpudlians" managed to maintain their sense of humor (right).



SUN-TIMES/Al Podgorski

CHICAGO, IL
SOUTHTOWN ECONOMIST
(SOUTH SUBURBAN ED.)
D. 30,000—S. 33,000
CHICAGO METROPOLITAN AREA

APR 11 1985

Illinois River begins to retract slowly

By United Press International

The Illinois River, which gushed over its banks to chase an estimated 2,000 people from their homes leveled off Sunday in some areas and began its slow fall.

Temperatures pushed toward the 50-degree mark for much of the state and forecasters expected highs near 70 in the south with showers possible today.

The Illinois River took its first fall during the weekend in dropping from 28.4 to 27.4 feet at Peoria, the Army Corps of Engineers said Sunday.

A Chillicothe police officer Saturday had estimated the river fell from 28.4 to 24 feet, but Army Corps of Engineers said the river is making a slow fall and may still drop to only 27.1 on Monday.

A spokesman for the Army Corps of Engineers said the river dropped to 27.4 at 8 a.m. Sunday.

"It's just going down slowly," one Peoria area resident said.

Although the river is falling from its near-record stage, it's too early for flood victims to return to river-drenched property and officials estimate the homecoming for some may take weeks.

Peoria Red Cross Jean Ann Crutchfield, public affairs officer, said in their survey for damages, 1,457 homes were affected from Kankakee south along the river.

Red Cross has served between 900 and 1,000 meals a day to victims and sent food to Meredosia to feed sandbaggers, who have worked around the clock since flooding Monday as a result of last Sunday's storm.

"Right now (we're doing) real well," said Meredosia Mayor Alex Gal. The river at Meredosia is at 29 feet and appears to have leveled off, he said.

"Right now we're cleaning up and just trying to maintain. At this point (we're) just kind of relaxing and working at a slower pace," said Gal. "The only thing that has helped us is the community and our neighbors."

Although Gal said flooding is not new to the city's 1,200 residents it is "usually not near as bad."

"We still haven't gotten our spring rain," Gal said. "If we had a lot of rain ... it would really be devastating."

Flood victims, unable to find a room in crowded hotels, spent much of their weekend at the Chillicothe shelter and sheriff's police patrolled the flooded towns.

State may buy out Liverpool homes

By SHELLEY EPSTEIN
of the Journal Star

SPRINGFIELD — The federal government could buy large portions of Liverpool that have been repeatedly flooded by the Illinois River.

Federal and state officials said Tuesday that if Liverpool residents want to sell their homes and relocate, money may be available to purchase their land.

The Federal Emergency Management Agency has already bought flood-prone property in Rome and Chillicothe, homes that were damaged by the high water of 1979 and 1982.

But the buy-out in Liverpool — where nearly all the homes in town have been damaged by flooding — may be more extensive.

"It's a long-term solution," said Charles Jones, state Emergency Services and Disaster Agency director. "It's a lot less expensive than continuing to pay flood insurance or building super levees to protect property."

Besides homes in Liverpool, Jones said the state may ask the federal government to buy two dozen properties in Meredosia, south along the Illinois River. Jones said he'll decide next month whether to ask the federal government to consider the buy-outs.

"There's a good likelihood that some property will be bought," said Gary Pierson, FEMA coordinator for six Midwestern states. "The buy-out is a restricted program; money is not unlimited."

People could be moved out of their homes later this year. About $5 million is available nationwide in the FEMA program.

Those who qualify for the program must have federal flood insurance, must have been repeatedly flooded and must want to sell to the federal government. Property will not be forcibly condemned.

Once the property is acquired, it will be turned over to local governments for park or recreational use. But Pierson said property won't be bought unless large tracts can be acquired.

"The purpose is to evacuate the area; we wouldn't buy homes sporadically, taking one and leaving another," Pierson said.

Later this week, state ESDA officials are to move into the Illinois River Valley to assess damages to determine if federal disaster relief will be requested. Their assessment will also provide information on the need of the federal buy-out program.

JOURNAL STAR, Peoria, Sunday, March 17, 1985

Liverpool has terminal illness: River flooding

LIVERPOOL — This 150-year-old town is on its deathbed, the first communal victim of an abused Illinois River which has now begun its dying throes.

Choked by the suicidal lack of conservation practices, the river now swells from its boundaries habitually and is beginning to swallow the towns on its banks.

The federal government has indicated it plans to buy Liverpool, 35 miles south of Peoria, level its 80 dwellings, displace its 200 residents, and let the town become a swamp.

Once a thriving commercial fishing and hunting village, the end of Liverpool seems as certain as the end of the river the town lived on. Only the formalities of the funeral arrangements remain.

Other towns won't be far behind. Parts of Spring Bay will disappear. Chunks of Rome will go away. Millions of dollars worth of riverfront development in Peoria will be destroyed.

The warnings are over. The reality is here. The floods aren't eccentricities anymore. They'll become more frequent. They'll keep getting deeper.

And it's time to begin writing the obituaries of towns.

□

Floyd Belles sits on a stack of sandbags next to a village of which he will soon be mayor. But the town he is to lead is underwater, in back of those bags.

During the first bad flood here six years ago, more than 200 volunteers stayed in Liverpool and built sandbag walls to save portions of the town. There was hope back then. But as more floods came, the volunteers faded.

This year, less than three dozen people stayed to bag. They bagged four entire days, until they were exhausted, and they finally surrendered the entire community to the river determined to kill it.

Belles examines his town like a cop would look at some huge highway collision. "That one there," he says and points to a home. "We blocked it up an extra five feet last year, figuring that would be enough to save it."

But water is now just a few feet from the roof. "It's totalled now," Belles said. "And that one over there. And that one. All totalled."

He points to a house closer to the river. "We've got an old lady in there who won't leave. Probably if you held a gun to her head, she wouldn't go. Lived there all her life. Says if anything's going to take her, it's going to be the river."

Somebody has stuck a "for sale" sign atop the sandbags, indicating the town of Liverpool can be had cheap.

"This was a good town," Belles said. "Maybe it wasn't a fancy town. But it was a home to people. It was just as much home as any fancy town ever was."

□

From its inception in 1836, the town of Liverpool was almost exclusively populated by people who made their livings directly from the river. They called themselves river rats.

The Illinois River near Liverpool was one of the more productive commercial fishing spots in the country for decades. The duck hunting was legendary, and a favorite hunting spot of millionaires from throughout mid-America.

Some of the duck hunting cabins and clubs near Liverpool sported butlers, sterling silver serving dishes, famous musicians, professional baseball players and the big names of high finance.

The river ran deep. Floods were almost unheard of. Decades passed and the people of Liverpool were in Fat City with the bounty from the water and the air above the river.

But by the 1930s, the river had become noticeably more shallow, and the once-clear water had become con-

stantly muddy. By then, Liverpool was 90 years old.

In the years that had passed since Liverpool was founded, the prairie land around the Illinois River Valley had been disced and plowed.

Every rainstorm washed tons of prime Illinois topsoil into the Illinois River, and slowly began to fill the river's bed. And instead of employing rather simple conservation methods to save their topsoil and the river, farmers became even more reckless.

Egged on by federal subsidies, farmers cut down every tree they could find on the prairie. They cleared all their hedgerows which help hold their land in place. And they began the disastrous process of fall plowing. All those actions resulted in millions more tons of topsoil being flushed into the river.

By the 1930s, flooding had become a slight problem for the settlements of river rats along the Illinois. No houses were ever under water, but every once in a while, a duck-hunter would get an ankle wet walking to his dock.

That decade the federal government offered to build earthen dams around river communities to save them from floods which could worsen. A lot of river areas took the government up on the offer.

But Liverpool did not. Five commercial fishermen from the community banded together to object to the levee. They would have to drag their boats across the hump, and they'd have to carry their thousands of pounds of fish over the dike to clean.

The people of Liverpool, most of whom still made their livings from the river, agreed with the fishermen. The levee was not worth the work it would take to cross it. And the threat of severe flooding seemed an idle one.

That decision would later prove fatal to the small town. Not only would the river continue to fill with muck, but the levees built upriver to protect other communities would force more water out of the banks downriver.

As early as the 1930s, with the Illinois River being suffocated by topsoil and the levees being built upriver, Liverpool was doomed.

□

"I get a little tired of the boys from Chicago and Peoria and Springfield coming down here, looking at this mess, and asking why we put up with it, why we don't just leave," Floyd Belles said. "You can't just walk away from your whole life."

People of Liverpool couldn't walk away if they wanted to. To do that would mean financial ruin for most of them, because everything that could go wrong with a town has gone wrong with Liverpool.

In the 1940s, industrial garbage was flushed into the Illinois River, from Chicago to every industrial center along the Illinois River Valley and every waterway leading into the river.

The wild Canadian breeding grounds for the millions of ducks migrating down the Illinois River Flyway, were converted to farmland. The duck population decreased dramatically. There was no living left to be made on the river.

The people from Liverpool got jobs in the coal mines, in the International Harvester plant at Canton, at the Caterpillar plants throughout the Peoria area, at the Hiram Walker Distillery. But they stayed in their hometown to live.

As the years went by, the mines closed. The distillery moved away. The Harvester plant went under. The Caterpillar layoffs struck.

Very few people in Liverpool today have jobs. The great bulk of the population lives off pensions, unemployment paymems, and whatever else it can scrape together.

They're poor. And everything they have financially is wrapped up in their homes — homes now being ruined by the river.

"The young ones, they can start over," Belles said. "Maybe they can walk away. But the older ones can't. You take a man 40, 50, or 60 years old who goes to a new town and tries to get a mortage on a house.

"The bank will say: 'You got a job?' And he'll say: 'No.' Then the bank will say: 'You got a future?' And he'll say: 'No.' Then the bank will say: 'You got a house?' And he'll say: 'Yeah. I'm trying to sell it, but it's on the bottom of the Illinois River.' Then the bank will say: 'Get out of here.'

"That's why these folks can't walk away. They're tired. They're worn out. They don't like what's happening to them. But they can't just leave. Now here comes the federal government saying they're going to buy the town and save everybody. But I just don't know about their sincerity," Belles said and looked at his drowning town.

□

The word rushed among the more than 200 left homeless from this town by the flood. The word moved through the motel rooms of the displaced river rats in Little America and Banner, and through the relatives' homes in Havana and Beardstown.

And the word was that the federal government was going to buy Liverpool, level it, and let it become a backwater swamp of the Illinois.

There was relief among them as the word spread. They were tired of being flooded out. The water had forced them from their homes three times in the last six years. They were tired of having to rebuild their lives.

The federal government was tired, too — tired of Liverpool; tired of having to fork over federal flood insurance to pay for the mess of the town. The government has paid out more than $1 million to the 240 residents of Liverpool in flood insurance claims since 1979 alone. This flood will cost the federal government another $650,000 for Liverpool alone.

In the past several years the government has already

paid well over the total worth of every dwelling in Liverpool, and the word was the government had decided it would be cheaper to just buy the town.

The newspaper from Peoria confirmed part of the word: "The federal government could buy large portions of Liverpool . . . federal and state officials said Tuesday that if Liverpool residents want to see their homes and relocate, money may be available. . ."

The people came from their motel rooms and their in-laws' houses and to where their village trustee and future mayor sat on a wall of sandbags, and with relief on their faces, said: "They're going to buy us out, Floyd. The feds are going to buy us out."

Floyd Belles looked at them and said: "Don't get your hopes up. I've seen this kind of thing before."

□

Floyd Belles still thinks this town can be saved, if the federal government would only build the levee Liverpool refused 50 years ago. Chances of that seem slim, though.

"We got up a petition for the levee and 100 percent of the people in Liverpool signed in favor," Belles said. "So the government had a big expensive study. Then they had another study. Then another.

"Any uneducated man could see what the problem was. Still, they kept studying it. If you combined the cost of all those studies, you could have built the levee. You could probably build a levee out of the studies themselves. It's almost like the government wants us to die."

If the federal government had any intention of building a levee here, it probably would have been done by now. Instead, the government apparently figured Liverpool would have drowned itself by now, without any official help.

But after every catastrophe, the river rats of Liverpool kept coming back, and back, and back. The population here isn't much different than it was 60 years ago.

Now the government has realized it's going to have to act as some kind of reverse Pied Piper to lead the rats away from the water.

And Belles is cynical as to what kind of tune the government plans to play to accomplish the death of Liverpool.

"If this town has to die," Belles said, "I want it done quickly and completely. I won't have these people slowly picked to death. We can't stand for that."

To see how a small town, or an area of a large town, is picked to death, one only need look at the South Side of Peoria. Years ago, the government announced South Town was a blight, a slum, something not worth existing. And the government announced it would buy all the homes in the area, tear them down, and rebuild the area.

The government bought a few houses. Then the government said it ran out of money. Nobody in the area could sell their homes, because they were all destined to be bought and demolished. But nobody knew when. The quality of the neighborhood decreased. The value of homes plummeted. And suddenly the government didn't have to pay as much for the homes anymore.

A few more homes were bought. The government ran out of money again. The neighborhood filled with arson and crime. Home values went down farther.

Lives are destroyed in this process. But the government does save money by starting to destroy a town, delivering a few, fatal blows, then letting the town die on its own.

And Belles is afraid that's the process the federal government might choose to kill Liverpool. The government may buy a few houses, destroy the town's tax base, then simply let the rest of the town rot and be washed away.

"We've got two simple options in this town," Belles said. "Either the government builds us a levee, or the government buys us out, lock, stock and barrel."

The option of the levee is pretty much gone. As far as the federal government is concerned, its options are: Buy the whole town, or pick it to death.

The government will select whichever option it feels comfortable with. River rats may be tough, but they don't have a chance against the federal government. And they've got even less of a chance against the violent death spasms of the Illinois River.

The man who will be sworn in as the mayor of Liverpool next month will probably see his town vanish long before his first term expires. And his only solace may be that he will soon have company.

The first of the funeral dirges has sounded.

Liverpool recovering from river disaster

By JIM KERRIGAN
of the Journal Star

LIVERPOOL — Letters posted with Zip Code 61543 hit the mail again this week, a sure sign of a change in the Illinois River here.

Three weeks ago, that mean and hungry stream swallowed the village of Liverpool. Even the mailman closed shop and ran for higher ground.

But the Liverpool Post Office reopened this week, and many of the town's 240 residents are coming home.

The Illinois River has dropped more than eight feet from its mid-March crest of more than 28 feet. A few short weeks ago, Main Street here was covered with seven feet of water. Now the town almost is dry again.

Recent rains have erased much outward evidence of last month's devastation. "The rain we had washed away that film of silt," said Mayor John Westerfield. "It looks like the flood never occurred, now."

But it did, and government estimates place flood damage on uninsured property in Fulton County at more than $1 million. Much, perhaps most, of the damaged property in Liverpool was insured and, thus, was not included in the estimate.

Westerfield said about 10 families returned to their homes this week, adding to the seven or eight families which, thanks to houses built atop high concrete foundations, never left.

There's still lots of waiting going on, though — waiting for flood insurance claims, waiting for a mood change in a fickle river still lying perilously close to town, waiting on a proposed levee to lock the river out for good.

Despite persistant rumors of a government buyout of the flood-plagued town, the proposed levee apparently remains Liverpool's best hope.

Over the years, in government studies after each major flood, many potential solutions to flooding were discussed. But the most recent federal studies have centered on levee construction as the most economical and locally acceptable solution.

In a February recommendation by the U.S. Army Corps of Engineers, consideration of a federal buyout and relocation of the town was eliminated in favor of levee construction.

Still another flood-solution study, conducted by a team of officials from both state and federal agencies, will be issued after the current flood.

Ronald Buddecke of the Federal Emergency Management Agency said the new study again will raise the possibility of a government buyout.

Buddecke said it's possible that the amount of federal flood insurance claims in Liverpool this time could alter the cost-benefit ratio of the levee vs. buyout proposals.

If a levee is built with federal dollars, its construction cost would be in addition to the amount paid in federal flood insurance claims. If a buyout arrangement is conducted immediately after a flood, however, the amount paid in flood insurance claims could be deducted from the government's purchase price for the property.

FORUM

Liverpool lives We're tough, we're staying

To add a few facts to the fiction I keep reading about the village of Liverpool:

This town isn't dead, yet. There are a few of us who stayed in our homes, through the entire flood of 1985.

The whole town was not evacuated, as the media put out. We had friends and relatives trying to call us because they had heard that the whole town had water clear to the eaves of the houses, and they were worried about our safety.

We are just one family out of nine who raised our homes in 1982, so the flooding would not drive us from our homes. We were not in any danger. It was a little inconvenient getting our two children out to school every morning, but they haven't missed a day because of the flood.

I haven't heard of one person being asked to sell their home to the government. As far as I know, the government has not offered to buy out the entire village of Liverpool. The Corps of Engineers has been conducting a study on the feasibility of putting up a levee to protect the town, which would be great, but I'm sure they'll find some reason why it can't be done. It would certainly be the answer for the people who, because of age or health, can't raise their homes.

The way everyone has been talking, Liverpool is no more! Well, I just have this to say, don't count us out, yet. This town has been here for almost 150 years and I hope to see it here for another 150 years. We're tough and we're not finished yet!

Maybe we aren't as smart as some of you think you are, but this town is our home and some of us will fight tooth and nail before we let anyone take it away from us. Would you want to give up your life and home because of an error in location, if there was a solution to your problem? I doubt it, so don't sit in judgment of us.

Mr. and Mrs. Ronald G. Taylor
Liverpool

Illinois Department of Transportation
Division of Water Resources
310 South Michigan Avenue / Room 1606
Chicago, Illinois 60604

May 14, 1985

Mr. Floyd Bellas, Mayor
Village of Liverpool
Village Hall
Liverpool, IL 61543

Dear Floyd:

As we discussed on the telephone, this letter is a summary of what we proposed and where we stand.

After the March flood, the Federal Interagency Hazard Mitigation team visited Liverpool to assess possible mitigation activities. You and I discussed local response to a relocation project. You confirmed what we learned in 1981: a project that acquired only part of the town was not acceptable. Instead of being chopped up, the Village's position was "Buy all or buy none".

Following that trip, the team discussed the "buy all" approach. Costs of such a project were compared with the costs of the Corps' 44 year levee. It was proposed that the cost to the federal government of the Corps' project ($1.4 million + an estimated $500,000 in flood insurance claims = $1.9 million) was not much different than the Corps' estimate of acquiring all the buildings ($2.1 million).

The team decided to explore the possibility of combining flood insurance claims payments, Section 1362 funds, and a special appropriation from the state legislature to buy all the properties. We researched this approach and concluded that the key factor was whether the residents would prefer to voluntarily sell their properties at fair market value or be protected by the 44 year levee. Therefore, before we could approach the legislature, I called you and asked your opinion of the owners' interests.

You surveyed 50 owners and found them 4 to 1 in favor of the levee over the acquisition proposal. You felt that given this strong sentiment, there would be no benefit to a meeting with the Board of Trustees to discuss a relocation project. I agree. We have advised the Corps of Engineers and FEMA and the Corps is proceeding with the next steps for the levee project.

I hope this letter clarifies what has happened. Please tell me if it is inaccurate. Thank you for the surveying and your other efforts in support of our research.

Sincerely,

French Wetmore, Chief
Local Floodplain Programs

FW:cp

312/793-3864

cc: Brian Milk, COE
Bill Powers, FEMA
Roger Towery, Liverpool
Chuck Jones, ESDA

Federal Emergency Management Agency

Region V 300 South Wacker, 24th Floor, Chicago, IL 60606 (312) 353-1500

Brigadier General Jerome B. Hilmes, Commander
U.S. Army Corps of Engineers
North Central Division
536 S. Clark Street
Chicago, Illinois 60603

JUN 28 1985

Dear General Hilmes:

This letter is submitted in response to the Region V Interagency Hazard Mitigation Team Report regarding the recent flood disaster on the Illinois River (FEMA-735-DR-IL). Specifically, Work Element B.1. states, "to facilitate immediate response to this event, potential relocation projects in the Rome, Ottawa "flats", Liverpool and Will County areas need to be investigated".

The background information for this work element, as it pertains to Liverpool, focuses on the levee proposed by the Corps of Engineers as described in your draft Reconnaissance Study. This levee would offer flood protection equal to that of an agricultural levee behind the Village (an estimated 44 year level of protection with three feet of freeboard). The cost estimate for this project is $1.6 million dollars. The Corps Report indicates that the proposed levee is the highest level of protection which can be offered and remain economically feasible. As an alternative, acquisition, relocation and redevelopment is estimated to cost approximately $2.1 million.

This relocation project work element is consistent with the charge to the Team "to assure... that flood recovery efforts give full consideration to non-structural as well as structural measures to minimize flood losses to the extent practicable and thereby reduce the flood vulnerability of riverine and coastal communities", (OMB memorandum 7\10\80).

This office has reviewed the Draft Reconnaissance Report and we are concerned about several points in the Report.

First, we recognize that National Economic Development policy does allow the Corps of Engineers to design and construct flood control levees for urban areas to elevations less than the 100 year flood level if the project presents a positive cost-benefit ratio. However, we do not understand, nor feel it is appropriate to include flood damage reduction benefits that accrue due to freeboard. On page D-6 is the statement "benefits in the freeboard range equal to one-half the area under the damage-frequency curve between the design level of protection and the largest flood that might be carried within the freeboard are accounted for in the flood damage reduction benefits. The 100 year flood elevation is approximately 454.3 feet Mean Sea Level (MSL). The 44 year flood level is approximately 451.5 feet MSL. The 44 year levee would have an elevation of 455 feet MSL including three feet of freeboard. Therefore, the freeboard elevation provided by the 44 year

levee would roughly equal the calculated 100 year flood elevation.

The statement above indicates that some benefits would accrue for protection between the 44 year design level and the 100 year flood level which is the elevation of the freeboard of the 44 year levee. FEMA's position is that 100 year flood protection is the absolute minimum acceptablefor urban flood protection for flood insurance purposes. Past experience has shown that FEMA will be pressured to accept levees designed and constructed to less than 100 year level of protection but with freeboard height exceeding the 100 year elevation. This is contrary to our policy.

FEMA's interim levee policy issued February 10, 1981, was adopted to determine if areas protected by levees should or should not be removed from the special flood hazard designation. While this concept and policy focused primarily on levees purporting to offer protection from the 1%, or 100 year flood, the principle of freeboard is applicable to levees offering lower levels of protection. "The degree of protection afforded by a levee system is uncertain because of both the uncertainty involved in establishing the 1% chance flood elevations and the uncertainty involved in the structural stability of the levee itself. Common engineering practice in the construction of flood protection works, such as dams and levees, is the inclusion of a freeboard allowance above the computed water surface levels to allow for all of the uncertainties in analysis, design, and construction that cannot be fully or readily considered in an analytical fashion".

These uncertainties exist whether we are discussing a 100 year levee or a 44 year levee. If the freeboard allowance is to insure against these uncertainties as they pertain to the design level of protection, the value of protection provided is only valid to that design level. Saying that there is a value of protection (e.g., benefits for property value removed from risks), provided within the freeboard allowance is to say that all or a portion of these uncertainties have been removed . If the uncertainties have been removed, then why not credit the freeboard level of protection with full benefits rather than one-half the benefits in the freeboard range? We feel that it is inconsistent with the interim levee policy and therefore inappropriate to confer any benefits to protection afforded by the freeboard allowance.

We also have concerns regarding the economic analysis comparison between the Relocation Alternative and the Levee Construction Alternative. Our experience with acquisition and demolition projects in Illinois and the Midwest generally, lead us to believe that some of the costs described in Table 1 of the Draft Report are either too high or are inappropriate. While it is usually beneficial to be conservative and estimate costs on the high side, in this case it leads to a negative benefit/cost ratio and eliminates what might be an appropriate solution.

Accordingly, we suggest the following items in the Relocation Plan Cost Estimate be adjusted:

ITEM	COST	ADJUSTED COST
Land value per lot	$2,800	$1,500
Removal of Structure	2,ooo	900
Value of Mobile Homes	9,000	7,000
Land Value per lot	2,800	1,500
Removal of Mobile Homes	1,000	400
Land Value of Special Uses	2,800	1,500
City Streets and Sidewalks		-0-
Removal of Special Use Building	3,000	1,000
Conversion of Floodplain to Recreation Use		-0-
Contingencies	25%	15%
Engineering and Design	11%	0%
Supervision and Administration	7%	3%

An additional consideration for the relocation alternative concerns the implementation of this project following the Spring '85 flood. Based on claims information to date and im comparison with the December, 1982 flood, it is estimated that the National Flood Insurance Program will pay approximately $300,000 to $325,000 for structural flood damage. Under the authority of Section 1362 of the National Flood Insurance Act, these claims could be credited toward the acquisition of the claimant's property thereby reducing the relocation project cost.

