GENERAL REEVALUATION REPORT

AND

ENVIRONMENTAL IMPACT STATEMENT

FOR THE

OTTAWA, OHIO

FLOOD PROTECTION PROJECT

April 1987

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FLOOD PROTECTION PROJECT

AT

OTTAWA, OHIO

Department of the Army
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

April 1987

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

The Ottawa, Ohio flood control project was authorized by Section 203 of the 1966 Flood Control Act to protect residential, commercial, and industrial areas of the village from overbank flooding of the Blanchard River. The Blanchard River Basin upstream of Ottawa drains about 638 square miles and is roughly rectangular in shape. The basin varies from flat plains along its main course to rolling hills in the headwaters. The village is situated along the banks of the Blanchard River and is the commercial center of a farming district. Major floods in the project area occurred in 1913, 1950, 1959, and more recently in 1981; however some flooding does occur annually. Several measures and plans were considered and investigated during the reevaluation study to select a plan with the greatest NED benefit. Most plans were dropped from further consideration in the process because they lacked economic justification and did not warrant further investigation.

The emphasis in this stage of planning is limited to an iteration of 11 structural alternatives, 7 non-structural alternatives, and selection of a recommended plan. Principal considerations in this effort were: the views of local interests, residents of the projects area and the local sponsors; development and presentation of additional and/or refined economic, environmental and engineering data; and preparation of the Environmental Impact Statement. The impacts of viable alternatives were then examined in comparative form to justify the Selected Plan.

Plan E, the NED plan, is a combination of structural Plan B and non-structural Plan C, having net benefits of $19,400 and a B/C ratio of 1.18 to 1. This plan could be implemented at a total first cost of 1,387,900 January 1986 price levels and the cost includes all lands easements, and right-of-way at January 1986 price levels.

GENERAL REEVALUATION REPORT
FOR
OTTAWA, OHIO

SYLLABUS

The Ottawa, Ohio flood control project was authorized by Section 203 of the 1966 Flood Control Act to protect residential, commercial, and industrial areas of the village from overbank flooding of the Blanchard River. The Blanchard River Basin upstream of Ottawa drains about 638 square miles and is roughly rectangular in shape. The basin varies from flat plains along its main course to rolling hills in the headwaters. The village is situated along the banks of the Blanchard River and is the commercial center of a farming district. Major floods in the project area occurred in 1913, 1950, 1959, and more recently in 1981; however some flooding does occur annually. Several measures and plans were considered and investigated during the reevaluation study to select a plan with the greatest NED benefit. Most plans were dropped from further consideration in the process because they lacked economic justification and did not warrant further investigation.

The emphasis in this stage of planning is limited to an iteration of 11 structural alternatives, 7 non-structural alternatives, and selection of a recommended plan. Principal considerations in this effort were: the views of local interests, residents of the project area and the local sponsors; development and presentation of additional and/or refined economic, environmental and engineering data; and preparation of the Environmental Impact Statement. The impacts of viable alternatives were then examined in comparative form to justify the Selected Plan.

Plan E, the NED plan, is a combination of structural Plan B and non-structural Plan C, having net benefits of $10,300 and a B/C ratio of 1.08 to 1. This plan could be implemented at a total first cost of $1,314,000 at January 1986 price levels and the cost includes all lands, easements, and rights-of-way at January 1986 price levels.

GENERAL REEVALUATION REPORT
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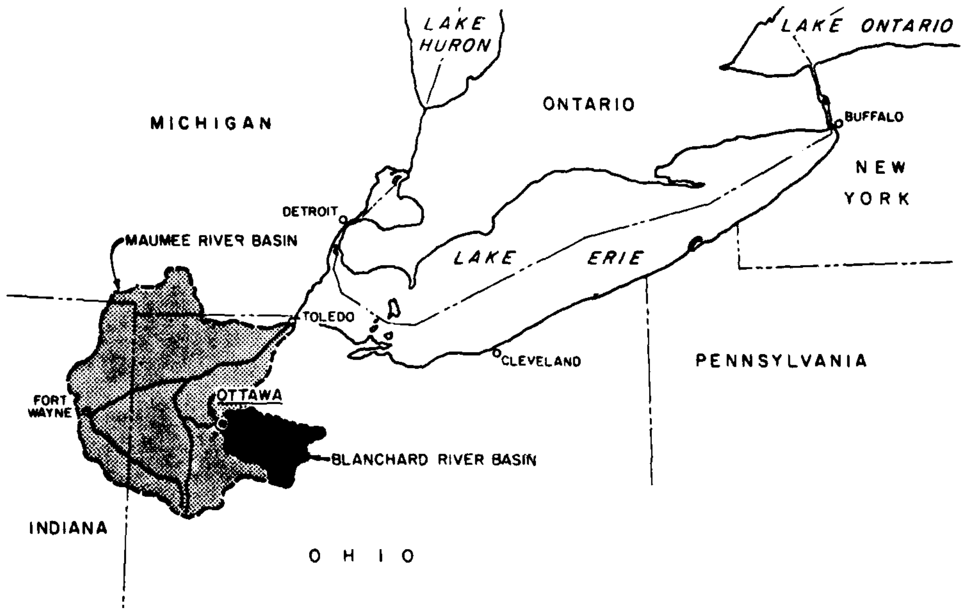

VICINITY MAP

U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, New York 14207

April 1987

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FLOOD PROTECTION PROJECT

SECTION A

INTRODUCTION

GENERAL.

This is a General Reevaluation Report for the authorized flood protection project at Ottawa, Ohio. The project is located in the village of Ottawa adjacent to the Blanchard River in Putnam County, Ohio and in the east central portion of the Maumee River Basin as shown on Figure 1. The purpose of this report is to present study results and events that have developed throughout the planning process since the project was authorized. The data developed include problem definition, opportunities, without-project conditions, formulating alternative plans, evaluating the effects and comparing alternative plans, and selecting and recommending a plan which, if implemented, would reduce flooding problems in the area. The flood problem is caused by the Blanchard River overtopping its banks.

PROJECT AUTHORIZATION.

The local flood protection project at Ottawa, Ohio was authorized under Section 203 of the Flood Control Act, Public Law 89-789, dated 7 November 1966. The applicable portion of Title II of the Act states:

"The project for Flood protection on the Maumee River at Ottawa, Ohio, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Number 485, Eighty-ninth Congress at an estimated cost of $3,413,000." (sic) --- on the Maumee River at Ottawa, Ohio --- should read --- on the Blanchard River at Ottawa, Ohio, ---.

REPORT PURPOSE AND SCOPE.

The purpose of this report is to present the results of studies conducted that identify and evaluate measures and plans to reduce flood damages at Ottawa, Ohio caused by overbank flow of the Blanchard River. Several structural measures and alternative plans are discussed, including the authorized project plan and several non-structural solutions. The alternative plans are discussed in detail and evaluated to identify the NED plan. The impact of a no-action plan is also presented.

The scope of this study is to provide sufficient data to develop alternatives and evaluate them in response to the objective of reducing flood damage in the village of Ottawa, Ohio. In order to develop these data, use was made of existing reports, field surveys and inspections, photogrammetry, stream gage records, on-site meetings, and data in Buffalo District files. In depth discussions and the results of this work are presented in subsequent sections of this report. In addition, the alternative plans were evaluated and assessed as to the likelihood, capability and willingness of the local co-operator to participate in the implementation of each. The local cooperator is the Maumee Watershed Conservancy District.

DEFINITION OF PLANNING AREA.

The planning area is about the same now as it was over 22 years ago during the preauthorization studies and subsequent authorization in 1966 of the plan recommended in House Document Number 485, Eighty-ninth Congress. The area considered for flood protection consists of most of the central residential-business district of the village of Ottawa on the north side of the river and west of the Grand Trunk Western (DT&I) railroad. A lesser area is flooded on the south side of the river in the vicinity of the Chessie (B&O) railroad. The extreme northern and eastern portions of the village do not experience flooding from the Blanchard River. The planning area is further defined as follows:

a. 543 residences occupying 295 acres in the flood inundation area

b. 1,395 occupied housing units within the corporate limits of the village of Ottawa

c. 1,590 acres of land within the corporate limits of the village of Ottawa

d. 276 acres of agricultural land

e. 40 acres of shaded picnic areas

f. 5 miles of meandering river within the corporate limits of the village of Ottawa

g. 60-acre stand of softwoods along the Blanchard River

The area is on the site of the last village of the Ottawa Indians who occupied it in the late eighteenth and early nineteenth centuries. The village of Ottawa was named in 1862 and always experiences some overbank flooding from the Blanchard River each year.

SUMMARY OF PRIOR REPORTS.

On 20 November 1964, the District Engineer, Detroit, Michigan submitted his survey report to the Chief of Engineers, through the Division Engineer, North Central. The District Engineer's recommendation contained in the report is as follows:

"It is recommended that a Federal project be authorized for flood protection at Ottawa, Ohio, to provide a system of levees and floodwalls with minor channel improvements along the Blanchard River, addition of and modification to several highway and railroad bridges, and utility modifications are described in this report, subject to such modifications as in the discretion of the Chief of Engineers may be advisable, at a net construction cost to the United States of $3,412,600. The recommendation for construction of this project is contingent upon the provision that no funds be expended by the United States until local interests have given assurances satisfactory to the Secretary of the Army that they will without cost to the United States:

a. Provide all lands, easements, and rights-of-way necessary for construction of the project.

b. Modify or relocate buildings, utilities, roads, and other facilities where necessary for the construction of the project.

c. Construct or modify one access bridge and one highway bridge.

d. Hold and save the United States free from damages due to the construction works.

e. Maintain and operate all the works after completion, including all new bridge maintenance, in accordance with regulations prescribed by the Secretary of the Army.

f. Prevent any encroachment on the project flood channels, existing flow-around areas at the Main Street and DT&I Railroad bridges, and ponding areas which would decrease the effectiveness of the flood control improvements. If ponding areas and capacities are impaired, promptly substitute capacities to restore the effectiveness of the flood control project.

g. Provide assurances of flood plain restrictions in the designated flood plain on the Blanchard River immediately downstream of the project and to permit improvements downstream of the project only if the effects thereof on the Ottawa flood protection project are negligible or if compensating works in the form of channel improvements are provided.

h. Reimburse the United States a sum estimated at $67,400 for non-Federal items of local cooperation which are included in the Federal project and comprise the additional riprap, approach fill, and concrete for the pier and abutments required for the park access bridge."

The recommended plan, accompanying the 1964 Survey report, is shown on Plate 1.

The views and recommendations of the Board of Engineers for Rivers and Harbors are as follows:

Views - The Board of Engineers for Rivers and Harbors concurs in general in the views and recommendations of the reporting officers. The Board notes that the proposed improvements would be compatible with any comprehensive plan of basin development. The proposed improvements are economically justified and the requirements of local cooperation are appropriate.

Recommendations - Accordingly, the Board recommends improvements for flood control in the Maumee River basin at Ottawa, Ohio, generally in accordance with the plan of the District Engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable, at an estimated cost of $3,480,000 for Federal construction: Provided that, prior to construction, local interests furnish assurances satisfactory to the Secretary of the Army that they will:

a. Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction of the project;

b. Modify or relocate buildings, utilities, roads, and other facilities where necessary for the construction of the project;

c. Construct or modify one access bridge and one highway bridge;

d. Hold and save the United States free from damages due to the construction works;

e. Maintain and operate all the works after completion, including all new bridge maintenance, in accordance with regulations prescribed by the Secretary of the Army.

f. Prevent any encroachment on the project flood channels, existing flow-around areas at the Main Street and Detroit, Toledo, and Ironton Railroad bridges, and ponding areas which would decrease the effectiveness of the flood control improvements; and if ponding areas and capacities are impaired, promptly substitute capacities to restore the effectiveness of the flood control project;

g. Restrict development in the designated flood plain immediately downstream of the project to the extent of their legal capability and permit improvements in this area only if the effects thereof on the Ottawa flood protection project are negligible or if compensating works in the form of channel improvements are provided; and

h. Reimburse the United States a sum estimated at $67,400 for non-Federal items of local cooperation which are included in the Federal project and comprise the additional riprap, approach fill, and concrete for the pier and abutments required for the park access bridge."

Of the Federal construction cost of $3,480,000, the net cost to the United States is estimated at $3,412,600.

The report of the acting Chief of Engineers, dated 25 August 1966, is printed in House Document 485/89/2, as are the other reports mentioned above. In his report, the Acting Chief of Engineers states that he concurs in the views and recommendations of the Board.

The report published in HD 48/89/2 was the basis for the authorization of the flood control project at Ottawa under the Flood Control Act of 1966. The project was reclassified from deferred to active on 30 August 1984.

An Initial Appraisal Report on Flooding on Blanchard River at Ottawa, Ohio, under Section 205 of the 1948 Flood Control Act as Amended was completed in July 1984 by the Buffalo District. The plan presented in the report consisted of a levee system on the north and south sides of the Blanchard

River to contain a 100-year flood event. The levee on the north side would extend from high ground at the Grand Trunk Western (DT&I) railroad bridge embankment to high ground in the vicinity of Tawa Run. The levee on the south side would extend from high ground in the vicinity of Williamstown Road to high ground just downstream of Route 65. Culvert pipes through the north levee would provide interior drainage and removal of the remains of the Perry Street bridge abutment/embankment and abandoned railroad embankment would improve the floodway. The recommendation was to initiate action for a reevaluation study.

A Section 208 report was approved in October 1984. The recommended plan provided for removal of the abandoned Perry Street bridge pier in Blanchard River at Ottawa, Ohio and clearing and excavation of shoals in the vicinity of the Chessie Railroad and Oak Street bridges. The work was completed in the Spring of 1985.

A Section 14 report was prepared and approved in August 1981 for remedial bank protection work that was substantially completed on 9 January 1985 except for seeding to provide grass cover. The work consisted of correcting erosion damage in the vicinity of Route 15 along the Blanchard River in the northwest section of the village.

A preliminary assessment report was completed in July 1985 as a part of the reevaluation study of the authorized project. The plan, shown on Plate 2, would provide protection from floods up to a 25-year recurrence interval. The plan would consist of: earth levees on both banks of the Blanchard River near the west side of the Village totaling 5,300 feet in length; about 2,500 feet of channel improvement work downstream of the Main Street bridge; snagging and clearing between the Grand Trunk Western bridge and Main Street bridge; and the installation of storm sewer check valves at about 190 homes.

A Flood Insurance Study, village of Ottawa, Putnam County, Ohio, prepared by U.S. Army Engineer District, Buffalo, New York, was completed on 3 January 1986.

A brief study was made to determine the feasibility of removing the Chessie Railroad bridge and rerouting all rail traffic over the Grand Trunk Western bridge to eliminate several costly features of the authorized project plan. If the Grand Trunk Western bridge could be used for all rail traffic it would eliminate: the need to modify the Chessie bridge; the diversion channel; and construction of new bridges. The plan was not economically justified or acceptable to railroad interests. A formal report was not completed or submitted.

NEW INFORMATION/DATA SINCE LAST REPORT.

The Preliminary Assessment Report plan was based upon field flood damage data developed in the fall of 1984 and spring of 1985. First floor elevations for all residences and commercial establishments within the 500-year flood plain were surveyed and commercial damages were based upon personal interviews. High water marks from the June 1981 flood were used to calibrate the hydraulic model for the Blanchard River. The 1981 flood profile based upon the 1981 flood high water marks of the 1981 flood is shown on Plate 3 with other flood profiles for comparative purposes. Topographic data used for the plan developed for the Preliminary Assessment Report have been superseded by photogrammetric mapping completed in 1985-1986 after the Preliminary Assessment Report was submitted. The results of the field flood damage survey of 1984/1985 clearly indicated that the total average annual damages could only support or economically justify a plan of improvement of about $1,200,000 or less including engineering and design costs. Construction costs of a plan therefore would be limited to about $700,000.

A meeting was held with village and county representatives and representatives of the Maumee Watershed Conservancy District, the sponsor, to obtain a letter of assurance for the flood protection project. The plan presented to them was the same as shown in the Preliminary Assessment report. The Village representatives indicated that they favored a project without high levees and floodwalls but preferred snagging and clearing in the Blanchard River. The data received at the meeting served to focus on the type of project plan that would be most acceptable to local interests.

Memoranda of various meetings with local interests and personnel of a consulting firm under contract to develop preliminary measures and plans are contained in Appendix E.

SECTION B
PROBLEM IDENTIFICATION

GENERAL.

The flood problem at Ottawa, Ohio is caused by overbank flooding of the Blanchard River. There are two types of meteorologic conditions that occur and cause flood flows in the Blanchard River. Rainfall of long duration sometimes falls over a large area with moderate intensities, and at other times thunderstorms occur with short duration and high intensity. The longer duration storms occur throughout the year, but heavy local storms occur usually in the late spring and summer. Some basement flooding occurs from both sewer backup and from overland flooding. The total acreage of the village of Ottawa is about 1,590 acres and during a flood with a recurrence interval of about 100-years about 300 acres are inundated although the depth of flooding in the urbanized area of the village is generally less than 2-feet. More than 100 homes suffer some flood damage. The flood problem then becomes one of either lowering the water surface profile during flood flows or by confining the overbank flooding to areas that are not residential or commercial.

EXISTING CONDITIONS.

There has been little change in the project area since the project was authorized 20 years ago. Some new homes and restaurants have been built and some have been upgraded but there is a relatively quiescent atmosphere in the village. The village of Ottawa continues to be a marketing and trading center in a rich agricultural area.

Several improvements have been completed or are underway related to flood flows in the Blanchard River at Ottawa. The Perry Street bridge was removed in 1951 and replaced by a new bridge at Elm Street that is less restrictive to flood flows since the waterway opening is greater than that provided by the Perry Street bridge. The Perry Street bridge pier and abutments in Blanchard River were not removed until the spring of 1985 as a part of Section 208 work by the Corps. The 208 work also included the removal of a shoal in the vicinity of the Chessie Railroad bridge and Oak Street bridge. Bank erosion work in the vicinity of Route 15 along the Blanchard River in the Northwest section of the village was also completed in 1985 by the Corps under Section 14 authority.

The Oak Street bridge will be replaced by a new bridge. Information from an AE firm under contract with the state of Ohio Department of Transportation indicates that the final design will be completed in July 1986 for review by the State. Construction of the new bridge is expected to begin in the fall of 1987. The effective waterway opening of the new Oak Street bridge is expected to be about 900 square feet greater than the existing bridge. The Main Street highway bridge and the Grand Trunk Western Railroad bridge do not constrict flood flows and no changes in these bridges are planned or anticipated. The Chessie System Railroad bridge, about 200 feet downstream from the Oak Street bridge, has the most constrictive waterway opening of all the bridges crossing the Blanchard River at Ottawa, Ohio, and could cause ice and debris jams. No changes are planned for the Chessie Railroad bridge.

Detailed hydrologic data are contained in Appendix A that includes information from several past sources including: the 1964 interim survey report that was the basis of the authorized project plan, the Flood Insurance Study for the village of Ottawa, Putnam County, completed in 1986, and data obtained in 1985-1986 for this reevaluation study. The data related to floods of record from 1883 to the flood of June 1981 show that floods in excess of 10,000 cfs cause some damage in the village of Ottawa. Owners of some homes and businesses have attempted to protect their properties from overbank flooding that has continued intermittently for more than the past 100-years. Some have elevated their home furnishings or business contents while others have changed their landscaping. All have become accustomed to the widespread area of flooding and have implemented some minor floodproofing measures. There has been little change in run-off because there has been no major land use developments or little change in stream flow since there has been no major channel improvements to the Blanchard River.

The Blanchard River drainage system upstream from Ottawa, Ohio, consists of the Blanchard River and several tributaries as shown on the basin map included on Plate 4. The Blanchard River stream slopes vary from 6 feet per mile in the headwaters to 0.5 foot per mile downstream from Ottawa. Upstream to Findlay the stream slope is 1.8 feet per mile. The Blanchard River at Ottawa has a bankfull depth of about 10 feet and a top width of about 180 feet. The bankfull capacity is approximately 4,000 cubic feet per second.