Using the adjustments indicated above and applying flood insurance claims for structural damage, the relocation project cost estimates would be modified as follows:

RELOCATION PLAN COST ESTIMATE

60 Houses - Occupied (average value $13,000)		$780,000
18 Homes - Unoccupied (average value $4,000)		72,000
Land Value (78 houses x $1,500/lot)		117,000
Demolition (78 houses x $900 ea.)		70,200
12 Mobile Homes (average $7,000 ea.)		84,000
12 Vacant Mobile Homes (average $7,000 ea.)		84,000
1 Burned Mobile Home		-0.
Land Value (25 x $1,500/lot)		37,500
Removal of Mobile Home/Salvage ($400 ea.)		10,000
Special Use Property (10 structures)		184,000
Land Value (10 x $1,500 ea.)		15,000
Demolition (10 x $1,000 ea.)		10,000
City Streets and Sidewalks (no acquisition)		-0-
Conversion of Floodplain to Recreational Use		-0-
	Subtotal	$1,464,200

RELOCATION PLAN COST ESTIMATE(cont.)

Subtotal	$1,464,200
Contingencies 15%	219,630
Engineering and Design 0%	-0-
Supervision and Administration 3%	43,926
	$1,727,756
Deduct Flood Insurance Structural Claims	-300,000
Total Project Cost	$1,427,756

$1,427,756 x .08528 = Annual Cost = $121,760

Annual Benefits of the Relocation Alternative would include a complete reduction in flood insurance claims, complete reduction in individual assistance, public assistance, clean-up costs and emergency response costs. We do not suggest there would be any enhancement of land values. N.E.D. benefits are estimated as follows:

Flood Insurance Payments	$139,000
Individual Assistance, Public Assistance and Clean-up Costs	10,600
Flood Insurance Overhead Costs	3,400
Total Annual Benefits	$153,500

Based on these estimates, the benefit/cost ratio for the Relocation Alternative would be 1.26 rather than the .74 stated in the Draft Report.

$153,500 / $121,760 = 1.26

In comparison, the Levee Construction Alternative accrue benefits for land enhancement, recreation and added value for location due to the protection afforded by the levee. Because of the depressed value of the economy in the general area, it is unlikely that there would be much, if any, increase in value for vacant land or the existing housing stock of Liverpool. Added to this is the fact that the 44 year levee would not remove the requirements of the Flood Insurance Program and, in fact, would do nothing to remove the Village from the special flood hazard area. Recreation benefits are not appropriate because the boat ramp is existing and the recreational development is not an integral feature of the levee. In addition those benefits ascribed to the protection provided by the levee's freeboard are invalid. For these reasons, we suggest the average annual benefits be adjusted as the following estimates suggest (compare with Table D-8).

ANNUAL BENEFITS - LEVEE ALTERNATIVE

Flood Damage Reduction	$ 80,000
Individual and Public Assistance and Clean-up	8,800
Land Enhancement	-0-
Recreation	-0-
Location	-0-
Reduction in Flood Insurance Overhead	-0-
	$ 88,800

We would also suggest minor adjustments to the project cost estimates for the 44 year levee in order to reflect more appropriate design and administrative costs (11% and 7%, respectively). The breakdown of these cost estimates are as follows:

44 YEAR LEVEE COST ESTIMATES

Real Estate	$ 219,567
Relocated Boat Ramp	107,200
Levee Alignment	707,877
Road Ramps	53,824
Interior Drainage	101,480
Subtotal	$1,189,948
Contingencies 25%	242,595
Engineering and Design 11%	133,427
Supervision and Administration 7%	84,908
Total First Cost	$1,650,878
Interest during Construction	69,337
Total Project Cost	$1,720,215

$1,720,215 x .08528 = Annual Cost = $146,700

Based on these estimates, the benefit/cost ratio for the 44 year levee alternative would be .61 rather than the 1.3 stated in the Draft Report.

($88,800 / $146,700 = .61)

With these adjustments to the relocation and levee alternatives, the benefit-cost ratios are 1.26 and .61 respectively. While the values change for each alternative, the most significant point is that the position of the recommended alternative would be reversed, i.e., the relocation alternative now appears to be the appropriate plan.

Another major concern we must express is that consideration is not given to contingency actions in the case of a flood event greater than a 44 year event or levee failure.

In the case of a flood greater than the 44 year event, protection from the proposed levee and the existing agricultural levee will be nullified and evacuation of the residents will be required. There is one road out of Liverpool leading to high ground, out of the floodplain. It is 2.1 miles

to the intersection of Liverpool Road and Highway U.S. 24. Even with the levee in place, a warning system and evacuation plan would be necessary to provide for events greater than the 44 year event.

The possibility that levee failure could occur is also a prime concern in the discussion of the 44 year levee proposal. It is possible to compute the probability of failure within the project life of the levee and potential failure becomes more important for projects offering less than 100 year protection. Because of the problems of evacuation, levee failure would cause catastrophic loss of life and property. A warning system and evacuation plan assumes even greater importance for both events: 1) greater than a 44 year flood event, and 2) for events less than the 44 year event in order to preclude losses due to levee failure.

It should be noted that in the case of Liverpool, the provision of a levee puts the Federal government, through the Corps of Engineers, in the position of spending federal dollars to protect a community which has used federal dollars, in the form of subsidized flood insurance claims, to maintain the value of property at risk from floods. As of 1983, the Flood Insurance Program has paid out $1,195,428 for structure and contents claims. Claims from the 1985 flood have reached another $285,000 at this writing and more claims are in the adjustment process. That is a total of $1,480,428 and represents the claim dollars only; it does not include deductibles, depreciation, emergency response costs, or the more intangible costs. In essence, the levee project puts us in the position of spending federal dollars to protect federal dollars and does not provide 100 year flood protection.

In summary, ;our review of the Liverpool Study raises these issues:

1) NED policy will recognize as feasible a project conferring less than 100 year flood protection though it is inconsistent with FEMA levee policy regarding urban flood protection;

2) With regard to the comparison of the relocation and levee alternatives, reasoned adjustments in costs and benefits cause changes in the benefit-cost ratios and reverses the position of the alternatives;

3) The levee proposal would not totally eliminate risk and does not consider the problem of flood warning and evacuation; and

4) The levee proposal would expend federal dollars to protect federal dollars, again, without totally removing risk of further damage or loss of life.

While we take this opportunity to raise questions about the alternative flood protection methods available, we must also look toward expanding the range of possible solutions, to those beyond the single agency authority. Corps projects are limited to economically feasible projects; the Section 1362 acquisition program is limited to eligible properties and does not provide relocation benefits, State construction projects are similarly limited by formula. Perhaps the best long range solution lies in combined agency action.

We sincerely thank the Rock Island District and the North Central Division Corps of Engineers for the opportunity to review and discuss the Reconnaissance Report. It is hoped that we may further assist in clarifying the issues of structural and non-structural flood control for Liverpool, Illinois. We recognize the relocation project would be difficult to implement and would require the best combined efforts of the community and State and Federal agencies. The problem of institutional constraints is at the heart of this issue.

Sincerely,

Ronald Buddecke, Chief
Disaster Assistance Programs

cc: Bruce Johnson, FEMA Coordinator
North Central Division

Jack Carr, Study Manager
Rock Island District

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

November 7, 1985

Planning Division

Mr. Charles N. Wilhelm
Rural Route 4
Lewistown, Illinois 61542

Dear Mr. Wilhelm:

This is in regard to your request for information concerning the levee alignment currently being proposed for the village of Liverpool. The study is presently in the detailed project study phase. Enclosed is a plate from the February 1985 Reconnaissance Report displaying the proposed alignment. A copy of the report was given to the village president and several of the village trustees. Also enclosed is a copy of a larger scale layout map which should enable you to examine the alignment more closely.

We received a letter from you dated September 27, 1984, in which you expressed concern over the alignment and the site for the relocated boat ramp because of the potential impact on property of which you are part owner. Following that inquiry, we spoke with you at the public meeting held in November 1984. Since that time, we have made adjustments in the alignment and the location of the boat ramp. The enclosed plate reflects those adjustments.

A recent development on the project will delay completion of the detailed study by 1 year. Archeological investigations along the currently proposed levee alignment revealed several potentially significant sites. A thorough excavation of the sites will be required to document their significance.

Should you require any further information, please call Ms. Teresa Kirkeeng-Kincaid at 309/788-6361, Ext. 392, or write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

Signed By
J. T. SCHNERRE

Dudley M. Hanson, P.E.
Acting Chief, Planning Division

Enclosures

Illinois Historic Preservation Agency

Old State Capitol • Springfield • 62701

217/785-4512

November 21, 1985

Dudley M. Hanson, P.E.
Acting Chief, Planning Division
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building - Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Hanson:

We have received the draft report entitled "A Geological Assessment and Cultural Resources Survey of the Proposed Flood Control Levee and Borrow Areas, Liverpool, Illinois" prepared by the Illinois State Museum for your office. A number of comments are included below that the contractors should address in their final draft.

1) The Village of Liverpool was included as part of the Rural Historic Structures Survey since it has a population of less than 500. As the report correctly noted the United Methodist Church was identified as a significant structure. In addition the rural survey identified six other structures that may be potentially important. We have included copies of the data cards on these structures for your information.

2) The background information given on prehistoric versus historic utilization of the area is of a very different nature. It would seem appropriate to include at least a short background piece on the prehistoric culture history of the area.

3) Also note there is no discussion of historic Indian occupation/utilization of the area.

4) Although Harn was consulted there is no indication that Conrad or Esarey were contacted. It would seem that contact with Conrad, given his long research interest and work in the area, would be essential.

5) Recommendations would be more useful if they:

   a) briefly recapped the evidence accumulated from each site;
   b) indicated the potential information that a Phase II investigation should seek; and
   c) suggest a methodology that can be utilized to gather the required information.

6) The recommendations should also clearly and distinctly address and identify those areas that the investigators feel are clear of significant resources and where work could proceed. This Phase I reconnaissance was carried to identify cultural resources within the project area, yet, in the instance of Borrow pit #2 and the terrace levee alignment the report appears to end by recommending additional Phase I work (although it is called Phase II). This needs to be clarified.

7) Our Phase II recommendation for investigation of significance are as follows:

   a) 11-F-2178A - Low density of material and absence of any in situ remains does not justify further work.

   b) 11-F-2174A - Appears to warrent further investigation to establish its integrity and significance.

   c) 11-F-2175A - The prehistoric component appears to require further investigation to determine its integrity and signficance. In our opinion the Phase I investigation recovered sufficient data on the historic component to indicate that it is not significant.

   d) 11-F-2181A - The level of modern disturbance suggests that no intact historic remains are present. This area appears to still require Phase I testing to determine if any intact historic remains are present and to investigate the western 2/3's of the parking lot that was in lawn (p. 64). Until Phase I investigation are complete, Phase II work is premature.

   e) 11-F-2176A - The three identified components at this site require Phase II testing to determine their extent, integrity, and significance.

   f) 11-F-2180A - It appears necessary to conduct Phase I investigation to determine if this site actually extends into the Borrow Pit #2 area.

   g) 11-F-2177A and 11-F-2179A - Since both sites be outside of the project area no further work is recommended.

8) The recommendations for Phase II work (p. 89) on the levee alignment, the Illinois Floodplain, and Borrow Pit #2 should be rewritten to recommend additional Phase I work.

In general, the report suffers somewhat from a lack of organization and clarity in presenting data and recommendations.

We hope these comments will assist you and the contractor in preparing the final draft of this document. If you have questions please contact Thomas E. Emerson, Chief Archaeologist at the above referenced telephone number.

Sincerely,

William G. Farrar

William G. Farrar
Deputy State Historic
Preservation Officer

WGF:TEE:bv

Enclosure

JOURNAL STAR, Peoria, Saturday, November 23, 1985 A1

Archaeology study delays planned levee

By JIM KERRIGAN
of the Journal Star

LIVERPOOL — As floodwater rises on this riverside town for the 11th time in 13 years, beleaguered residents have learned that their long-awaited levee will be delayed for a year while archaeologists sift for the remains of ancient Indians.

Over the years, various governmental flood-control measures have been proposed to protect the residents of this Fulton County hamlet, which has a population of about 200. But only recently has the list of choices been narrowed to a levee.

Officials of the U.S. Army Corps of Engineers, who are responsible for design and construction of the levee, had hoped the earthen berm would be completed by 1988.

Early this fall, however, an archaeological study of the levee construction site — required by federal law — uncovered remnants of a long-gone Indian civilization. As a result, plans for the levee have been put on hold until archaeologists can fully assess the find and arrange for its preservation.

"We're talking about a study delay here," said Teresa Kincaid, the corps official directing the Liverpool project. She estimated the archaeological work will push levee construction back about a year and could alter the levee's final form.

Planning for the levee will come to a halt at least until next spring, the earliest time at which scientists can return to study the site. Depending on the outcome of the study, additional delays could result if a larger archaeological dig becomes necessary.

The finds occurred in September and October when a research team from the Illinois State Museum in Springfield uncovered an Indian spear point and other artifacts on the site of the proposed dike.

"We think there is the potential we are dealing with significant archaeological finds," said Kenneth Barr, another corps official.

He said the spear point is thought to have been made about A.D. 200 by Middle Woodland Indians. Liverpool probably served as a village site as well as a burial area for Indians of that period, he said.

Additional evidence has been found indicating the area may have been used by man as early as 5,000 B.C., Barr said.

With the delay, levee completion is now loosely scheduled for late 1989, Kincaid said.

Meanwhile, Liverpool's population remains unprotected from the Illinois River, which is above flood stage here and only a few feet from causing real trouble.

Officials hope to build an approximately 5,000-foot-long levee around three sides of the town. As now envisioned, the levee would tie in with an existing agricultural levee immediately west of town.

The levee is expected to cost about $1.8 million.

3 Dec 1985

Indian relics spark questions

By JIM KERRIGAN
of the Journal Star

LIVERPOOL — Ancient Indian relics uncovered here — an archaeological find that has delayed construction of a levee to protect this flood-plagued town — may have arrived through modern earthmoving operations, a local official said.

Government archaeologists dispute that claim, however, insisting that a stone spear point and pottery shards found in this Illinois River community indicate the area was the site of a prehistoric Indian settlement.

How the ancient artifacts arrived is significant because their presence brought a halt to plans for a long-awaited levee. Weathering their 11th flood in 13 years, the town's approximately 300 residents had hoped the federally financed levee would be completed by 1988.

But the discovery of the Indian relics this fall delayed levee construction at least a year while archaeologists evaluate the site. Federal law requires archaeological surveys on all federal construction projects, the aim being to avoid the loss of valuable sites.

Liverpool Mayor Floyd Belless sees the situation from a different perspective, however. He said he wonders why living people must suffer through recurring floods while scientists sift for evidence of a people long since dead.

He also wonders if the Indian artifacts found here truly mark Liverpool as a "potentially significant" archaeological site, as scientists claim, or whether the town was simply the unwitting recent recipient of the relics.

"It's very possible it (the spear point) was hauled in, rather than being here for several thousand years," Belless said. "Property owners have told me this dirt was hauled in there. It was fill dirt."

The initial archaeological study of the levee site was conducted in September and October by scientists from the Illinois State Museum in Springfield. Belless said many of the sites checked contained fill dirt hauled in for construction purposes during modern times.

Government scientists, however, said there's very little doubt the spear point and other articles were deposited at the river bottom location by prehistoric Indians, not by modern earthmovers.

Kenneth Barr, an archaeologist with the U.S. Army Corps of Engineers, the agency responsible for levee construction, said scientists were aware their sampling sites contained recently deposited earth.

But rather than proving a handicap for the archaeologists, Barr said, the fill dirt helped to protect the relics beneath it.

"It (the site) was actually preserved by having this material put on top of it," Barr said. Scientists discovered the Indian remains by digging below the fill, he said.

The spear point, pottery shards and flakes of chert lay "undisturbed since placed there in prehistoric times," Barr said. "I assure you the sites . . . are indeed intact landscapes," their contents unaltered by modern man, he said.

Still, Belless remains unconvinced.

When engineers conducted their initial soil sampling in preparation for levee construction, he said, a test hole was drilled near the town's public boat ramp.

Engineers then wondered why the hole, bored virtually on the shore of the river, produced a soil sample containing 12 feet of clay. "They took it (the clay sample) back, and they studied it, and they were all concerned," Belless said.

Liverpool residents could have explained the clay was dumped at the site to build up the boat ramp, Belless said, but the engineers "hadn't bothered to ask anybody."

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF

January 3, 1986

Planning Division

Honorable Floyd Pelless
Mayor of Liverpool
Village Hall
Liverpool, Illinois 61543

Dear Mayor Pelless:

Enclosed is a copy of the final report on the archeological reconnaissance survey of the proposed Liverpool, Illinois, levee alignment. The report is supplied for your information as Mayor of Liverpool. The archeological site location information contained in this report is confidential and therefore not for public release. The Illinois State Museum did an excellent job presenting information on the early history of Liverpool that you and your constituency may find interesting. A meeting between members of the Corps of Engineers project study team and yourself can be arranged after you have had time to review the archeological report. If you have any questions while reading the report, please contact Mr. Ken Kerr at 309/788-6361, Ext. 342, or write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

I hope you enjoy reading the report. The study team looks forward to meeting with you to discuss the archeological report and the levee project.

Sincerely,

Signed By
J. T. [illegible]

Dudley M. Hanson, P.E.
Acting Chief, Planning Division

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

December 24, 1985

Planning Division

Honorable Robert H. Michel
Representative in Congress
100 Northeast Monroe, Room 107
Peoria, Illinois 61602

Dear Mr. Michel:

This is to inform you of the Liverpool, Illinois, Section 205 Study status.

The Illinois State Historic Preservation Office and our District archeologists have recently completed review of an archeological reconnaissance survey report which was prepared subsequent to field testing of the proposed levee alignment and borrow sites. The field test, conducted by the Illinois State Museum for the Rock Island District, indicates that no additional archeological investigations are required for approximately 80 percent of the proposed construction area. However, additional investigations will be necessary at approximately six locations which contain potentially significant archeological sites. The required procedure for this includes another more intensive field testing phase, and an evaluation of the results which determines significance.

Should any of the sites be determined significant (elivible for inclusion in the National Register of Historic Places), mitigation of the impact from construction or avoidance is required. This may take the form of documenting the sites through detailed site excavation and analysis. This process is dictated by the National Historic Preservation Act, as amended in 1980 (P.L. 89-665), Executive Order 11593, and the Archeological and Historic Preservation Act of 1974 (P.L. 93-291). This process will necessitate delaying the completion of the Detailed Project Report by about 9 months. The draft Detailed Project Report will be circulated for public review in the spring of 1987.

You also should be aware that, as part of our Detailed Project Study, we are reevaluating a relocation plan for Liverpool in cooperation with the Federal Emergency Management Agency and the State of Illinois. Additionally, we are examining the feasibility of raising the agricultural levee (which would include the protection of the Village of Liverpool) under the authority of the Illinois River, Henry to Naples study.

If your staff requires further information, they may call Ms. Teresa Kirkeeng-Kincaid of this office at 309/788-6361, Ext. 392, or write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

Signed By:
ARTHUR E. MILLER
LTC, Corps of Engineers
Deputy District Engineer

William C. Burns
Colonel, Corps of Engineers
District Engineer

Copy Furnished:

Honorable Robert H. Michel
House of Representatives
Washington, D.C. 20515

Federal Emergency Management Agency

Region V 300 South Wacker, 24th Floor, Chicago, IL 60606 (312) 353-1500

January 8, 1986

The Honorable Robert H. Michel
Member of Congress
100 NE. Monroe, Room 107
Peoria, Il 61602

Dear Mr. Michel,

Thank you for your inquiry concerning the Riverview Inn, owned by John and Elizabeth Callear, in Liverpool, Illinois. Ms. Callear wrote you requesting assistance to move away from the Illinois River. We realize the Riverview Inn is located in the floodway of the Illinois River and is one of the first buildings to be flooded when the River rises above floodstage.

We also realize there has been a long history of flooding in Liverpool; the entire town is within the 100 year floodplain. After the flood in March, 1979, our office and representatives of the State of Illinois Division of Water Resources met with local officials and residents to determine if relocation of residents was feasible through the Section 1362 acquisition program. Several meetings were held in Liverpool during the winter and spring of 1981. While we found 22 eligible candidates for acquisition, the Village would not agree to participate in tahe program due to the reduction of the property tax base and the cost of demolition and site maintenance. Without the Village's participation, the program requirements could not be met and the application was terminated.

Since then, the Village requested a U.S. Army Corps of Engineers restudy of potential flood control measures. In 1975, the Corps performed a Section 205 study and found negative benefit-cost ratios and, therefore, terminated further study activity. In 1983, the Corps found a higher cost of damage than was found in 1975. Based on this information, the Corps felt that there would be a chance to achieve a positive benefit-cost ratio and proceeded with a restudy of the 1975 report. The restudy concluded that a 44 year levee would achieve a positive benefit-cost ratio. A 100 year levee and relocation were determined to be economically unfeasible.

The Rock Island District of the Corps is proceeding with a Detailed Project Report to further refine the costs and benefits of the levee project. While some residents, now including John and Elizabeth Callear, have expressed a desire to relocate from Liverpool, the Village will not participate in a Section 1362 project as long as there is a possibility that a levee will be built or unless all the properties could be acquired. As mentioned above, without the Village's participation, we cannot assist the Callears.

Our office has expressed concerns about the levee project to the Corps of Engineers. Specifically, we feel that because of the location of the Village, approximately 2 miles away from high ground, a flood event of greater magnitude than a 44 year event would seriously jeopardize the lives and property of Liverpool's residents. It is for this reason that our office is working with the Corps to determine if there may be a way of combining program resources to implement a complete relocation project. Failing this, we would investigate FEMA and Corps program authorities and criteria to see what changes would be necessary to achieve a complete solution to the flood problems in Liverpool and similarly situated communities.

I regret that we cannot directly assist Mr. and Mrs. Callear with relocation. However we will continue to work with the Corps of Engineers, the State of Illinois and the Village to achieve a permanent solution to their flooding problems. If we can help you with additional information regarding the flooding problems in Liverpool, please contact our office at FTS 353-1500 or our Hazard Mitigation Officer, William Powers, at FTS 886-9447. Thank you for your interest in this matter.

Sincerely,

Robert E. Connor
Acting Regional Director

Federal Emergency Management Agency

Region V 300 South Wacker, 24th Floor, Chicago, IL 60606 (312) 353-1500

Brigadier General Jerome B. Hilmes, Commander
U.S. Army Corps of Engineers
North Central Division
536 S. Clark Street
Chicago, Il 60603

Dear General Hilmes:

On December 10, 1985, staff representatives from FEMA, Illinois Division of Water Resources and COE North Central Division and Rock Island District Offices met to discuss alternative solutions to the flood problems of Liverpool, Illinois. The meeting came as a result of FEMA's review of the draft Reconnaissance Report which presented the various flood control alternatives, including the 44 and 100 year levees and the relocation alternative. In the Reconnaissance Report, the COE indicated that the only alternative which presented a positive benefit-cost ratio was the levee built to a 44 year level of protection. FEMA questioned some of the benefits ascribed to that alternative as well as some of the costs ascribed to the relocation alternative. FEMA also questioned the wisdom of providing a levee in a situation where the town could be cut off from high ground, thus making evacuation impossible. As a result of the meeting it was decided to further investigate the relocation alternative using FEMA acquisition/demolition experience to develop revised cost figures. The following information and table provides relocation cost estimates for Liverpool, Illinois.

The basic categories of cost are 1) acquisition 2) relocation benefits and 3) demolition/removal of the structure. Under the relocation alternative in the COE Reconnaissance study the vacated land would be developed for recreational reuse. The estimated cost was $165,000. Under the proposal presented here, the land would be turned over to the County or the State of Illinois in its vacant state. There would be no federal dollars contributed to the project for recreational reuse. The demolition of buildings would include rough grading, pulling water pumps and filling in basements and septic tanks. No other land treatment is contemplated.

Acquisition

The cost estimates for the acquisition of residential and commercial property in Liverpool are based on a review of several factors. FEMA has acquired property in floodplain areas in Illinois over the past five years under the 1362 program. Project areas include Peoria County (Rome), Grafton, and Browning on the Illinois River and Thebes Illinois and the Mississippi River. In addition, FEMA is currently going into the acquisition phase of a 1362 project in Kampsville, Illinois also on the Illinois River. The appraised values, accepted offers, and assessed values were reviewed and compared with the type and range of structures in Liverpool.

In addition, property values in Liverpool were researched by reviewing assessed values, prior sales, and asking prices for properties currently listed for sale. However, we found so little data for comparable sales or recent sales in Liverpool that the strongest basis for indicating market value for all properties in town appeared to be assessed value. For this reason, we used assessed value, appraisals and offers from those properties in the acquisition projects to determine a reasonable relationship between market value and assessed value. We then applied this relationship to the assessed values in Liverpool to estimate current market values.

Completed acquisition projects involved 30 properties in Peoria County, Browning, Grafton and Thebes, Illinois. Twenty three of the properties were acquired. The properties in the Peoria County, Browning and Grafton projects generally reflected higher appraised values and offer prices than those in Thebes. They also reflected a higher margin between appraised and offer price and the estimate of market value based on assessed value. On the average, the offer/appraised value was approximately $10,800.00 (24.8%) higher than the market value based on assessed value. In Thebes, we found the appraised value and offers to be lower than the market value based on assessed value; on the average $4,200.00 lower. The difference is due in great part, to a later date for the appraisal in Thebes and, the fact that, in the period prior to the appraisal, the properties in Thebes had suffered two more flood crests within a period of less than a year. Another major factor is that the floodplain in Thebes, as in Liverpool, is more obvious than is the floodplain in the other three project areas. The difference in values and relationship to assessed values between Thebes and the other acquisition areas is due to more recent appraisals which, in turn, includes the impact of more flood events on property values. The results indicate a definite decline in property values, even to the point of dipping below market value based on assessed values. The appraisers for the 1362 acquisition projects suggest that current market values would be much decreased from the values established under the 1362 program and would be much closer to, if not lower than, the market values based on assessed values.

This trend appears to be borne out in Liverpool. We asked four real estate firms known to have listed properties in Liverpool, what they thought current property values would be. Respondents suggested that current values are at, or below, market value based on assessed value. Normally market value would be approximately three times assessed value. The respondents suggested the current market value would lie between 2 to 2.5 times the assessed value.

For purposes of estimating costs, we used a factor of 2.5 times the assessed value. We believe that absent actual appraisal reports, this factor will give us the best available estimate of current market value. Current total assessed value within the corporate limits of Liverpool is $372,600 including vacant property. Applying the factor would produce an estimated market value of $931,500.

Relocation

The second major category of cost to the relocation alternative is the provision of relocation benefits to property owners and renters living in or doing business in the structures to be removed. While the Section 1362 program does not provide relocation benefits, most acquisition programs using federal funds do. Because the project contemplates acquisition of the entire town, some owners would not, or could not, move or sell unless compensation were added to the purchase price of the property. Therefore relocation costs are estimated for all occupants of residential and commercial property.

It is estimated that there are 50 owner occupied units consisting of 35 owner occupied houses and 15 owner occupied mobile homes. Current tax records indicate 62 houses, 35 owner occupied, and 33 mobile homes, 15 owner occupied, and 58 vacant parcels in town. Based on a field survey we estimate approximately 13 renter occupied residences and 4 occupied businesses. Vacant residences, mobile homes and businesses will not be eligible for relocation benefits. The figures used here are estimates and must be verified in order to provide a more accurate relocation cost, however, it is believed that these estimates provide a maximum cost.

A HUD relocation specialist was contacted to provide information regarding eligible relocation benefits for residential owner and renter properties and commerical properties. The Region V relocation specialist indicated that for homeowner benefits it is wise to budget for the maximum benefit, $15,000, however, the grants are decided on a case by case basis and a cost estimate of $12,500 per owner occupied residence is reasonable. She also suggested that estimates for tenants at 4,000 per case, and 10,000 per business would be reasonable. More accurate costs could only be determined after a detailed relocation survey. The table below lists relocation costs by category.

Demolition/Removal Costs

FEMA's experience with demolition of damages structures and removal after the Marion, Illinois and the Barneveld, Wisconsin tornadoes suggest costs per structure range from $1200 to $2200. For purposes of estimating costs in future disasters, FEMA uses a unit cost of $.15 per cubic foot for residential structures and $.17 per cubic foot for commerical structures. The State of Illinois also uses unit costs for estimating building demolition. A single story house is estimated to costs $.15 per cubic foot, a multi-story house $.13 per cubic foot and a commercial structure is estimated at $.16 per cubic foot.

Using the residential figure of .15 per cubic foot on a 20' x 50' x 10' building the cost to demolish are average house would be $1500.00. A commercial building of approximately the same size would be about $1700.00 for purposes here we will use an average cost of $2,000 per structure for commercial buildings.

While mobile homes may be considered residential structures and costed as such, it would be more appropriate to have them removed either as salvage by the seller or have the county salvage them. The net cost per mobile home would be lower. It may be possible to require the owner, or a condition of sale, to be responsible for removing the unit from the site. In either case it is estimated that the per unit cost would be approximately $400.00 +/-.

The following table presents the estimates of cost for acquisition and removal of structures in Liverpool Illinois.

Table 1. Relocation Project Cost Estimates

Property Acquisitions Costs		
All property within corporate limits land & improvements assessed value: $372,600 X 2.5 includes 52 residential struc. 33 Mobile Homes 8 Commercial/other 58 Vacant Parcels		$ 931,500
Relocation Costs		
Owner occupied residential	35@ $12,500	$437,500
Renter occupied residential	13@ $ 4,000	52,000
Owner occupied mobile home	15@ $12,500	187,500*
Renter occupid mobile home	6@ $ 4,000	24,000*
Businesses	4@ $10,000	40,000
		$741,000
Demolition / Removal Costs		
Residential	62@ $ 1,500	$ 93,000
Commercial/other	8@ $ 2,000	16,000
Mobile homes	33@ 400	13,200*
		$122,200
Admin. Costs (15%)		$270,000
Total estimated project		$2,064,500

*These costs may be reduced or eliminated if mobile homes are salvaged and moved by seller. Alternate treatment of mobile homes could reduce project costs by $224,700. Reduced Project Cost ($1,739,800)

Possible Funding Sources

Several sources of funds could be applied towards the relocation project. These would include Corps Section 205, Section 1362 of the Flood Insurance Program, State of Illinois Division of Water Resources, and Community Development funds through the Illinois Community Development Assistance Programs. At our last meeting it was noted that the state would probably have to assist the community with 20-35% of the project cost. For comparison sake, a 35% share of the levee project cost (1.6 million) would be over $560,000. A 35% share of a 1.7 million relocation project would be approximately 11% more at $609,000.

In addition, Section 1362 funds could be applied to acquire eligible properties. It is estimated that 20-25 structures would be eligible for acquisition under the 1362 Program at a cost of $375,000 to $425,000. These figures are based on an assumption that 1362 funds would pay the full market value of the property. If the acquisition project were to be executed after a flood event, flood insurance claims would be applied to the purchase price of the 1362 eligible properties. This would reduce the amount of 1362 funds needed to purchase eligible property. Those properties not eligible for 1362 acquisition could be purchased under the Corps Section 205 program.

Costs for relocation benefits could be shared by the Section 205 Program and the Illinois Community Development Assistance Program. Demolition costs could be supported by the Division of Water Resources. Administration costs could be shared between the Corps 205 Program and the Section 1362 Program. The project sharing and cost per program source is projected as follows

Table 2. Relocation Project Cost Sharing

Component	Est. Cost.	Fund Source	Program Costs
Acquisition	$931,500	1362	$425,000
		IDWR	425,000
		205	81,500
			$931,500
Relocation	$741,000	IL CDAP	$370,500
		205	370,500
			$741,000
Demolition	$122,000	205	$122,000
Admin.	$270,000	205	$206,250
		1362	68,250
			$270,000
	$2,064,500		$2,064,500

Section 1362 Program	$ 488,750
Corps of Engineers 205	658,250
Illinois Community Development Program	370,500
Illinois Division of Water Resources	547,000
	$2,064,500

This is a preliminary cost sharing allocation and would have to be verified according to program requirements. As stated above these costs may be reduced in two ways. First if the project is executed in a past flood context structural flood insurance claims may reduce the amount needed from 1362 and other funds to meet fair market value. Second, if requirements are placed on the owner for removal of mobile homes, both relocation and demolition costs would be reduced. The estimates provided above should be considered on the high side.

We feel that the research to provide the above information, without conducting a house to house building and resident survey, has produced more realistic cost estimates for the relocation alternative. To be more accurate, current market value would require actual appraisal; more accurate relocation costs would require a relocation survey; more accurate demolition costs would require bids.

As a result of this effort, we could summarize our conclusions as follows:

1) available indicators show low and declining values for properties in floodplains, especially in areas subject to recent, repetitive flooding;
2) acquisition and relocation is a viable alternative;
3) cost sharing may produce the best possible range of service and expertise while lessening the cost to any one particular agency.

In order to move further with this alternative, we would like to discuss the above information with your staff and representatives of the State of Illinois. If there is agreement that there is merit in pursuing the relocation alternative further, we would suggest the next two steps. First, we would jointly present the relocation options to the community and conduct a combination structure and resident survey. This should give us specific structure data to be used as a basis for appraisals and relocation or demolition options. The resident survey would serve as the basis for estimating detailed relocation costs and options for the entire Liverpool population. Following this, we would seek interagency and intergovernmental project sponsors.

Again, we thank the Rock Island District and the North Central Division, Corps of Engineers for their patience and cooperation in reviewing the alternatives for flood damage reduction in Liverpool, Illinois. We look forward to discussing this material with you at your earliest convenience.

Sincerely yours,

Ronald Buddecke

Ronald Buddecke, Chief
Disaster Assistance Programs

cc: French Wetmore, IDWR

Jack Carr, Study Managfer
Rock Island District

Tim Monteen, FEMA Coordinator
North Central Division

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT. CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND. ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

March 7, 1986

Planning Division

Mrs. James Hughes
Liverpool, Illinois 61543

Dear Mrs. Hughes:

This is in response to a request from Liverpool village trustees that you be contacted regarding the flood control project for the village.

Three village trustees were in Rock Island on February 18, 1986, to meet with District personnel on various issues regarding the flood control study for Liverpool. We were informed that a significant number of residents have left the community during 1985 due to flooding which occurred during the year. Based on this information, the levee, as currently planned, may not be economically feasible. Therefore, we are considering modifications to the plan for Liverpool.

We have been informed that many of the residences are vacant on the eastern portion of the village. Therefore, the levee could be moved to the west of these vacant structures. This levee could tie into the existing agricultural levee between State and Exchange Streets, follow along Exchange Street south for one block, and then lay on a northwest-southeast alignment which would protect the restaurant and one of the three occupied residences which are east of Exchange Street. The plan would include moving the residents of the two other properties. We also are examining the option of raising the agricultural levee and including protection of the village.

Additionally, we have investigated the feasibility of protecting various parts of your property as a change to the tie-off proposed in the reconnaissance report. In all cases, the cost of these tie-offs is more than the benefits provided. Therefore, our future planning only will consider the tie-off as presented in the reconnaissance report or a new tie-off to the west.

As soon as sufficient information can be gathered regarding a joint agricultural and urban levee, we will be contacting village officials.

If you have any questions on this information, please call Ms. Teresa Kincaid at 309/788-6361, Ext. 392, or write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

Signed By
J. T. SCHNERRE
Dudley M. Hanson, P.E.
Acting Chief, Planning Division

Copy Furnished:

Honorable Floyd Belless
Mayor of Liverpool
Village Hall
Liverpool, Illinois 61543

BOARD MEMBERS:
Warren Wolf-President
Gary Shelby-Secretary
Jim R. Bull
Pete Miller
Tom Shockley
Joe Turk
Mike Turk

Prichard-Clark

CONSOLIDATED SCHOOL DISTRICT NO. 340
Rural Route No. 2 - Box 107
LEWISTOWN, ILLINOIS 61542
TELEPHONE 309-668-2309

SUPERINTENDEI
Bud Coz

RESOLUTION

REGARDING THE PURCHASE OF THE VILLAGE OF LIVERPOOL, STATE OF ILLINOIS

WHEREAS, this Board of Directors of Prichard Clark Consolidated Elementary School, No. 340, Fulton County, State of Illinois, R. R. 2, Box 107, Lewistown, Illinois, has received reports the Federal Emergency Management Agency is planning on purchasing(buy-out) the entire Village of Liverpool, Fulton County, State of Illinois; and,

WHEREAS, this Board of Director finds that the purchase (buy-out) of the Village of Liverpool, Fulton County, State of Illinois, would definitely decrease the pupil population attending our said school district to the point of possible closure of said school district; and,

WHEREAS, this Board of Directors finds that the purchase (buy-out) of the Village of Liverpool, Fulton County, State of Illinois, would definitely decrease and impair the funding of revenues received from the real estate property tax value, and other revenue funds received from the Village;

NOW THEREFORE, Be it Resolved by the Board of Directors of Prichard Clark Consolidated Elementary School District No. 340, Fulton County, State of Illinois, as follows:

SECTION 1: That this Board has considered the reports, and the effects to the said school district of the purchase (buy-out) by the Federal Emergency Management Agency of the Village of Liverpool, Fulton County, State of Illinois.

SECTION 2: That this Board expresses its concerns be known that it is not in favor of the Federal Emergency Management Agency purchasing (buy-out) of the Village of Liverpool, Fulton County, State of Illinois.

SECTION 3: That the President and Secretary of this Board of Directors are hereby authorized and directed to sign, serve or caused to be served, for and on behalf a copy of this RESOLUTION to the Liverpool Village Board President and/or Mayor expressing the Board of Director's concern.

SECTION 4: This Resolution shall be in force and effect forthwith upon its adoption.

ADOPTION this 16 th day of June, 1986 by the following roll call vote:

Ayes: Five

Nays: None

Absent: Two

Board President, No. 340

Board Secretary, No. 340

RESOLUTION

WHEREAS, the Village of Liverpool is within Community High School District #341, Fulton County, Illinois, and pupils attending the School live within the said Village and tax revenue is derived from real estate within said District, and the Board finds that it is in the best interest of Community High School District #341, Fulton County, Illinois, that an adequate and appropriate levee be constructed around said Village to protect the property and the residences from yearly flooding by the Illinois River,

THEREFORE IT IS RESOLVED BY THE BOARD OF EDUCATION OF COMMUNITY HIGH SCHOOL DISTRICT #341, Fulton County, Illinois, that said District express its support for the construction of such a levee around the Village of Liverpool as a better alternative to a buy-out of the Village property by federal or any other authorities. The Superintendent of this District is directed to forward a copy of this Resolution to any interested and concerned parties.

ADOPTED June 18, 1986.

Harry L. Myers
President, Board of Education

Betty J. Myers
Secretary, Board of Education

IN THE MATTER OF THE)
)
WEST LIVERPOOL DRAINAGE)
AND LEVY DISTRICT)

R E S O L U T I O N

BE IT RESOLVED by the Commissioners of The West Liverpool Drainage and Levy District that the district be on record as apposing the evaluation and "buy out" of the Village of Liverpool situated in the Town of Liverpool, Fulton County, Illinois as proposed by the Federal Emergency Management Agency (FEMA); and,

BE IT FURTHER RESOLVED that the district is on record as being in favor of the construction of the levy around said village and that in the judgment of the commissioners it would be in the best interest of the Federal Covernment, the County of Fulton, the Town of Liverpool, and the interested School Districts that such levy be constructed and that said Village remain upon the tax rolls of Fulton County, Illinois.

THIS RESOLUTION ADOPTED at a duly construed meeting of said Board.

DATED this 26th day of June, A.D., 1986.

WEST LIVERPOOL DRAINAGE AND LEVY DISTRICT

BY: Everett Bruff
It's Chairman

ATTEST:

Frank Hummel

Warren E. Wall
It's Commissioners

RESOLUTION NO. 1168

A RESOLUTION OF SUPPORT FOR THE VILLAGE OF LIVERPOOL'S EFFORTS TO OBTAIN FUNDING FOR THE CONSTRUCTION OF A LEVY AROUND THE VILLAGE.

WHEREAS, the City Council of the City of Canton, Fulton County, Illinois has been made aware of and is familar with the efforts of the Village of Liverpool, Fulton County, Illinois to obtain funding for the construction of a levy around the Village of Liverpool; and,

WHEREAS, the Canton City Council is also aware of the ravages of previous years floodings on the Village of Liverpool; and,

WHEREAS, the Canton City Council has determined that the Village of Liverpool is an integral part of this community and of this area.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF CANTON, Fulton County, Illinois, as follows:

1. That the Canton City Council hereby finds the foregoing recitals to be fact.

2. That the Canton City Council wholeheartedly supports the efforts of the Village of Liverpool, Fulton County, Illinois to obtain funding for the construction of a levy around the Village of Liverpool.

3. That the City Clerk is hereby instructed to certify a copy of this resolution to the Village Clerk of the Village of Liverpool for such subsequent and further use as the Village may have.

4. That this Resolution shall be in full force and effect immediately upon its passage by the City Council of the City of Canton, Fulton County, Illinois, and approval by the Mayor thereof.

PASSED by the City Council of the City of Canton, Fulton County, Illinois at a regular meeting this ~~1st~~ day of July, 1986, upon a roll call vote as follows:

AYES: Aldermen Chapman, May, Bohler, Wrokman, Zilly, Kovachevich.

NAYS: Aldermen Sarff, Steck.

ABSENT: None.

APPROVED:

Donald E Edwards

Donald E. Edwards, Mayor.

ATTEST:

Nancy Hilton

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF

July 15, 1986

Planning Division

Mr. William G. Farrar
State Historic Preservation Officer
405 East Washington
Springfield, Illinois 62706

Dear Mr. Farrar:

Enclosed, for your review and comment, is a draft Scope of Work for a two-stage archeological reconnaissance and testing for the proposed Liverpool, Illinois, levee alignment.

Your Chief Archeologist, Tom Emerson, reviewed an earlier draft of this Scope of Work and the Initial Reconnaissance survey. Since that time, the proposed alignment has been revised to avoid four of the five areas recommended for additional testing by your office in a letter dated November 21, 1985.

The enclosed Scope of Work provides for both the archeological reconnaissance of 1,000 feet of revised levee alignment and testing of any potentially significant cultural resources encountered in the alignment. The Scope of Work also provides for testing of previously recorded Site 11-F-2180A in proposed borrow area No. 2. Advertisement to procure a contractor for this work has been initiated and award is anticipated about September 1, 1986.

Please review this document at your earliest convenience so that your comments can be included in the request for proposals. If you have any questions, please call Mr. Kenneth Barr at 309/788-6361, Ext. 349, or write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,
Signed By
J. T. SCHNERRE

Dudley M. Hanson, P.E.
Chief, Planning Division

Enclosure

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING — P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF

July 31, 1986

Planning Division

Mr. Ronald Ruddecke
Chief
Disaster Assistance Programs
Federal Emergency Management Agency
Region V
300 South Wacker, 24th Floor
Chicago, Illinois 60606

Dear Mr. Ruddecke:

In response to your letter of April 1986, the Rock Island District has completed a reevaluation of the permanent evacuation alternative at Liverpool, Illinois. We appreciate your considerable effort in providing the cost data to us. We used the information to modify some of the costs we had used in the Reconnaissance Study.

Following receipt of the cost estimate you sent to the North Central Division, a Corps of Engineers real estate representative made a site visit, spoke to local residents, and obtained 7 local property sales for 1985-1986. The outcome of this investigation resulted in the following cost estimate for accomplishing permanent evacuation of the village of Liverpool (table 1). The economic cost of this plan would equal the financial cost of $2,699,500 minus relocation assistance of $650,000, which equals $2,049,500.

The cost estimate is compiled based on the Federal Government accomplishing the relocation within the Section 205 program. Therefore, the cost estimate also includes the cost of acquisition (title evidence, appraisals, negotiating and closing, salaries and travel expenses); the cost of supervision and administration (temporary field office, removal of structures, other clearing of right-of-way, and salary and travel expenses); and contingency costs. All of these costs must be assigned to the project, since this program will be cost-shared with a minimum 25 percent contribution by the local sponsor.

Because Liverpool does not have the resources necessary to accomplish the real estate purchasing requirements, the Federal Government would oversee this function.

The benefits which can be attributed to this permanent evacuation plan include: reduction in externalized flood damages, individual and family assistance grants and cleanup costs, flood insurance overhead savings, and employment benefits (table 2). (Deductible amount and uninsured losses are not counted for the evacuation plan.) Benefits from the floodplain's new use are also credited to this permanent evacuation alternative. The new use of land following evacuation is passive recreation compatible with the existing boat ramp. The land is appraised at $2,500/acre, which is the estimated remaining value of this land after it is acquired and the evacuation plan is implemented. This annual benefit amounts to ($2,500/acre x 55 acres x .09765) = $12,100. Average annual benefits for this plan amount to $133,100, as shown in table 3. As shown in table 4, the B/C ratio is .68 for this plan. The analysis of the relocation plan, as well as levee protection, will be included in a draft Definite Project Report (DPR) which will be available for public review in March or April of 1987. A public meeting is anticipated during the report review period.

We would be agreeable to a meeting with you and your staff, together with representatives of the State of Illinois and our North Central Division to discuss our analysis. If you should need additional information, please call Mr. Patrick Burke of my staff at 309/788-6361, Ext. 340.

Sincerely,

SIGNED BY

Dudley W. Hanson, P.E.
Chief, Planning Division

Enclosures

Copies Furnished:

Honorable Paul Simon
United States Senator
3 West Old Capitol Plaza
Suite 1
Springfield, Illinois 62701

Honorable Robert H. Michel
Representative in Congress
100 Northeast Monroe, Room 107
Peoria, Illinois 61602

Mr. French Hetmore
Illinois Department of Transportation
Division of Water Resources
310 South Michigan Avenue
Room 1606
Chicago, Illinois 60604

Mr. Paul Wiedernhofer, P.E.
Illinois Department of Transportation
Division of Water Resources
Room 328
2300 South Dirksen Parkway
Springfield, Illinois 62764

Honorable Floyd Bellew
Mayor of Liverpool
Box 267
Liverpool, Illinois 61543

Commander, North Central Division
ATTN: NCDPD-PP

Commander, North Central Division
ATTN: NCDPD-PP

TABLE 1

Permanent Evacuation
Cost Estimate ($)

Acquisition

Houses		
34 occupied at $8,000 per house	272,000	
36 vacant at $2,000 per house	72,000	
land value, 70 lots at $1,000 per lot	70,000	
Trailers (Mobile Homes)		
15 occupied at $5,000 per trailer	75,000	
7 vacant at $1,500 per trailer	10,500	
land value, 22 lots at $1,000 per lot	22,000	
Special Use Properties		
10 properties at $17,000 (average) per property	170,000	
land value, 10 lots at $2,000 per lot	20,000	
city streets, value of access to county boat ramp	175,000	
Acquisition Subtotal		824,500

"Construction Costs"

Demolition and Removal		
70 houses at $1,500 per house	105,000	
22 trailers at $500 per trailer	11,000	
10 special use properties at $2,000 per property	20,000	
Land Treatment Following Demolition		
earthwork, 55 acres at $1,000 per acre	55,000	
seeding, 55 acres at $2,000 per acre	110,000	
"Construction" Subtotal		301,000

Relocation Assistance

34 houses at $15,000 per house	510,000	
15 trailers at $6,000 per trailer	90,000	
10 special use properties at $5,000 per property	50,000	
		650,000

TABLE 1 (Cont'd)

Cost of Acquisition	
102 owners at $2,500 per owner	255,000
Contingencies on Acquisition	
20 percent of $886,000	177,000
Contingencies on "Construction" Costs	
20 percent of $301,000	60,000
Engineering and Design on "Construction"	
5 percent of ($301,000 + 60,000)	18,000
SUBTOTAL	2,347,500
Supervision and Administration	
(15 percent of subtotal)	352,000
TOTAL (includes relocation assistance)	2,699,500

TABLE 2

Redevelopment Benefits
Permanent Evacuation Plan

1. Estimated On-Site Labor Costs:

Construction Cost 1/	$361,000
Percent to Labor	50

2. Allocation of On-Site Labor by Category:

Labor Category	On-Site Labor Cost ($)	Percent Allocation 2/	Amount of Wages ($)
Skilled	180,500	40	72,200
Semi-Skilled	180,500	50	90,300
Other	180,500	10	18,000

3. Allocation of Wages to Locally Employed or Underemployed Labor:

Labor Category	Amount Wages ($)	Percent to Locally Hired Unemployed Labor	Wages to Previously Unemployed Local Labor ($)
Skilled	72,200	75	54,200
Semi-Skilled	90,300	90	81,300
Other	18,000	25	4,500
Total	180,500		140,000

1/ Includes total construction costs, less costs for engineering and design, supervision and administration, and lands and damages.

2/ Estimates based on previous experience with similar local protection projects.

$1.043125^3 \times \$70,000 = \$\ 79,500$
$1.043125 \times \$70,000 = \underline{\$\ 73,000}$

$\$152,500 \times .08765 = \$13,400$

TABLE 3

Summary of Average Annual Benefits ($)
8-5/8 Percent Interest Rate, June 1986 Price Levels

Category	Permanent Evacuation Plan 1/ Existing	Future	Total
Flood Damage Reduction			
Residential			
Contents	13,200	4,700	17,900
Structure	64,500	-	64,500
Commercial	11,500	-	11,500
Family Assistance Plus Cleanup Costs	10,100	-	10,100
Value of Floodplain's Land in Few Use	12,100		12,100
Employment	13,400	-	13,400
Flood Insurance Overhead Savings	3,600	-	3,600
Commercial Intensification			
Village	-	-	-
Agricultural District	-	-	-
Agricultural District	-	-	-
Flood Damage Reduction	-	-	-
TOTAL	128,400	4,700	133,100

1/ Deductable amount of Insurance Loss and uninsured property are not counted in benefit analysis for evacuation plan.