About 5 to 10 percent of the surface area of the Blanchard River basin upstream from Ottawa is covered by trees and bushes. Most of the growth lies either in small privately-owned wood lots or scattered along the river flood plain. The present tree growth commonly consists of a second growth of species of elm, maple, and oak.

All of the Blanchard River basin lies within the area covered by the Pliestocene glacial ice sheets. The entire area was inundated by glacial Lake Maumee during subsequent recessions of the ice sheets. Evidence of these glacial lake beaches are conspicuous along the northern rim of the basin.

The soils of the basin are typical heterogeneous material found in the till plain that covers central Ohio. Glacial drift varies in thickness but is not generally very deep.

Bedrock in Putnam County consists of the Monroe dolomites except in the northwest corner which is underlain by the Columbus formation. Economically, the Monroe formation is of much value to the county for crushed rock products and for building stone. The regional dip in the western portion is 17 feet per mile and 16 feet per mile in the eastern portion. The most important exposures of the Monroe dolomites are either in the bed of the Blanchard east of Ottawa or in the streams tributary to it from the south. Glacial grooves are found to the northwest, southwest, and to the east of Ottawa. Other data and laboratory test results are presented in Appendix D, Geotechnical Design.

The main topographical feature of the Blanchard River basin is the Defiance moraine, a sharp topographic relief that forms the northern border of the Blanchard River watershed for a distance of 50 miles. The topography of the basin varies from flat plains along its main course to rolling hills in the headwaters. The southern border of the Blanchard River basin is formed by the Wabash moraine which has elevations exceeding 1,000 feet above mean sea level. All elevation data presented in this report, unless otherwise noted, are based on U.S. Geological Survey datum.

The Blanchard River basin is covered by nine U.S. Geological Survey topographic 15-minute quadrangle sheets. These include the Continental, Ottawa, Deshler, Bluffton, Findlay, Forstoria, Arlington, Upper Sandusky, and Kenton quadrangles. The scale of these maps is approximately 1 inch to the mile and the contour interval is 10 feet.

In addition, various county and village maps are available. These maps include data on streams, roads, property ownership, utilities, etc. Aerial photos of the project area were obtained in April 1985 and pencil manuscript mapping on a scale of 1" = 50', was completed in December 1985. The mapping has a contour interval of 1-foot.

As described in more detail in Appendix B, Economics, the area under consideration for protection against overbank flooding of the Blanchard River is comprised of an area of about 300 acres within the village of Ottawa that has a total acreage of about 1,590 acres. The area within the limits of the village is developed almost entirely for industrial, residential, commercial, and public land use. Some vacant lands still exist in the village and are expected to be developed into residential and commercial use. Putnam County surrounding the village is devoted almost entirely to agriculture. Ottawa is the County Seat of Putnam County which is considered to be one of the finest agricultural areas in the state of Ohio.

Ottawa, with a population of 3,874 (1980 census), is largely residential and has experienced a 7 percent increase in population from the 1970 census. The village has about 1,400 occupied housing units with an average market value of $43,200 for owner occupied non-condominium housing units. There are 9 industries in Ottawa that employ 2,312 persons. Three of the industries are related to wood products, 2 to plastics, 1 electrical, 1 steel, 1 truck, and 1 agriculture. This means that Ottawa's industrial economy is not influenced by the surrounding agricultural area. There is a small business and commercial district within the village but no large department stores or shopping plazas. There are however, a wide variety of small retail and service activities that provide for the immediate needs of the community and surrounding rural population. There are two banks within Ottawa and 3 savings and loan associations that, in total, have assets of more than $500 million.

Ottawa is located on Federal Highway 224 which extends from New Castle, Pennsylvania, through Ottawa to points west. Ohio Route 65 passes through Ottawa on a north-south course from Toledo to Lima. Ottawa is also served by Ohio routes 109, 694, 114, and 15. The Chessie System and Grand Trunk Western railroads pass through Ottawa and over the Blanchard River but neither make scheduled stops. The Chessie System dispatches 15-20 trains daily through Ottawa and the Grand Trunk Western dispatches about 4 trains. All village streets crossing the trackage are at grade. The Chessie Railroad Bridge, a plate girder type, is the most constrictive bridge crossing the Blanchard River at Ottawa. The Grand Trunk Western bridge is a thru-truss.

The existing environmental conditions in the project area are described in detail in the EIS. Several pertinent topics are discussed and described that include: physiography, topography, geology, soils, climate, hydrology, water quality, air quality, habitat, vegatation, wildlife, fish, and human environment. The impact on the environment of various alternative plans considered in this reevaluation study are assessed and influenced some of the plan development strategy. There are 3 major environmental concerns: Channel improvements such as clearing and snagging in the Blanchard River and removal of obstructive trees and debris could adversely affect fish and wildlife habitat; removal of trees or debris on the overbanks could adversely affect the habitat of Indiana Bats known to exist in the general area and the implementation of any changes to the overbank must be exercised with care to preserve cultural resources of the Ottawa Indians who occupied the area in and around the village of Ottawa in the late 18th and early 19th centuries.

The Maumee Watershed Conservancy District, Putnam County, and village of Ottawa officials meet periodically to discuss water resource problems and needs in the Blanchard River Basin to insure that plans developed for flood protection of the village of Ottawa are compatible to those for the entire Maumee River Basin. The village does some maintenance and improvement work in and along the banks of the Blanchard River to prevent debris jams that would eventually constrict flows in the River and cause overbank flooding. The village also assists residents and businesses during flood emergencies by providing technical and material assistance to install temporary floodproofing of structures by sandbagging, moving merchandise, and elevating personal belongings.

FUTURE CONDITIONS.

Under existing conditions and present method of minimizing flood damages with technical and material assistance provided by the village of Ottawa, the assumed most probable future is that under certain levels of flood flows, structural damage, and detour costs would be slightly reduced but the damage to household contents would increase somewhat because the value of contents rise with increasing price levels. In the meantime, future village of Ottawa budgets will affect the extent of technical and material assistance available to residences and businesses. Future village budgets would particularly affect the extent of clearing and removal work in the river and overbanks. This would mean that people who live and work within the project area would continue to live under the threat of flooding and with less assistance from the village the amount of flood damage would probably increase.

If, under future conditions, the village is financially unable to provide any technical or material assistance the amount of flood damage will increase unless residents and private interests assume this responsibility. It is most unlikely that private interests would clear the river and overbanks of debris but might assume some of the temporary floodproofing such as sandbagging, moving merchandise and elevating personal belongings. At its best, the withdrawal of all public funds to provide technical and material assistance would greatly increase flood damages and create a very unstable and uncertain community life during floods.

A possibility exists that some other public body such as Putnam County, Maumee Watershed Conservancy District, or the Ohio Department of Natural Resources would assume the technical and material assistance costs now provided by the village of Ottawa. It is reasonable to assume that any or all of these mentioned entities have the financial resources to continue maintenance of the floodway and to assist in placing sandbags, moving merchandise in business places, and assisting residents to elevate household furnishings. This future is, however, unlikely since such assistance would set a precedent for other communities to seek similar assistance. These public agencies like all others have demands on their budget which are less localized and require all of their available resources.

If, under future conditions, the village of Ottawa is severely damaged by a catastrophic flood some Federal Emergency Assistance may be available provided that non-Federal interests have exhausted their own resources. Various types of assistance may be provided including: rescue operations, technical assistance, furnishing flood fighting materials, and removal of debris jams that are blocking stream flow and causing or likely to cause flooding to improved property or to endanger life.

THE "WITHOUT PROJECT" CONDITION.

From the future conditions presented in the preceding paragraphs, the "Without Project" condition is based upon the most probable future. It is, therefore, most probable that the village of Ottawa will continue to provide technical and material assistance to those who live or work in the project area. The village will probably always provide for such assistance in their annual budget and seek additional funds from other public entities. It is reasonable to assume that the assistance will become more effective and efficient as the workers become more experienced in transporting materials for sandbagging, moving merchandise, and in removing debris from the Blanchard River and the overbanks.

Presumably the village workers will do some preventative maintenance before flooding occurs. The private sector will become more experienced in assisting the village workers and thereby continue to floodproof many homes and business places well in advance of a flood. Some floodproofing measures such as elevating personal belonging, moving merchandise and sandbagging will be temporary but in a few isolated cases some will have had their homes or businesses permanently floodproofed. This flood fighting procedure of providing technical and material assistance is not a substitute for a permanent type plan of flood protection since it depends to a great extent upon cooperative efforts of both village workers and private interests. The annual costs for the village to implement the work could equal the costs of maintaining a permanent type of flood protection project. Without some permanently established flood management project, improvements to homes and businesses will probably be slowed down considerably since most owners would forsee little possibility of receiving a return on their investment if they chose to sell. Asking prices would have to be low to induce purchasers since they would be reluctant to locate in an area subject to periodic flood damages.

PROBLEM IDENTIFICATION

House Document 485, Eighty Ninth Congress, 2nd Session describes the study area prior to project authorization and prior to work completed under Section 208 and under Section 14 authority. Pertinent excerpts are as follows:

"The greater portion of Ottawa, Ohio, is susceptible to flood flows of the Blanchard River, part of which flows overland through Ottawa to Tawa Run during periods of high flow. High water is experienced annually along this river in Ottawa but the flooding is usually restricted to the immediate banks. Serious flooding, which inundated the residential and commercial streets by overland flow from the river, occurs on the average of once every three years. The worst flood of modern record occurred in 1913 and completely inundated the business and most of the residential districts for several days.

The commercial section of Ottawa is rather well diversified and is largely concentrated about Oak Street, the B&O Railroad, and the immediate cross streets. The village has developed on both sides of the Blanchard River but the central business district lies north of the river. The municipal buildings are centered in this northern commercial area of Ottawa. Residential developments surround the central business district radiating in all directions. Residential and agricultural areas have been developed on the south side of the river. The low agricultural lands are inundated almost annually.

The residential areas, immediately adjacent to the commercial district, are generally two-story dwellings with basements. Although these homes are not new, they are nevertheless sturdy, well-maintained structures. This type of development is typical of long-established communities in Ohio.

Three highway and two railroad bridges over the Blanchard River at Ottawa tend to obstruct flood flows. The bridge pier and abutments of the abandoned Perry Street bridge form obstacles to flood flows as does an abandoned railroad embankment just north of and parallel to Main Street. Furthest bridge to the east is the Detroit, Toledo, and Ironton Railroad bridge. The next bridge to the west is the Oak Street bridge. The Baltimore and Ohio Railroad bridge, about 200 feet downstream from the Oak Street bridge, has an inadequate waterway opening and is subject to ice and debris jams. These factors caused increased flood heights of about 1.2 feet east of the bridge in the February 1959 flood. The other two bridges on Highways 65 and 224 evidently had some affect on 1959 floods and probably would materially increase the height of a larger flood such as that of 1913. No significant ice jams have been observed on the Blanchard River at Ottawa in the past; however, ice jams have been a problem on the tributary streams which flows into the Blanchard River just upstream of Ottawa, Ohio."

Some of the identified problems described in the above description of the study area have been mitigated. The Perry Street bridge pier in the Blanchard River at Ottawa was removed in 1985 and clearing and excavation of shoals formed in vicinity of the Chessie Railroad (B&O) bridge and Oak Street bridge have been removed. In addition, a bank erosion problem along Route 15 in the northwest section of the village was corrected and completed in 1985. The existing Oak Street bridge is planned for replacement in 1987 that will increase the waterway opening by about 900 square feet. The Initial Appraisal report completed in 1984 recognized the need to remove the remains of the Perry Street bridge embankment on the north side of the Blanchard River and to remove the abandoned railroad embankment north of and parallel to Main Street. The inadequate waterway opening of the Chessie Railroad bridge (Baltimore and Ohio) was recognized and mitigative measures were recommended and became a feature of the authorized project plan as were levees and floodwalls to contain flood flows and prevent inundation of residential and business districts of the village of Ottawa, Ohio.

During this reevaluation study it has become apparent that local interests desire some sort of permanent relief from overbank flooding of the Blanchard River. Most preferred measures other than levees or floodwalls to reduce flooding. Some suggest snagging and clearing only, while others believe channelization and straightening the river by eliminating some bends would lower the flood profile considerably. Local interests also suggest the removal of the embankments of the Perry Street bridge and an abandoned railroad. Most of the local interests realize that the Chessie Railroad bridge is constrictive during flood flows but none have suggested a solution to the problem. All seem to indicate that the passage of trains through the village has become a part of community life and all seem willing to maintain this aspect of community life. The Chessie Railroad officials do not favor jacking or elevating the bridge as recommended in the authorized project plan and the cost could not be economically justified. Re-routing trains over the Grand Trunk Western bridge and then removing the Chessie bridge is less viable. The suggestion of a reservoir upstream of Ottawa was investigated. Information contained in HD 485, 89th Congress, 2nd Session is quoted below.

> "An investigation of potential upstream reservoir sites has revealed that storage possible in such reservoirs is limited. Seven sites were analyzed. Two individual sites are located on the main stem of the Blanchard River. The other sites are located on the tributaries; one each on Riley Creek, Dukes Run, Ottawa Creek, and Aurand Run. The combined storage capacity is very small when compared to the capacity needed to protect Ottawa. Reservoir sites upstream from Findlay, Ohio, which is upstream from Ottawa, were found to be impractical for the Findlay flood problem and would therefore be impractical for Ottawa."

Based on this information and a brief field trip in 1986 to observe topography, land use and stream flow, it was concluded that the conclusion reached in the previous investigation of upstream reservoirs was valid.

Early in this reevaluation study it became apparent that the flooding problem at Ottawa, Ohio, has continued but complete alleviation would not be economically feasible or would plans with levees and/or floodwalls be acceptable to local interests. This then caused the focus of reevaluation to be on measures that would be acceptable to the residents and business interests, reduce flood damages to the greatest extent possible, and result in a benefit cost ratio above unity. The public attitude has been one of patience, understanding and a sustained desire for a permanent and dependable project plan to reduce damages caused by overbank flooding of the Blanchard River.

PLANNING CONSTRAINTS

The major constraints to planning for a permanent project at Ottawa, as previously mentioned, are all three aspects that must be considered in development of any Federal water resource projects namely: economic justification, social acceptability, and environmental concerns. Each have a major impact related to a local flood protection project at Ottawa, Ohio. Early in the reevaluation study of the authorized project and during the development of the preliminary assessment report in 1985, it became apparent that the potential average annual benefits could only support a very small project with a rather low level of protection. This then became a major constraint related to sizing a project and in the type of measures that could be included in a plan of protection. The Chessie bridge also is a major constraint element. The waterway opening through the draw is a limiting factor related to sizing a project and to replace the bridge or provide a diversion channel is not economically feasible. The existing Chessie bridge is adequate for the trains that presently use the bridge but continues to constrict stream flow. The flat slopes of the river and topography greatly diminish the effectiveness of channel improvement work. The potential for upstream storage is also constrained by the topography. Besides these constraints both channelization and reservoirs are costly and neither could be economically justified because of the very limited amount of average annual damages that occur in the village of Ottawa.

On 25 September 1985, Corps personnel met with local officials in Ottawa, Ohio, to discuss project cost sharing and financing arrangements consistent with S 366, as reported out by the Senate Environment and Public Works Committee on July 18, 1985, that reflects a compromise previously reached between the Administration and the Senate majority leadership. Representatives of Putnam County, the Maumee Watershed Conservancy District (the identified local sponsor) and officials of the village of Ottawa were present. The Preliminary Assessment Plan was presented that would consist of: snagging and clearing, minor channel improvement, installation of storm sewer check valves in basement storm sewer lines of homes and low levees on the north and south banks of the Blanchard River. During the discussions related to the plan it became apparent that levees and floodwalls were not totally acceptable to local interests. The Mayor was asked about the authorized project plan developed in 1964 and his response was that the plan was too big, levees too high, too costly and it would segregate the community. The question was then asked about the levees in the Preliminary Assessment Plan and the answer was a weak maybe. They might be acceptable but he seemed unsure eventhough the levees would only be about 5 or 6 feet high. all of the local interest present favored snagging and clearing, channel work and something other than levees and floodwalls particularly if the levees were high. In summary, levees and floodwalls were not socially acceptable.

The Blanchard River is a significant fish and wildlife resource for both Putnam County, as well as northwestern Ohio. Modifications to this riparian corridor would result in a significant loss of important fish and wildlife habitat. In addition, a Federal endangered species - Indiana bat (Myotis sodalis) - has been documented as nesting in similar riparian habitat along the Little Auglaize River (approximately 15 miles west) and suitable summer nursery roost habitat has been identified in the project area.

The project area has been identified as an archaeologically sensitive area. Although no archaeological sites or historic properties listed in the National Register of Historic Places are located within the area, cultural material in the form of fire-cracked rock and large blocky chert and quartzite fragments were noted along the terraces on the north side of the Blanchard River. A cultural resources survey of the area has been conducted and concluded no archaeological sites or historic properties are present which could be adversely affected by the proposed project.

OBJECTIVES

The objectives of this study are to identify the best general plan(s) for satisfying the flood protection and related water resource needs at Ottawa, Ohio, based on physical constraints, the desires and preferences of local interests, and consistent with sound engineering, economic, and environmental principles.

As previously stated, overbank flooding of the Blanchard River at Ottawa, Ohio occurs almost annually and many times inundates about 300 acres or, about 20 percent of the total acreage of the village. Most of the inundation is in the urbanized section of the village. Continuing attempts by the village and local residents to floodproof and take emergency measures to sandbag and elevate merchandise and furnishings somewhat reduces damages but is neither totally reliable or effective. There is no assurance that the emergency responses will be timed to be most effective or when workers are available to assist.

The Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

a. Contributions to national economic development (NED) are:

(1) Increases in the net value of the national output of goods and services expressed in monetary units.

(2) The direct net benefits that accrue in the planning area and the rest of the nation.

(3) Increases in the net value of those goods and services that are marketed, and also those that may not be marketed.

b. Specific planning objectives were formulated to meet the Federal objective and specific State, and local concerns to alleviate problems and realize opportunities within the study area. The Buffalo District has established the following planning objectives to guide the formulation of improvement of the Ottawa, Ohio Flood Control project:

(1) Reducing flood damages in the village of Ottawa, Ohio caused by overbank flooding of the Blanchard River to the maximum extent possible consistent with current cost sharing arrangements and development of improvement plans acceptable to non-Federal interests.

(2) contributing toward community cohesion.

(3) Protecting health and safety.

(4) Protecting prime farmland.

(5) Improving water quality.

(6) Protecting cultural resources.

(7) Protecting fish and wildlife resources.

SECTION C
FORMULATION OF ALTERNATIVE PLANS

The formulation and evaluation of alternative plans in this report is based on the most likely conditions expected to exist in the future either with a project or without a project. The Without Project condition is the most likely condition expected to prevail if no action is taken. The With Project condition is the condition expected if a particular alternative plan were to be implemented. In this formulation process, an iternative procedure that provided for refinement, critique, and evaluation by the study team was used to narrow the range of alternatives assessed in further detail. Review and comments by other agencies, local levels of government, and the public were also solicited.

MANAGEMENT MEASURES

As the basis for formulating alternative plans, a broad range of technical and institutional measures, both structural and non-structural, which could possibly satisfy the planning objectives were investigated. The views of the interest groups were considered important. These measures were then formulated into alternative plans by considering the tests described in the next sub-section. Based on the objectives of this study three basic measures were identified.

a. Structural
b. Non-structural
c. No Action

In addition to the Authorized Project and the Preliminary Assessment Report Plans, five appropriate flood damage abatement measures were evaluated. These measures are:

- Clearing and snagging of the channel;
- Removing the abandoned railroad and Perry Street embankments;
- Levees and floodwalls;
- Establishing an efficient floodway on the right overbank area; and
- Cutoff channels.

Eight combinations of these measures were selected for additional evaluation. The management plans thus identified were:

- The Authorized Project Plan;
- The Preliminary Assessment Report Plan;
- Channel improvements to shorten or bypass stream meander loops;

- Clearing and snagging of the channel (Alternative I);
- Levees and floodwalls (Alternative II);
- Clearing and snagging with removal of the railroad and Perry Street embankments (Alternative III);
- Levees and floodwalls with removal of the embankments (Alternative IV);
- Clearing and snagging, levees and floodwalls, and removal of embankments (Alternative V);
- Clearing and snagging, levees and floodwalls, removal of embankments, and establishing the floodway (Alternative VI); and
- Clearing and snagging, removal of the embankments and establishing the floodway (Alternative VII).

Two additional measures, channel dredging and upstream impoundments, were also evaluated, but were eliminated from further evaluations. Dredging would be very costly, and would have very little influence on lowering the water surface of the Blanchard River in the vicinity of Ottawa because of the flat river slope. In addition, there are serious environmental impacts associated with dredging. There are no suitable upstream impoundment sites and the extremely high costs associated with an impoundment eliminated this measure from further evaluation. Figure 1, the Vicinity Map, shows the general locations of Ottawa and the Blanchard River.

In consideration of non-structural measures, six management measures were identified:

a. Flood warning and emergency measures;

b. Floodproofing;

c. Flood plain management;

d. Flood insurance;

e. Permanent evacuation; and

f. Relocation of structures.

In consideration of no action, this is a plan which would be implemented by non-Federal, or local interests with no Federal involvement.

PLAN FORMULATION RATIONALE

According to Principles and Guidelines, alternative plans are to be formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability.

a. Completeness is the extent to which a given alternative plan provides and accounts for all necessary investments or other action to ensure the realization of the planned effects.

b. Effectiveness is the extent to which an alternative plan alleviates the specified problems and achieves the specified objectives.

c. Efficiency is the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the environment.

d. Acceptability is the workability and viability of the alternative plan with respect to acceptance by State and local entities, the public, and compatibility with existing laws, regulations, and public policies.

Alternative plans formulated during this study take into consideration the requirement of recommending plan implementation including cost-sharing, the relationship of benefits to costs, and the Corps authority. Therefore, the Selected Plan recommended at the conclusion of this planning process will be those management actions capable of being implemented based on their institutional and technological feasibility (i.e., completeness, effectiveness, and efficiency), and on their acceptability to the affected public.

PLANS OF OTHERS

During the course of this study, numerous Federal and non-Federal agencies, and local interest groups were questioned about their plans, either enacted or proposed, as well as their policies and regulations that relate to the project area. The following are the comments of those who responded to the inquiries. The U.S. Department of the Interior, Fish and Wildlife Service expressed concern over the loss of riparian habitat that would be incurred by either clearing and snagging or by the destruction of wooded areas to accommodate levee construction. They recommended that levees be set back away from the river and from the riparian vegetation to minimize destruction of habitat and to maximize the area of floodway contained by the levees. They also emphasized the need to mitigate for the loss of habitat by replacing trees and shrubs and by seeding to create new habitat.

The Ohio Department of Natural Resources requested that only those snags which hinder stream hydraulics should be removed and standing trees should be spared unless they were in danger of falling into the stream. In reference to removal of the abandoned railroad embankment, ODNR recommended that the area be revegetated with species of value to wildlife. Like the Fish and Wildlife Service, they also believed that levees should be located as far from the river as practical, and that levees should be vegetated with species useful to wildlife. Finally, in commenting on the channel improvement to shorten the stream meander, they urged that only high flows be admitted to such a cutoff channel and that normal low flows be maintained in the present Blanchard River channel. They also asked that the associated vegetation be preserved.

The Ohio Environmental Protection Agency also expressed concern that any cutoff channel project should maintain low flows in the existing oxbow. They, like the other review agencies, believe that levee construction should be set back from the stream banks to the maximum possible extent.

DEVELOPMENT OF ALTERNATIVE PLANS

Candidate Plans.

The Authorized Plan, as presented in the Interim Survey Report (November 1964), would provide effective protection against a flood equal to the 1913 flood with a discharge of 29,000 cfs and a recurrence interval of 220 years. As a result of the Preliminary Assessment Report (July 1985), the recurrence interval of the 1913 flood was extended to about 1000 years. The high construction costs associated with this plan result in high average annual costs that greatly exceed the average annual damages causing the Authorized Plan to be cost-ineffective. During the study for the Preliminary Assessment Report, it was also determined that abandonment of the Chessie Bridge and rerouting of rail traffic over the Grand Trunk Western (formerly DT&I) bridge was not feasible. In addition, the stream channel diversions called for in that plan would be objectionable from an environmental viewpoint and mitigation of the ecological impacts would, at best, be difficult and costly. Because there were no other feasible variations on the Authorized Plan, and because of its inefficiency based on costs and unacceptability from an environmental viewpoint, it was not considered further.

The Preliminary Assessment Report presented a plan of improvement that included earth levees, a minor channel improvement, snagging and clearing and installation of check valves in the storm sewer lines of homes. The plan, if constructed, would provide protection from floods up to a 25-year recurrence interval. With improved mapping that became available during this reevaluation study, however, it was possible to more accurately determine the extent of flooding from a 25-year flood. It became apparent that the levees proposed in the Preliminary Assessment Report were not long enough to provide effective protection as planned. This was true along the north bank of the Blanchard River above Oak Street, the south bank near Oak Street, and for a considerable length along Tawa Run.

To provide the planned 25-year level of protection, the levee on the north bank of the Blanchard River would have to extend nearly to the Grand Trunk Western Railroad bridge and interior drainage requirements would be complex, as much of the drainage in town would be trapped behind the levees. There is limited ponding storage capacity, and gated conduits through the levees or even pump stations would be required to handle high-magnitude floods. The Preliminary Assessment Report plan was dropped from further consideration and became infeasible due to the additional cost of levees, and interior drainage requirements. In addition, this plan lacks support from the townspeople.

A long meander exists in the Blanchard River channel downstream of the abandoned railroad embankment and in the area of Tawa Run. One possible alternative is a cutoff channel through an existing depression that would eliminate 4,840 feet of travel distance for flows in the left overbank. This cutoff would be designed to function only when carrying large flood flows. Normal low flows would continue in the existing Blanchard River channel. This alternative would provide minimal relief from flooding, however, and the benefit would be most pronounced for small floods. Unlike channel clearing, however, the maximum benefit would apply at the downstream end of the project and would decrease to virtually no lowering of the flood level at the upstream end of the project. The extremely flat slope and low velocities, even in an improved channel, of the river in the vicinity of Ottawa are not conducive to this kind of approach and this alternative was dropped from further consideration.

Seven other plans, shown on Figures 2 through 8, were screened to eliminate those plans which were clearly infeasible economically and/or technically. For all structural plans, the HEC-2 computer program "Waters Surface Profiles" was used to determine the resulting water surface elevations. Table 1 is a summary of the water surface elevations for existing conditions and the resulting differences due to the various alternatives, as determined at the Index River Station 22.82, located 270 feet upstream of the Oak Street bridge.

Clearing and snagging of the channel (Alternative I) provides a small but cumulative decrease in the flooding levels through Ottawa for the lower-magnitude events. For rarer events, the decrease is less pronounced. The clearing and snagging was assumed to begin at the downstream corporate limit of the village of Ottawa, and extended to just upstream of the Grand Trunk Western Railroad Bridge. Alternative I is shown on Figure 2. For the 2-year event, the cumulative decrease computed at the Index Station 22.82 is -0.7 feet. At the same station, the decrease for the 500-year event is -0.2 feet. The June 1981 flood would have been approximately 0.5 foot lower at the Oak Street bridge. Due to its temporary nature and continual maintenance costs, and the relatively low reduction in damages, clearing and snagging was found to be economically infeasible.

Levee/floodwall alternatives were analyzed for four levels of protection - the 10-year, 25-year, 50-year, and 99-year events. Levees and floodwalls were proposed for only the right (north) bank of the Blanchard River. The ground and subsurface conditions on the left (south) bank are extremely poor for levee construction, due to the presence of spoil disposal sites along the levee alignment, interior drainage problems, and poor drainage. Induced damages occur on the left bank areas under the levee plan (Alternative II) for levels of protection greater than 25 years, and significant induced damages occur for a degree of protection greater than 50 years (see Table 1). Mitigation of these induced damages would not be cost-effective and would be difficult to implement. Providing protection for only a portion of the town (right bank) at the expense of the rest (left bank) of the town would also not be acceptable to the people, as evidenced by comments received at the

Table 1 - Cross Section 22.82 Just Upstream of Oak Street
Differences in Water Surface Elevation from Existing Conditions

Return Period (Years)	Flood Flow (cfs)	Water Surface Elevation Existing Conditions (ft, NGVD)	Alternative						
			I	II	III	IV	V	(Plan A) VI	(Plan B) VII
2	7,350	721.8	-0.7	-0.1	-0.7	-0.4	-1.0	-1.2	-1.2
5	10,000	723.9	-0.6	-0.1	-0.7	-0.6	-1.1	-1.4	-1.4
10	12,200	725.4	-0.6	-0.1	-0.7	-0.6	-1.1	-1.5	-1.4
25	15,000	727.2	-0.6	-0.1	-0.6	-0.8	-1.2	-1.6	-1.5
50	17,000	728.3	-0.5	+0.1	-0.5	-0.7	-1.1	-1.5	-1.5
100	19,700	729.5	-0.5	+0.6	-0.2	-0.7	-1.1	-1.4	-1.5
200	22,400	730.4	-0.3	+1.0	+0.6	-0.3	-0.7	-1.0	-1.5
500	26,300	731.5	-0.2	+1.5	+1.1	+0.6	+0.3	-0.1	-1.2
June 1981	17,900	728.6							

public workshop held on 19 March 1986. It was therefore considered necessary to incorporate various other measures with any levee/floodwall plan so as to reduce damages which could otherwise occur to portions of the town on the south bank. The levee/floodwall plan, Alternative II, as shown on Figure 3, was found to be economically infeasible.

The levee plan (Alternative II) was then combined with the clearing and snagging plan and with removal of the abandoned railroad and Perry Street embankments (Alternatives III, IV, and V). Flood depths would generally decrease from about 0.2 foot to 1.2 feet at River Station 22.82, although an increase in flood depths would occur for rare events (greater than 100-year) (refer to Table 1). This is attributed to the greater influence of the levees when more flow is in the overbanks. Induced damages would still occur, but they would be postponed until the very rare events. Levee heights for Alternative II would be reduced by one foot or less throughout the project area by including snagging and clearing. Alternatives III, IV, and V are shown on Figures 4 through 6, respectively.

Clearing and snagging and the removal of the abandoned railroad and bridge approach embankments would provide a small amount of relief from flooding problems within the village. The channel banks and the overbank areas are choked with dense undergrowth in many areas and large trees along the banks often fall into the stream, creating obstructions to flow. In addition, the abandoned railroad embankment on the east bank of the river below the Main Street bridge forces the river to meander for an additional distance of 1200 feet to the west end of the embankment. Overbank flows which could otherwise flow directly across the agricultural fields are forced along the same meander with associated hydraulic losses. A similar, but much smaller, effect occurs at the former bridge on Perry Street where a short approach embankment inhibits flow. The removal of both embankments, combined with a minimal amount of snagging and clearing to improve the conveyance capacity of the Blanchard River would result in a decrease in flood heights in Ottawa. The effect would be small in the downstream reaches near Tawa Run, but would increase upstream to a total reduction of flood heights of about one foot in the vicinity of the Oak Street bridge. It is a viable alternative to reduce flood damages and enjoys support among the public. It is ineffective, however, in providing protection against all but small and frequent floods. Alternatives III, IV, and V were found to be economically infeasible.

Alternative VI, a variation on the Preliminary Assessment Report Plan and Alternatives I through V, inclusive, involves a combination of earth levees and floodwalls along the right bank of the Blanchard River from the Grand Trunk Western railroad bridge downstream to Tawa Run and then upstream on both banks of Tawa Run to the Chessie System bridge. This would be combined with some clearing and snagging and removal of the abandoned railroad and Perry Street embankments to mitigate against induced damages to unprotected properties along the south bank of the Blanchard River in the area between Oak Street and opposite Perry Street. The removed embankment material would serve as a ready source of borrow material for the levees. In addition, the right overbank area in the vicinity of the removed embankments would be maintained as a floodway. Sand-bag closures would be required across Oak Street and Chessie Railroad bridges over the Blanchard River and across Perry, Elm, and Main Streets along Tawa Run. Alternative VI is shown on Figure 7.

Flood levels would be reduced by one foot or more over much of the project area. The June 1981 flood, for example, would have been approximately 1.5 feet lower in stage as measured at River Station 22.82. Of all alternatives containing levees and floodwalls, Alternative VI provides the greatest degree of flood damage reduction on the south bank of the Blanchard River, but was found to be economically infeasible.

As mentioned previously, there is no local support for any levee plan. Minor grading and filling to eliminate poorly-drained areas would be acceptable to the residents, but such measures provide very little or no flood damage reduction. As a levee height increases to provide a greater level of protection, the base width also increases and it then becomes necessary, because of space constraints, to make use of floodwalls that require less space but are more costly than levees. Alternative VI incorporates both levees and floodwalls, plus all the other measures considered in Alternatives I-V, inclusive. Alternative VI was analyzed in detail to illustrate the cost impacts of all measures considered in Alternatives I through VI inclusive.

Alternative VII is basically Alternative VI without the levees or floodwalls. The combination of channel clearing and snagging, removal of the abandoned embankments, and creation of the floodway provides the greatest reduction of the water surface elevations of any of the plans except for Alternative VI. Its major drawbacks are its environmental impacts and high maintenance costs. Significant flood damages under this plan would begin at a flood frequency between 10 and 25 years as compared to 5 years under existing conditions. The minor damage threshold would be shifted from the existing 2-year frequency to approximately a 5-year event. As a comparison, the 1981 flood level would be reduced by 1.5 feet, thereby reducing damages by approximately $2,000,000. However, maintenance will be required on an "as-needed" basis as well as on a periodic basis, and thus the costs may be highly variable from year to year. If a flood similar to the 1981 event occurred again, most homes and businesses in the center section of the village that experienced first floor flooding with a depth up to 1.5 feet would not have water on their first floor is Alternative VII were constructed. On this basis, the approximate degree of protection is estimated to be 10 years. Alternative VII is a viable plan. Alternative VII is presented on Figure 8.

Removal of the embankments and the improved floodway are important elements of both Alternative VI and Alternative VII. Figure 9 shows typical cross sections of the railroad and Perry Street embankments, and a representative section of the improved floodway.

Flood warning and responsive emergency measures are possible non-structural alternatives. The relatively large watershed of the Blanchard River and flat river slopes result in floods that build slowly enough to permit some advanced warning and emergency responses. Sand-bagging operations were credited with preventing much damage in the 1981 flood. Quoting the Putnam County Sentinel (June 17, 1981), "Rescue efforts were handled out the city building and hundreds of volunteers helped move personal belongs, sandbag business buildings and move merchandise and business equipment. Most of their efforts were rewarded as most of the stores escaped the raging waters which stopped within one inch of going inside." Based upon that experience, the installation of an automated stream gage on the Oak Street Bridge and automating the Findlay gage would provide earlier warning of impending floods and is a viable alternative. In addition, property owners could be furnished plastic creates to elevate household goods and merchandise.

A second non-structural alternative is floodproofing of affected buildings. A large number of buildings suffer inundation from major floods but are old and are of wood-frame construction. It is therefore infeasible to apply effective floodproofing to every structure. Also, a program of floodproofing that encompassed the entire village could, during a large flood, probably leave large numbers of people isolated in some buildings. This is contrary to the general guidance and policy contained in ER 1105-2-20. Floodproofing may also be done only on buildings that are structurally capable of withstanding the potential hydrostatic pressures, otherwise the building could collapse and pose a greater threat to human life than the flood. Businesses in the area have already implemented a floodproofing program by locating valuable inventory as high as possible and by having plans to move merchandise in advance of a flood. These actions were credited with preventing much damage in the 1981 flood. There are some commercial and public structures of solid masonry construction that could be effectively floodproofed. Therefore, permanent-type floodproofing should be considered only for a select number of structures which are of sound construction and which could not be otherwise protected. This alternative was not considered further.

Floodplain management is a possible non-structural alternative that can be particularly effective for preventing damages to new buildings constructed in the floodplain. Zoning and building codes have already been approved within the village that effectively regulate new construction and which require consideration of the 100-year flood elevation. Floodplain management, however, is ineffective in preventing future damages to existing buildings that are vulnerable to flooding. Therefore, since the village already has an active floodplain management program, and because existing damages are not alleviated by this method, this alternative was not considered further.

A fourth non-structural alternative is flood insureance. A flood insurance study of the village has been completed and Ottawa is enrolled in the National Flood Insurance Program. One-hundred-twenty-six (126) structures within the village are now covered bvy flood insurance policies. This alternative provides relief to the victims of flooding but does not protect against future damages. Because the village is already enrolled in the National Flood Insurance Program, this alternative was not considered further.

Permanent evacuation of the village of Ottawa is a non-structural alternative that would effectively eliminate all future damages and danger to loss of life. However, the costs would far exceed the benefits. The village is a thriving commericial center, and the local interests would strongly oppose this alternative. Otherwise, this alternative would have been implemented.

Another non-structural alternative would involve relocation of affected structures to sites located beyond the danger of flooding. Because of the large number of structures that are involved in major floods, this alternative is impractical as a general solution to flooding in Ottawa. In selected cases, however, it can be a viable alternative in combination with structural measures where the cost of relocating some structures may be less than the cost of their outright purchase or the cost of routing a line of protection around them.

The final plan evaluated was the "No-Action" plan, in which present damages may be expected to continue.

PLANS DROPPED FROM FURTHER CONSIDERATION

Eleven structural plans were evaluated in this study. They are:

- the Authorized Plan;
- the modified Authorized Plan (re-routing of the railroad traffic);
- the Preliminary Assessment Plan;
- channel bypass and cutoff plan;
- Alternative I;
- Alternative II;
- Alternative III;
- Alternative IV;
- Alternative V;
- Alternative VI; and
- Alternative VII.

Of these plans, all but one, Alternative VII, were eliminated as being infeasible because of technical and/or economic reasons, and thus did not satisfy the formulation criteria.

One non-structural plan, early flood warning by stream gage alarms, was also evaluated. This plan, by itself, was determined to be economically and technically feasible.

On 19 March 1986, a public workshop was held in Ottawa to present all the plans considered to date in the re-evaluation study. The residents and local officials present were unanimous in opposing levees and floodwalls. Reasons given by the residents were the required heights, the unsightliness, the extent of area required, exacerbation of existing problems of interior drainage, and the lack of uniform protection for the entire town. Measures suggested by the townspeople included dredging, clearing and snagging of the channel, additional outlets through the railroad and road embankments, and an upstream reservoir. Dredging and upstream impoundments have been found to be technically and economically infeasible. The other measures, by themselves, are also not feasible.

Alternative VII, which consists of channel clearing and snagging, removal of the abandoned embankments, and creation of a floodway, was the plan received most favorably by the townspeople. Their major objection to this plan would be the maintenance costs required by these measures. The comparatively low initial cost of this project could be offset by high recurring cost for maintenance. These maintenance costs would, however, exist for all of the structural alternatives evaluated. Alternative VII also has significant environmental impacts.

The south bank of the Blanchard River is somewhat unsuitable for a levee/floodwall plan, due to its past use as a disposal site and the costly interior drainage measures that would be required. Construction costs related to uncertainties in levee/floodwall foundations would be prohibitive, and a pumping station would probably be required to discharge the drainage collected along State Route 65 and adjacent areas. Non-structural measures were then considered for mitigation. Residences in this portion of Ottawa are almost exclusively of wood-frame construction, and not capable of withstanding hydrostatic pressures without increasing the risk of injury to the people. Raising the large number of homes on the south bank of the river could not be economically justified. Any alternative which would only provide protection to the village on the north bank of the river while inducing damages on the south bank would not be acceptable. A non-structural plan for people on the south bank would be viewed as a token gesture only, and could be divisive within the community. Therefore, all levee alternatives that would require mitigation of flood damages on the south bank were dropped from further consideration.