TABLE 4

Summary of Average Annual Benefits and Costs
8-5/8 Percent Interest Rate, June 1986 Price Levels

Alternative	Average Annual Benefits ($)	Average Annual Costs ($)	B/C Ratio	Net Benefits
Permanent Evacuation Plan	133,100	195,600	.68	-

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF:

August 8, 1986

Planning Division

Mr. Michael Witte
Director
Illinois Department of Conservation
524 South Second Street
Lincoln Tower Plaza
Springfield, Illinois 62701-1787

Dear Mr. Witte:

The U.S. Army Corps of Engineers, Rock Island District, is proposing a flood control project for the city of Liverpool, Illinois. The project would be constructed under the authority of Section 205 of the 1948 Flood Control Act, as amended. Liverpool is located in Fulton County along the Illinois River at river mile 128. Enclosure 1 shows the location of the project area.

The proposed project is a levee around three sides of Liverpool which would tie-in to an existing agricultural levee that is located along the north side of town. The levee would provide a 50-year protection level. It would be approximately 4,000 feet long and affect 9 acres. An additional 2.5 acres within the protected area would be used as a ponding area to provide for interior drainage. Enclosure 2 shows the locations of the proposed levee alignment and ponding area.

Approximately one-half of the levee alignment would be within the urban area of Liverpool and would affect areas with limited habitat value such as lawns and vacant lots.

The other half of the levee alignment would occupy a relatively undeveloped portion of land between the town and the Illinois River. This area is composed of floodplain forest dominated by silver maple (Acer saccharinum), and includes cottonwood (Populus deltoides), and willow (Salix sp.). A large section of the forest is fenced and the ground has been grazed to a low level by livestock.

Remnants of old river channel are interspersed with floodplain forest. These sites flood frequently and are colonized by monoculture stands of willow; cocklebur (Xanthium stumarium), and aster-like members of the Compositae family. No obligate hydrophytes were noted during site visits.

Approximately 120,000 cubic yards of impervious borrow will be required to construct the levee. The borrow would come from a 13-acre site at the downstream end of Liverpool. The site has previously been used for disposal of dredged material, but present land use is agricultural. Enclosure 3 shows the location of the site.

There are four federally listed endangered species recorded for Fulton County and the Illinois River. These are:

Indiana bat (Myotis sodalis)
Bald eagle (Haliaeetus leucocephalus)
Higgins' eye pearly mussel (Lampsilis higginsi)
Pink mucket pearly mussel (Lampsilis orbiculata)

The Indiana bat uses caves for winter hibernation and typically uses large trees with shaggy or peeling bark near a stream with a closed forest canopy as summer habitat. No caves or streams with an enclosed canopy will be affected, and no affect on the Indiana bat is anticipated.

The Bald eagle is listed as wintering in Fulton County. The eagles would use large trees along the Illinois River for roosting or feeding perches or large trees in sheltered valleys during periods of harsh weather. No potential shoreline perches would be affected by the project and no sheltered valleys with large trees or other critical or sensitive eagle habitat would be disturbed. Therefore, no impacts to the Bald eagle are expected.

The Higgins' eye pearly mussel and the Pink mucket pearly mussel are listed as endangered for the Illinois River. These mussels have been historically documented for the river. However, recent mussel surveys have not indicated the presence of either species. In addition,

construction will not involve any discharge into the river. Thus, no impact to either mussel species is anticipated.

If you should require additional information or have comments, please call Mr. Ron Klump of our Environmental Analysis Branch at (309)788-6361, Ext. 344, or write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Comments should be received by our office within 30 days of the date of this letter. If comments are not received within this time, it will be assumed no comments are forthcoming.

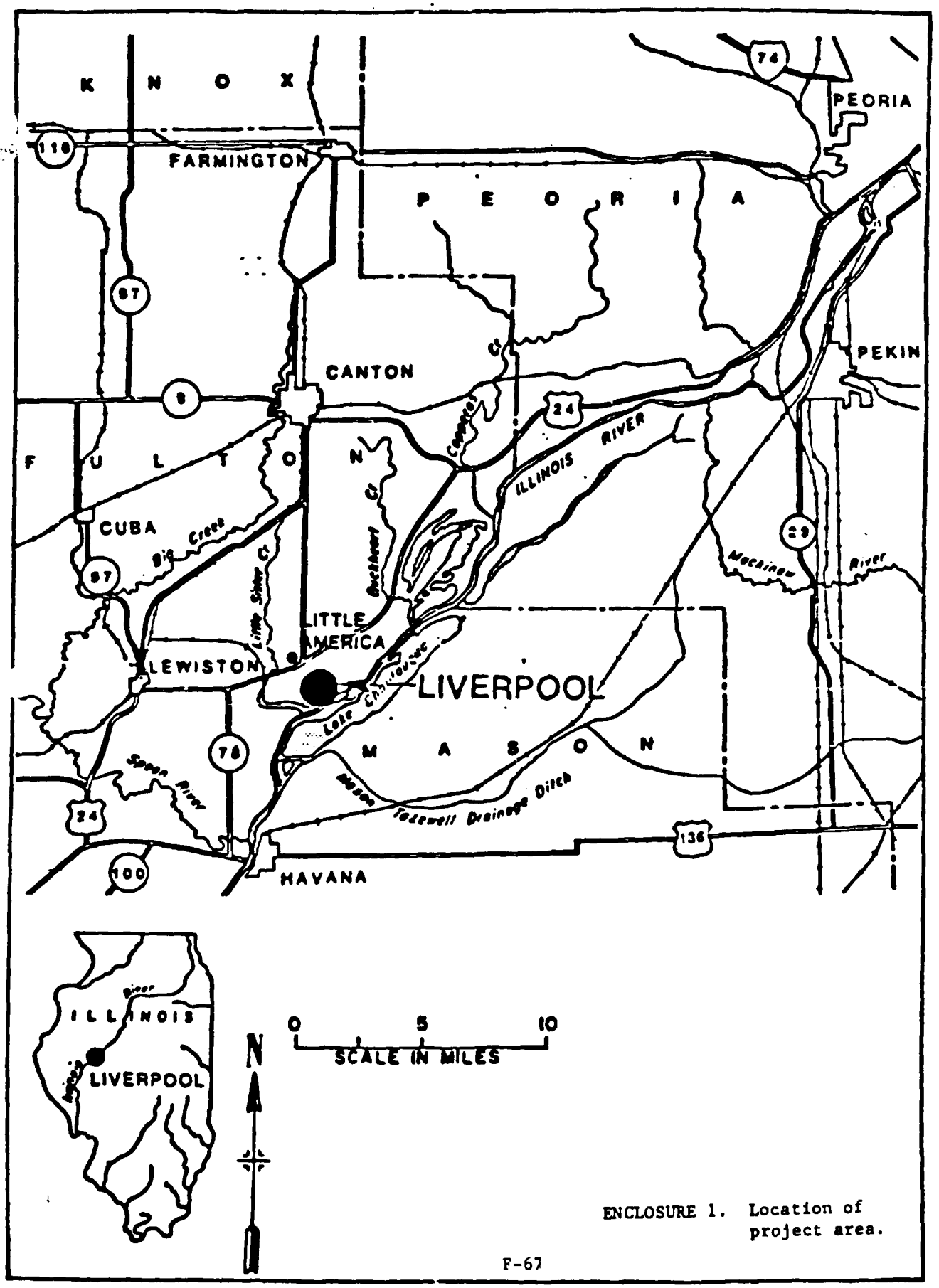
Sincerely,
ORIGINAL SIGNED BY

for Dudley M. Hanson, P.E.
Chief, Planning Division

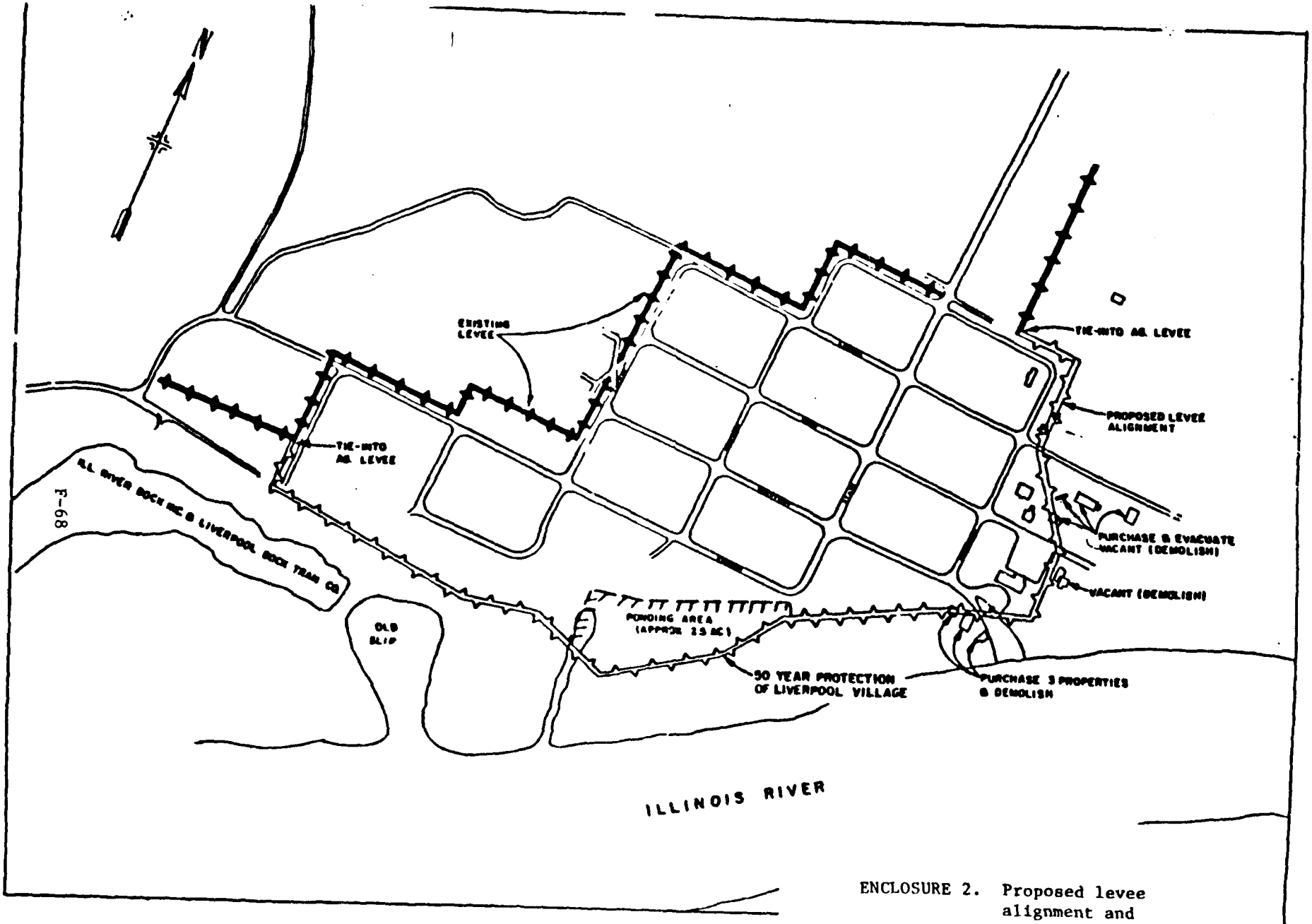
Enclosures

Copy Furnished:

Mr. Robert W. Schanzle
Division of Planning and Information
Illinois Department of Conservation
524 South Second Street
Lincoln Tower Plaza
Springfield, Illinois 62701-1787 w/enclosures



ENCLOSURE 1. Location of project area.



ENCLOSURE 2. Proposed levee alignment and ponding area.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF

10 SEP 1986

5ME-14

Dudley M. Hanson, P.E.
Chief, Planning Division
Department of the Army
Rock Island District, Corps of Engineeers
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Hanson:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) of 1969 and Section 309 of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA), Region V Office, has reviewed the Section 205 Flood Control Project in Liverpool, Fulton County, Illinois.

The proposed project consists of the construction of a levee around three sides of Liverpool, along the Illinois River, which would tie-in to an existing agricultural levee that is located along the north side of town. The construction of three sides of the levee would provide a 50-year protection level. The levee would extend approximately 4,000 feet. The report states that the levee will affect 9 acres and therefore, our Agency would like to know if this is due to the construction impact or if this is the size of the protected area. An additional 2.5 acres within the protected area would be used as a ponding zone for drainage purposes. No alternative actions were considered for the project.

Our Agency believes that protection by a boxed-levee system may result in increased flood damages due to the overtopping of floodwaters into the area. If for some reason flood levels are found to be higher than expected, then the project construction level would prove to be insufficient. The costs and environmental impacts of any of these events with their associated impacts of greater losses of lands, must be compared to the costs of other alternative actions. In addition, if further development is to be constructed in the vicinity within the levee system, then a question remains as to whether or not the wastewater treatment plant for Liverpool is capable of handling the induced changes.

A more effective long-term and cost-efficient measure would be provided with evacuation rather than an increased construction procedure. We request that an assessment of this alternative be developed for this project.

The Federal Emergency Management Assistance (FEMA) is proposing to move the town to higher ground, outside the floodplain. The existing site of the town would be demolished by burning structures in adherence to an Illinois Environmental Protection Agency Open Burning Permit. This achievement will be effective upon the demonstration that in-place structures can be used for local fire department training programs such as arson techniques, room fires, total burndown, etc. Adequate information on the size, amount, and type of materials burned along with the estimation of the number of people affected by the smoke must be known.

Thank you for the opportunity to review the proposal. Our Agency would like to cooperate with your office to assure that the alternative chosen is the best suitable proposal for the site. If you have any questions concerning our comments, please contact Ms. Amy Blumberg of my staff at 312/886-7342.

Sincerely yours,

William D Franz

William D. Franz, Chief
Environmental Review Branch
Planning and Management Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF

30 OCT 1986

5ME-14

Colonel Neil A. Smart
District Engineer
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

The U.S. Environmental Protection Agency (USEPA), Region V Office, has received the Notice of Intent to prepare a Draft Environmental Impact Statement (DEIS) for the proposed Liverpool, Fulton County, Illinois, Flood Control project. It will be our responsibility under the National Environmental Policy Act (NEPA) of 1969 and Section 309 of the Clean Air Act to review and comment on the proposed action.

The proposed project consists of four alternatives for the construction of a levee system: no action (continuation of present conditions), permanent relocation of residents to outside of the floodplain, construction of a levee to a 50-year flood protection level, and construction of a levee to a 100-year flood protection level.

Thank you for informing our Offices of the forthcoming report. Please refer to our comment letter of September 10, 1986 in response to the Section 205 project. Please send us copies of the DEIS as soon as it becomes available. If there are any scoping meetings or site visits planned, please keep us advised. If we can be of further assistance feel free to contact me at 312/886-7500 (commercial) or 886-7500 (FTS).

Sincerely yours,

William D. Franz

William D. Franz, Chief
Environmental Review Branch
Planning and Management Division

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF

November 12, 1986

Planning Division

Dear Resident:

We wish to express our thanks to you and the city officials of Liverpool, Illinois. With your help, we are now in the final stages of planning a flood control project for your city. The proposed project will protect as much of Liverpool as possible, at an affordable cost, and with minimal disruption to the natural and human environment.

On November 17 and 18, 1986, Jack Carr and Patti Risser from our Economic and Social Analysis Branch will be in Liverpool to assess the degree of support that this project has from local residents. They will ask you some questions about your flooding problems and request your opinions on:

a. The seriousness of floods on the Illinois River

b. Potential solutions to the flood problem

c. Social and economic impacts

Results of this questionnaire will help us formalize the opinions and values of Liverpool residents as we finalize the flood control plan. To assure confidentiality, your name will not be associated with your questionnaire, and your answers will be combined with all the others we receive.

We hope you will take about 10 minutes of your time on the 17th or 18th to give us your ideas on these issues. Your participation is entirely voluntary and it will be very helpful in reaching the best solution to local flooding problems.

Sincerely,

Dudley M. Hanson, P.E.
Chief, Planning Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ROCK ISLAND FIELD OFFICE (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

IN REPLY REFER TO:

COM: (309) 793-5800
FTS: 386-5800

November 24, 1986

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

This constitutes our Draft Fish and Wildlife Coordination Act Report on your flood protection study at Liverpool, Illinois. Your study is being conducted under the authority of Section 205 of the 1948 Flood Control Act.

This report was prepared by Gerald Bade, Fish and Wildlife Biologist, Rock Island Field Office, Illinois. It is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); the National Environmental Policy Act of 1969, as amended; the Endangered Species Act of 1973, as amended; and in accordance with the Fish and Wildlife Service's Mitigation Policy.

Previous Involvement By The Service

Representatives of the Fish and Wildlife Service have accompanied Corps personnel on at least two field trips to the study area. On December 7, 1985, the Service provided a Planning Aid Report to the Rock Island District describing the resources of the project area. That report also included a preliminary assessment of project impacts based upon the extent of planning at that time and an indication of our expectations with regard to mitigation of those impacts. That report is incorporated herein by reference.

Description of the Project Area

A description of the fish and wildlife resources of the project area was provided in our Planning Aid Report and need not be repeated. Since that report, however, a borrow site was selected for obtaining levee material. It is located just downstream of the town of Liverpool and consists of an agricultural field that has previously been used for dredged spoil disposal. It is approximately thirteen acres in size.

Endangered and Threatened Species

Comments with regard to species protected under the Endangered Species Act were provided in our Planning Aid Report and need not be repeated. No further coordination is necessary on this matter unless the project is modified or new information indicates endangered species may be affected.

Project Description and Impact Analysis

The current proposal consists of construction of a levee around the south and east sides of Liverpool. It will be approximately 4000 feet in length, 2000 feet of which will lie within undeveloped floodplain or bottomland habitat. It will tie into an existing agricultural levee on the north and west, and will occupy approximately 9 acres total or 4.5 acres of bottomland habitat. The top of the levee will be at elevation 455.0 N.G.V.D. and provide protection from the 50-year frequency flood. The bottom width of the levee will vary with terrain but we are assuming an average width of 75 feet through the bottomland habitat.

A ponding area 2.5 acres in size will be provided inside the levee to collect interior drainage during a storm event. This will be connected via a gated culvert to a drainage channel near the center of the site.

Approximately 120,000 cubic yards of material will be obtained from the borrow site. There has been no indication as to the use of the borrow site following removal of the borrow material.

Project impacts are limited to the alteration and disturbance of approximately 7.0 acres of low to moderate quality wildlife habitat. The levee will not likely offer any habitat value to wildlife. Depending on the frequency, duration and timing of storm events, the ponding area may provide some wildlife values to amphibians and birds on an irregular frequency. These values cannot be counted on, however.

Mitigation Recommendations

We would place the bottomland habitat in our Resource Category 5, habitat of medium value that is relatively abundant in the nation or ecoregion. Our mitigation goal for this category is "no net loss of habitat value". Losses that are unavoidable can be compensated in or out-of-kind.

The borrow site provides an opportunity to replace lost habitat values although not necessarily in-kind. We recommend the Corps design the borrow site so that it will revegetate as a wetland. If borrow material were excavated to the approximate water table, this goal could be easily accomplished. Furthermore, a connection with the river would be desirable so as to afford access to the wetland area by fish during high water periods. Dedicating this 13 acre site as fish and wildlife habitat would more than compensate for habitat losses. We would be happy to assist your staff in designing the borrow site to maximize habitat values.

We appreciate the opportunity of providing fish and wildlife input into your planning process and look forward to working with your staff in the future.

Sincerely,

Richard C. Nelson
Field Supervisor

cc: IDOC (Lutz)

Federal Emergency Management Agency

Region V 300 South Wacker, 24th Floor, **Chicago, IL 60606** (312) 353-1500

February 20, 1987

Brigadier General Joseph Pratt, Commander
North Central Division
U.S. Army Corps of Engineers
536 S. Clark St.
Chicago, Il 60605-1592

Dear Gen. Pratt:

We have reviewed The Corps' response regarding the comparison of the Liverpool, Il levee proposal with a permanent evacuation proposal. Mr. Hanson's letter of September 8, 1986 from the Rock Island District Corps Office addressed a number of issues we raised concerning this project. We have attached copies of both FEMA and Corps letters.

We do not agree with the Corps planning and evaluation criteria that allow basic and important inconsistencies in the comparison of structural projects such as the Liverpool levee with permanent evacuation. First, there are inconsistencies in the measurement of benefits and damages between the two types of projects; and second, any comparison must recognize the inherent difference between the calculated 50 year level of protection offered by a levee and the permanent 100% reduction of flood damages provided by a complete evacuation of the floodplain. The Corps' criteria for the measurement of worth of alternatives has not considered the context in which a evacuation project can occur, both in terms of potential external resources and in terms of predisaster and post-disaster situations. Finally, we cannot accept the procedures used and the cost estimates provided for the Corps evacuation alternative.

A meeting of COE, FEMA, and State staffs was held at the North Central Division offices, December 10, 1985. "The major point of the discussion was that we should try to combine program resources, i.e., purchase of property through Section 1362 and Flood Insurance and the remainder of the properties purchased under the Corps' authority. To accomplish this, a variation from program procedures must be granted by the Office of the Chief Engineer. NCD staff felt that we should first investigate the possibility of accomplishing a combined project without requesting a variance. However, such a request would not be ruled out. The second major point of the discussion concerned the project authorities governing COE and FEMA projects. It was suggested that policy constraints to fully resolving the Liverpool situation should be identified and modifications be proposed to remove these constraints." (taken from memo to file following the 12/10/85 meeting).

It was decided to pursue cost estimates and comparative procedures, using the Liverpool alternatives, as far possible to weigh the alternatives. Apparently, P & G guidelines and the Corps policies will not allow any more flexibility than what is outlined in the September 8, 1986 letter from the Rock Island District. While further review by the Rock Island staff resulted in some cost reductions in the evacuation alternative, We cannot agree with the analysis of the two projects. We feel that it is therefore necessary to request the Chief of Engineers to review the Principles and Guidelines and the Corps of Engineers planning policies in order to eliminate inconsistencies and fairly evaluate evacuation projects. It is clear that current Corps planning policy is heavily biased against floodplain evacuation projects.

Consideration of Alternatives

After a review of the Standards in the Principles and Guidelines, we feel that the Corps evaluation of alternatives, particularly the evacuation alternative did not follow these guidelines. Section VI, 1.6.1 states that an alternative plan may consist of both structural and/or nonstructural measures, and in combination if necessary, to solve the problem; the plans should not be limited to one agency but should take advantage of other resources and authorities as well (P&G p. 6). Note particularly Section 1.6.4, which states "When institutional barriers would prevent implementation of an economically attractive plan, alternative plans which include removal of those barriers should be presented where such plans are implementable." (P&G p.8).

We feel that these guidelines have not been followed in the preparation of the plans for Liverpool, Il. The evacuation plan should include the use of financial resources available to the area in addition to those provided by the COE. These would include Section 1362 flood-damaged property acquisition funds, Community Development Block Grant funds, Flood insurance claim payments, State of Illinois Department of Water Resources and Department of Conservation funds, to name a few.

In the case of post-disaster recovery under a Presidential disaster declaration, additional resources would also be available. These would include Small Business Administration disaster assistance loans, Individual and Family Grants and public assistance grants for debris clearance.

We know that a permanent evacuation program for Liverpool can be accomplished. After the 1985 flood, disaster recovery funds, Section 1362 and minimal Corps funding participation could have accomplished an evacuation project. Instead, attention was focused on the levee proposal. Acquisition and demolition projects in Region V and other FEMA regions have been accomplished under combined program authorities. With combined resources from Section 1362, Community Development and COE authorities, FEMA could coordinate and accomplish permanent evacuation as we have stated in our letters of August 30, 1986 and April 4, 1986.

In a post-flood situation where permanent evacuation is identified by the Interagency Flood Hazard Mitigation Team as a viable and practicable solution, the Corps should provide supplemental funding to accomplish the evacuation. The amount of Corps participation would be based on a formula to be developed based on apportionment of the project costs among the participating agencies. Execution of the evacuation project would be performed by FEMA as lead agency in order to reduce administrative costs of the Corps of Engineers. On the same basis, if a structural project was clearly superior to evacuation the Corps would be the lead agency in carrying out the project.

Measurement of Benefits and Costs

One of the major problems in comparing structural and evacuation projects is that of comparing benefits. The primary benefit to any plan is that of reducing flood damage. However, there is an inequity in how flood damage is considered in comparing structural and evacuation alternatives. According to the P&G, reduction of primary flood damage is claimable for evacuation projects. Reduction of flood damages borne by floodplain activities should not be claimed as a benefit of evacuation or relocation because they are already accounted for in the fair market value of floodplain properties." (P&G p. 38).

In a structural project, both the internal and external costs of flood damage are considered a benefit to the extent these costs are reduced. In an evacuation project, these guidelines allow only the external costs, i.e. insurance subsidies, insurance program overhead, etc., while those costs borne by the property owner, not covered by insurance are not considered as a benefit if reduced by the project. The P & G assume that reduction of these costs is already accounted for in the fair market value of the floodplain property. We disagree, the fair market value of the floodplain property is a cost to the evacuation project and is reflected on the cost side of the benefit-cost ratio. By eliminating the full benefits of flood damage reduction and accounting for flood damage reduction as a cost item, the BCR is, and will always be, skewed in favor of structural projects. Evacuation projects will cause a net increase in value for the activity being relocated. Evacuation of residents also causes a benefit, albeit immeasurable, in terms of removing population from life safety risks.

The procedures outlined in the P & G need to be revised to clearly show the overall benefits of removing property and famillies at risk to locations without risk.

The basic issues still remain and are summarized in the following paragraphs.

1. Why does the evacuation proposal achieve less benefits than the 50 year levee proposal?

The District's response states that insurable flood damages are computed as total flood damages minus noninsurable losses, the deductible portion of each flood damage event, and the annual cost of the insurance premium paid by the policy holders. "Therefore, using the methodology directed by P & G, the magnitude of damages and benefits is greater for a levee than an evacuation alternative." As stated, this response is consistent with the P & G but, as we state above, an improper method of accounting for flood damages. If only the external flood damage costs are to be used as benefits for evacuation projects then only the external flood damage costs should be used as benefits for structural projects. Conversely, if reduction of total flood damage costs, including the property owner's out of pocket expenses, can be used as a benefit for structural projects, they should be applied to evaluate evacuation projects as well.

2. Why must we purchase the city streets and boat ramp access as a part of the evacuation plan? Who gets the money?

The District's response is that this is standard COE policy for evacuation plans and results in clear title and the land value can be credited to the Village for cost-sharing purposes. We disagree. An evacuation plan for the Village of Liverpool would proceed on the basis of total evacuation. Clear title can be passed for little or no cost to the Township, County, State or Special District; the City will no longer exist as a legal entity if the evacuation plan can be implemented. Taxpayers of the Village and State have paid for these facilities once, why should they pay for them again! The Village's responsibility in the implementation of such a project would involve initiating the project and then dis-incorporation as a municipality. The Village will cease to exist as a legal entity. There would be no need for the Village to share project costs; it would be basically a matter of transferring title from individual property owners to the County, Township or State, through the COE, FEMA, or the State acquisition agency.

3. "Construction" - Why must we grade and seed the area after demolition if the area is to be returned to its natural state?

Again, the District's response is that this is standard COE policy and the procedures address safety and environmental concerns. We disagree. This is an unnecessary procedure and cost item. Demolition of structures as part of the evacuation plan would include rough grading and removal of debris, at a cost as indicated in our August 30, 1986 letter. It has been our experience with demolition and debris clearance work that re-seeding will occur naturally within one growing season.

4. The cost of acquisition should be reduced because of the elimination of the street acquisition and because the percentage cost is too high.

The District's response is that acquisition of streets cannot be eliminated and costs are based on COE real estate policy and practice. With regard to the acquisition of the streets, We respectfully disagree for the reasons stated above. We believe that this policy and practice should be reviewed and revised accordingly.

5. Contingency costs are too high and are improperly assessed.

Contingency costs are reported to be based on regulation, guidance and/or policy provided for COE activities. However, adjustments were made in the original cost estimates. Specific policies or guidance need to be developed for the type of evacuation projects represented by Liverpool, Il.

In the above-mentioned meetings and in your response of September 8, 1986, replies to our questions concerning the comparison of the costs and benefits of the projects lead to either the P&G or to the Corps policies. We feel that the factors that apply to Liverpool, Il necessitate an in depth review of the processes that proscribe evaluation of alternatives for flood damage reduction. We suggest that permanent evacuation is a solution to flooding problems which is being eliminated as an alternative because of inappropriate review procedures and guidelines. Permanent evacuation can be accomplished by combining resources, including Corps participation, to achieve this solution.

We have restated the questions posed in our letter of August 30, 1986 and propose that the issues raised there and above be reviewed at the Division and submitted to the Office of the Chief of Engineers for his reply. We request that this issue be placed on the joint COE/FEMA meeting scheduled for April 6 - 10, 1987.

Sincerely yours,

Robert E. Connor
Acting Regional Director

cc: Mr. Stasys Tamulionis, North Central Division
Mr. Dudley Hanson, Rock Island District

Attachments

Illinois Historic Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4512

March 17, 1987

Mr. Dudley M. Hanson, P.E.
Chief, Planning Division
District Engineer
U.S. Army Engineer District, Rock Island
Attention: Planning Division
Clock Tower Building - Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Hanson:

In reference to your letter of 18 February 1987 it is our opinion that the documentation provided for archaeological site 11-F-25, the Liverpool Village, is sufficient to make a determination of eligibility. The presence of intact subsurface features containing materials relating to the Woodland period will contribute important information to our understanding of cultural development of the Illinois River Valley as well to our knowledge of prehistoric utilization of the floodplain. It is our opinion that this site possesses sufficient archaeological significance for listing on the National Register of Historic Places.

We look forward to working with your office on mitigating the impact of the Liverpool Levee Project on this important site. The field meeting between the Corps of Engineers, Illinois Historic Preservation Agency, and Illinois State Museum Society personnel on 17 March 1987 was an important first step in this process.

Please include this letter with your documented finding to the Advisory Council on Historic Preservation (The Old Post Office Building, 1100 Pennsylvania Avenue, N.W., #809, Washington, D.C. 20004) as specified in 36 CFR 800.6. If they have no objections to this finding within 30 days of receipt, you will have satisfied your responsibilities pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended.

If you have any questions, please contact Thomas Emerson, Chief Archaeologist, Illinois Historic Preservation Agency at 217/785-4999.

Sincerely,

William G. Farrar
Deputy State Historic
Preservation Officer

WGF:TEE:bv

cc: ACHP

Springfield, IL 62706 • R. Bruce McMillan, Museum Director • Telephone 217-782-7386

springfield
illinois
state
museum

May 28, 1987

Mr. Ken Barr
Staff Archaeologist
U.S. Army Engineer District
Planning Division
Clock Tower Building
P.O. Box 2004
Rock Island, IL 61204-2004

Dear Ken,

I want follow up our field meeting with Tom Emerson and Jim Yingst with a brief summary of our findings in Liverpool. Our assessment of the proposed levee alignment at the north end of town has included surface collection, shovel testing, and backhoe and hand excavation. As you recollect, local informants suggested that a structure, perhaps at least a century old, once stood near the location where the proposed levee will abut the existing levee. We plowed and disked the area and collected artifacts from the surface. The distribution of artifacts was patterned; a distinct cluster was discovered near the suggested location of the former structure. The recovery of mid- to late-nineteenth century artifacts supported informants contentions about the age of the structure. A rectangular area was excavated with a backhoe to expose subplowzone deposits. Historical features were found along the edge of the proposed levee alignment. Several post holes and what appears to be a waste water drain were discovered. The age of the artifacts discovered in these features is consistent with those from the plowzone. Further exploration in the area yielded no other evidence of either prehistoric or historic occupation. It appears that remains of the structure in question are located north and west of the proposed alignment; according to current construction plans they will not be impacted.

North and east of the aforementioned section of the alignment are the remains of a barn. The structure was razed and burned within the last decade. The exterior dimensions of the foundation were recorded and limited excavations were undertaken to document its contents as per Tom's suggestion. In our opinion, no further work is necessary at this location.

Shovel test holes, hand excavated one by two meter units, and a series of backhoe excavated trenches were used to explore the remainder of the levee alignment. The only evidence of intact cultural deposits were found between Laurel Street and the entrance to the boat landing. Sediment in this area contained historic artifacts, a high frequency of chert flakes, and some prehistoric Late Woodland and Mississippian pottery. Test excavations exposed the remains of a late Mississpian period structure and several pit features. Further excavation indicates that the structure was occupied around A.D. 1200 and according to Alan Harn, of Dickson Mounds Museum, it is a unique example for this particular physiographic setting. These deposits also contain well-preserved botanical remains. Given that this find has attracted the attention of some local residents and it has considerable potential to enlighten us about an interesting aspect of local prehistory, we enlisted volunteer help to completely excavate the remains of the structure. This work will be completed early next week.

In our opinion additional archaeological investigations on the proposed alignment will involve only the short stretch of property between Laurel Street and the road to the boat landing. In this area there is evidence for substantial Woodland and Mississippian period remains that will require mitigation if the current construction plan is implemented.

If your have any questions, please do not hestitate to call me.

Sincerely,

Michael D. Wiant
Associate Curator of Anthropology

cec

Illinois Historic Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4512

July 22, 1987

Mr. Dudley M. Hanson, P.E.
Chief, Planning Division
District Engineer
U.S. Army Engineer District, Rock Island
Attention: Planning Division
Clock Tower Building - Post Office Box 2004
Rock Isiand, Illinois 61204-2004

Dear Mr. Hanson:

Our staff has reviewed the draft copy of Phase I and Phase II Archaeological Investigations, Liverpool Levee Project, Liverpool, Illinois prepared by the Illinois State Museum Society. This report thoroughly and clearly documents the archaeological investigations conducted in the proposed Liverpool, Illinois Flood Protection project area.

Based upon the information presented in this draft and in reference to your letter dated 10 July 1987 it is our opinion that the section of archaeological site, 11-F-2713 located between Laurel and Main Streets, Liverpool, Illinois possesses sufficient archaeological significance for listing on the National Register of Historic Places. The presence of intact subsurface features containing materials from the Late Woodland Maples Mills phase and the Mississippian Wolf sub-phase will provide important information to our understanding of late prehistoric interaction in the Central Illinois River Valley.

If you have any questions, please contact Thomas E. Emerson, Chief Archaeologist at the above referenced telephone number.

Sincerely,

Theodore W. Hild

Theodore W. Hild
Deputy State Historic
Preservation Officer

TWH:TEE:bv

cc: Dr. M. Wiant

F-83

CONVERSATION RECORD

TIME:

DATE: 16 August 1988

TYPE: ☐ VISIT ☐ CONFERENCE ☒ TELEPHONE ☐ INCOMING ☒ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Dick Lutz	Illinois Dept. of Conservation	(217) 782-3715

SUBJECT: Liverpool, Illinois, Section 205, Definite Project Report

ROUTING	
NAME/SYMBOL	INT
Dist File	
PD (Hanson)	
PD-P	
PD-E	

SUMMARY

I called Dick Lutz to see if the IDOC had any comments concerning the environmental impacts of the Liverpool Flood Control Project. Dick Lutz said that his agency had reviewed our letter dated August 8, 1986 and that they had no comments at this time.

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
Ron Klump	Ron Klump	16 August 1988

ACTION TAKEN

SIGNATURE	TITLE	DATE

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

August 16, 1988

Planning Division

Mr. Robert E. Connor
Acting Regional Director
Federal Emergency
Management Agency
Region V
300 South Wacker, 24th Floor
Chicago, Illinois 60606

Dear Mr. Connor:

This letter is in response to your February 20, 1987, letter concerning the Liverpool, Illinois, flood damage reduction study and is a followup to the North Central Division's interim response dated March 16, 1987. Copies of your letter and the interim response are enclosed.

The draft Definite Project Report was submitted to the North Central Division in March 1987 for review. Following initial review by the Division, an Issue Resolution Conference was held with District, Division, and U.S. Army Corps of Engineers Headquarters personnel to discuss plan formulation aspects of the study, including the permanent evacuation alternative. The report was subsequently transmitted to Headquarters for review of the economic analysis.

The report has been thoroughly coordinated through all review levels of the Corps and project information has been coordinated with the Fish and Wildlife Service, the Illinois State Historical Preservation Officer, and the Illinois Department of Transportation, Division of Water Resources.

The review concludes that the permanent evacuation alternative is not economically feasible based on criteria and methodology employed by the Corps of Engineers for these types of projects. Also, this alternative is generally not supported by the residents of Liverpool.

The other major issues raised by your letter concern the Principles and Guidelines. As you are aware, this is Federal policy for all water resources implementation studies and was approved by the President on February 3, 1983. It is unlikely that these policies will be changed significantly in the near future.

The draft Definite Project Report with accompanying draft Environmental Impact Statement will be distributed to public and government agencies for review in August 1986. We invite your comments on the report.

I hope this information responds to your concerns. If you care to discuss the matter further, please feel free to call me or Ms. Teresa Kirkeeng-Kincaid of our General Investigations and Special Studies Branch at 309/788-6361, Ext. 260 and 392, respectively.

Sincerely,

ORIGINAL SIGNED BY

for Farnham

Dudley M. Hanson, P.E.
Chief, Planning Division

Enclosures

Copy Furnished:

Commander, North Central Division
ATTN: CENCD-PD-FP

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

August 31, 1988

Planning Division

SEE DISTRIBUTION LIST

The Rock Island District, U.S. Army Corps of Engineers, has completed a Draft Definite Project Report under the authority of Section 205 of the 1948 Flood Control Act, as amended. This report represents the results of an investigation of flooding problems along the Illinois River within the village of Liverpool, Illinois. The study was performed at the request of the village.

The recommended plan is a levee providing protection to the village at the 50-year frequency level, having a 2-percent chance of occurrence in any year.

A copy of this report with Draft Environmental Impact Statement is enclosed for your review and comment. Any comments should be forwarded to the following address within 45 days of receipt of this letter:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

Dudley M. Hanson, P.E.
Chief, Planning Division

Enclosure

STATE OF ILLINOIS

OFFICE OF THE GOVERNOR

SPRINGFIELD 62706

JAMES R THOMPSON
GOVERNOR

September 9, 1988

Dudley M. Hanson
Dept. of the Army
Rock Island Dist., Corps of Engineers
Clock Tower Bldg., P.O. Box 2004
Rock Island, Illinois 61204-2004

SAI#: 88-09-09-35
REGIONAL# NONE
TITLE: Flooding problems along the IL River within the Village of Liverpool, IL
DEPT.: Dept. of the Army

The Illinois State Clearinghouse has received a "Notice of Intent" for the above project.

The review of your proposal has begun as required by law. You should receive additional correspondence on this project within 30 days. Please refer to the SAI number in future correspondence on this proposal. For further information call (217)782-1671.

Claudia Lemon
Illinois State Clearinghouse
Room 107 Stratton Building
Springfield, Illinois 62706

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

September 9, 1988

Planning Division (1105-2-10b)

Honorable Floyd Belless
Village President
Liverpool, Illinois 61543

Dear Mr. Belless:

The Rock Island District, Corps of Engineers, has distributed the Liverpool Section 205 draft Definite Project Report (DPR) to the public for review. You should have received several copies.

Upon completion of the 45-day review period, any changes necessitated by the comments will be incorporated into the report and it will be submitted to the North Central Division Engineer for review prior to an additional 30-day public review period.

The total cost of the flood protection project is currently estimated at $1,511,000. The Federal portion is $1,123,450 and the non-Federal portion is $387,550. The local sponsor is required to provide the lands, easements, and rights-of-way ($200,000), is financially responsible for road ramps and the relocation of any utilities ($112,000), and an up-front 5-percent cash contribution ($75,550).

After the Village Board has reviewed the report, you will be asked to provide a Letter of Assurance (LOA) and comments on the draft Local Cooperation Agreement (LCA). We have enclosed a sample LOA and a draft LCA.

We will contact you to arrange an October meeting with the Village Board to obtain the LOA and comments on the LCA. Also, it would be appropriate at this time for the village and State to reach an agreement on the level of support the State will be providing.

The tentative schedule for the project is as follows:

Public Review of Draft DPR/ Environmental Impact Statement (EIS)	Sep 88 - Oct 88
Meeting with Liverpool Officials	Oct 88
Submit Final DPR/EIS to North Central Division	Nov 88
Final Public Review of DPR/EIS	Dec 88 - Jan 89
North Central Division Engineers Approval 1/	Feb 89
Complete Plans and Specifications	Oct 89
Signing of Local Cooperation Agreement by Village	Dec 89
Complete Acquisition of Right-of-Way by Village	Jan 91
Award Construction Contract	Mar 91
Complete Construction	Jun 92

1/ The above schedule could change if the North Central Division requests approval of the report by Headquarters, U.S. Army Corps of Engineers

Should you have any questions, please call Mr. Jack Carr at 309/788-6361, Ext. 396, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

ORIGINAL SIGNED BY
CHARLES R. SMITH

Dudley M. Hanson, P.E.
Chief, Planning Division

Enclosures

UNITED STATES ARMY CORPS OF ENGINEERS

CONTINUING AUTHORITIES PROGRAM

SECTION 205
SINGLE PURPOSE
STRUCTURAL FLOOD CONTROL PROJECT

****

LOCAL COOPERATION AGREEMENT

BETWEEN

THE DEPARTMENT OF THE ARMY

AND

THE VILLAGE OF LIVERPOOL, ILLINOIS

[full name of Local Sponsor]

FOR CONSTRUCTION OF THE

LIVERPOOL, ILLINOIS
LOCAL FLOOD PROTECTION PROJECT

[full name of project]

THIS AGREEMENT, entered into this _____ day of _____, 19____, by and between the DEPARTMENT OF THE ARMY (hereinafter referred to as the "Government"), acting by and through the Rock Island District Commander, and the Village of Liverpool, Illinois

[Local Sponsor]
(hereinafter referred to as the "Local Sponsor"), acting by and through its President

[title of person signing this Agreement]

WITNESSETH, THAT:

WHEREAS, the authority for the construction of the Flood Control Project on the Illinois River

[name of project]

at Liverpool, Illinois

[specific location of project]

(hereinafter referred to as the "project") not specifically authorized by Congress is contained in Section 205 of the Flood Control Act of 1948, as amended, 33 U.S.C. 701s; and

WHEREAS, Section 205 of the Flood Control Act of 1948, as amended, 33 U.S.C. 701s, limits Federal expenditures for a project at any single locality to $5,000,000.00; and

WHEREAS, construction of the project is described in a report entitled Definite Project Report for Section 205, Flood Control, Illinois River, Liverpool, Illinois, prepared by the District Engineer, U.S. Army Engineer District, Rock Island, dated August 1988 and approved by the Chief of Engineers on _____; and
[date]

WHEREAS, Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, specifies the cost-sharing requirements applicable to the project; and

WHEREAS, the Local Sponsor has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in project cost-sharing and financing in accordance with the terms of this Agreement;

NOW, THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS

For purposes of this Agreement:

a. The term "project" shall mean constructing a levee to protect the Village which ties into the agricultural levee. The levee would be built to a 50-year level of protection, which

is the level of the existing agricultural levee. The plan would include a gravity outlet and a pump station for interior drainage, three road ramps, raising a parking area, and approximately 4,395 feet of levee ranging in height from 3.5 to 17.5 feet.

[Describe the project as specifically as necessary to avoid any confusion over what is, and what is not, included; if more space is needed, reference and securely attach a separate sheet and have all signatories initial it when they sign.]

b. The term "total project cost" shall mean all costs incurred by the Local Sponsor and the Government directly related to construction of the project. Such costs shall include, but not necessarily be limited to, actual construction costs, costs of alterations or relocations of railroad bridges, costs of preparation of contract plans and specifications, costs of applicable engineering and design, supervision and administration costs, costs of project construction contract dispute settlements or awards, and the value of lands, easements, rights-of-way, relocations, and dredged material disposal areas provided for the project by the Local Sponsor, but shall not include any costs for betterments, operation, maintenance, replacement nor rehabilitation, nor Government costs for preauthorization studies.

c. The term "period of construction" shall mean the time from the advertisement of the first construction contract to the time of acceptance of the project by the Contracting Officer.

d. The term "Contracting Officer" shall mean the Commander of the U.S. Army Engineer District, Rock Island, or his designee.

e. The term "highway" shall mean any highway, thoroughfare, roadway, street, or other public or private road or way.

f. The term "days" shall mean successive twenty-four-hour days, including non-working days such as Saturdays, Sundays and holidays, unless otherwise specifically indicated.

g. The term "fiscal year" shall mean one fiscal year of the United States Government, unless otherwise specifically indicated. The Government fiscal year begins on October 1 and ends on September 30.

ARTICLE II - OBLIGATIONS OF THE PARTIES

a. The Government, subject to and using funds provided by the Local Sponsor and appropriated by the Congress, shall expeditiously construct the project (including alterations or relocations of railroad bridges), applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The Local Sponsor shall be afforded the opportunity to review and comment on all contracts, including relevant plans and specifications, prior to the issuance of invitations for bids. The Local Sponsor also shall be afforded the opportunity to review and comment on all modifications and change orders prior to the issuance to the contractor of a Notice to Proceed. The Government will consider the views of the Local Sponsor, but award of the contracts and performance of the work thereunder shall be exclusively within the control of the Government.

b. When the Government determines that the project, or functional element thereof, is complete, the Government shall turn over the completed project or element to the Local Sponsor, which shall accept the project or element and be solely responsible for operating, maintaining, replacing, and rehabilitating the project or element in accordance with Article VIII hereof.

c. As further specified in Article VI hereof, the Local Sponsor shall provide, during the period of construction, a cash contribution of 5 percent of total project cost.

d. As further specified in Article III hereof, the Local Sponsor shall provide all lands, easements, rights-of-way, and dredged material disposal areas, and perform all relocations and alterations of buildings, utilities, highways, railroads, bridges (other than railroad bridges), sewers, and related and special facilities determined by the Government to be necessary for construction of the project.

e. If the value of the contributions provided under paragraphs c. and d. of this Article represents less than 25 percent of total project cost, the Local Sponsor shall provide during the period of construction an additional cash contribution in the amount necessary to make its total

contribution equal to 25 percent of total project cost.

f. The Local Sponsor shall pay all costs in excess of the Federal statutory cost limitation of $5,000,000.00. In no instance shall the Government's expenditures on the project, including preauthorization planning costs (reconnaissance studies, feasibility studies, etc.), exceed this limitation.

g. With respect to areas protected from floods by the project, the Local Sponsor shall participate in and comply with applicable Federal flood plain management and flood insurance programs.

h. No less than once each year, the Local Sponsor shall inform affected interests of the limitations of the protection afforded by the project.

i. The Local Sponsor shall publicize floodplain information in the area concerned and shall provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the floodplain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project.

ARTICLE III - LANDS, FACILITIES, AND RELOCATION ASSISTANCE

a. Prior to the advertisement of any construction contract, the Local Sponsor shall furnish to the Government all lands, easements, and rights-of-way, including suitable borrow and dredged material disposal areas, as may be determined by the Government to be necessary for construction of the project, and shall furnish to the Government evidence supporting the Local Sponsor's legal authority to grant rights-of-entry to such lands.

b. The Local Sponsor shall provide or pay to the Government the full cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged material disposal areas necessary for construction of the project.

c. Upon notification from the Government, the Local Sponsor shall accomplish or arrange for accomplishment at no cost to the Government all alterations and relocations of buildings, highways, railroads, bridges (other than railroad bridges), storm drains, utilities, cemeteries, and other facilities, structures, and improvements determined by the

Government to be necessary for construction of the project.

d. The Local Sponsor shall comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved January 2, 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent operation and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

ARTICLE IV - VALUE OF LANDS AND FACILITIES

a. The value of the lands, easements, and rights-of-way to be included in total project cost and credited toward the Local Sponsor's share of total project cost will be determined in accordance with the following procedures:

1. If the lands, easements, or rights-of-way are owned by the Local Sponsor as of the date this Agreement is signed, the credit shall be the fair market value of the interest at the time such interest is made available to the Government for construction of the project. The fair market value shall be determined by an appraisal, to be obtained by the Local Sponsor, which has been prepared by an independent and qualified appraiser who is acceptable to both the Local Sponsor and the Government. The appraisal shall be reviewed and approved by the Government.

2. If the lands, easements, or rights-of-way are to be acquired by the Local Sponsor after the date this Agreement is signed, the credit shall be the fair market value of the interest at the time such interest is made available to the Government for construction of the project. The fair market value shall be determined as specified in subparagraph 1., above. If the Local Sponsor pays an amount in excess of the appraised fair market value, it may be entitled to a credit for the excess if the Local Sponsor has secured prior written approval from the Government of its offer to purchase such interest.

3. If the Local Sponsor acquires more lands, easements, or rights-of-way than are necessary for project purposes, as determined by the Government, then only the value of such portions of those acquisitions as are necessary for project purposes shall be included in total project cost and credited to the Local Sponsor's share.

4. Credit for lands, easements, and rights-of-way

in the case of involuntary acquisitions which occur within a one-year period preceding the date this Agreement is signed or which occur after the date this Agreement is signed will be based on court awards, or on stipulated settlements that have received prior Government approval.

5. For lands, easements, or rights-of-way acquired by the Local Sponsor within a five-year period preceding the date this Agreement is signed, or any time after this Agreement is signed, credits provided under this paragraph will also include the actual incidental costs of acquiring the interest, e.g., closing and title costs, appraisal costs, survey costs, attorney's fees, plat maps, and mapping costs, as well as the actual amounts expended for any relocation assistance provided in accordance with the obligations under this Agreement.

b. The costs of relocations or modifications of utilities or facilities that will be included in total project cost and credited toward the Local Sponsor's share of total project cost shall be that portion of the actual costs incurred by the Local Sponsor as set forth below:

1. Highways and Highway Bridges: Only that portion of the cost as would be necessary to construct substitute bridges and highways to the design standard that the State of Illinois would use in constructing a new bridge or highway under similar conditions of geography and traffic loads.