Clearing and snagging (Alternative I) would provide a relatively small reduction in damages. First costs for this plan would be high, and annual maintenance costs could approach the first costs. The reduction in damages would not exceed the costs, and this plan was dropped from further consideration.

Alternatives III, IV, and V would include measures to offset the increase in water surface elevations caused by levees only, as considered for Alternative II. However, even without the costs of mitigation, analyses showed that the reduction in damages was not sufficient to cover the construction costs of the levees, floodwalls and the architectural, engineering, and design (AE&D) costs. These Alternatives and Alternative II were therefore not considered further.

Alternative VI, which includes channel clearing and snagging, removal of the abandoned railroad and Perry Street embankments (with relocation of the power transmission line), establishment of an improved floodway on the right overbank, and levees and floodwalls, provides the greatest reduction of flood levels of any plan with levees. A detailed economic evaluation of this alternative was completed to determine whether a project would be feasible.

Alternative VI consists of five (5) main components:

- Relocation of the transmission line;

- Removal of the abandoned railroad and Perry Street embankments;

- Clearing and snagging of the channel;

- Levee/floodwall protection, extending from Tawa Run to the Grand Trunk Western Railroad bridge; and

- Establishment of an improved floodway along the right overbank of the Blanchard River, from Tawa Run to the Elm Street bridge over the river.

Figure 7 shows the general alignment and detailed components of this plan.

Four levels of protection were analyzed in detail (see Table 2, Section D) — the 10-, 25-, 50-, and 99-year. For a level of protection greater than the 10-year event, the levee/floodwall must extend to the Grand Trunk Western Railroad bridge. For the 10-year and lesser levels of protection, selective filling of low areas is considered sufficient to provide the necessary freeboard. For levee/floodwall alternatives, all levels of protection include three (3) feet of freeboard for levees, and at least two (2) feet for floodwalls. Upstream of the Oak Street bridge, freeboard has been set at least 3 feet. The past history of blockage at the existing Oak and Chessie System bridges, plus flow paths which permit overbank flows to be directed along he Chessie tracks to Tawa Run, indicate that this area is critical. Flows leaving the channel and immediate floodplain areas upstream of Oak Street may follow independent paths into town and cause flooding far from the river. It is this occurrence that requires the extension of the levee to the Grand Trunk Western Railroad bridge. For floods less than a 50-year event, the overbank flooding is generally restricted to houses in and along the floodplain. For greater floods, there is an increasing chance of flow escaping into town. The cost-effectiveness of each level is discussed in detail in the Economics Appendix (B) and the Cost Estimates Appendix (C).

Clearing and snagging of the channel was considered for the channel between River Mile (RM) 19.55, the downstream corporate limit, to RM 24.39, 380 feet upstream of the Grand Trunk Western Railroad bridge. The downstream limit was selected to provide the greatest effect in reducing flood elevations. Clearing and snagging would be extended upstream of town to remove potential obstructions.

The Ohio Power Company has a 69-kV transmission line on wood poles along the abandoned railroad embankment. Relocation of this line is required prior to removal of the embankment. The Perry Street embankment is much smaller than the railroad embankment, and no relocations are necessary. The materials in both embankments, excluding the topsoil, is considered suitable for use in the levees, based on soil sample and boring log data, included in Appendix D.

The levees would be constructed of on-site materials, with borrow from the embankments and adjacent lands. Preliminary results indicate that satisfactory material is available on-site, and would be less costly than using off-site material. The length of the levee/floodwall protection would vary, depending upon the degree of protection, but generally would extend from the Chessie Railroad bridge over Tawa Run upstream to the Grand Trunk Western Railroad bridge over the Blanchard River, a total of 7,550 feet (see Figure 7). For 10-year protection, selective filling of low areas would suffice for much of the reach upstream of the Oak Street bridge. Floodwalls would be used in areas where there is insufficient space for constructing levees. Use of floodwalls in several locations was determined to be more cost-effective and socially acceptable than moving homes or relocating people. Floodwalls would be constructed along the left bank of Tawa Run between Elm and Perry Streets, and along the right bank of the Blanchard River between the Chessie and Oak Street bridges (by a feed mill), behind the County Extension-Soil Conservation Service building, behind some residences on Second Street and along Thomas Street to the Grand Trunk Western Railroad bridge.

The floodway on the right overbank extends from Tawa Run upstream to the Elm Street bridge over the Blanchard River, and from the river to the levee (see Figure 7). Approximately 100 acres comprise the floodway on the right overbank from Tawa Run to the Elm Street Bridge over the river. It was considered necessary that the floodway would be kept clean of woody vegetation, although its use for agricultural crops such as soybeans and field corn may be acceptable.

Alternative VII contains all the elements of Alternative VI except for levees and floodwalls. These elements -- clearing and snagging of the channel, relocation of the power line, removal of the abandoned railroad and Perry Street embankments, and the more efficient floodway, shown on Figure 8 -- would result in reduction of flood stages at the Oak Street Bridge of 1.2 to 1.5 feet. The absence of levees and floodwalls in Alternative VII would result in damages occurring at significantly lower flood stages than for Alternative VI.

Clearing and snagging of the channel would extend from the downstream corporate limit at RM 19.55 to 380 feet upstream of the Grand Trunk Western Railroad bridge, RM 24.39. The extent of clearing and snagging in Alternative VII is identical to that for Alternative VI.

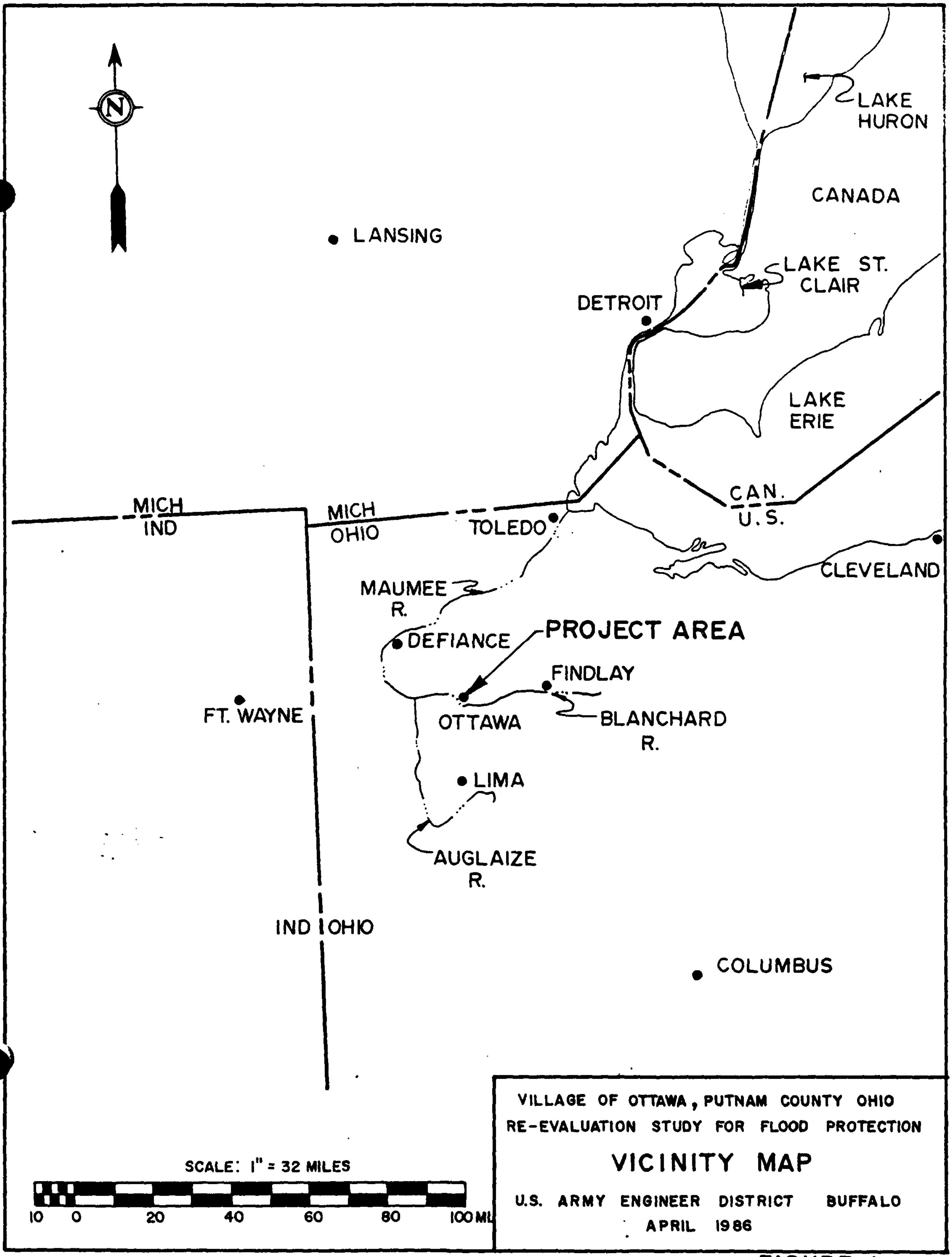
Relocation of the Ohio Power Company's 69-kV transmission line would be to a parallel alignment, the same as for Alternative VI. Removal of the embankments would be accomplished by using the embankment material to fill in low areas and to improve drainage to the Blanchard River in the right overbank. The topsoil in the right overbank would first be stripped, then replaced over the spread embankment materials, to preserve the agricultural capability of the land.

The improved floodway would be the same as for Alternative VI, extending from Tawa Run to the Elm Street bridge over the Blanchard River.

Alternative VII would be acceptable to the residents of Ottawa. Implementation of Alternative VII would result in less disruption of the community than any alternative with levees or floodwalls. Maintenance costs may be high, as Alternative VII is a "preventative" plan. Of the eleven structural plans evaluated, only Alternative VII is viable both economically and technically.

Neither the Authorized Plan in any form nor the Preliminary Assessment Plan was determined to be viable. The townspeople would not support any plan which includes levees or floodwalls. Clearing and snagging and channel cutoffs were determined to be not economically feasible. Alternative VII was the only structural plan which was determined to be feasible both technically and economically. However, Alternative VI was also evaluated in detail, to demonstrate its cost-ineffectiveness.

The non-structural plan, consisting of a flood warning system with temporary relocation of merchandise and household items, was found to be feasible and viable technically. The plan by itself was determined to be economically feasible, but would be a supplement to a structural plan. The plan would be ineffective by itself in reducing content damages.



VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION

VICINITY MAP

U.S. ARMY ENGINEER DISTRICT BUFFALO
APRIL 1986

FIGURE 1

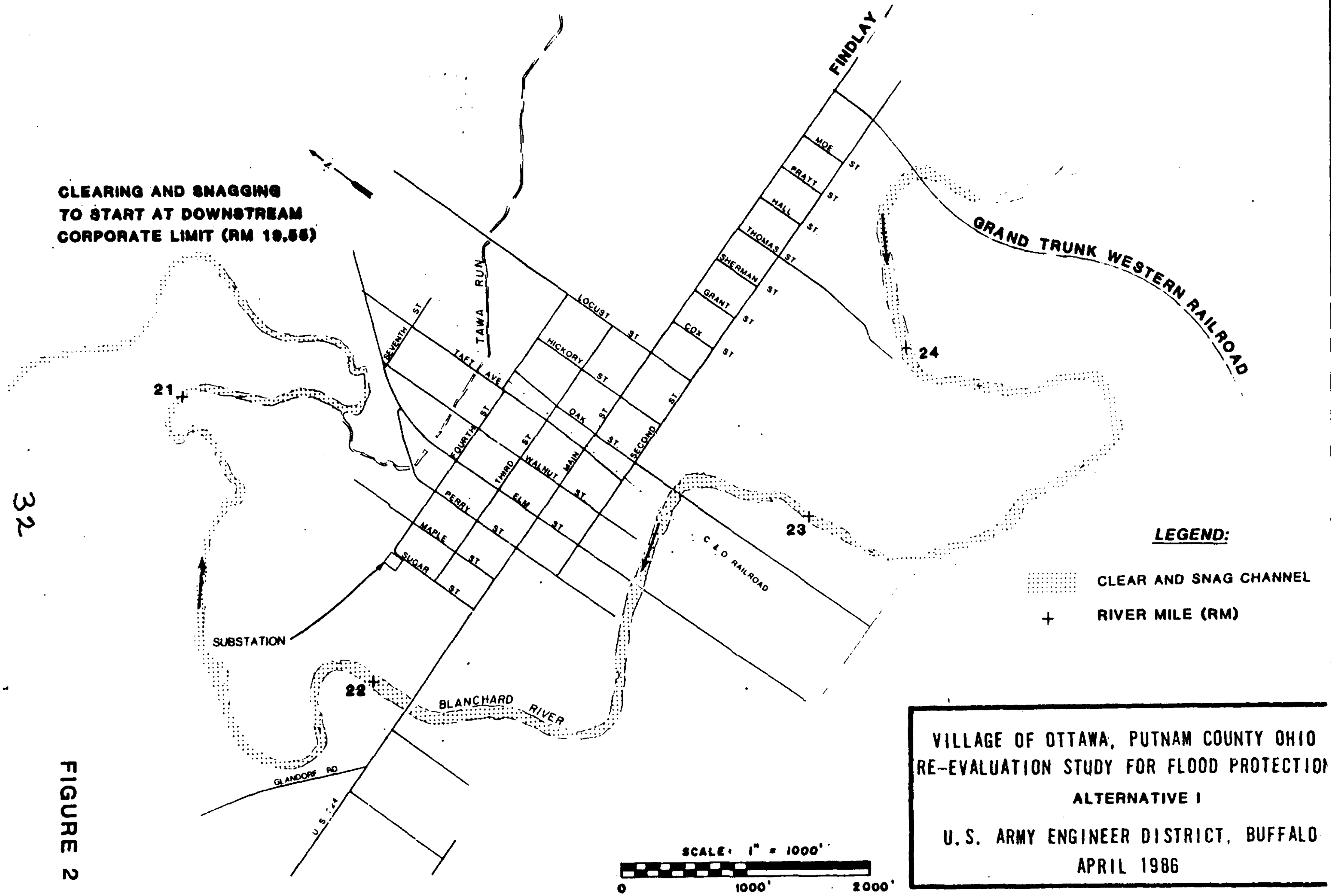

CLEARING AND SNAGGING
TO START AT DOWNSTREAM
CORPORATE LIMIT (RM 19.55)
FINDLAY
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
LOCUST ST
HICKORY ST
OAK ST
SECOND ST
MAIN ST
WALNUT ST
THIRD ST
ELM ST
FOURTH ST
TAFT AVE
SEVENTH ST
PERRY ST
MAPLE ST
SUGAR ST
TAWA RUN
GRAND TRUNK WESTERN RAILROAD
C & O RAILROAD
BLANCHARD RIVER
SUBSTATION
GLANDORF RD
U.S. 24
21
22
23
24
LEGEND:
CLEAR AND SNAG CHANNEL
RIVER MILE (RM)
SCALE: 1" = 1000'
0
1000'
2000'
VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
ALTERNATIVE I
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986

FIGURE 2

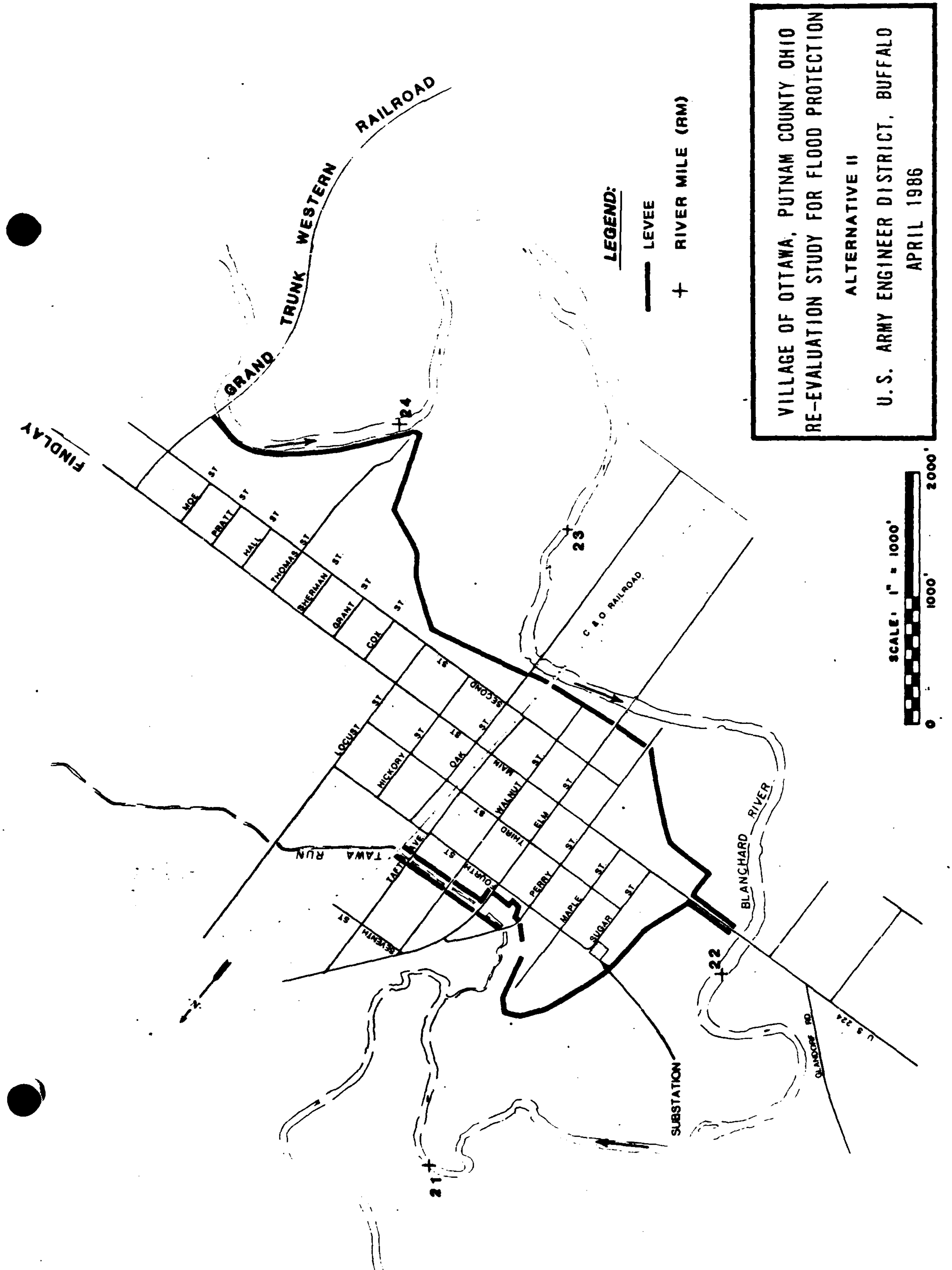

VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
ALTERNATIVE II
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986
LEGEND:
LEVEE
+ RIVER MILE (RM)
SCALE: 1" = 1000'
0
1000'
2000'
GRAND TRUNK WESTERN RAILROAD
FINDLAY
C & O RAILROAD
BLANCHARD RIVER
TAWA RUN
SUBSTATION
U S 224
BLANCHARD RD
24
23
22
21
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
SECOND ST
LOCUST ST
HICKORY ST
OAK ST
MAIN ST
WALNUT ST
THIRD ST
ELM ST
PERRY ST
MAPLE ST
SUGAR ST
TAFT AVE
FOURTH ST
SEVENTH ST
N

FIGURE 3

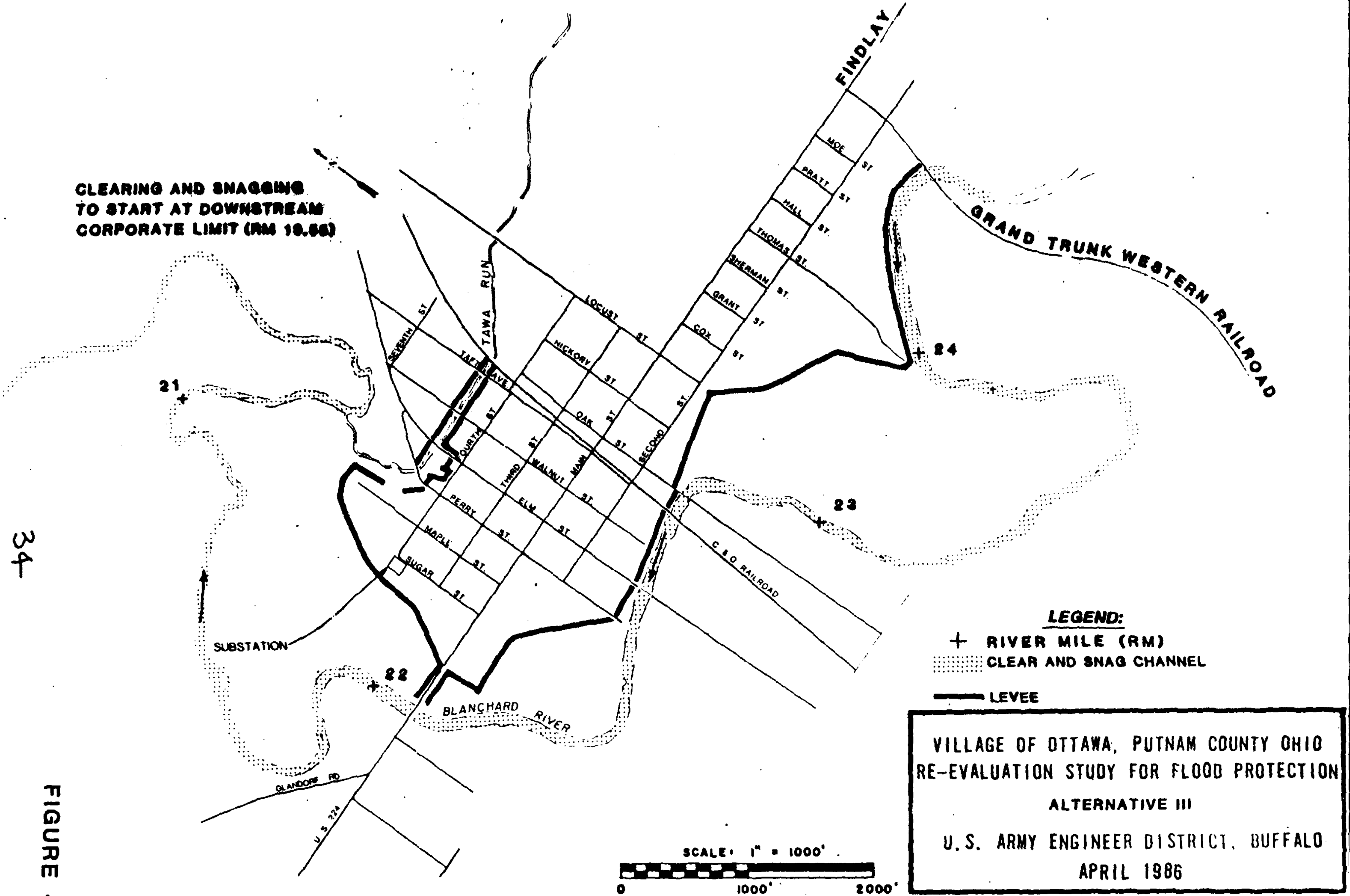

CLEARING AND SNAGGING
TO START AT DOWNSTREAM
CORPORATE LIMIT (RM 19.56)
FINDLAY
GRAND TRUNK WESTERN RAILROAD
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
LOCUST ST
HICKORY ST
OAK ST
SECOND ST
MAIN ST
WALNUT ST
THIRD ST
FOURTH ST
TAFT AVE
SEVENTH ST
PERRY ST
ELM ST
MAPLE ST
SUGAR ST
TAWA RUN
C & O RAILROAD
SUBSTATION
BLANCHARD RIVER
GLANDORF RD
U S 224
21
22
23
24
LEGEND:
RIVER MILE (RM)
CLEAR AND SNAG CHANNEL
LEVEE
SCALE: 1" = 1000'
0
1000'
2000'
VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
ALTERNATIVE III
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986

FIGURE 4

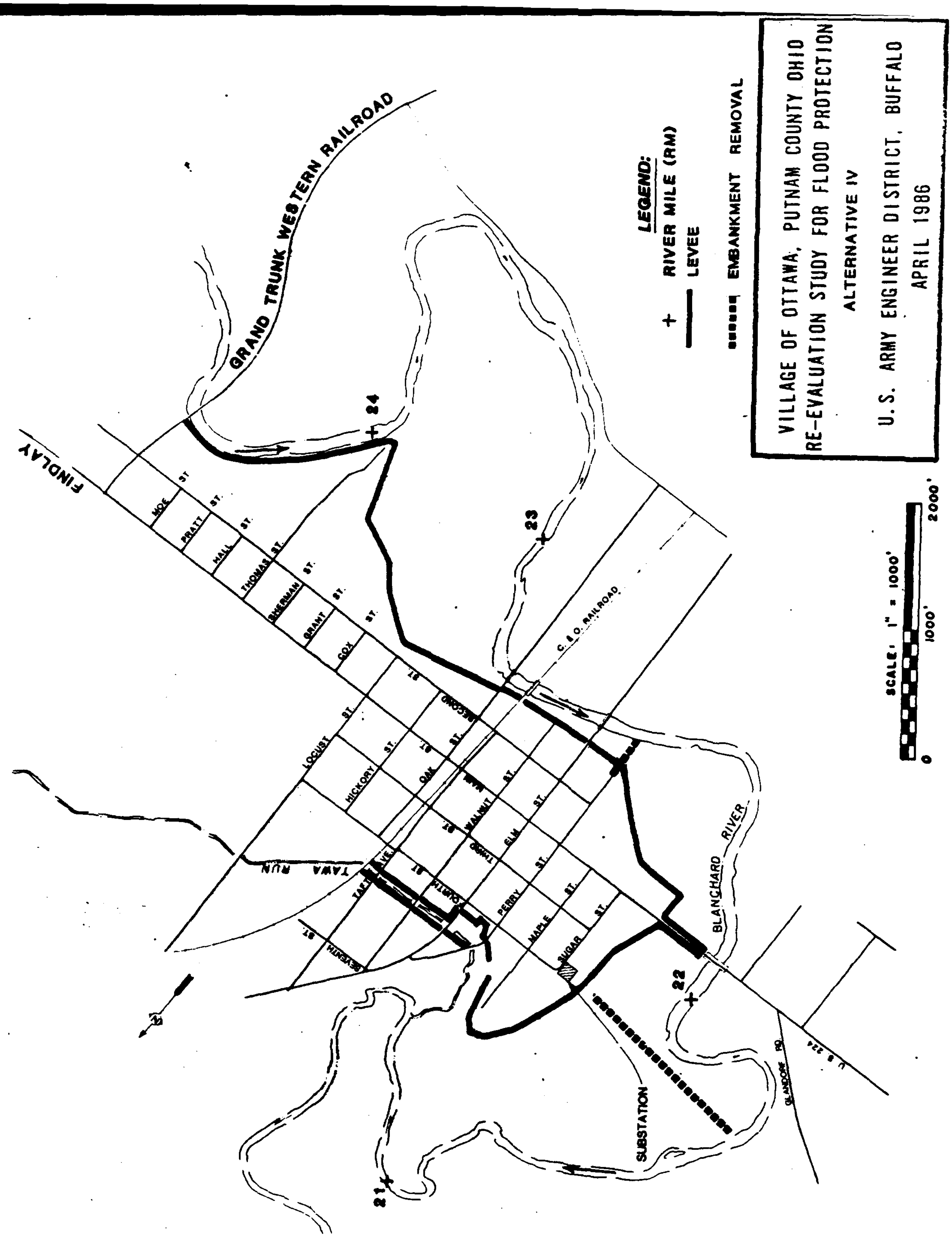

VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
ALTERNATIVE IV
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986
LEGEND:
RIVER MILE (RM)
LEVEE
EMBANKMENT REMOVAL
SCALE: 1" = 1000'
0
1000'
2000'
GRAND TRUNK WESTERN RAILROAD
FINDLAY
C. & O. RAILROAD
BLANCHARD RIVER
TAWA RUN
SUBSTATION
GLANDORF RD.
U S 224
24
23
22
21
MOE ST.
PRATT ST.
HALL ST.
THOMAS ST.
SHERMAN ST.
GRANT ST.
COX ST.
SECOND ST.
LOCUST ST.
HICKORY ST.
OAK ST.
MAIN ST.
WALNUT ST.
ELM ST.
THIRD ST.
FOURTH ST.
TAFT AVE.
PERRY ST.
MAPLE ST.
SUGAR ST.
SEVENTH ST.

FIGURE 5

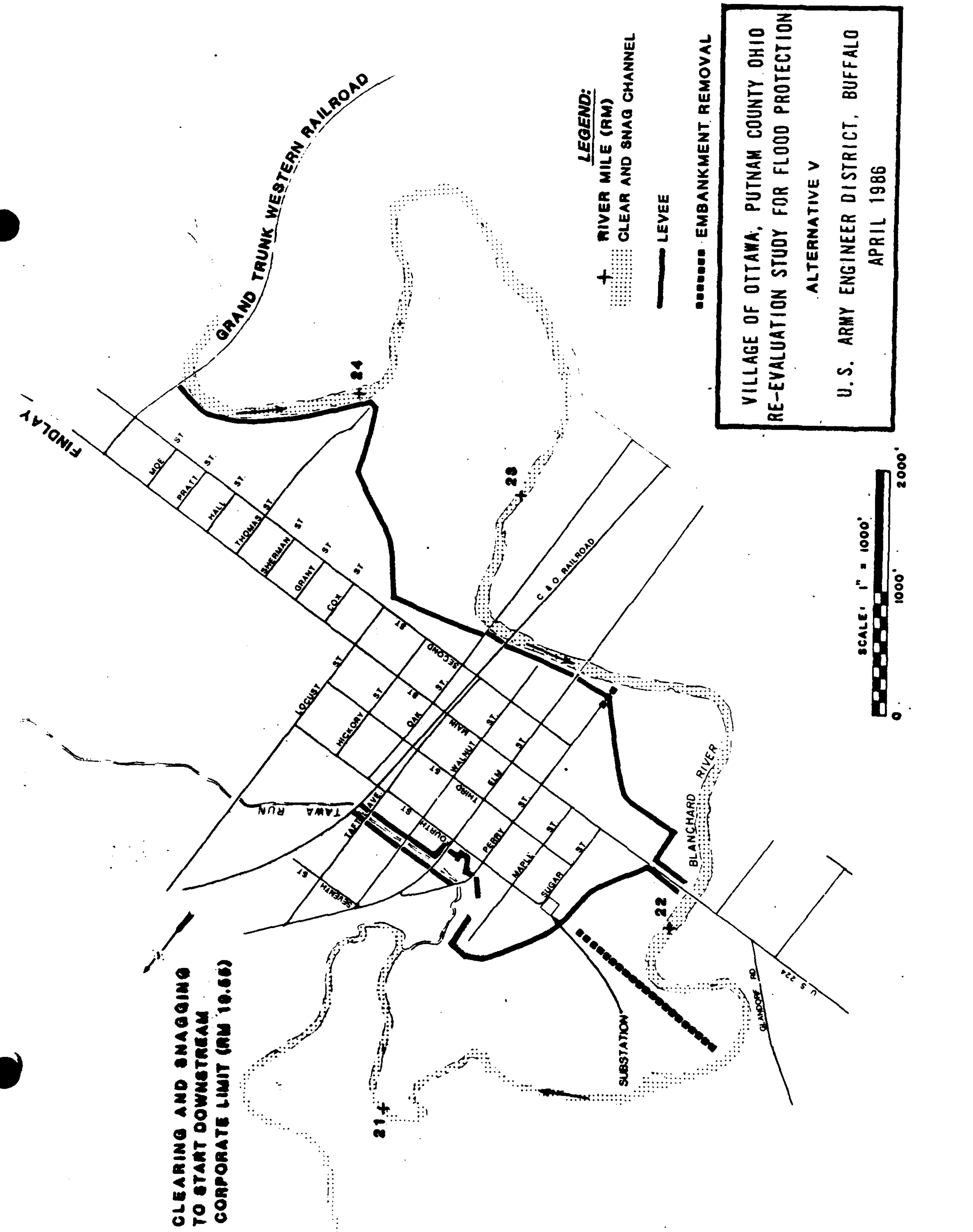

VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
ALTERNATIVE V
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986
LEGEND:
RIVER MILE (RM)
CLEAR AND SNAG CHANNEL
LEVEE
EMBANKMENT REMOVAL
SCALE: 1" = 1000'
0
1000'
2000'
GRAND TRUNK WESTERN RAILROAD
C & O RAILROAD
FINDLAY
BLANCHARD RIVER
TAWA RUN
SUBSTATION
GLANDORF RD
U S 224
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
LOCUST ST
HICKORY ST
OAK ST
MAIN ST
WALNUT ST
ELM ST
PERRY ST
MAPLE ST
SUGAR ST
SECOND ST
THIRD ST
FOURTH ST
SEVENTH ST
TAFT AVE.
21
22
23
24
CLEARING AND SNAGGING
TO START DOWNSTREAM
CORPORATE LIMIT (RM 19.66)

FIGURE 6

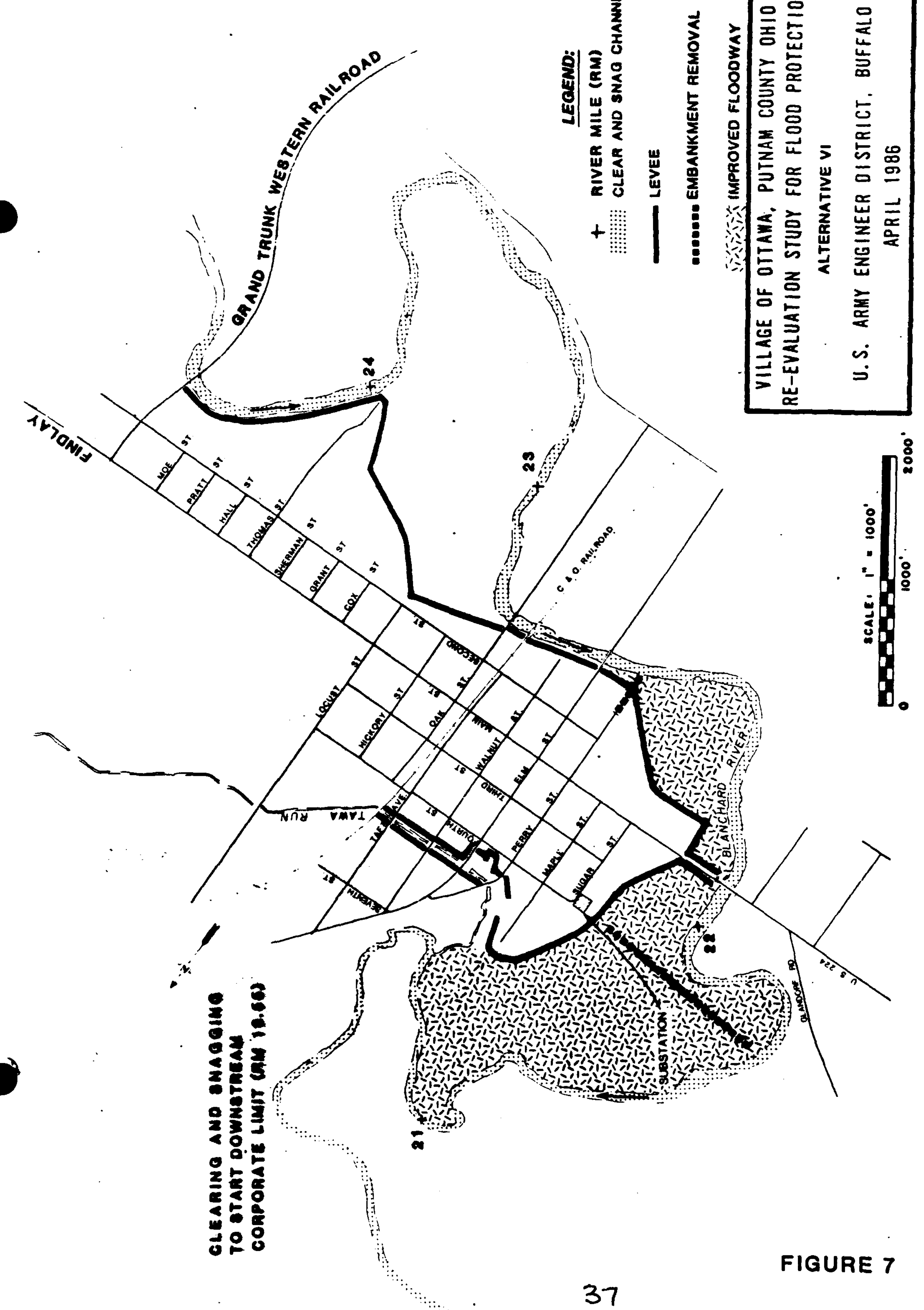

LEGEND:
+ RIVER MILE (RM)
CLEAR AND SNAG CHANNEL
LEVEE
EMBANKMENT REMOVAL
IMPROVED FLOODWAY
VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
ALTERNATIVE VI
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986
SCALE: 1" = 1000'
0
1000'
2000'
GRAND TRUNK WESTERN RAILROAD
FINDLAY
C & O RAILROAD
BLANCHARD RIVER
TAWA RUN
SUBSTATION
GLANDORF RD
U S 224
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
SECOND ST
LOCUST ST
HICKORY ST
OAK ST
MAIN ST
WALNUT ST
ELM ST
THIRD ST
PERRY ST
MAPLE ST
SUGAR ST
FOURTH ST
TAFT AVE
SEVENTH ST
21
22
23
24
CLEARING AND SNAGGING
TO START DOWNSTREAM
CORPORATE LIMIT (RM 19.66)