2. Utilities and Facilities (including Railroads): Actual relocation costs, less depreciation, less salvage value, plus the cost of removal, less the cost of betterments. With respect to betterments, new materials shall not be used in any relocation or alteration if materials of value and usability equal to those in the existing facility are available or can be obtained as salvage from the existing facility or otherwise, unless the provision of new material is more economical. If, despite the availability of used material, new material is used, where the use of such new material represents an additional cost, such cost will not be included in total project cost.

ARTICLE V - CONSTRUCTION PHASING AND MANAGEMENT

a. To provide for consistent and effective communication between the Local Sponsor and the Government during the period of construction, the Local Sponsor and the Government shall appoint representatives to coordinate on

scheduling, plans, specifications, modifications, contract costs, and other matters relating to construction of the project.

b. The representatives appointed above shall meet as necessary during the period of construction and shall make such recommendations as they deem warranted to the Contracting Officer.

c. The Contracting Officer shall consider the recommendations of the representatives in all matters relating to the project, but the Contracting Officer, having ultimate responsibility for construction of the project, has complete discretion to accept, reject, or modify the recommendations.

ARTICLE VI - METHOD OF PAYMENT

a. The Local Sponsor shall provide, during the period of construction, the amounts required under Articles II.c., II.e., and II.f. of this Agreement. Total project cost is presently estimated to be $ 1,511,000. In order to meet its share, the Local Sponsor must provide a total cash contribution presently estimated to be $ 75,550.

b. The Local Sponsor shall provide its required cash contribution in proportion to the rate of Federal expenditures during the period of construction in accordance with the following provisions:

1. For purposes of budget planning, the Government shall notify the Local Sponsor by [specific date] _____ of each year of the estimated funds that will be required from the Local Sponsor to meet its share of project costs for the upcoming Government fiscal year.

2. No later than [30-60] 60 days prior to the award of the first construction contract, the Government shall notify the Local Sponsor of its share of project costs, including costs attributable to the project incurred prior to the initiation of construction, for the first fiscal year of construction. No later than [one half of the number selected in the first line] 30 days thereafter, the Local Sponsor shall [select one: provide the requisite amount to the Government in cash by delivering a check payable to "FAO, USAED, Rock Island " to the Contracting Officer. OR verify to the satisfaction of the Government that it has deposited the requisite amount in an escrow account acceptable to the Government, with interest accruing to the Local Sponsor, OR present to the Government an irrevocable letter of credit acceptable to the Government in an

amount sufficient to meet its obligation] _____
_____
_____
_____
_____.

3. For the second and subsequent fiscal years of project construction, the Government shall, no later than 60 days prior to the beginning of the fiscal year, notify the Local Sponsor of its share of project costs for that fiscal year. No later than 30 days prior to the beginning of the fiscal year, the Local Sponsor shall make the necessary funds available to the Government through the funding mechanism specified above. As construction of the project proceeds, the Government may adjust the amounts required to be provided under this paragraph to reflect actual project costs.

4. If at any time during the period of construction the Government determines that additional funds will be needed from the Local Sponsor, the Government shall so notify the Local Sponsor, and the Local Sponsor, no later than [30-60] 30 days from receipt of notice, shall make the necessary funds available through the funding mechanism specified above.

c. The Government will draw on the [funds OR account OR letter of credit] _____ provided by the Local Sponsor such sums as it deems necessary to cover contractual and in-house fiscal obligations attributable to the project as they are incurred, as well as project costs incurred by the Government prior to the initiation of construction.

d. Upon completion of the project and resolution of all relevant contract claims and appeals, the Government shall compute the total project cost and tender to the Local Sponsor a final accounting of its share of total project cost. In the event the total contribution by the Local Sponsor is less than its minimum required share of total project cost at the time of the final accounting, the Local Sponsor shall, no later than 90 days after receipt of written notice, make a cash payment to the Government of whatever sum is required to meet its minimum required share of total project cost.

e. In the event the Local Sponsor has made cash contributions in excess of 5 percent of total project cost which result in the Local Sponsor's having provided more than 25% of total project cost, the Government shall, no later than 90 days after the final accounting is complete, subject to the

availability of appropriations, and subject to the Federal statutory cost limitation set out in Article II.f., return said excess to the Local Sponsor; however, the Local Sponsor shall not be entitled to any refund of the 5 percent cash contribution required pursuant to Article II.c. hereof.

f. If the Local Sponsor's total contribution under this Agreement (including lands, easements, rights-of-way, relocations, and dredged material disposal areas provided by the Local Sponsor) exceeds 50 percent of total project cost, the Government shall, subject to the availability of appropriations for that purpose, and subject to the Federal statutory cost limitation set out in Article II.f., refund the excess to the Local Sponsor no later than 90 days after the final accounting is complete.

ARTICLE VII - DISPUTES

Before any party to this Agreement may bring suit in any court concerning an issue relating to this Agreement, such party must first seek in good faith to resolve the issue through negotiation or other forms of nonbinding alternative dispute resolution mutually acceptable to the parties.

ARTICLE VIII - OPERATION, MAINTENANCE, AND REHABILITATION

a. After the project is turned over by the Government, the Local Sponsor shall operate, repair, maintain, replace, and rehabilitate the project, or functional element thereof, upon completion in accordance with regulations or directions prescribed by the Government.

b. The Local Sponsor hereby gives the Government a right to enter, at reasonable times and in a reasonable manner, upon land which it owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, repairing, maintaining, replacing, or rehabilitating the project. If an inspection shows that the Local Sponsor for any reason is failing to fulfill its obligations under this Agreement without receiving prior written approval from the Government, the Government will send a written notice to the Local Sponsor. If the Local Sponsor persists in such failure for 30 days after receipt of the notice, then the Government shall have a right to enter, at reasonable times and in a reasonable manner, upon lands the Local Sponsor owns or controls for access to the project for the purpose of completing, operating, repairing, maintaining, replacing, or rehabilitating the project. No completion,

operation, repair, maintenance, replacement, or rehabilitation by the Government shall operate to relieve the Local Sponsor of responsibility to meet its obligations as set forth in this Agreement, or to preclude the Government from pursuing any other remedy at law or equity to assure faithful performance pursuant to this Agreement.

ARTICLE IX - RELEASE OF CLAIMS

The Local Sponsor shall hold and save the Government free from all damages arising from the construction, operation, and maintenance of the project, except for damages due to the fault or negligence of the Government or its contractors.

ARTICLE X - MAINTENANCE OF RECORDS

The Government and the Local Sponsor shall keep books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement to the extent and in such detail as will properly reflect total project cost. The Government and the Local Sponsor shall maintain such books, records, documents, and other evidence for a minimum of three years after completion of construction of the project and resolution of all claims arising therefrom, and shall make available at their offices at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the parties to this Agreement.

ARTICLE XI - FEDERAL AND STATE LAWS

In acting under its rights and obligations hereunder, the Local Sponsor agrees to comply with all applicable Federal and State laws and regulations, including section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

ARTICLE XII - RELATIONSHIP OF PARTIES

The parties to this Agreement act in an independent capacity in the performance of their respective functions under this Agreement, and neither party is to be considered the officer, agent, or employee of the other.

ARTICLE XIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, or resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE XIV - COVENANT AGAINST CONTINGENT FEES

The Local Sponsor warrants that no person or selling agency has been employed or retained to solicit or secure this Agreement upon agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Local Sponsor for the purpose of securing business. For breach or violation of this warranty, the Government shall have the right to annul this Agreement without liability, or, in its discretion, to add to the Agreement or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

ARTICLE XV - TERMINATION OR SUSPENSION

a. If at any time the Local Sponsor fails to make the payments required under this Agreement, the Secretary of the Army shall terminate or suspend work on the project until the Local Sponsor is no longer in arrears, unless the Secretary of the Army determines that continuation of work on the project is in the interest of the United States. Any delinquent payment shall be charged interest at a rate, to be determined by the Secretary of the Treasury, equal to 150 per centum of the average bond equivalent rate of the 13-week Treasury bills auctioned immediately prior to the date on which such payment became delinquent, or auctioned immediately prior to the beginning of each additional 3-month period if the period of delinquency exceeds 3 months.

b. If the Government fails to receive annual appropriations in amounts sufficient to meet project expenditures for the then-current or upcoming fiscal year, the Government shall so notify the Local Sponsor. After 60 days either party may elect without penalty to terminate this Agreement or to suspend performance thereunder, and the parties shall conclude their activities relating to the project and proceed to a final accounting in accordance with Article VI.

c. Notwithstanding any other provision of this Agreement, if the award of any contract for construction of the project would result in total project cost exceeding $ 1,600,000, [not less than the estimated cost of the project] the award of that contract and subsequent contracts shall be deferred until such time as both parties to this Agreement agree to resume construction of the project.

ARTICLE XVI - ABILITY TO PAY

[Only one of the two following paragraphs will apply. Strike through the paragraph which does not apply.]

~~The project qualifies for a revision to the non-Federal cost share pursuant to application of proposed guidelines, published as Flood Control Cost-Sharing Requirements Under the Ability To Pay Provision, 52 Fed. Reg. 35,872 (1987) (to be codified at 33 C.F.R. sections 241.1-.6), which implement Section 103(m) of the Water Resources Development Act of 1986. The non-Federal cost share as determined by the proposed Ability to Pay test is ____ percent, derived as set out in Exhibit ____ to this Agreement. Upon completion of the project, this percentage will be compared to the percentage derived by dividing expenses incurred by the Local Sponsor under Articles II.c., II.d. and II.e. of this Agreement by total project cost. The smaller of the two percentages shall be the non-Federal cost share. Qualification under the Ability to Pay test does not, however, relieve the Local Sponsor of its responsibility to pay all costs in excess of the Federal statutory cost limitation, as set out in Article II.f. of this Agreement.~~

The project does not qualify for a revision to the non-Federal cost share pursuant to application of proposed guidelines published as Flood Control Cost-Sharing Requirements Under the Ability To Pay Provision, 52 Fed. Reg. 35,872 (1987) (to be codified at 33 C.F.R. sections 241.1-.6), which implement Section 103(m) of the Water Resources Development Act of 1986.

ARTICLE XVII - NOTICES

a. All notices, requests, demands, and other communications required or permitted to be given under this Agreement shall be deemed to have been duly given if in writing and delivered personally, given by prepaid telegram, or mailed by first-class (postage-prepaid), registered, or certified mail, as follows:

If to the Local Sponsor:

Honorable Floyd Belless
President, Village of Liverpool
Village Hall
Liverpool, Illinois 61543

;

[full address]

If to the Government:

District Engineer
US Army Engineer District, Rock Island
Clock Tower Building, PO Box 2004
Rock Island, Illinois 61204-2004

;

[full address]

b. A party may change the address to which such communications are to be directed by giving written notice to the other in the manner provided in this Article.

c. Any notice, request, demand, or other communication made pursuant to this Article shall be deemed to have been received by the addressee at such time as it is personally delivered or seven days after it is mailed, as the case may be.

ARTICLE XVIII - CONFIDENTIALITY

To the extent permitted by the law governing each party, the parties agree to maintain the confidentiality of exchanged information when requested to do so by the providing party.

ARTICLE XIX - APPROVAL OF CONTRACT

This District Commander is authorized to execute, on behalf of the Department of the Army, this form contract provided no modifications are made to this form. If any such modifications are incorporated, this contract shall be subject to the written approval of the Assistant Secretary of the Army (Civil Works) and is not binding on the Government until so approved.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

THE DEPARTMENT OF THE ARMY

BY: _____
[signature]

NEIL A. SMART
[typed name]

Colonel, U.S. Army
_____
_____
_____
District Commander

DATE: _____

THE LOCAL SPONSOR

THE VILLAGE OF LIVERPOOL, ILLINOIS

BY: _____
[signature]

FLOYD BELLESS
[typed name]

President
_____
_____
_____
_____
_____
[title in full]

DATE: _____

EXHIBIT A

CERTIFICATE OF AUTHORITY

In accordance with Section 221 of Public Law 91-611, as amended, 42 U.S.C. 1962d-5b, I, Tom B. Ewing,
[typed or printed name]
do hereby certify that I am the Village Attorney
[title]
of the Village of Liverpool, Illinois,
[Local Sponsor]
and that the Village of Liverpool, Illinois
[Local Sponsor]
_____ is a legally constituted public body with full authority and capability to perform the terms of the Agreement between the Department of the Army and the Village of Liverpool, Illinois in connection with
[Local Sponsor]
a flood control project on the Illinois River at Liverpool, Illinois
_____, and to pay
[name of project]
damages, if necessary, in the the event of failure to perform, and that the person(s) who have executed the aforementioned Agreement on behalf of the Village of Liverpool, Illinois
[Local Sponsor]
have acted within their statutory authority.

IN WITNESS WHEREOF, I have made and executed this Certificate of Authority this _____ day of _____, 1988.

[Place seal and/or acknowledgment(s) below, if necessary for execution of this document—the Department of the Army does not require either.]

_____
[signature]

Tom B. Ewing
[typed name]

Village Attorney for
Liverpool, Illinois
190 North Adams Street
Lewistown, Illinois 61542
[title in full]

"SAMPLE" LETTER OF ASSURANCE

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District,
Rock Island
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

The Village of Liverpool, Illinois, has reviewed the draft of the proposed Local Cooperation Agreement covering a proposed flood control project on the Illinois River at Liverpool, Illinois. The Agreement includes the following obligations to be carried out by the Village:

a. Provide, without cost to the Government, during the period of construction, all lands, easements, rights-of-way, and dredged material disposal areas, and perform all relocations and alteration of buildings, utilities (except those which pass under or through the line of protection), highways, railroads, bridges (except railroad bridges and approaches), sewers, and related and special facilities determined by the Government to be necessary for construction of the project.

b. Make a cash payment of not less than 5 percent of total project costs during the period of construction, regardless of the value of the items in a. above. If the value of the items in a. above is less than 20 percent of total project costs, the Village shall, during the period of construction, make such additional cash payments as are necessary to bring its total contribution in cash and value of lands, easements, rights-of-way, and utility and facility alterations and relocations, to an amount equal to 25 percent of total project

costs.

c. Pay all project costs in excess of the Federal statutory limitation of $5,000,000.

d. Hold and save the Government free from all damages arising from the construction, operation, and maintenance of the project, except for damages due to the fault or negligence of the Government or its contractors.

e. Operate, maintain, replace, and rehabilitate the project or functional element thereof upon completion in accordance with regulations or directions prescribed by the Government.

f. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved January 2, 1971, as amended, in acquiring lands, easements, and rights-of-way for construction and subsequent operation and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

g. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, as well as Army Regulation 600-7, entitled "Non-Discrimination on the Basis of Handicap and Programs and Activities Assisted or Conducted by the Department of the Army."

h. Participate in and comply with applicable Federal flood plain management and flood insurance programs.

i. Prevent encroachment on any of the flood protection structures, including ponding areas, and if ponding areas are impaired, provide substitute storage capacity or equivalent pump capacity

promptly without cost to the United States.

j. Prescribe and enforce regulations to prevent obstruction or encroachment on channels which would reduce their flood-carrying capacity or hinder maintenance and operation.

k. Participate in and comply with applicable Federal floodplain management and flood insurance programs. Publicize floodplain information in the areas concerned and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the floodplain and in adopting such regulations as may be necessary to ensure compatibility between future development and protection levels, including ponding areas, provided by the project.

l. Implement a flood-warning system and a flood preparedness plan. The plan will be updated as necessary to remain current. Action will be taken as necessary to evacuate the community when needed.

m. Annually inform residents of the potential flood risks.

n. Prior to construction, and in accordance with the provisions of Section 221 of Public Law 91-611, the Village will enter into a contract with the Government whereby the Village will grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the Village owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, repairing, maintaining, replacing or rehabilitating the project. If an inspection shows that the Village for any reason is failing to fulfill its obligations under the Agreement without receiving prior written approval from the Government,

the Government will send a written notice to the Village. If the Village persists in such failure for 30 calendar days after receipt of the notice, then the Government shall have a right to enter, at reasonable times and in a reasonable manner, upon lands the Village owns or controls for access to the project for the purpose of completing, operating, repairing, maintaining, replacing, or rehabilitating the project. No completion, operation, repair, maintenance, replacement, or rehabilitation by the Government shall operate to relieve the Village of responsibility to meet its obligations as set forth in the Agreement, or to preclude the Government from pursuing any other remedy at law or equity to assure faithful performance pursuant to the Agreement.

The Village is willing and able to pay its share of the total project costs. Sufficient funds are on hand or can be raised quickly, and the cash payment can be deposited directly with the Government, or in an escrow account, upon demand by the Government.

This is to advise that if the Liverpool, Illinois, Local Flood Protection Project is approved substantially in its present form as reviewed by the Village and as submitted for approval by the Corps of Engineers' higher authority, the Village is willing, and legally and financially able, to sign the referenced Local Cooperation Agreement which includes the obligations set forth above.

VILLAGE OF LIVERPOOL, ILLINOIS

By _____
President

United States
Department of
Agriculture

Soil
Conservation
Service

Springer Federal Building
301 North Randolph Street
Champaign, Illinois 61820

September 21, 1988

District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building
P. O. Box 2004
Rock Island, IL 61204-2004

ATTN: Planning Division

Gentlemen:

We have reviewed the Draft Definite Project Report for Section 205 Flood Control Illinois River, Liverpool, Illinois with Draft Environmental Impact Statement.

We have the following comment:

A description of soil types which would be affected by the project should be included to allow for identification of prime farmland and to confirm compliance with the Farmland Protection Policy Act.

Thank you for the opportunity to review this document.

Sincerely,

JOHN J. ECKES
State Conservationist

cc
Rick Macho, AC, Edwardsville, IL

GP:17pm29

State of Illinois
DEPARTMENT OF AGRICULTURE
Division of Natural Resources
State Fairgrounds, P.O. Box 19281, Springfield, IL 62794-9281, 217/782-6297

Bureau of Farmland Protection

Bureau of Soil Conservation

September 23, 1988

Colonel Neil Smart, District Engineer
U. S. Army District, Rock Island
ATTN: Planning Division
Clock Tower Building, P. O. Box 2004
Rock Island, IL 61204-2004

RE: Draft Definite Project Report
for Section 205 Flood Control
Illinois River
Liverpool, Illinois
with Draft Environmental Impact Statement

Dear Colonel Smart:

The Illinois Department of Agriculture has studied the Draft Definite Project Report for Section 205 Flood Control for Liverpool, Illinois and agrees with the Corps' recommendation for project approval.

The selection of the 50-year plan levee is the only alternative acceptable with positive net benefits. The selected plan to protect the Village of Liverpool is an earthen levee which provides a 50-year level of protection plus 3 feet of freeboard. The proposed levee will tie into the existing agricultural levee. It is approximately 4400 feet in length, generally ranges in height from 3.5 to 17.5 feet, has side slopes of 3 feet horizontal to 1 foot vertical and has a top width of 10 feet. The levee would be seeded and a ramp constructed at Station 4+59 to allow access for operation and maintenance purposes. Riprap would be placed along the full length of the slope from Station 29+00 to 33+00 to prevent erosion.

The proposed levee would be constructed of suitable impervious material obtained from a 13-acre site which has previously been used for disposal of dredged material. Clay beneath the dredged disposal would be used as levee fill. This site will be shaped to allow for open water and the establishment of wetland vegetation.

The levee right-of-way, road ramps and parking lot raise require approximately 12.8 acres of permanent easement and 1.8 acres of temporary easement. A temporary easement also will be obtained on 13.0 acres of agricultural land for borrow.

The Department concurs with the selection of the downstream borrow site. Although the site has been in recent agricultural production, we feel its use meets the intent of the Illinois Farmland Preservation Act to utilize less productive soils. The site may be in yearly cropland production, but its ability to produce respectable yields are determinate upon the duration of spring and/or fall flooding.

We support the Corps' final recommendation in the Draft Environmental Impact Statement to construct an earthen levee around the Village of Liverpool.

Sincerely,

Teresa J. Savko

Teresa J. Savko
Bureau of Farmland Protection

TJS:11
cc: Fulton County SWCD

Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787
CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH 60601
MARK FRECH, DIRECTOR

September 28, 1988

Mr. Dudley M. Hanson, P.E.
Chief, Planning Division
Rock Island District, Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island Illinois 61204-2004

Dear Mr. Hanson:

The Department has completed its review of the August 1988 Draft Definite Project Report for Section 205 Flood Control, Illinois River, Liverpool, Illinois and the accompanying Draft Environmental Impact Statement which you transmitted to us on August 31, 1988.

The Department believes the selected plan (the 50-year levee) can be implemented with minimal impacts to the area's fish and wildlife resources. We do note, however, that access to the village public boat ramp will be temporarily disrupted. We hope this inconvenience to the boating public will be brief.

We support your plan to use the borrow site to replace habitat lost from project construction. We understand the borrow pit slopes will be shaped and the center of the 13-acre site will be deepened to allow for open water and the establishment of wetland vegetation around the water's perimeter.

Thank you for the opportunity to comment.

Sincerely,

Mark Frech

Mark Frech

Director

MF:RWL:se

cc: USFWS, Rock Island

Illinois Historic Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4512

FULTON COUNTY
Proposed levee construction
Illinois River
Liverpool

September 29, 1988

Mr. Dudley M. Hanson, P.E.
Chief, Planning Division
District Engineer
U.S. Army Engineer District, Rock Island
Attention: Planning Division
Clock Tower Building - Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Sir:

Thank you for the opportunity to comment on the Draft Definite Project Report for Section 205 Flood Control, Illinois River, Liverpool, Illinois with Draft Environmental Impact Statement. Our staff has previously reviewed the draft copy of Phase I and Phase II Archaeological Investigations, Liverpool Levee Project, Liverpool, Illinois prepared by the Illinois State Museum Society, responded that adequate survey and testing was conducted to assess the archaeological resources and that, in our opinion sites 11-F-25 and 11-F-2713 possess sufficient archaeological significance for listing on the National Register of Historic Places.

We concur with the recommendations as presented in this report that site 11-F-25, located adjacent to the proposed borrow area, be avoided and that plans to mitigate the adverse effects of project construction to site 11-F-2713 will be developed and coordinated with the Illinois State Preservation Office and the Advisory Council on Historic Preservation.

We look forward to working with your office on mitigating the impact of the Liverpool Levee Project on this important site. If you have any questions, please contact Paula G. Cross, Staff Archaeologist, Illinois Historic Preservation Agency at 217/785-4998.

Sincerely,

Theodore Hild

Theodore W. Hild
Deputy State Historic
Preservation Officer

~WH:PGC:bv

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333

October 6, 1988

Dudley M. Hanson, P.E.
Department of the Army
Corps of Engineers
Rock Island District
P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Hanson:

Thank you for sending the Draft Definite Project Report and Environmental Impact Statement (DEIS) for "Section 205 Flood Control on the Illinois River, Liverpool, Illinois." We are responding on behalf of the U.S. Public Health Service. We feel that the proposed levee to protect the village of Liverpool, Illinois will result in a safer, more healthful community by substantially reducing the likelihood of a flood. The selection of the 50-year level of protection appears to be a prudent choice balancing cost and protection against the flood hazard. The benefit-to-cost ratio of the selected plan at 1.80 to 1.0 provides a particularly good benefit from the investment of public funds. We appreciate the Summary of Environmental Effects provided on the second page of the DEIS. This summary allows a rapid, yet comprehensive scan of the potential adverse impacts of this project.

We have reviewed the portions of the document which relate to public health and safety and based upon the information provided in the EIS, we see no potential for adverse effects on human health.

Thank you for sending this document for our review. Please insure that we are included on your mailing list for further documents which are developed under the National Environmental Policy Act (NEPA).

Sincerely yours,

Dm d E Clapp

David E. Clapp, Ph.D., P.E., CIH
Environmental Health Scientist
Special Programs Group
Center for Environmental Health
and Injury Control

STATE OF ILLINOIS)
) S.S.
COUNTY OF FULTON)

FULTON COUNTY BOARD
FULTON COUNTY, ILLINOIS
OCTOBER 11th, 1988 SESSION

R E S O L U T I O N

WHEREAS, the Village of Liverpool is located on the riverside of an agricultural levee and frequently suffers severe flooding, and,

WHEREAS, the Village of Liverpool has requested assistance from the US Army Corps of Engineers, and,

WHEREAS, the Rock Island District, U.S. Army Corps of Engineers conducted a detailed project study and evaluated several flood control alternatives which included levees at various protection levels as well as permanent evacuation, and,

WHEREAS, the Corps has recommended a plan which consists of constructing a levee to a 50-year level of protection and which would tie into the existing agricultural levee, and,

WHEREAS, Fulton County feels that said levee would be in the best interest of Liverpool and of Fulton County.