FIGURE 7

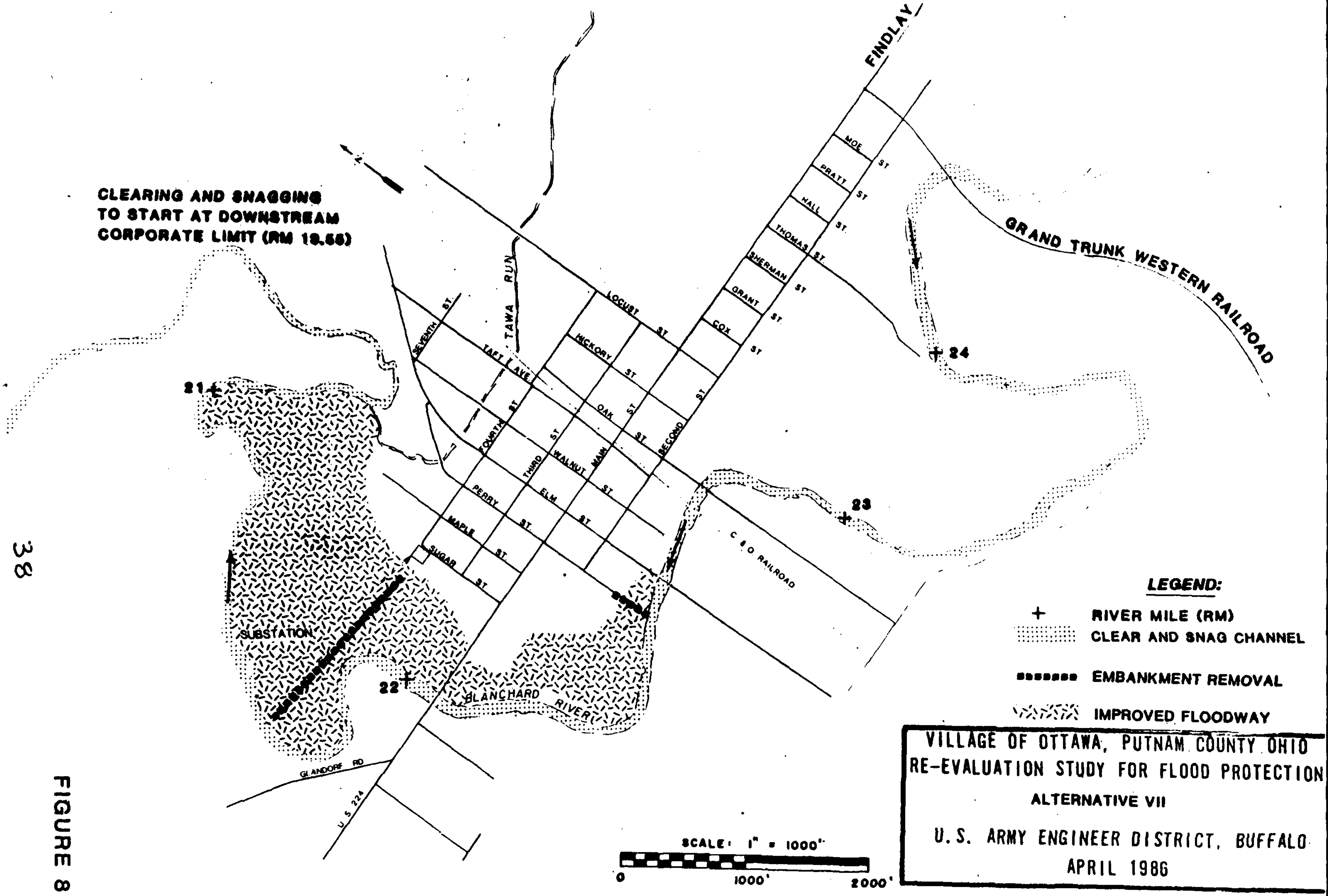

CLEARING AND SNAGGING
TO START AT DOWNSTREAM
CORPORATE LIMIT (RM 19.55)
FINDLAY
GRAND TRUNK WESTERN RAILROAD
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
SECOND ST
LOCUST ST
HICKORY ST
OAK ST
MAIN ST
WALNUT ST
THIRD ST
ELM ST
FOURTH ST
TAFT AVE
SEVENTH ST
PERRY ST
MAPLE ST
SUGAR ST
TAWA RUN
C & O RAILROAD
BLANCHARD RIVER
SUBSTATION
GLANDORF RD
U S 224
21
22
23
24
LEGEND:
RIVER MILE (RM)
CLEAR AND SNAG CHANNEL
EMBANKMENT REMOVAL
IMPROVED FLOODWAY
VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
ALTERNATIVE VII
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986
SCALE: 1" = 1000'
0
1000'
2000'

FIGURE 8

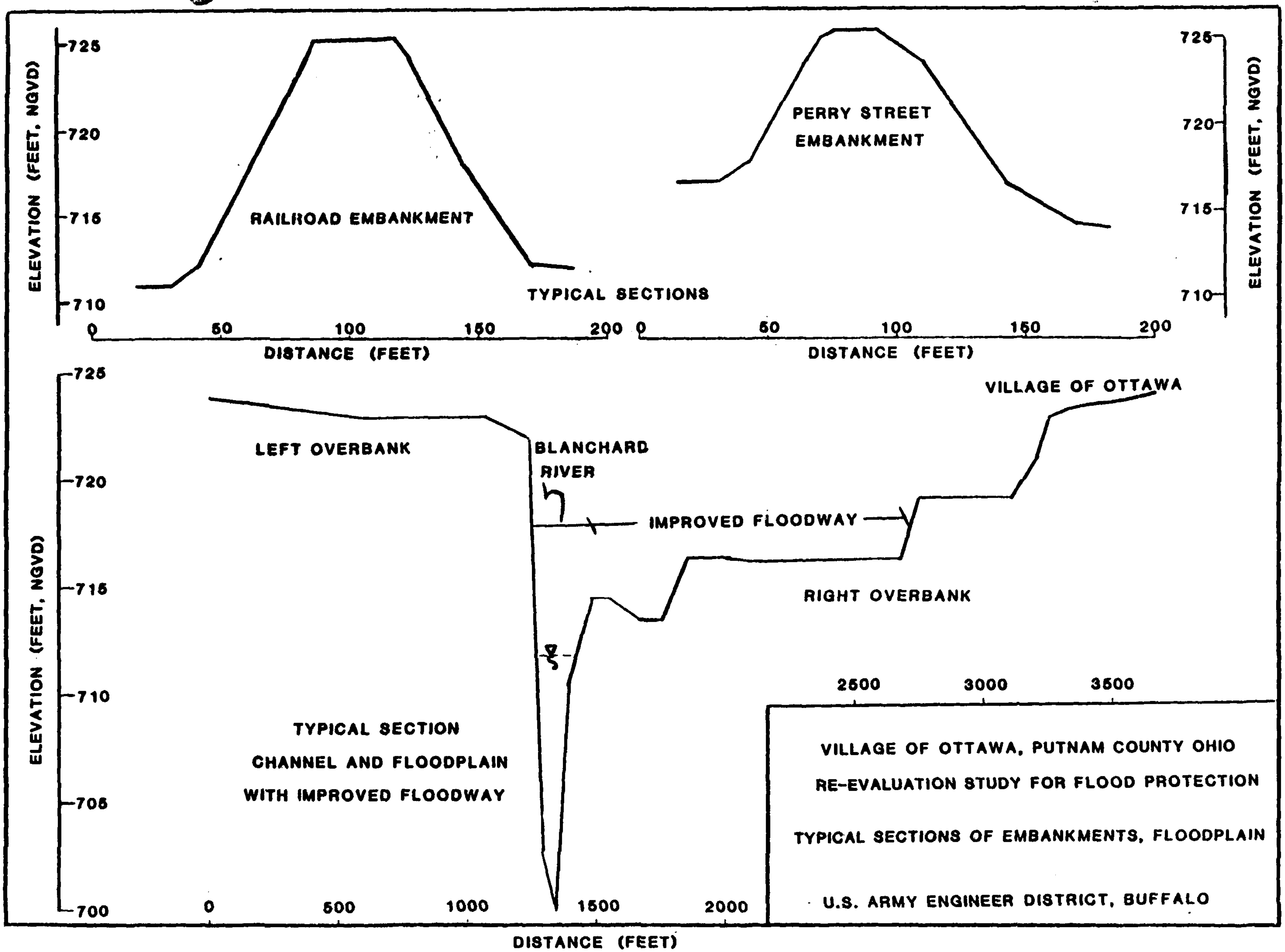

ELEVATION (FEET, NGVD)
RAILROAD EMBANKMENT
PERRY STREET
EMBANKMENT
TYPICAL SECTIONS
DISTANCE (FEET)
DISTANCE (FEET)
VILLAGE OF OTTAWA
LEFT OVERBANK
BLANCHARD
RIVER
IMPROVED FLOODWAY
RIGHT OVERBANK
TYPICAL SECTION
CHANNEL AND FLOODPLAIN
WITH IMPROVED FLOODWAY
DISTANCE (FEET)
VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
TYPICAL SECTIONS OF EMBANKMENTS, FLOODPLAIN
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 9

SECTION D
ASSESSMENT AND EVALUATION OF ALTERNATIVE PLANS

Based on the formulation of alternatives given in the previous section, three candidate plans have been developed for evaluation along with the No-Action Plan. They are:

a. Plan A - Alternative VI - levees, floodwalls, clearing and snagging, removal of embankments, and improved floodway;

b. Plan B - Alternative VII - clearing and snagging, removal of embankments, and improved floodway;

c. Plan C - Non-Structural Alternative - early flood warning and emergency action;

d. Plan D - No Action.

Plans A through C demonstrate a broad range of alternatives which could, if implemented, provide flood damage reductions, thereby satisfying the planning objectives for this project. Plans A and B are structural plans, Plan C non-structural, and Plan D represents no change from present conditions.

PLAN A - ALTERNATIVE VI

Description

Plan A, shown on Plate 5, is composed of the following elements:

- Relocation of the Ohio Power Company's 69-kV transmission line from the abandoned railroad embankment to a location approximately 150 feet from and parallel to the removed railroad embankment;

- Combination of levees and floodwalls, extending along Tawa Run and upstream along the Blanchard River to the Grand Trunk Western Railroad bridge;

- Removal of the abandoned railroad and Perry Street embankments, with disposal of the materials in the adjacent floodplain to improve drainage to the Blanchard River;

- Establishment of a more efficient floodway along the right overbank of the Blanchard River, from Tawa Run at the downstream end to the Elm Street bridge over the river at the upstream end; and

- Clearing and snagging of the channel area from the downstream corporate limit (River Mile 19.55) to above the Grand Trunk Western Railroad Bridge (River Mile 24.39).

Plate 8 shows representative sections of the railroad and Perry Street embankments, and of the river with its floodplains. The more efficient floodway is proposed for the right overbank or floodplain.

Assessment

a. Social Effects - Implementation of Plan A would have several significant social, economic, and environmental effects in the village of Ottawa. The residents, at the public workshop of 19 March 1986, voiced strong disapproval of any plan with levees. Their concerns were many, varying from aesthetics and unequal levels of protection to induced damages and exacerbation of existing drainage problems. Plan A demonstrated the greatest reduction of flood levels of any levee plan, with no induced damage and a general reduction of flood levels for all but extremely rare events. However, this plan was not acceptable to the local residents.

b. Economic Effects - A decrease in flood damages may be expected from this plan. Agricultural activities could continue in the floodplain areas, with only minor reduction of tillable land and some restrictions on the types of crops. Commercial activities would experience less frequent flooding, as would the residential areas. With this plan, there would be fewer interruptions in public facilities and services. Effects on property values and tax revenues is likely to be minor, as most of the village is currently classified as within the 100-year floodplain.

c. Environmental Effects - Environmental impacts would be significant, due mainly to the clearing and snagging activities in the channel, and clearing of the floodplain. The long-term effects of this plan are likely to have more significant impacts on the ecology than the activities themselves. Loss and modification of both fish and wildlife riparian habitat would occur. The habitat created by this plan may not, by itself, be adverse to local wildlife, but modification of behavior due to changed feeding and nesting areas and similar results may occur. In-stream impacts would include loss of some riffle zones and decreased shading of the stream.

Disposal areas for the materials is assumed to be available on-site. Village officials indicated that normal disposal activities are permissible. No degradation of the floodplain's agricultural capabilities or potential would occur under this plan. Revegetation of disturbed areas will be with vegetation consistent with maintaining efficient conveyance of flow, environmental considerations, and aesthetics. As an option, agricultural activities may be permitted to continue, with certain restrictions.

Evaluation

The construction and land costs associated with Plan A are given in Table 2. The major elements of Plan A are listed in Table 2. Table 3 is a summary of the annual costs and benefits. The average annual costs include AE&D costs, interest during construction, and average annual maintenance costs. Appendix B, the Economic Appendix and Appendix C, the Cost Estimates Appendix, contain additional and more detailed information.

Plan A was determined to be economically infeasible for all levels of protection. The benefit-cost ratio computed for the 99-year level of protection of Plan A was 0.42. Local interests would not support this plan.

Table 2 - Cost Estimate for Plan A

Level of Protection	Item	Amount
		$
10-year	Clearing and Snagging	208,510
	Relocation of Power Line	222,855
	Floodway with Removal of Embankments	262,440
	Levees and Floodwalls	1,169,730
	Real Estate Costs (purchase)	137,700
	Subtotal	2,001,200
25-year	Clearing and Snagging	208,510
	Relocation of Power Line	222,855
	Floodway with Removal of Embankments	262,440
	Levees and Floodwalls	1,718,740
	Real Estate Costs (purchase)	178,260
	Subtotal	2,590,800
50-year	Clearing and Snagging	208,510
	Relocation of Power Line	77,520
	Floodway with Removal of Embankments	262,440
	Levees and Floodwalls	1,919,300
	Real Estate Costs (purchase)	179,100
	Subtotal	2,792,200
99-year	Clearing and Snagging	208,510
	Relocation of Power Line	222,855
	Floodway with Removal of Embankments	262,440
	Levees and Floodwalls	2,163,100
	Real Estate Costs (purchase)	179,900
	Subtotal	3,036,800

Table 3 - Summary of Annual Benefits and Costs, Plan A
99-Year Level of Protection

	$
Average Annual Benefits	164,030
Average Annual Costs	391,490
Net Benefits	(227,460)
Benefit-Cost Ratio	0.42

AE&D costs, interest during construction, and average annual maintenance costs. Appendix B, the Economic Appendix, and Appendix C, the Cost Estimates Appendix, contain additional and more detailed information.

Plan A was determined to be economically infeasible for all levels of protection.

Mitigation Needs and Environmental Enhancement Features

No mitigation needs have been identified for the implementation of Plan A.

Implementation

Based on the results of the technical and economical analyses, Plan A was determined to be not viable.

PLAN B

Description

Plan B contains the following elements:

- Relocation of the Ohio Power Company's 69-kV transmission line from the abandoned railroad embankment to a location approximately 150 feet from and parallel to the removed railroad embankment;

- Removal of the abandoned railroad and Perry Street embankments, with disposal of the materials in the adjacent floodplain to improve drainage to the Blanchard River;

- Establishment of a more efficient floodway along the right overbank of the Blanchard River, from Tawa Run at the downstream end to the Elm Street bridge at the upstream end; and

- Clearing and snagging of the channel area from the downstream corporate limit (River Mile 19.55) to above the Grand Trunk Western Railroad bridge (River Mile 24.39).

Plan B is shown schematically on Plate 6. Representative sections of the railroad and Perry Street embankments, and of the proposed more efficient floodway, are shown on Plate 8.

Assessment

a. Social Effects - Drawbacks to Plan B are significant. Plan B would only provide only a low level of protection, and homes and businesses which experience frequent flooding will probably still experience flooding, although the frequency and magnitude will be less. Structures which only occasionally or rarely are flooded may not realize a noticeable reduction of damages, at least in the short term. Secondly, there is no permanent or guaranteed level of protection unless the project is continually maintained, especially the clearing and snagging portion of the plan.

b. Economic Effects - Plan B is effectively a "preventative" plan, which will require periodic maintenance. The maintenance costs may be high, as they will need to be performed on an "as-needed" basis. Maintenance may need to be performed more than once during some years. Maintenance of the channel area is expected to be the most costly item, as it will require more specialized equipment and labor. It is conceivable that the cost of the initial clearing and snagging may be incurred repeatedly if routine maintenance of the channel does not occur.

Plan B, shown on Plate 6, includes all the elements of Plan A except for levees and floodwalls. The plan therefore has a lower level of protection, but significant flood damages under this plan would begin at a flood frequency between 10 and 25 years, as compared to 5 years under existing conditions. The minor damage threshold would be shifted from the existing 2-year frequency to approximately a 5-year event. Flood elevations and thus flood damages are greatly reduced, on the order of 1.5 feet at the Oak Street bridge for most significant floods. Although the plan has a low level of protection, it does provide a fairly uniform reduction of flood elevations throughout the town, an important consideration of the residents. As an example, the June 1981 flood level would have been reduced by about 1.5 feet at the Oak Street bridge, and damages reduced by approximately $2,000,000.

The floodway costs for this plan have been based on outright purchase of the required land. An alternate solution is a flowage easement on the land, with the use restricted for only selected agricultural crops. If flowage easements were obtained, the cost would be considerably less. Conversations with Mr. Donald Kimmett, the County Extension Agent, indicate that a 3-year cycle consisting of 2 years of soybeans and 1 year of corn would be sound, and with no income loss to the farmer. The proposed grading of the floodway, which includes eliminating poorly drained spots and incorporating materials of the removed embankments, would be amenable to continued agricultural usage, as topsoil would first be stripped and then replaced over the reworked area.

c. Environmental Effects - Significant environmental impacts will also result, as approximately half of the channel bank growth (trees and brush) would be removed, and the right overbank would be cleared of trees and brush. The loss of habitat and associated habitat factors (tree shading, riffles, ...) may be substantial. Reports of fishing in the affected area vary from none to occasional, although the potential may be greater.

Evaluation

The construction and land costs associated with Plan B are presented in Table 4. The annual maintenance costs were based on periodic clearing and snagging, and mowing of the floodway. Purchase of the floodway land has been used, although flowage easements may be possible. Use of flowage easements would permit agricultural activities in the floodway, thereby reducing both first costs and annual maintenance costs. Table 5 is a summary of the annual costs and benefits. The average annual costs include AE&D costs and average annual maintenance costs. The construction period is estimated to be less than three months, so there are no costs for interest during construction. Additional information is contained in Appendix B, Economics, and Appendix C, Cost Estimates.

Plan B is a viable plan both technically and economically. It also received local support at the public workshop of 19 March 1986. Environmental resources would not be affected to the degree that would preclude the implementation of Plan B.

Mitigation Needs and Environmental Enhancement Features

No mitigation needs have been identified for the implementation of Plan B.

Implementation

Plan B is viable both technically and economically, and also has local support. This plan can be fully implemented consistent with Section 221 of PL 91-611.

Table 4 - First Costs for Construction and Land Acquisition, Plan B

Plan Element	Cost
	$
Clearing and Snagging	208,510
Removal of Embankments and Establishment of Floodway	262,440
Relocation of Power Line	222,855
Real Estate Costs (purchase)	100,000
Total	793,805

Table 5 - Summary of Annual Benefits and Costs, Plan B

	$
Average Annual Benefits	115,490
Average Annual Costs	
Excluding O&M	111,326
Annual Maintenance	5,300
Subtotal	116,626
Net Benefits	0
Benefit-Cost Ratio	.99

Taken from Appendix B, Table B34. Interest rate taken as 8-5/8% project economic life at 50 years.

PLAN C

Description

Plan C is a nonstructural alternative, and consists of the following measures.

- ° Enhance and modify local equipment and programs as necessary with the use of tone-altert radios, intercoms with emergency coordinators, preparedness brochures, data processors, and pre-flood seminars;
- ° Installation of an automated gage on the Blanchard River at the proposed Oak Street Bridge, and automating the gage at Findlay;
- ° Operate and maintain flood-warning sirens activated by the automated gages;
- ° Increased use of floodproofing and flood shields for commercial structures and public buildings, including plastic crates to temporarily elevate furnishings and merchandise; and
- ° Designate a public employee as the Flood Emergency Director to coordinate activities.

In addition, the permanent relocation of contents would be recommended.

Assessment

a. Social Effects.

Plan C would provide additional flood warning for the residents of Ottawa, with emphasis on early warning and preparation. A brochure/flyer will be developed explaining the implementation of the early warning system. A sample instructions flyer is shown on Plate 9. The sense of security of the community would be increased as the gage system could alert the designated authorities and the public throughout the day, and permit floodproofing and emergency measures to be implemented both earlier and more efficiently. Plan C could easily facilitate the existing individual efforts toward floodproofing and shielding.

b. Economic Effects.

Plan C, if properly implemented, would result in incremental reductions of flood damages. Its greatest effect may be expected to occur for the more frequent floods. A danger does exist in that too great a trust may be placed in Plan C, and an "intensification-type" phenomenon may occur. Proper administration of the early warning system would be necessary to maintain the plan's effectiveness.

c. Environmental Effects.

Plan C would have no significant environmental effects in either the stream or the adjacent flood plain areas.

Evaluation

Construction and maintenance costs for Plan C are given in Table 6. contingencies, E&D and S&A costs were added to the costs shown in Table 6 to develop the annual costs shown in Table 7. As can be seen, the benefits justify the total plan cost. The average annual benefits accruing from the plan are based on a similar plan presented for the Passaic River Basin in New Jersey. Full achievement of the benefits is dependent upon proper administration, coordination, and implementation. Mechanical failure of the gages would incapacitate the plan. Such failure could occur due to floating ice or debris, both of which are common occurrences during floods on the Blanchard River, or by vandalism.