THEREFORE, BE IT RESOLVED that the Fulton County Board fully supports the recommendations of the U.S. Army Corps of Engineers to construct said levee, and,

BE IT FURTHER RESOLVED that the Fulton County Clerk forward a copy of this resolution of support to: District Engineer, U.S. Army Engineer District, Rock Island, ATTN: Planning Division, Clock Tower Building, P.O. Box 2004, Rock Island, Illinois 61204-2004.

PASSED AND APPROVED this 11th day of October, A.D., 1988.

Melba C. Ripper
CHAIRMAN, FULTON COUNTY BOARD

ATTEST:
COUNTY CLERK AND EX-OFFICIO CLERK OF
THE FULTON COUNTY BOARD

RECOMMENDED FOR APPROVAL BY:
Alfred Pete Murphy
Charles D. Wright
Dean Burden
PLANNING & INDUSTRIAL DEVELOPMENT
COMMITTEE OF THE FULTON COUNTY BOARD

U.S. Department
of Transportation
**Federal Highway
Administration**

Region 5
Illinois, Indiana, Michigan,
Minnesota, Ohio, Wisconsin

18209 Dixie Highway
Homewood, Illinois 60430

October 13, 1988

District Engineer
U. S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building P. O. Box 2004
Rock Island, Illinois 61204-2004

Gentlemen:

The draft EIS for the Section 205 flood control, Illinois River, Liverpool, Illinois has been reviewed. The project will have no impact of any Federal-aid highways. We, therefore, have no comments to offer on the draft EIS.

Ennis V. Heathcock, Director
Office of Planning and
Program Development

By: Paul D. Quinn
Regional Environmental Specialist

cc: P-14
Sec. Rep.
HEV-11
IL D/O

STATE OF ILLINOIS

OFFICE OF THE GOVERNOR

SPRINGFIELD 62706

JAMES R. THOMPSON
GOVERNOR

SAI# 88-09-09-35

SUBJECT: Flooding problems along the IL River within the Village of Liverpool, IL

TO: Dudley M. Hanson
Dept. of the Army
Rock Island Dist., Corps of Engineers
Clock Tower Bldg., P.O. Box 2004
Rock Island, Illinois 61204-2004

The Illinois State Clearinghouse has reviewed the reference subject pursuant to the National Environmental Policy Act of 1969. State agencies which are authorized to develop and enforce environmental standards have been given the opportunity to comment on this subject. At this time no comments have been received.

Illinois State Clearinghouse

October 13, 1988

Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway/Springfield, Illinois/62764

October 14, 1988

District Engineer
U. S. Army District, Rock Island
Clock Tower Building, P. O. Box 2004
Rock Island, Illinois 61204-2004

Attention: Dudley M. Hanson, P.E.
Chief, Planning Division

Gentlemen:

Thank you for providing us with a copy of your August 1988 "Draft Definite Project Report for Section 205 Flood Control for the Illinois River at Liverpool, Illinois." An Illinois Department of Transportation, Division of Water Resources permit will be required for the recommended plan to construct a new 50-year levee at Liverpool.

Our requirements for levees are as follows:

A. Flood damages outside the project right of way shall not be increased by greater flood heights. Absent contrary evidence, this requirement will be considered met if, for the worst-case analysis*, the application shows that the water surface profile increase would not exceed 0.5 feet or would be contained within flood easements.

(It is anticipated that the proposed levee, in combination with other existing levees in the vicinity, would result in more than a 0.5' increase in flood stages over unobstructed conditions. If this is the case, flood easements will be required on all properties impacted by the proposed levee construction. The analysis should include a comparison of water surface profiles under existing and proposed conditions.)

B) The project shall not cause damage outside the project right of way due to increased scour, erosion, or sedimentation. This requirement will be considered met if, for the worst-case analysis*, the application shows that:

i) The average channel velocities of the channel and overbank would not be increased beyond the scour velocities of the predominant soil types of the channel and overbank; or

ii) For those cases where the average velocities naturally exceed scour velocities, neither the channel or overbank velocity increase would exceed ten percent (10%); or

iii) Scour, erosion and sedimentation would be prevented by the use of riprap or other design measures.

C) Adequate outlets for interior drainage shall be provided when drainage from upland property not owned or controlled by the applicant would be affected.

D) Disturbance of streamside vegetation shall be kept to a minimum during construction to prevent erosion and sedimentation. All disturbed areas shall be seeded or otherwise stabilized upon completion of construction.

*A worst-case analysis is the calculation of the maximum increases in flood heights, velocities and damages which could be caused by the project in combination with other existing flood plain encroachments in the vicinity. The discharge which would produce a stage which would be just contained by the proposed levee should be used in the analysis. All cross section data used and assumptions made in the analysis should be provided.

Please feel free to contact Mike Diedrichsen of my staff at 217/782-3862 if you have any questions or comments concerning our requirements.

Sincerely,

David R. Boyce

David R. Boyce, P.E.
Chief Flood Plain Management
Engineer

DRB:MLD:lmb

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
230 S. DEARBORN, SUITE 3422
CHICAGO, ILLINOIS 60604

ER-88/832

October 24, 1988

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building, P. O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

The Department of the Interior has reviewed the Draft Definite Project Report and Environmental Impact Statement for the Section 205 Flood Control Project on the Illinois River at Liverpool, Illinois. Consolidated Departmental comments are provided for your consideration during future planning phases.

Personnel of the Intermountain Field Operations Center, Bureau of Mines reviewed the project document for possible conflict with mineral resources and mineral-producing facilities. Although the report does not mention mineral resources, the nature of the project is such that no significant impact to mineral resources is anticipated. Therefore, we suggest that a statement to that effect should be incorporated in subsequent versions of the document. Such an inclusion would provide users of the document with the knowledge that mineral resources had been considered during project planning.

The Fish and Wildlife Service's Planning Aid Report of December 7, 1984, and Draft Fish and Wildlife Coordination Act Report of November 24, 1986, are incorporated in the document. The Service has no additional comments to offer at this time.

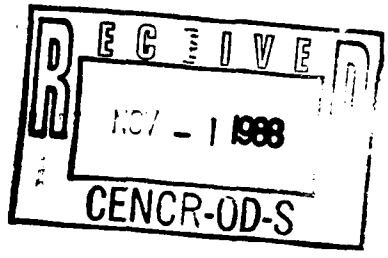
We appreciate the opportunity to review the project document, and look forward to continued involvement in the future.

Sincerely,

for Sheila Minor Huff
Regional Environmental Officer

Illinois Natural History Survey A Division of the Department of Energy and Natural Resources ENR
River Research Laboratory, Box 599, Havana, Illinois 62644, (309) 543-3950

October 26, 1988



Mr. Michael Diedrichsen
IL Dept. of Transportation
Division of Water Resources
2300 South Dirksen Parkway
Springfield, IL 62764

Dear Mr. Diedrichsen:

This letter raises two points regarding the proposed flood control levee around the village of Liverpool on the Illinois River between miles 127.5 and 128.2 (Public Notice No. CENCR-17141Z).

Slight modifications to this project would enhance fish and wildlife values and wetlands. First, although the 2.5-acre ponding site within the levee is small, it could become a productive wetland if properly designed and managed. Second and more important, the 13-acre borrow site outside the levee could be excavated in such a way that it would extend or deepen the adjacent backwater. An alternative design would be to open and shape the backwater so that it would receive some flow from the main channel and maintain itself by scouring. Either approach would require engineering analysis to determine the most feasible design.

Our studies on habitat utilization by fish in the Illinois River indicate that many species select side channel and backwater habitats when they have access to them. Former backwaters and side channels in the Liverpool reach of the Illinois River and in the Spoon River bottoms have been degraded by sedimentation, drainage, dredge spoil, or are isolated from the river by levees. Liverpool Ditch (also includes Liverpool Lake and Mud Lake in the Chautauqua National Wildlife Refuge, on the east side of the River) and the Senate Island side channel (west side) now are completely or partially filled with sediment and are unusable or inaccessible to fish during low river stages. The borrow pits for the Liverpool Levee have the potential to replace some of this lost habitat.

Thank you for the opportunity to comment on this project.

Sincerely yours,

Richard E. Sparks

Dr. Richard E. Sparks
Aquatic Biologist

RES:mw

cc: District Engineer, Rock Island
L. Osborne, INHS, Champaign
G. Miller, Chautauqua National Wildlife Refuge, Havana
S. Havera, INHS, Havana
L. Vogt, DENR
T. Heavisides, DENR

Damaged by Postal Service

Illinois Historic Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4512

FULTON COUNTY
CENCR-17141Z
Liverpool

October 28, 1988

Neil A. Smart, Colonel
District Engineer, US Corps of Engineers
Rock Island District
Clock Tower Building
Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Sir:

Thank you for requesting comments from our office concerning the possible effects of your project on cultural resources. Our comments are required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

Our staff has reviewed the specifications of the referenced project as submitted by your office. We cannot adequately review this proposed project until the following additional documentation has been submitted to our agency:

/ / Map showing geographical location of project area

/ / Project narrative, i.e., description of proposed undertaking

/ / Name of Federal Funding Agency/Licensing Authority/Program

/ / Current photos of all standing structures within the project area

/ / Project address(es)

/ / Project plan map(s) showing specifics of proposed undertaking

/XX/ Other: Please send an up-to-date version of the project map. Our records indicate that the levee placement has been altered.

In all future correspondence please refer to our log number IHPA #88101102.

If you have any further questions, please contact Ms. Joyce A. Williams, Staff Archaeologist, Illinois Historic Preservation Agency, Old State Capitol, Springfield, Illinois 62701, 217/785-4997.

JAW:bv

cc: Dudley Hanson, CoE-Planning Division

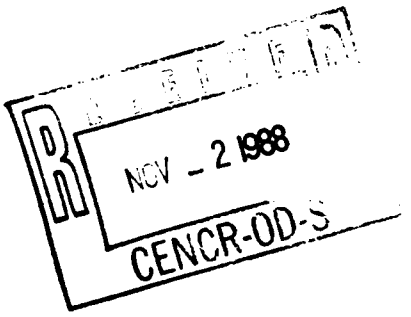
Based on our review of the information provided and incorporation of the above comments, our Agency does not have any objections to the proposed flood control project for Liverpool in Fulton County, Illinois. We have rated the project as a "LO". The rating of "LO" indicates our lack of objection to the project. This rating will be published in the Federal Register.

Thank you for the opportunity to comment on the DEIS for Liverpool, Illinois. If you have any questions or comments, please contact Al Fenedick of my staff at (312) 886-6872.

Sincerely yours,

William D. Franz, Chief
Environmental Review Branch
Planning and Management Division

October 31, 1988



District Engineer
U.S. Army Corp of Engineers
Rock Island District
Clock Tower Bldg.
P.O. Box 2004
Rock Island, IL 61204-2004

Dear Sirs:

I have read the notice regarding your plans to erect a levee around the outside of Liverpool, Illinois. As a land owner, resident and farmer of multiple acres in the West Liverpool Drainage District, I would like to express my happiness in your doing this. I feel it is very much needed. However, I have a concern about the 13 acres where you propose to acquire the soil to build this levee located southwest of the Village of Liverpool. The levee situated adjacent to this area is sitting on and constructed of a sandy deposit and was a weak area in the 1943 flood. This area experienced heavy seepage during the 1943 flood. Subsequent pumping, dredging and filling the area on the riverfront of this levee has solved the '43 problems. We fear the removal of this fill will greatly jeopardize the levee and cause additional tax dollars spent in pumping seep water. We strongly feel that the removal of this soil will create a serious problem with that levee.

We would like to discuss this with your engineers before you proceed with this project.

Sincerely,

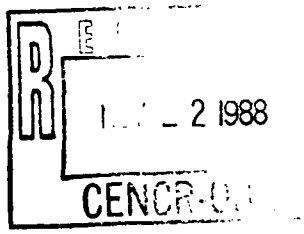
BULL FARMS
Richard Bull
Richard Bull, Sr.
Richard Bull Jr.
Richard Bull, Jr.

LAW OFFICES OF
KOST & KOST
200 NORTH MAIN
LEWISTOWN, ILLINOIS 61542
(309) 547-2203

ORAL C. KOST
KEITH K. KOST

ASTORIA OFFICE
61501
(309) 329-210

November 1, 1988



District Engineer
U.S. Army Corp of Engineers
Rock Island District
Clock Tower Bldg.
P. O. Box 2004
Rock Island, IL 61204-2004

Gentlemen:

We have been informed of notice regarding plans to erect a levee around the outside of the Village of Liverpool, Fulton County, IL.

As landowners, and as commissioners of the Liverpool Levee and Drainage District, Fulton County, Illinois, we reaffirm our support of this action. We feel that the construction of the levee will be a much needed improvement.

However, we do have reservations about the 13 acres where the corp proposes to acquire the soil to build the levee; the 13 acres is located southwest of the Village of Liverpool.

The levee situated adjacent to this 13 acre tract is situated on, and constructed of, a sandy deposit and was a vulnerable area in the 1943 flood. Also, the area experienced heavy seepage during the flood. Subsequent dredging, pumping, and filling the area on the riverfront of this portion of the levee has solved the 1943 problems. We submit that the removal of this fill at this time will greatly jeopardize the levee and cause additional tax dollars to be spent in pumping the seep water.

Also, we submit that the removal of this soil will create a serious problem with that portion of the levee.

We would like to discuss this with you before you proceed with the project.

Respectfully submitted,

LIVERPOOL LEVEE AND DRAINAGE DISTRICT

BY: _____ and

_____
Its Commissioners, and

_____
ITS Attorney

OCK:eh

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF:

13 NOV 1988

Dudley M. Hanson, P.E.
Chief, Planning Division
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Hanson:

In accordance with National Environmental Policy Act and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement(DEIS), for the Section 205 Flood Control for Liverpool on the Illinois River in Fulton County, Illinois.

The DEIS proposes the construction of a levee at the 50 year level of protection. The levee would tie in with the existing agricultural levee, which is located on the north side of the town. The length of the levee would be approximately 4,400 feet with a maximum height of 17.5 feet. The levee would be seeded, and riprapped to protect against erosion during flood conditions. A ramp would be provided to allow access for levee operation and maintenance. For interior drainage a gravity outlet with a 24 inch discharge pipe, 2 acre pond, and two 4000 gallons per minute pumps will be included in the flood control plan.

We offer the following comments on the DEIS. The DEIS did not outline or specify the measures that would be taken to control erosion. In terms of erosion, the proposed plan must contain provisions to prevent soils from entering the river, during the construction phase of the project. This is to reduce the negative impacts to the water quality of the Illinois River. Measures that will be incorporated into the project and required of the contractor should be provided.

The use of the borrow sites after excavation, was not addressed in the DEIS. We recommend that the these areas be converted into wetlands. The proposed project requires that approximately 10 acres of wetlands to be utilized for the levee. It is the policy of our Agency that the any loss of wetlands be mitigated by replacement in terms of a ratio of 1.5 to 1. The conversion of the borrowed site to wetlands would fulfill this requirement. The natural flood control of the wetlands would also enhance the proposed flood control plan. The Final Environmental Impact Statement should include a plan for using the borrow pits for mitigation of wetland impacts. We would be willing to review a draft plan for such a mitigation plan prior to the publication of the Final Environment Impact Statement.

Based on our review of the information provided and incorporation of the above comments, our Agency does not have any objections to the proposed flood control project for Liverpool in Fulton County, Illinois. We have rated the project as a "LO". The rating of "LO" indicates our lack of objection to the project. This rating will be published in the Federal Register.

Thank you for the opportunity to comment on the DEIS for Liverpool, Illinois. If you have any questions or comments, please contact Al Fenedick of my staff at (312) 886-6872.

Sincerely yours,

William D. Franz, Chief
Environmental Review Branch
Planning and Management Division

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

November 30, 1988

Planning Division

Mr. Oral C. Kost
Law Offices of
Kost & Kost
200 North Main
Lewiston, Illinois 61542

Dear Mr. Kost:

This letter is in response to the concerns raised in your November 1, 1988, letter regarding the proposed borrow site for the Liverpool, Illinois, Flood Control Project.

The site is located immediately downstream of the project site along the Illinois River and just riverward of the existing agricultural levee.

The following construction parameters will be followed to provide an acceptable borrow site excavation and to ensure continued structure integrity of the existing agricultural levee:

a. Borrow shall be restricted to no closer than 40 feet from the riverside toe of the levee to allow a berm to remain.

b. A minimum of 2 feet of cover (impervious top stratum blanket) shall remain in place in the bottom of the borrow pit, to restrict any increase in underseepage over existing conditions.

c. The borrow pit shall be shallow (no deeper than 6.5 feet).

d. Right of way allowance of 15 to 20 feet shall be made for flattening or caving of borrow slopes.

e. Side slopes parallel to the river shall be 1-foot verticle on 2- to 2.5-foot horizontal to accommodate any necessary mowing and to achieve stability of slopes. Both upstream and downstream side slopes shall be flat, 1-foot vertical on 6- to 10-foot horizontal to minimize scour from overtopping.

f. The bottom of the pit shall be sloped to drain away from the levee.

g. The borrow pit shall be uniform in width and grade.

h. Stands of trees shall remain if possible. Pits shall be shallow enough to encourage restoration of vegetative growth.

We feel that the parameters listed above will adequately address the question of underseepage and maintain the structural integrity of the agricultural levee.

Any design refinements that may be required regarding the borrow site will be addressed in the final plans and specifications

If you have further comments, please call Mr. Jack Carr of my staff, at 309/788-6361, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

ORIGINAL SIGNED BY
JONES

FOR Dudley M. Hanson, P.E.
Chief, Planning Division

Copy Furnished:

Mr. Floyd Belless
Mayor of Liverpool
Liverpool, Illinois 61543

Illinois Historic Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

217/785-4512

FULTON COUNTY
CENCR-17141Z
Flood control levee project
Liverpool

December 12, 1988

Neil A. Smart, Colonel
District Engineer, U.S. Corps of Engineers
Rock Island District
Clock Tower Building
Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Sir:

Thank you for requesting comments from our office concerning the possible effects of the project referenced above on cultural resources. Our comments are required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

Our office was requested by the Corps of Engineers - Rock Island District to comment on the above referenced project during the planning stage. We have previously reviewed the Phase I survey and Phase II testing reports prepared by Illinois State Musuem Society for the project area and have commented on the Draft Definite Project Report for Section 205 Flood Control, Illinois River, Liverpool, Illinois with Draft Environmental Impact Statement.

The following is a summary of our past consultation concerning this project:

1) Archaeological sites 11-F-25 and 11-F-2713 possess sufficient archaeological significance for listing on the National Register of Historic Places;

   a) Site 11-F-25, located adjacent to the proposed borrow area, will be avoided during project activities; and

   b) A plan to mitigate the adverse effects of project construction to site 11-F-2713 will be developed and coordinated with the Illinois State Preservation Office and the Advisory Council on Historic Preservation.

Illinois Historic
Preservation Agency

Old State Capitol • Springfield, Illinois 62701 • (217) 782-4836

A revised levee alignment was designed to avoid impact to the archaeological sites identified during the Phase I survey with the exception of 11-F-2713.

At this point in the consultation process, the Corps of Engineers - Rock Island District should initiate a Memorandum of Agreement concerning the mitigation of adverse effects to site 11-F-2713 to ensure compliance with the National Preservation Act of 1966, as amended.

If you have any further questions, please contact Ms. Paula G. Cross, Staff Archaeologist, Illinois Historic Preservation Agency, Old State Capitol, Springfield, Illinois 62701, 217/785-4997.

Sincerely,

Theodore W. Hild
Deputy State Historic
Preservation Officer

TWH:PGC:bv

cc: Dudley Hanson, CoE-Planning Division

VILLAGE OF LIVERPOOL

Liverpool, Illinois 61543

December 16, 1988

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District,
Rock Island
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

The Village of Liverpool, Illinois, has reviewed the draft of the proposed Local Cooperation Agreement covering a proposed flood control project on the Illinois River at Liverpool, Illinois. The Agreement includes the following obligations to be carried out by the Village:

a. Provide, without cost to the Government, during the period of construction, all lands, easements, rights-of-way, and dredged material disposal areas, and perform all relocations and alteration of buildings, utilities (except those which pass under or through the line of protection), highways, railroads, bridges (except railroad bridges and approaches), sewers, and related and special facilities determined by the Government to be necessary for construction of the project.

b. Make a cash payment of not less than 5 percent of total project costs during the period of construction, regardless of the value of the items in a. above. If the value of the items

in a. above is less than 20 percent of total project costs, the Village shall, during the period of construction, make such additional cash payments as are necessary to bring its total contribution in cash and value of lands, easements, rights-of-way, and utility and facility alterations and relocations, to an amount equal to 25 percent of total project costs.

c. Pay all project costs in excess of the Federal statutory limitation of $5,000,000.

d. Hold and save the Government free from all damages arising from the construction, operation, and maintenance of the project, except for damages due to the fault or negligence of the Government or its contractors.

e. Operate, maintain, replace, and rehabilitate the project or functional element thereof upon completion in accordance with regulations or directions prescribed by the Government.

f. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved January 2, 1971, as amended, in acquiring lands, easements, and rights-of-way for construction and subsequent operation and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

g. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense

Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, as well as Army Regulation 600-7, entitled Non-Discrimination on the Basis of Handicap and Programs and Activities Assisted or Conducted by the Department of the Army."

h. Participate in and comply with applicable Federal flood plain management and flood insurance programs.

i. Prevent encroachment on any of the flood protection structures, including ponding areas, and if ponding areas are impaired, provide substitute storage capacity or equivalent pump capacity promptly without cost to the United States.

j. Prescribe and enforce regulations to prevent obstruction or encroachment or channels which would reduce their flood-carrying capacity or hinder maintenance and operation.

k. Participate in and comply with applicable Federal floodplain management and flood insurance programs. Publicize floodplain information in the areas concerned and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the floodplain and in adopting such regulations as may be necessary to ensure compatibility between future development and protection levels, including ponding areas, provided by the project.

l. Implement a flood-warning system and a flood preparedness plan. The plan will be updated as necessary to

remain current. Action will be taken as necessary to evacuate the community when needed.

m. Annually inform residents of the potential flood risks.

n. Prior to construction, and in accordance with the provisions of Section 221 of Public Law 91-611, the Village will enter into a contract with the govenment whereby the Village will grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the Village owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, repairing, maintaining, replacing or rehabilitating the project. If an inspection shows that the Village for any reason is failing to fulfill its obligations under the Agreement without receiving prior written approval from the Government, the Government will send a written notice to the Village. If the Village persists in such failure for 30 calendar days after receipt of the notice, then the Government shall have a right to enter, at reasonable times and in a reasonable manner, upon lands the Village owns or controls for access to the project for the purpose of completing, operating, repairing, maintaining, replacing, or rehabilitating the project. No completion, operation, repair, maintenance, replacement, or rehabilitation by the Government shall operate to relieve the Village of responsibility to meet its obligations as set forth in the Agreement, or to preclude the Government from

pursuing any other remedy at law or equity to assure faithful performance pursuant to the Agreement.

The Village is willing and able to pay its share of the total project costs. Sufficient funds are on hand or can be raised quickly, and the cash payment can be deposited directly with the Government, or in an escrow account, upon demand by the Government.

This is to advise that if the Liverpool, Illinois, Local Flood Protection Project is approved substantially in its present form as reviewed by the Village and as submitted for approval by the Corps of Engineers' higher authority, the Village is willing, and legally and financially able, to sign the referenced Local Cooperation Agreement which includes the obligations set forth above.

VILLAGE OF LIVERPOOL, ILLINOIS

By Floyd E. Bellers
President

Sylvia K. Tate
Village Clerk

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

December 20, 1988

Planning Division

Mr. Dennis Kennedy
Illinois Department Of Transportation
Division Of Water Resources
2300 South Dirksen Parkway
Room 024
Springfield, Illinois 62706

Dear Mr. Kennedy:

Enclosed is an application for a flood plain permit concerning the proposed flood control project for the village of Liverpool, Illinois. The proposed plan is a 50-year levee to protect the village from flooding by the Illinois River.

The draft Definite Project Report (with Draft Environmental Impact Statement and Section 404(b)(1) Evaluation) for Liverpool was distributed to the public and State and Federal agencies for review in September 1988.

Should you have any questions, please call Mr. Jack Carr of our Economic and Social Analysis Branch at 309/788-6361, Ext. 396, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

ORIGINAL SIGNED BY
CHARLES R. SMITH

Dudley M. Hanson, P.E.
Chief, Planning Division

Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway/Springfield, Illinois/62764

January 27, 1989

Honorable Floyd Belless
Village President
Village of Liverpool
Village Hall
Liverpool, Illinois 61543-9999

Dear Mr. Belless:

We have been informed by the Corps of Engineers in Rock Island that the Village of Liverpool has signed a letter of intent for the proposed flood control project. The village should contact us concerning any state financial assistance that can be applied toward your non-federal share. Mr. Paul Niedernhofer, of my staff, has been involved with this project since the Corps produced its preliminary findings. Please contact him at 217/782-3488 so that the financial considerations of this project can be discussed.

To accomplish the transfer of funds for projects such as these, we draft a memorandum of agreement between the local sponsor and the State of Illinois. This document spells out the financial responsibilities for both parties. In the past, we have requested that the local sponsor be responsible for the traditional "abc's" (lands, esements, rights-of-way, and utility relocations). We assume that the village would be in a favorable position to negotiate these items below the Corps of Engineers' estimated costs; this would not reduce the amount we would be willing to contribute. The State of Illinois would be responsible for the other costs, including the required 5% cash payment.

Sincerely,

Donald R. Vonnahme
Director

DRV:PRN:mam
cc: Ms. Teresa Kirkeeng-Kincaid
Rock Island District

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

August 18, 1989

REPLY TO ATTENTION OF

Planning Division (1105-2-10b)

Honorable Floyd Belless
Village President
Liverpool, Illinois 61543

Dear Mr. Belless:

We are nearing approval of the Final Definite Project Report for Section 205 Flood Control at Liverpool. The report is in our North Central Division office in Chicago. We have responded to some additional comments from the Division office and we are looking forward to approval in the near future. When the report is approved, it will be sent out to the public for final review.

Since we coordinated on a draft Local Cooperation Agreement last September, the format for that document has been updated. It is therefore necessary that we provide you with an updated copy, which is enclosed.

Please review the enclosed document. If you have any comments or questions, please call Ms. Teresa Kirkeeng-Kincaid at 309/788-6361, Ext. 392, or you may write to the following address:

District Commander
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

ORIGINAL SIGNED BY
CHARLES R. SMITH

Dudley M. Hanson, P.E.
Chief, Planning Division

Enclosure

August 30, 1989

DRAFT

**LOCAL COOPERATION AGREEMENT
BETWEEN
THE DEPARTMENT OF THE ARMY
AND
THE VILLAGE OF LIVERPOOL, ILLINOIS
FOR CONSTRUCTION OF THE
FLOOD CONTROL PROJECT ON THE ILLINOIS RIVER
AT LIVERPOOL, ILLINOIS**

THIS AGREEMENT, entered into this _____ day of _____, 19__, by and between the DEPARTMENT OF THE ARMY (hereinafter referred to as the "Government"), acting by and through the Assistant Secretary of the Army (Civil Works), and THE VILLAGE OF LIVERPOOL, ILLINOIS (hereinafter referred to as the "Village"), acting by and through its Village President,

WITNESSETH, THAT:

WHEREAS, construction of the flood control project along the Illinois River at Liverpool, Illinois (hereinafter called the "Project") not specifically authorized by Congress is contained in Section 205 of the Flood Control Act of 1948, as amended, 33 U.S.C. 701s; and

WHEREAS, Section 205 of the Flood Control Act of 1948, as amended, 33 U.S.C. 701s, limits Federal expenditures for a project at any single locality to $5,000,000; and

WHEREAS, Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, specifies the cost-sharing requirements applicable to the Project; and,

WHEREAS, Section 221 of the Flood Control Act of 1970, Public Law 91-611, as amended, provides that the construction of any water resources project by the Secretary of the Army shall not be commenced until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project; and,

WHEREAS, the Village does not qualify for a reduction of the maximum non-Federal cost share pursuant to the guidelines which implement Section 103(m) of the Water Resources Development Act of 1986, Public Law 99-662, published in 33 C.F.R., sections 241.1 - 6, entitled "Flood Control Cost-Sharing Requirements Under the Ability to Pay Provision"; and,

WHEREAS, the Village has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in cost-sharing and financing in accordance with the terms of this Agreement;

NOW, THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS AND GENERAL PROVISIONS

For purposes of this agreement:

a. The term "Project" shall mean constructing a levee to protect the Village which ties into the agricultural levee. The levee would be built to a 50-year level of protection, which is the level of the existing agricultural levee. The plan would include a gravity outlet and a pump station for interior drainage, three road ramps, raising a parking area, and approximately 4,395 feet of levee ranging in height from 3.5 to 17.5 feet.

b. The term "total project costs" shall mean all costs incurred by the Village and the Government directly related to construction of the Project. Such costs shall include, but not necessarily be limited to, continuing planning and engineering costs incurred after October 1, 1985; costs of applicable engineering and design; actual construction costs; supervision and administration costs; costs of contract dispute settlements or awards; and the value of lands, easements, rights-of-way, utility and facility alterations or relocations, and dredged material disposal areas provided for the Project by the Village, but shall not include any costs for betterments, operation, repair, maintenance, replacement, or rehabilitation.

c. The term "period of construction" shall mean the time from the advertisement of the first construction contract to the time of acceptance of the Project by the Contracting Officer.

d. The term "Contracting Officer" shall mean the U.S. Army District Engineer for the Rock Island District, or his designee.

e. The term "highway" shall mean any highway, thoroughfare, roadway, street, or other public or private road or way.

f. The term "relocations" shall mean alterations, modifications, lowering or raising in place, and/or new construction related to, but not limited to, existing: railroads, highways, bridges, railroad bridges and approaches thereto, buildings, pipelines, public utilities (such as municipal water and sanitary sewer lines, telephone lines, and storm drains), aerial utilities, cemeteries, and other facilities, structures, and improvements

termined by the Government to be necessary for the construction, operation and maintenance of the Project.

g. The term "fiscal year" shall mean one fiscal year of the United States Government, unless otherwise specifically indicated. The Government fiscal year begins on October 1 and ends on September 30.

h. The term "involuntary acquisition" shall mean the acquisition of lands, easements, and rights-of-way by eminent domain.

i. The term "functional portion of the Project" shall mean a completed portion of the Project as determined by the Contracting Officer to be suitable for tender to the Village to operate and maintain in advance of completion of construction of the entire project.

ARTICLE II - OBLIGATIONS OF THE PARTIES

a. The Government, subject to and using funds provided by the Village and appropriated by the Congress of the United States, shall expeditiously construct the Project (including relocations of railroad bridges and approaches thereto), applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The Village shall be afforded the opportunity to review and comment on all contracts, including relevant plans and specifications, prior to the issuance of invitations for bid. The Village will be afforded the opportunity to review and comment on all modifications and change orders prior to the issuance to the contractor of a Notice to Proceed. The Government will consider the comments of the Village, but award of contracts, modifications or change orders, and performance of all work on the Project (whether the work is performed under contract or by Government personnel), shall be exclusively within the control of the Government.

b. When the Government determines that the Project or a functional portion of the Project is complete, the Government shall turn the completed Project or functional portion over to the Village, which shall accept the Project or functional portion and be solely responsible for operating, repairing, maintaining, replacing, and rehabilitating the Project or functional portion in accordance with Article VIII hereof.

c. As further specified in Article VI hereof, the Village shall provide, during the period of construction, a cash contribution of 5 percent of total project costs allocated to structural flood control.

d. As further specified in Article III hereof, the Village shall provide all lands, easements, rights-of-way, and dredged

material disposal areas, and perform all relocations (excluding railroad bridges and approaches thereto) determined by the Government to be necessary for construction of the Project. At its sole discretion, the Government may perform relocations in cases where it appears that the Village's contributions will exceed the maximum non-Federal cost share set out in Article VI.f.

e. If the value of the contributions provided under paragraphs c. and d. of this Article represents less than 25 percent of total project costs, the Village shall provide, during the period of construction, an additional cash contribution in the amount necessary to make its total contribution equal to 25 percent of total project costs.

f. After consultation with the Contracting Officer, or upon direction by the Contracting Officer, the Village shall perform, or cause to be performed, any environmental audits determined by the Government to be necessary on lands to be provided to the Government by the Village for construction of the Project. All actual costs incurred by the Village which are properly allowable and allocable to performance of any such environmental audits shall be included in total project costs and cost shared in accordance with Section 103(a) of P.L. 99-662.

g. If any lands provided to the Government by the Village are found to contain hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act, the Village shall be solely responsible for any and all necessary associated clean up and response costs as defined in the statute.

h. No Federal funds may be used to meet the Village share of project costs under this Agreement unless the expenditure of such funds is expressly authorized by statute as verified in writing by the granting agency.

i. The Village agrees to participate in and comply with applicable Federal flood plain management and flood insurance programs.

j. The Village shall pay all costs in excess of the Federal statutory cost limitation of $5,000,000. In no instance shall the Government's share of project costs, including preauthorization planning costs (reconnaissance studies, feasibility studies, etc.), exceed this limitation.

k. The Village will prevent encroachment on any of the flood protection structures, including the ponding areas, and if ponding areas are impaired, provide substitute storage capacity or equivalent pumping capacity promptly without cost to the United States.

l. No less than once each year the Village shall inform affected interests of the limitations of the protection afforded by the Project.

m. The Village shall publicize flood plain information in the area concerned and shall provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the flood plain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the Project.

n. Implement a flood-warning system and a flood preparedness plan. The plan will be adopted in the form of a village ordinance, and will be updated as necessary to remain current. Action will be taken as necessary to evacuate the community when needed.

ARTICLE III - LANDS, FACILITIES, AND PUBLIC LAW 91-646 RELOCATION ASSISTANCE

a. The Village shall furnish to the Government all lands, easements, and rights-of-way, including suitable borrow and dredged material disposal areas, as may be determined by the Government to be necessary for the construction, operation, and maintenance of the Project, and shall furnish to the Government evidence supporting the Village's legal authority to grant rights-of-entry to such lands. The necessary lands, easements, and rights-of-way may be provided incrementally, but all lands, easements, and rights-of-way determined by the Government to be necessary for work to be performed under a construction contract must be furnished prior to the advertisement of the construction contract.

b. The Village shall provide or pay to the Government the cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged material disposal areas necessary for construction of the Project.

c. Upon notification from the Government, the Village shall accomplish or arrange for accomplishment at no cost to the Government all relocations (excluding railroad bridges and approaches thereto) determined by the Government to be necessary for construction of the Project.

d. The Village shall comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way for construction and subsequent operation and maintenance of the Project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

ARTICLE IV - VALUE OF LANDS AND FACILITIES

a. The value of the lands, easements, and rights-of-way to be included in total project costs and credited towards the Village's share of total project costs will be determined in accordance with the following procedures:

1. If the lands, easements, or rights-of-way are owned by the Village as of the date the first construction contract for the Project is awarded, the credit shall be the fair market value of the interest provided to the Government by the Village at the time of such award. The fair market value shall be determined by an appraisal, to be obtained by the Village, which has been prepared by a qualified appraiser who is acceptable to both the Village and the Government. The appraisal shall be reviewed and approved by the Government.

2. If the lands, easements, or rights-of-way are to be acquired by the Village after the date of award of the first construction contract for the Project, the credit shall be the fair market value of the interest at the time such interest is acquired. The fair market value shall be determined as specified in Article IV.a.1. of this Agreement. If the Village pays an amount in excess of the appraised fair market value, it may be entitled to a credit for the excess if the Village has secured prior written approval from the Government of its offer to purchase such interest.

3. If the Village acquires more lands, easements, or rights-of-way than are necessary for project purposes, as determined by the Government, then only the value of such portions of those acquisitions as are necessary for project purposes shall be included in total project costs and credited towards the Village's share.

4. Credit for lands, easements, and rights-of-way in the case of involuntary acquisitions which occur within a one-year period preceding the date this Agreement is signed or which occur after the date this Agreement is signed will be based on court awards, or on stipulated settlements that have received prior Government approval.

5. Credit for lands, easements, or rights-of-way acquired by the Village within a five-year period preceding the date this Agreement is signed, or at any time after this Agreement is signed, will also include the actual incidental costs of acquiring the interest, e.g., closing and title costs, appraisal costs, survey costs, attorney's fees, plat maps, and mapping costs, as well as the actual amounts expended for payment of any Public Law 91-646 relocation assistance benefits provided in accordance with the obligations under this Agreement.

b. The costs of relocations which will be included in total project costs and credited towards the Village's share of total project costs shall be that portion of the actual costs as set forth below, and approved by the Government:

1. Highways and Highway Bridges: Only that portion of the cost as would be necessary to construct substitute bridges and highways to the design standard that the State of Illinois would use in constructing a new bridge or highway under similar conditions of geography and traffic loads.

2. Utilities and Facilities (including railroads): Actual relocation costs, less depreciation, less salvage value, plus the cost of removal, less the cost of betterments. With respect to betterments, new materials shall not be used in any alteration or relocation if materials of value and usability equal to those in the existing facility are available or can be obtained as salvage from the existing facility or otherwise, unless the provision of new material is more economical. If, despite the availability of used material, new material is used, where the use of such new material represents an additional cost, such cost will not be included in total project costs.

ARTICLE V - CONSTRUCTION PHASING AND MANAGEMENT

a. To provide for consistent and effective communication between the Village and the Government during the period of construction, the Village and the Government shall appoint representatives to coordinate on scheduling, plans, specifications, modifications, contract costs, and other matters relating to construction of the Project. The Village will be informed of any changes in cost estimates.

b. The representatives appointed above shall meet as necessary during the period of construction and shall make such recommendations as they deem warranted to the Contracting Officer.

c. The Contracting Officer shall consider the recommendations of the representatives in all matters relating to construction of the Project, but the Contracting Officer, having ultimate responsibility for construction of the Project, has complete discretion to accept, reject, or modify the recommendations.

ARTICLE VI - METHOD OF PAYMENT

a. The Village shall provide, during the period of construction, cash payments required to meet its obligations under Article II of this Agreement. Total project costs are presently estimated to be $1,511,000.00. In order to meet its cash payment requirement, the Village must provide a cash contribution presently

estimated to be $75,550.00. The dollar amounts set forth in this Article are based upon the Government's best estimates which will reflect projection of costs, price level changes, and anticipated inflation. Such cost estimates are subject to adjustments based upon cost actually incurred and are not to be construed as the total financial responsibilities of the Government and the Village.

b. The required cash contribution shall be provided as follows: Sixty (60) calendar days prior to the award of the first construction contract, the Government shall notify the Village of the Village's estimated share of project costs, including its share of costs attributable to the Project incurred prior to the initiation of construction. Within thirty (30) calendar days thereafter, the Village shall provide the Government the full amount of the required contribution by delivering a check payable to "FAO, USAED, Rock Island" to the Contracting Officer representing the Government. In the event that total project costs are expected to exceed the estimate given at the outset of construction, the Government shall immediately notify the Village of the additional contribution the Village will be required to make to meet its share of the revised estimate. Within forty-five (45) calendar days thereafter, the Village shall provide the Government the full amount of the additional required contribution.

c. Upon completion of the Project and resolution of all relevant contract claims and appeals, the Government shall compute the total project costs and tender to the Village a final accounting of the Village's share of total project costs. In the event the total contribution by the Village is less than its minimum required share of total project costs, the Village shall, no later than 90 calendar days after receipt of written notice, make a cash payment to the Government of whatever sum is required to meet its minimum required share of total project costs.

d. In the event the Village has made cash contributions in excess of 5 percent of total project costs allocated to structural flood control which result in the Village's having provided more than its required share of total project costs, the Government shall, no later than 90 calendar days after the final accounting is complete, subject to the availability of appropriations, and subject to the $5,000,000 Federal limitation set out in Article II.j.,) return said excess to the Village; however, the Village shall not be entitled to any refund of the 5 percent cash contribution required pursuant to Article II.c. of this Agreement.

e. If the Village's total contribution under this Agreement (including lands, easements, rights-of-way, and relocations, and dredged material disposal areas provided by the Village) exceeds 50 percent of total project costs, the Government shall, subject to the

availability of appropriations for that purpose, and subject to the $5,000,000 Federal limitation set out in Article II.j., refund the excess to the Village no later than 90 calendar days after the final accounting is complete.

ARTICLE VII - DISPUTES

Before any party to this Agreement may bring suit in any court concerning an issue relating to this Agreement, such party must first seek in good faith to resolve the issue through negotiation or other forms of nonbinding alternative dispute resolution mutually acceptable to the parties.

ARTICLE VIII - OPERATION, MAINTENANCE, REPAIR, REPLACEMENT AND REHABILITATION

a. After the Government has turned the completed Project, or functional portion of the Project, over to the Village, the Village shall operate, maintain, repair, replace, and rehabilitate the completed Project, or functional portion of the Project, in accordance with regulations or directions prescribed by the Government.

b. The Village hereby gives the Government a right to enter, at reasonable times and in a reasonable manner, upon land which it owns or controls for access to the Project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the Project. If an inspection shows that the Village for any reason is failing to fulfill its obligations under this Agreement without receiving prior written approval from the Government, the Government will send a written notice to the Village. If the Village persists in such failure for 30 calendar days after receipt of the notice, then the Government shall have a right to enter, at reasonable times and in a reasonable manner, upon lands the Village owns or controls for access to the Project for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the Project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Government shall operate to relieve the Village of responsibility to meet its obligations as set forth in this Agreement, or to preclude the Government from pursuing any other remedy at law or equity to assure faithful performance pursuant to this Agreement.

ARTICLE IX - RELEASE OF CLAIMS

The Village shall hold and save the Government free from all damages arising from the construction, operation, and maintenance of the Project, except for damages due to the fault or negligence of the Government or its contractors.

ARTICLE X - MAINTENANCE OF RECORDS

The Government and the Village shall keep books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement to the extent and in such detail as will properly reflect total project costs. The Government and the Village shall maintain such books, records, documents, and other evidence for a minimum of three years after completion of construction of the Project and resolution of all relevant claims arising therefrom, and shall make available at their offices at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the parties to this Agreement.

ARTICLE XI - GOVERNMENT AUDIT

The Government shall conduct an audit when appropriate of the Village's records for the Project to ascertain the allowability, reasonableness, and allocability of its costs for inclusion as credit against the non-Federal share of project costs.

ARTICLE XII - FEDERAL AND STATE LAWS

In acting under its rights and obligations hereunder, the Village agrees to comply with all applicable Federal and State laws and regulations, including section 601 of Title VI of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army".

ARTICLE XIII - RELATIONSHIP OF PARTIES

The parties to this Agreement act in an independent capacity in the performance of their respective functions under this Agreement, and neither party is to be considered the officer, agent, or employee of the other.

ARTICLE XIV - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, or resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE XV - COVENANT AGAINST CONTINGENT FEES

The Village warrants that no person or selling agency has been employed or retained to solicit or secure this Agreement upon

agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Village for the purpose of securing business. For breach or violation of this warranty, the Government shall have the right to annul this Agreement without liability, or, in its discretion, to add to the Agreement or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

ARTICLE XVI - TERMINATION OR SUSPENSION

a. If at any time the Village fails to make the payments required under this Agreement, the Secretary of the Army shall terminate or suspend work on the Project until the Village is no longer in arrears, unless the Secretary of the Army determines that continuation of work on the Project is in the interest of the United States or is necessary in order to satisfy agreements with any other non-Federal interests in connection with the Project. Any delinquent payment shall be charged interest at a rate, to be determined by the Secretary of the Treasury, equal to 150 per centum of the average bond equivalent rate of the 13-week Treasury bills auctioned immediately prior to the date on which such payment became delinquent, or auctioned immediately prior to the beginning of each additional 3-month period if the period of delinquency exceeds 3 months.

b. If the Government fails to receive annual appropriations for the Project in amounts sufficient to meet project expenditures for the then-current or upcoming fiscal year, the Government shall so notify the Village. After 60 calendar days either party may elect without penalty to terminate this Agreement pursuant to that Article or to defer future performance hereunder; however, deferral of future performance under this Agreement shall not affect existing obligations or relieve the parties of liability for any obligation previously incurred. In the event that either party elects to terminate this Agreement pursuant to this Article, both parties shall conclude their activities relating to the Project and proceed to a final accounting in accordance with Article VI. of this Agreement. In the event that either party elects to defer future performance under this Agreement pursuant to this Article, such deferral shall remain in effect until such time as the Government receives sufficient appropriations or until either party elects to terminate this Agreement.

ARTICLE XVII - NOTICES

a. All notices, requests, demands, and other communications required or permitted to be given under this Agreement shall be deemed to have been duly given if in writing and delivered personally, given

by prepaid telegram, or mailed by first-class (postage pre-paid), registered, or certified mail, as follows:

If to the Village:
Honorable Floyd Belless
President, Village of Liverpool
Village Hall
Liverpool, Illinois 61543-9999

If to the Government:
District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

b. A party may change the address to which such communications are to be directed by giving written notice to the other party in the manner provided in this Article.

c. Any notice, request, demand, or other communication made pursuant to this Article shall be deemed to have been received by the addressee at such time as it is personally delivered or seven calendar days after it is mailed, as the case may be.

ARTICLE XVIII - CONFIDENTIALITY

To the extent permitted by the laws governing each party, the parties agree to maintain the confidentiality of exchanged information when requested to do so by the providing party.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, which shall become effective upon the date it is signed by the Assistant Secretary of the Army (Civil Works).

THE DEPARTMENT OF THE ARMY

BY: _____
ROBERT W. PAGE
Assistant Secretary
of the Army
(Civil Works)

DATE: _____

THE VILLAGE OF LIVERPOOL, ILLINOIS

BY: _____
FLOYD D. BELLESS
Village President

DATE: _____

CERTIFICATE OF AUTHORITY

I, _____, do hereby certify that I am the principal legal officer of the Village of Liverpool, Illinois, that the Village of Liverpool is a legally constituted public body with full authority and legal capability to perform the terms of the Agreement between the Department of the Army and the Village of Liverpool, Illinois, in connection with the Project, and to pay damages, if necessary, in the event of the failure to perform, in accordance with Section 221 of Public Law 91-611, and that the person who has executed this Agreement on behalf of the Village of Liverpool has acted within his statutory authority.

IN WITNESS WHEREOF, I have made and executed this certification this _____ day of _____, 19____.

_____

Village Attorney for Liverpool, Illinois

*U.S. Government Printing Office 1989 - 743-105/00515

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MR VALDAS J ADAMKUS - ADMINISTRATOR, US ENVIRONMENTAL PROTECTION AGCY 230 S DEARBORN ST, CHICAGO IL 60604	3
FEDERAL EMERGENCY MANAGEMENT AGENCY, REGIONAL OFFICE V ATTN: BILL POWERS, 300 S WACKER DRIVE CHICAGO IL 60602	

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REGIONAL ADMINISTRATOR, REGION V, DEPT OF HUD 300 S WACKER DR, CHICAGO, IL 60606	
RICK MACHO, SOIL CONSERVATION SERVICE-DOA 612 S MAIN ST, LEWISTOWN IL 61542	
STATE CONSERVATIONIST, SOIL CONSERVATION SVC USDA 301 N RANDOLPH, CHAMPAIGN IL 61820	2
DIRECTOR, WATER RESOURCES CENTER UNIVERSITY OF ILLINOIS, 208 N ROMINE URBANA IL 61801	
REGIONAL DIRECTOR, REGION 3, U.S.FISH AND WILDLIFE SERVICE FEDERAL BLDG FORT SNELLING, TWIN CITIES MN 55111	
LEE W LARSON - W/CR2, NWS CENTRAL REGION HYDR 601 E 12TH STREET - ROOM 1936, KANSAS CITY MO 64106	
REGIONAL FORESTER, FOREST SERVICE US DEPT OF AGRICULTURE, 310 W WISCONSIN AVE-SUITE 500 MILWAUKEE WI 53203	2
COMMANDER, US ARMY ENGR DIVISION, N. CENTRAL ATTN: NCDPD, 536 SOUTH CLARK ST. CHICAGO, IL 60605	
OFFICE OF THE GOVERNOR, ATTN: TOM BERKSHIRE STATE OF ILLINOIS, SPRINGFIELD, IL 62706	
HONORABLE JAMES R THOMPSON, GOVERNOR OF ILLINOIS STATE CAPITOL, SPRINGFIELD IL 62706	

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HONORABLE THOMAS J. HOMER, ILLINOIS REPRESENTATIVE 2 NORTH MAIN - PO BOX 219, CANTON IL 61520	
KEVIN WIEHARDT, WESTERN ILLINOIS REGIONAL PLANNING COUNCIL, 223 SOUTH RANDOLPH MACOMB IL 61455	
COUNTY ATTORNEY, COURT HOUSE FULTON COUNTY, LEWISTOWN, IL 61542	
COUNTY CLERK, COURT HOUSE FULTON COUNTY, LEWISTOWN, IL 61542	

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TRI COUNTY REGIONAL PLANNING COMM., 432 W JEFFERSON ST MORTON IL 61550-1590-1590	
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THE LEWISTON BANK, 120 E WASHINGTON LEWISTON IL 61542	
LINN FARMS, 32 N AVENUE A CANTON IL 61520	
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PRATT LUMBER & HOME CENTER, 311 E AVENUE EAST LEWISTON IL 61542	
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MRS. JANE JOHNSON, PRESIDENT ILLINOIS COUNCIL OF WATERSHEDS, R.R. 2, BOX 50 GILSON, IL 61436	
EMILY H. SMITH, RI CITY LEAGUE OF WOMEN VOTERS 4424 42ND AVE., ROCK ISLAND, IL 61201	
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LIVERPOOL IL 61543

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