Plan C is technically and economically feasible. The benefit-cost ratio for the plan is approximately 3.05, as estimated in Table 7. The net annual benefits are $11,300 for the entire community. The plan may easily be implemented with a structural plan. The plan has received local support from village and conservancy district officials.

Mitigation Needs and Environmental Enhancement Features

No mitigation needs are expected in the implementation of Plan C.

Implementation

Plan C is technically and economically justified, and has received local support. This plan would be supplemented to Plan B in reducing damages to contents of homes and businesses.

Table 6 - Costs for Plan C

Item	First Costs	Operation
	$	$
Local Equipment		
Radio	1,000	50
Intercoms	1,000	50
Brochures	1,000	0
Automated Gages (1)		
Ottawa	10,000	1,000
Findlay	7,000	500
Plastic Crates (6,000) (2)	12,000	-
Subtotals	32,000	1,600

(1) Gage costs obtained from the U.S. Geological Survey for similar installations, April 1986

(2) Plastic crate costs obtained from a dairy owner, April 1986.

Table 7 - Summary of Annual Costs and Benefits, Plan C (1)

	$
Average Annual Benefits (2)(3)	16,800
Average Annual Costs (3)	5,500
Net Benefits	11,300
Benefit-Cost Ratio	3.05

(1) See Appendix B, Table B-35.

(2) Average Annual Benefits based on 40% of Without Project Total Average Annual Content Damages. Percentage is based upon "Flood Emergency Preparedness System - Passaic River Basin, New Jersey and New York," Detailed Project Report and Environmental Assessment, June 1984; Alternative II Plan Benefits, Table 8.8, p. 147, and content damage reduction due to lowering the water surface profile 1 foot. These damages were further adjusted by assuming a 50 percent response rate.

(3) Interest rate used is 8-5/8%, economic life is 50 years.

Evaluation

The residents of Ottawa have already expressed their willingness to suffer some flood damages by maintaining the village in the condition as it appears. There is no indication that this plan will have a further detrimental effect on the town.

Mitigation Needs and Environmental Enhancement Features

No mitigation needs have been identified for implementation of this plan.

Implementation

This plan currently exists, and no Federal action is required for its implementation or maintenance.

SECTION E
TRADE-OFF ANALYSIS

A comparison of the four candidate plans, based on their impact assessment and evaluation with the four national accounts, is presented in Table 8. This table provides a comparison of the four alternative plans as to the beneficial and adverse impacts each has on the National Economic Development (NED) account, Environmental Quality (EQ) account, Regional Economic Development (RED) account, and Other Social Effects (OSE) account.

TRADE-OFF ANALYSIS

In accordance with ER 1105-2-30 and Principles and Guidelines, alternative plans are to include the NED Plan that reasonably maximizes net national economic benefits. Other alternative plans are to be formulated to adequately explore opportunities to address other Federal, State, local, and international concerns not fully addressed by the NED Plan. The number and variety of alternative plans were governed by:

a. The problems and opportunities associated with the water and related land resources in the study area;

b. The overall resource capabilities of the study area;

c. The available alternative measures; and

d. Preferences of the conflicts among State and local entities and different segments of the public.

Four plans; A, B, C, and D; are considered further for reasons discussed above. two of the four plans considered for in-depth study are structural plans that would protect the project area from overbank flooding of the Blanchard River. The third plan is a non-structural alternative which could reduce flood damages through early warning measures. The fourth plan is the no-Action plan. Alternative Plans A, B, and C would meet some of the planning objectives and are discussed here to determine the trade-offs between those plans of action or no action. Plan A would provide more flood damage prevention that Plan B, due to the additional element of levees. Plan C would partially meet the objectives by reducing flood damages. Plans A, B, and C present a cross section of viable plans that offer variable degrees of protection at various cost ranges. Plan D, No-Action, would have no cost.

Plan A - Four (4) levels of protection were evaluated, and each would provide definite degrees of protection, but the average annual cost exceed the average annual benefits for each of the levels evaluated. In addition, there is no public support for any plan that includes levees or floodwalls. Plan A therefore does not satisfy three of the four criteria for plan formulation.

Plan B - This plan would provide a comparatively low level of protection (about a 10-year event), and the protection level is contingent on the quality of project maintenance. Plan B is a "preventative" or "maintenance" plan, with a relatively low initial cost. This plan received a favorable reaction when presented at a public workshop on 19 March 1986. It does not, however, eliminate all of the damages that local interests would prefer. Plan B is the structural plan that maximizes net benefits and is socially acceptable even though the plan has some serious adverse environmental impacts and would only provide a low level of protection. Plan B satisfies the four criteria for plan formulation.

Plan C - This non-structural alternative would supplement Plan B and relies upon an early-warning system and the community response to flood events. Its effectiveness is therefore dependent upon many factors that require human effort. Many residents and businesses have already implemented temporary floodproofing measures to reduce flood damages. Permanent floodproofing is only suitable for a limited number of structures. Plan C only satisfies two of the formulation criteria, but as a supplement to and with Plan B maximizes net benefits.

Plan D - The no-action plan is self-explanatory. Flood damage will continue to occur even under the National Flood Insurance Program, since much of the village where damages now occur has been assigned to within the 100-year floodplain.

To continue the evaluation process, it is necessary to determine which of the four alternative plans best meets the Federal objective and satisfies the other evaluation criteria. As a part of the process it is necessary to identify the NED plan. In order to assist in identifying this plan, a review of the comparison has been made as displayed in Table 8.

While the NED Plan must satisfy generally all planning objectives and evaluation criteria, it must maximize net benefits. Therefore, the four plans shown in Table 8 are analyzed using the available data to determine their degree of compliance with these objectives and criteria.

The alternative plan that is judged to reasonably maximize net contributions to the NED objective is referred to as the NED Plan. As Table 8 shows, the highest average annual net benefits are for Plan C, but this plan is only effective as a supplement to Plan B. Plans B and C together maximize net benefits and is the NED Plan. Plans B and C together have a B/C ratio of 1.08.

It is recognized that environmental quality has both natural and human manifestations, while addressing the planning objectives in a way which emphasizes aesthetic, ecological, and cultural contributions. Beneficial contributions are made by preserving, maintaining, restoring, or enhancing the significant cultural and natural environmental attributes of the study area. Determination of environmental benefit involves subjective analysis, underscoring the need for interdisciplinary planning with public input to place values on the environmental contribution of plans. Designating a plan involves measuring the environmental changes related to different plans and selecting the plan which, based on public input, contributes to or is most harmonious with environmental objectives. This means that plans must make net positive contributions to the components of the EQ account.

The alternative plan that is judged to reasonably maximize net contributions to environmental quality is referred to as the EQ plan. By comparison of the EQ account in Table 8, Plans C and D would preserve, maintain, restore, and enhance ecological and aesthetic characteristics of the project area more than any other plan.

Table 8 - Comparison of Alternative Plans

	Plan A	Plan B	Plan C	Plan D
A. Plan Description	Alternative VI Levees/floodwalls Remove embankments Clear and snag channel Establish floodway	Alternative VII Remove embankments Clear and snag channel Establish floodway	Early-warning system	No-Action Plan (Federal)
B. Significant Impacts				
1. Social Effects				
a. Noise*	Short-term, localized increase	Short-term, localized increase	None	No change
b. Displacement of People	Short-term in response to possible flooding	Short-term in response to possible flooding	None	No change
c. Aesthetic Values*	Degradation related to construction activities and project	Degradation related to reconstruction activities and project	No change	No change
d. Cultural Resources	Possible loss due to alignment of levees	None	None	None
e. Transportation	Short-term disruption due to construction activities and floods	Short-term disruption due to construction activities and floods	No change	No change
f. Community Cohesion*	Enhanced through flood protection	Enhanced through flood protection	No change	No change
g. Desirable Community Growth*	Facilitated in a floodprone area	Facilitated in a floodprone area	Facilitated in a floodprone area	No change
h. Health	Protected	Protected	Protected	No change
2. Economic Effects				
a. Tax Revenues*	Property tax revenues may increase as threat of flooding decreases	Property tax revenues may increase as threat of flooding decreases	Property tax revenues unchanged	Property tax revenues unchanged
b. Property Values*	May increase as flooding threat decreases	May increase as flooding threat decreases	No change	No change

Table 8 - Comparison of Alternative Plans (Cont'd)

	Plan A	Plan B	Plan C	Plan D
c. Public Facilities*	Flood damages lessened	Flood damages lessened	No change	No change
d. Public Services*	Interruptions lessened	Interruptions lessened	No change	No change
e. Desirable Regional Growth*	No change	No change	No change	No change
f. Employment/Labor Force*	Short-term increase in construction jobs during construction activities	Short-term increase in construction jobs during construction activities	No change	No change
g. Business and Industrial Activity*	Flood-related interruptions lessened	Flood-related interruptions lessened	No change	No change
h. Displacement of Farms*	Some restrictions on crop types in floodway under flowage easements	Some restrictions on crop types in floodway under flowage easements	None	None
3. Environmental Effects			Designated EQ Plan	Designated EQ Plan
a. Man-Made Resources*	None	None	None	None
b. Natural Resources*	Use of an unspecified amount of bedding and soil and fuel	Use of an unspecified amount of fuel	No change	No change
c. Air*	Short-term degradation	Short-term degradation	No change	No change
d. Water*	Short-term degradation, possible long-term effects	Short-term degradation, possible long-term effects	No change	No change
e. Fish & Wildlife	Short-term disruption, long-term loss of riparian habitat with herbaceous vegetation	Short-term disruption, long-term loss of riparian habitat with herbaceous vegetation	No change	No change
f. Threatened and Endangered Species	None	None	None	None
g. Vegetation	Major/temporary, minor destruction	Major/temporary, minor destruction	No change	No change
h. Habitat	Reduction due to clearing and snagging of channel floodway	Reduction due to clearing and snagging of channel floodway	No change	No change
C. Plan Evaluation				
1. Contributions to Planning Objectives	Provides partial flood protection	Provides partial flood protection	Provides partial flood protection	No change

Table 8 - Comparison of Alternative Plans (Cont'd)

	Plan A	Plan B	Plan C	Plan D
2. Relationship to the Four National Accounts				
a. NED				
(1) Project Cost	$4,341,480	$1,270,120	$44,160	$0
(2) Annual Benefits	$164,030	$115,490	$16,800	$0
(3) Annual Costs	$391,490	$119,886	$ 7,100	-
(4) Net Benefits	-$227,460	0	$ 9,700	-
b. EQ				
(1) Environmental Quality Enhanced	None	None	None	No change
(2) Environmental Quality Degraded	Impacts on: aesthetic values, air quality, fish and wildlife habitat, vegetation, water quality, and natural resources.	Impacts on: aesthetic values, air quality, vegetation, water quality, natural resources, and fish and wildlife habitat.	None	None
(3) Environmental Quality Destroyed	Some loss of fish and wildlife habitat.	Some loss of fish and wildlife habitat.	None	None
c. OSE				
(1) Beneficial Impacts	Negligible to moderate impacts on: fiscal conditions of State and local governments, life, health, safety, and long-term productivity.	Negligible to major impacts on: fiscal condition of State and local governments, life, health, safety, and long-term productivity.	Major impact on: life, health, and safety.	No change
(2) Adverse Impacts	Negligible to moderate impacts on: non-renewable energy resources, and noise.	Negligible to moderate impacts on: non-renewable energy resources and noise.	No change	No change
d. RED				
(1) Beneficial Impacts	Minor impact on: increased income and stability of regional economic growth.	Negligible impact on: increased income, employment, and stability of regional economic growth.	No change	No change
(2) Adverse Impacts	None	None	No change	No change

Table 8 - Comparison of Alternative Plans (Cont'd)

	Plan A	Plan B	Plan C	Plan D
3. Plan Response to Associated Evaluation Criteria				
a. Acceptability	Non acceptable	Acceptable	Not acceptable	Acceptable
b. Completness	Incomplete	Incomplete	Incomplete	No change
c. Effectiveness	Ineffective	Ineffective	Ineffective	No change
d. Efficiency	Inefficient	Efficient	Inefficient	No change
e. Certainty	High	Low	No change	No change
f. Geographic Scope	Project area	Project area	Project area	Project area
g. Reversability	Reversible	Reversible	Reversible	No change
h. Stability	0	0	0	0
i. B/C Ratio	0.42	.963	2.4	-
D. Implementation				
Responsibility				
1. Federal Share (75%)	$3,256,100	$952,600	$33,100	N/A
2. Non-Federal Share (25%)	$1,085,400	$317,500	$11,000	None
(Cash Contribution)	$ 905,500	$217,500	$11,000	None
(Lands and Damages)	$ 179,900	$100,000	$ 0	

* Significant impacts/resources identified in Section 122 of PL 91-611, River and Harbor and Flood Control Act of 1970, 31 December 1970 (88 STAT. 1818).

SECTION F
THE SELECTED PLAN

GENERAL.

The flood control project at Ottawa, Ohio, was authorized by Congress 20 years ago. Since authorization, the project area has been flooded many times as previously discussed. Likewise emergency temporary measures, funded mostly by the Federal government, have been completed during this period. The most extensive temporary measure was completed in the spring of 1985 and consisted of removing a shoal and an abandoned bridge pier from the Blanchard River. A less extensive effort also completed in 1985 consisted of remedial bank protection to correct bank erosion along Route 15. These temporary measures have had minimal effect on lowering the water surface of the Blanchard River and of reducing flood damages. Non-Federal interest continue to place sandbags to control and confine flooding and elevate household furnishing and merchandise in business places to minimize flood damage. Local interests have been patient and understanding but desire a more reliable and permanent type of flood protection plan to reduce flood damages. Four alternative plans were finally compared, discussed and displayed in the previous Section of this report: Plan A includes all the structural measures investigated in this reevaluation study but is not economically justified; Plan B, an economically justified structural plan; Plan C, an economically justified non-structural plan; and, Plan D is a no-action plan. Local interests favor Plan B and believe it would be prudent to add Plan C at very little additional cost. Plan D is not acceptable since local interests want a reduction in flood damage and a more stable community that would induce others to relocate to Ottawa, Ohio. Village officials and the Maumee Watershed Conservancy District have endorsed Plan B and Plan C that together comprise the Selected Plan, Plan E, consisting of a structural plan and a non-structural plan combined. Plan E, the Selected Plan, is the NED Plan and is shown on Plate 7.

DESCRIPTION OF SELECTED PLAN E.

Plan E, the Selected Plan, consists of improving the channel capacity and floodway of the Blanchard River (Plan B) supplemented by an early warning system for community response (Plan C). Plan E consists of the following:

Structural.

a. Relocation of the Ohio Power Company's 69-KV electric power transmission line, now located on an abandoned railroad embankment on the right overbank of the Blanchard River, to a location 150 feet from and parallel to the embankment. The final alignment of the planned relocation of the power line will be determined and finalized along with the completion of the plans and specifications;

b. Removal of the abandoned railroad embankment and disposing of the material on the adjacent floodplain;

c. Removal of the remains of the Perry Street embankment on the right overbank of the Blanchard River and disposing of the material on the adjacent floodplain;

d. Establishment of a more efficient floodway along the right overbank of the Blanchard River by leveling, grading and removal of obstructive vegetation, debris and trees between Tawa Run at the downstream limit to the Elm Street bridge at the upstream limit; and

e. Clearing and snagging of the Blanchard River from the downstream corporate limit of the village of Ottawa, Ohio (River Mile 19.55) to the vicinity of the Grand Trunk Western Railroad Bridge at River Mile 24.39. The extent of grading will be determined during plans and specifications with early indications pointing to a minimal effect. A field investigation will be conducted in May of 1987 to determine the extent of grading required.

f. The maintenance program for Plan E consists of the following:

1. Minor snagging along the reach annually.

2. Major snagging operations at 10-year intervals.

3. Annual maintenance of banks (mowing throughout growing season).

4. Annual maintenance of floodway (mowing throughout growing season).

Valley cross-sections will be established at key locations (determined during initial clearing and snagging work), and periodically surveyed to ensure that shoaling does not decrease design channel capacity. Sedimentation problems may be reduced under project conditions due to slightly higher velocities in the channel.

Non-structural.

a. Installation of an automated gage on the Oak Street bridge and modification of the gage at Findlay, Ohio;

b. Operate and maintain flood warning sirens activated by automated gages;

c. Distribute plastic floodproofing crates to property owners as needed and requested;

d. Enhance and modify local equipment and programs as necessary with use of tone-alert radios, intercoms and emergency coordinators, pre-flood seminars, data processors and preparedness brochures; and

e. Designate a public employee as a Flood Emergency Director.

In regards to implementing the Early Warning System, the clearing and snagging (Plan B), lowers the rivers profile approximately 1.5 feet at the Oak Street Bridge for most significant floods. Thus Plan E provides 1.5 feet of flood protection to contents and structures for residential and commercial properties from implementing Plan B. Plan C reduces content damages (residential and commercial) due to the distribution of 12" square crates. These crates would be used to raise residential and commercial contents one foot. It was assumed only one half of the people given the crates would actually use them during the flood warning. The implementation of the Early Warning System (Plan C) provides an additional foot of protection to residential and commercial contents only.

Thus, Plan E provides 1.5 feet of flood protection to residential and commercial structures and 2.5 feet of protection to residential and commercial contents.

The early-warning component of the Selected Plan will not require the development of a Preflood Preparation Plan. The early warning system will be implemented via the dissemination of brochures/flyers to residents and commercial establishments in the floodprone areas. The brochure will include the following information:

a. Radio station for flood information and advice.

b. Classification of storm damage potential with respect to depth and time of flood peak.

c. Appropriate responses to storm classifications.

d. Instructions on proper flood proofing procedures.

e. Emergency instructions on evacuation.

f. Post-flood emergency procedures.

The early-warning system is not intended to be 100 percent effective. The system to be devised is very rudimentary in nature and is consistent with local desires.

Mitigation

a. In order to protect any Indiana Bat Summer nursery roosts which may be present in the study area, tree removal in the proposed floodway would be limited to those trees with a diameter of 10 inches (dbh) or less.

A 50-foot wide (distance measured at tree trunks) wooded corridor would be maintained along the river from the Perry Street Bridge abutment downstream to the former Findlay and Fort Wayne Railroad embankment. The corridor would extend a minimum of two trees in width, provided a sufficient number of qualifying trees exist and they are spaced no closer than 15 feet apart (to prevent the collection of debris and snags in the proposed floodway).

b. The possible loss of a 2-acre intermittently flooded wetland located on the north side of the old railroad embankment would be mitigated by the creation of a wetland of equal or greater size along the periphery of the proposed floodway. An earthen berm constructed at a to-be-selected site would impound surface runoff during nonflood periods and permit the establishment of the proposed wetland.

c. Approximately 33 acres of field and wooded areas would be seeded and mulched with beneficial wildlife plantings. These plantings must be nonwoody species with a maximum height of 12-18 inches in order to insure the hydraulic efficiency of the floodway. These species may include bromegrass, timothy, orchardgrass, bluegrass, fescue, reed canarygrass, alfalfa, and clover. Cleared cropland (73 acres) would be allowed to return to agricultural uses, provided only low-height crops (e.g., soybeans) are planted.

COST ESTIMATE FOR THE SELECTED PLAN.

The cost estimate for the Selected Plan is presented in Table 9 and reflects cost data contained in Appendix C. The estimate is based on January 1986 price levels and shows the apportionment of Federal and non-Federal cost based on cost sharing and financing requirements as contained in S.1567 as passed by the U.S. Senate 26 March 1986 and revised 31 March 1986.

The total cost of the Selected Plan is $1,314,200 that includes $100,000 for lands, easements, and rights-of-way. The apportionment of cost is $985,700 Federal and $328,500 non-Federal.

Table 10 presents the average annual costs and benefits, including annual maintenance, net benefits, and Benefit-to-Cost ratios. The average annual benefits and costs are shown for both the authorized interest rate of 3-1/8 percent and the current interest rate of 8-5/8 percent. The B/C ratio is 2.09 to 1 at the authorized rate, and the net benefits are $64,800. The B/C ratio is 1.08 to 1 at current interest rate and the net benefits are $10,300.

The NED Plan was also evaluated using October 1986 price levels and an annual interest rate of 8-5/8 percent. The plan has net benefits of $9,300, average annual benefits of $133,700, average annual costs of $124,400, and a benefit to cost ratio of 1.07 to 1.

Total project first costs are $1,340,000. The non-Federal portion of the first cost is $430,000. This includes a $70,000 cash contribution and $360,000 for Other Costs.

Flood reduction benefits include all residential, commercial, public, and other as well as the affluence factor for residential cost. Intensification benefits are not applicable but the project area qualifies for area redevelopment benefits. Although no landfill savings benefits are claimed, the material removed for the railroad embankment and Perry Street embankment will be used to improve the Blanchard River overbank for a floodway.

Table 9 - Estimate of First Cost for the Selected Plan

Item	Amount
	$
Structural	
Clear and Snag	239,800
Relocate Power Transmission Line	256,200
Remove Railroad and Bridge Embankments	301,800
Sub Total	797,800
Engineering and Design	272,600
Supervision and Administration	99,700
Project Cost	1,170,000
Lands, Easements, and Rights-of-Way	100,000
Total Structural	1,270,000
Non-Structural	
Flood Warning Enhancement	
Automated River Level Gages	
Findlay	7,000
Ottawa	10,000
Information-Instruction Brochures	1,000
Intercom	1,000
Plastic Crates	12,000
Radio	1,000
Contingencies	6,400
Sub Total	38,400
Engineering and Design	3,800
Supervision and Administration	1,900
Total Non-Structural	44,100
Total First Cost - Selected Plan	1,314,000
Federal Share at 75 Percent	985,700
Non-Federal Share at 25 Percent (1)	328,500
Cash Contribution	(228,500)
Lands, Easements and Rights-of-Way	(100,000)

(1) The plan was also evaluated using October 1986 price levels; this resulted in non-Federal costs of $430,000. The non-Federal cash contribution is $70,000 and $360,000 for other costs (lands, easements, rights-of-way, and utility relocations).

Table 10 - Average Annual Benefits and Costs for the Selected Plan

Item	3-1/8 Percent Authorized	8-5/8 Percent Current
	$	$
Average Annual Benefits		
Flood Reduction		
Innundation	110,900	115,900
Detour Costs	10,300	10,300
Employment	2,800	6,100
Total Average Annual Benefits	124,000	132,300
First Cost	1,314,000	1,314,000
Interest During Construction	0	0
Total Investment Costs	1,314,000	1,314,000
Average Annual Cost		
Interest	41,100	113,300
Amortization	11,200	1,800
Operation and Maintenance	6,900	6,900
Total Average Annual Cost	59,200	122,000
Net Benefits	64,800	10,300
Benefit/Cost Ratio	2.09	1.08
Apportionment of Annual Cost		
Federal	38,800	85,800
Non-Federal	20,400	36,200
(Interest and Amortization)	(13,500)	(29,300)
Maintenance	(6,900)	(6,900)

SUMMARY OF ECONOMIC, ENVIRONMENTAL, AND SOCIAL EFFECTS.

Flood protection for the project area will provide an improved and more stable economic and social climate without adversely effecting the environment. Public services and facilities will remain more intact and interruptions in traffic caused by flooding in the past without the project will be significantly reduced. With the potential for flood damages reduced, property values and tax revenues will increase somewhat. The impact on farmland in the vicinity of the abandoned railroad embankment could be favorable since the land will drain into the Blanchard River more easily and allow farmers to plant sooner after a flood.

Since there are no structures to be constructed, the landscape will remain practically unchanged. The removal of the embankments will have a very temporary disturbance of wildlife as will the removal of some trees and snagging and clearing in the river. The river channel work will result in a short-term degradation in water quality as a result of an increase in turbidity. Construction activities may also result in the accidental spilling of fuel, oil, and grease. The operation of construction equipment could result in a short-term, localized degradation of air quality. Details of environmental impacts are given in the Environmental Impact Statement of this report.

A unique feature of the Selected Plan is that flood damages will be reduced at no safety risk to the residents even though the level of protection is low. Flood water cannot be trapped behind levees or floodwalls since there are none. Since there are no structures, visitors to the area will not perceive the area as flood devastated. The early warning system will improve the safety of the residents and cause them to be better prepared emotionally for an impending flood.

POST AUTHORIZATION CHANGES.

As presented in ER 1105-2-10 (18 DEC 85) Chapter 2, "Changes to Uncompleted Authorized Projects," the changes discussed below require, as a minimum, approval authority delegated to the Commander, USACE.

a. Change in Scope. The project as authorized was intended to provide protection from overbank flooding of the Blanchard River based upon a 220-year recurrence interval. The project as reformulated, maintains the same objective but is based upon an estimated 10-year recurrence interval without the additional flood damage reduction to structure contents that would be provided by the supplemental non-structural feature of the Selected Plan.

b. Change in Location. The location of the Project selected as a result of this reformulation study is basically the same as authorized.

c. Change in Design. The design of the project as reformulated has changed considerably. As authorized the project consisted of a system of levees and floodwalls; channel modifications and improvements; alterations, additions, and modifications to highway and railroad bridges and utilities; and interior drainage facilities. The reformulated project does not include levees, floodwalls, channel modification, and alterations, modification to bridges and utilities or interior drainage facilities. The reformulated project only consists of improving the floodway by clearing and snagging the Blanchard River, removing abandoned railroad and highway embankments, and clearing the overbanks on the right side of the Blanchard River. The associated features of the non-structural portion of the project consist of items that are readily available form suppliers and from the USGS who would provide the necessary components for providing an automated river level gage at Ottawa and modifying the gage at Findlay, Ohio.

d. Change in Project Cost.

Project Cost for Authorized Project at October 1985 Price Levels	$10,300,000
Project Cost for Selected Plan	1,314,000
Decrease in Project Cost	8,986,000
Cost Decrease as a Percent	87.2

Since the 87.2 Percent represents a decrease rather than an increase in project cost, (ER 1105-2-10, Chapter 2, Para. 2-5a.(3)) does not apply.

e. Change in Project Purpose. The purpose of the project as authorized was for local flood protection at Ottawa, Ohio. That purpose has remained unchanged.

f. Addition of Fish and Wildlife Mitigation.

In order to protect any Indiana bat summer nursery roosts which may be present in the study area, tree removal in the proposed flood way would be limited to those trees with a diameter of 10 inches (dbh) or less. A 50-foot wide (distance measured at tree trunks) wooded corridor would be maintained along the river from the Perry Street Bridge abutment downstream to the former Findlay and Fort Wayne Railroad embankment. The corridor would extend a minimum or two trees in width, provided a sufficient number of qualifying trees exist and they are spaced no closer than 15 feet apart (to prevent the collection of debris and snags in the proposed floodway).

The possible loss of a 2-acre intermittently flooded wetland located on the north side of the old railroad embankment would be mitigated by the creation of a wetland of equal or greater size along the periphery of the floodway. An earthen berm constructed at a to-be-selected site would impound surface runoff during nonflood periods and permit the establishment of the proposed wetland.

Approximately 33 acres of field and wooded areas would be seeded and mulched with beneficial wildlife plantings. These plantings would be non-woody species with a maximum height of 12-18 inches in order to insure the hydraulic efficiency of the floodway. These species may include bromegrass, timothy, orchardgrass, bluegrass, fescue, reed canarygrass, alfalfa, and clover. Cleared cropland (73 acres) would be allowed to return to agricultural uses, provided only low-height crops (e.g., soybeans) are planted.

The post-authorization changes are all reductions in: scope, design and project costs that can be approved by the Commander, USACE in accordance with ER

1105-2-10 (18 DEC 85), Chapter 2. Further, ER 1105-2-10 (18 DEC 85), Chapter 2, Para. 2-5c provides for the Commander, USACE to determine whether the changes can be made under discretionary authority or whether additional Congressional authorization is required.

Changes in the local cooperation requirements referenced in the authorizing document and stated in House Document 485, 89th Congress, 2nd Session may require authorization by Congress. The changes are necessary to be compatible with construction of the Selected Plan and reflect post authorization changes in scope and design discussed previously in this section of the General Reevaluation Report. The items of local cooperation that reflect current legislation and compatibility to the Selected Plan are:

a. Provide, all lands, easements, and rights-of-way necessary for the construction and subsequent maintenance of the project, as required;

b. Hold and save the United States free from damages due to construction of the project except for damages due to the fault or negligence of the United States or its Contractors;

c. Maintain and operate the project, or integral parts, after completion in accordance with regulations prescribed by the Secretary of the Army;

d. Provide, assistance to the United States, in the alterations and relocations of existing improvements including bridges, highways, buildings, utilities, sewers, and other facilities where necessary for construction of the project;

e. Comply with the applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," Public Law 91-646, approved 2 January 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with the said Act;

f. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (PL 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 and operation of the project;

g. Prevent any encroachment on the project floodway that would decrease the effectiveness of the flood management improvements; and

h. Contribute 25 percent of the total project cost, an amount currently estimated at $328,500 on January 1986 price levels that includes $100,000 for lands, easements, and rights-of-way and a cash contribution of $228,500.

SECTION G
PLAN IMPLEMENTATION

GENERAL.

The Selected Plan will be implemented in accordance with the authorizing document that provides for modification as in the discretion of the Chief of Engineers may be necessary. The Federal share, based on 75 percent of the project cost is $935,700. The non-Federal share is $328,500 that includes $100,000 for lands, easements, and rights-of-way and a cash contribution of $228,500. This plan will reduce flood damages in the project area and represents the type of project that the local residents favor and advocate. This plan can be fully implemented when the local cooperator enters into an agreement consistent with Section 221 of PL 91-611.

LOCAL COOPERATION.

The Maumee Watershed Conservancy District is the designated local cooperator. They are the agency empowered by law to provide the non-Federal cooperation required for the Blanchard River—Ottawa, Ohio, flood protection project and on 9 October 1985 furnished an expression of intent to cooperate. The cooperator stated that they intend to enter into a binding agreement with the Corps of Engineers which addresses project construction and satisfies the requirements of Section 221 of Public Law 61-611 prior to construction. As provided for in the project authorization, subsequent legislation, and for reasons and data presented in Section F of this reevaluation report, the local cooperator must furnish assurances prior to construction, satisfactory to the Secretary of the Army, that they will:

a. Provide, easements, and rights-of-way necessary for the construction and subsequent maintenance of the project, as required;

b. Hold and save the United States free from damages due to construction of the project except for damages due to the fault or negligence of the United States or its Contractors;

c. Maintain and operate the project, or integral parts, after completion in accordance with regulations prescribed by the Secretary of the Army;

d. Provide, assistance to the United States in the alterations and relocations of existing improvements including bridges, highways, buildings, utilities, sewers, and other facilities where necessary for construction of the project;

e. Comply with the applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," Public Law 91-646, approved 2 January 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with said Act;

f. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (PL 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 and operation of the project;

g. Prevent any encroachment of the project floodway that would decrease the effectiveness of the flood-control improvements; and

h. Contribute 25 percent of the total project cost, an amount currently estimated at $328,500 on January 1986 price levels that includes $100,000 for lands, easements, and rights-of-way and a cash contribution of $228,500.

SECTION H
SUMMARY OF COORDINATION, PUBLIC VIEWS, AND COMMENTS

GENERAL.

Coordination and public involvement was accomplished in order to complete the reformulation and present the views and comments in this General Reevaluation Report (GRR). The evaluation throughout this study strongly indicates that there is agreement in the Selected Plan. The emphasis in the final level of planning was the refinement of the Selected Plan through further coordination and public involvement.

COORDINATION.

a. Other Federal Agencies. The U.S. Fish and Wildlife Service (USFWS) has prepared a draft Fish and Wildlife Coordination Act Report which expresses the agency's overall concerns and recommendations (Appendix F).

The U.S. Environmental Protection Agency, U.S. Soil Conservation Service, U.S. Department of Housing and Urban Development, and U.S. Department of the Interior were consulted in order to insure that the proposed flood protection plans would conform with existing or proposed land use plans (7 April 1986). No adverse comments were received.

A Phase I Cultural Resources Survey (Reconnaissance) of the study area was completed and submitted to the National Park Service (NPS) and Advisory Council on Historic Preservation (ACHP) (27 December 1985). The ACHP concurred with the conclusions and recommendations of the reconnaissance and recommended that the sites identified in the survey "be further investigated to determine if they are eligible for the National Register of Historic Places (27 January 1986)." When completed, the draft Phase II Cultural Resources Survey will be submitted for review and comment to the ACHP and NPS.

b. State Agencies. The views of the Ohio Department of Natural Resources (ODNR) were requested on the Selected Plan's possible impacts on the Indiana bat (*Myotis sodalis*), a Federal endangered species (16 May 1986). ODNR noted "records of pregnant Indiana bats (utilizing similar riparian habitat) along the Little Auglaize River in Paulding County indicated the presence of a summer nursery roost." Consequently, ODNR recommended "that the Corps complete a survey along the Blanchard River to determine the potential for nursery roosts within the project area" (16 May 1986).

Compliance with the plans of State agencies was assured through coordination with ODNR and the Ohio Environmental Protection Agency (OEPA). OEPA identified no State-formulated or reviewed land use plans for the study area, but recommended that vegetation removal be kept to a minimum, in-stream work be avoided during spring spawning periods, and a wetland assessment of the proposed floodway area be conducted to determine if low-lying areas "currently, or have the potential to, support wetland vegetation" (20 May 1986).

The Ohio State Historic Preservation Office (SHPO) reviewed the Phase I Cultural Resources Survey (Reconnaissance) and recommended further investigations of the area to determine if the sites identified in the reconnaissance would be eligible for the National Register of Historic Places (13 January 1986). The draft Cultural Resources Survey will be submitted for review and comment to the SHPO.

c. Conservancy District. The views of the Maumee Watershed Conservancy District were solicited on numerous occasions during the formulation of a plan of action to reduce flood damage in the village of Ottawa, Ohio caused by overbank flooding of the Blanchard River. The most recent communication from them Supporting Selected Plan B in combination with Plan C is their letter of 11 June 1986.

d. Local Agencies. The views of the county and regional planning commission on the proposed project were requested in a letter dated 7 April 1986. The Mid-Western Ohio Joint Planning Council recommended further coordination with Putnam County residents and advised a "more comprehensive perspective concerning the Blanchard River" (7 May 1986). The Putnam County Commissioners expressed their support for Alternative VII (Plan B) (21 May 1986).

PUBLIC INVOLVEMENT.

On 19 March 1986, a public workshop was held at the Ottawa Village Council Chambers to present an overview of the study and proposed alternative plans for flood protection. Those in attendance expressed opposition to the construction of any levees or floodwalls citing adverse impacts on aesthetic values and other social resources, the potential for induced damages on the south bank of the river, and risk due to ponding behind the levees/floodwalls if adequate interior drainage were lacking. The general consensus was support for Plan B. Other data and pertinent correspondence are presented in Appendix E.

COMPLIANCE WITH ENVIRONMENTAL PROTECTION STATUTES.

The recommended plan has been considered in relation to the following Federal laws and policies:

Archaeological and Historic Preservation Act, 16 U.S.C. 469, et seq.
Clean Air Act, as amended, 42 U.S.C. 1857h-7, et seq.
Clean Water Act (Federal Water Pollution Control Act), 33 U.S.C. 1251 et seq.
Coastal Zone Management Act, 16 U.S.C. 1451, et seq.
Endangered Species Act, 16 U.S.C. 1531, et seq.
Estuary Protection Act, 16 U.S.C. 1221, et seq.
Federal Water Project Recreation Act, 16 U.S.C. 4001-12, et seq.
Fish and Wildlife Coordination Act, U.S.C. 661, et seq.
Land and Water Conservation Fund Act, 16 U.S.C. 4601-1-4601-11, et seq.
Marine Protection, Research and Sanctuary Act, 33 U.S.C. 1401, et seq.

National Environmental Policy Act 42 U.S.C. 1401, _et seq_.
National Historic Preservation Act, 16 U.S.C. 470a, _et seq_.
Rivers and Harbors Act, 33 U.S.C. 403, _et seq_.
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, _et seq_.
Wild and Scenic Rivers Act, 16 U.S.C. 1271, _et seq_.
Executive Order 11593, Protection and Enhancement of the Cultural Environment
Executive Order 11988, Floodplain Management
Executive Order 11990, Protection of Wetlands

For the Ottawa Flood Protection Study, the Coastal Zone Management Act; Estuary Protection Act; Marine Protection, Research and Sanctuary Act; Watershed Protection and Flood Prevention act; and Wild and Scenic Rivers Act are not applicable.

In accordance with the Archaeological and Historic Preservation Act, the proposed project was initially coordinated with the Advisory Council on Historic Preservation (ACHP), National Park Service (NPS), and Ohio State Historic Preservation Office (SHPO). Upon the recommendation of the SHPO, a Phase 1 Cultural Resources Survey (Reconnaissance) of the study area was completed and submitted to the ACHP, NPS, and SHPO (27 December 1985). The SHPO recommended further investigations of the study area to determine if the sites identified in the reconnaissance would be eligible for the National Register of Historic Places (13 January 1986). The ACHP also recommended additional studies in order to determine National Register eligibility (27 January 1986). A Cultural Resources Survey of the area has concluded, no archaeological sites or historic properties are present in the area which could be affected by the proposed project.

In order to attain compliance with the Clean Air Act, copies of the DEIS have been submitted to the Regional Administrator of the U.S. Environmental Protection Agency (EPA) to obtain their written views and comments on the environmental impact of any matter relating to EPA's authorities from the standpoint of public health, welfare or environmental quality under Section 309 of the Act, and the determinations and findings required by Section 176(c) of the Act to assure the conformity of the proposed project to the State of Ohio's implementation plan.

Since no dredged or fill materiel would be placed in the Blanchard River, Section 401 and 404 of the Clean Water Act are not applicable to this study.

In order to attain compliance with the Endangered Species Act and Fish and Wildlife Coordination Act, coordination has been maintained with the U.S. Fish and Wildlife Service and Ohio Department of Natural Resources (ODNR). A draft Fish and Wildlife Coordination Act Report addressing USFWS's overall concerns and recommendations is included in Appendix F. Consultation with ODNR revealed that pregnant Indiana bats (_Myotis sodalis_), a Federal endangered species, had been recorded along the Little Auglaize River in Paulding County utilizing riparian habitat similar to that present in the study area. Consequently, ODNR has recommended a survey along the Blanchard River to determine the potential for summer roosts in the area (16 May 1986). A survey is currently under way to determine if this species or its critical habitat may be present in the area.

In accordance with the Federal Water Project Recreation Act and Land and Water Conservation Fund Act, review copies of the draft Reevaluation Report and DEIS have been provided to the Department of the Interior in regard to recreation and fish and wildlife activities in order to insure compliance with the comprehensive nationwide outdoor plan formulated by the Secretary of the Interior.

Full compliance with the National Environmental Policy Act will be attained when the Record of Decision is signed. Corps planning actions fulfill the requirements of the Rivers and Harbors Act.

In accordance with Executive Order 11990, Protection of Wetlands, a determination has been made that there exists no practicable alternative to undertaking the proposed action which may adversely impact upon a 2-acre $\pm$ wetland. Efforts would be made to exclude the placement of any excavated materials in the wetland; however, river overbank flooding and siltation would be unavoidable. To mitigate this impact, a wetland of greater or equal size would be created along the periphery of the proposed floodway.

SECTION I
RECOMMENDATION

I recommend that the project for flood protection at Ottawa, Ohio, presented in HD 485, 89th Congress, 2d Session and authorized under Section 203 of the Flood Control Act, Public Law 89-789 dated 7 November 1966 be modified and be the Selected Plan, Plan E, as reformulated in this General Reevaluation Report. Further, I recommend that, because of the simplicity of Plan E, the General Reevaluation Report serve as the basis for development of Plans and Specifications for construction without completing a General Design Memorandum.

Daniel R. Clark

DANIEL R. CLARK
Colonel, Corps of Engineers
District Commander

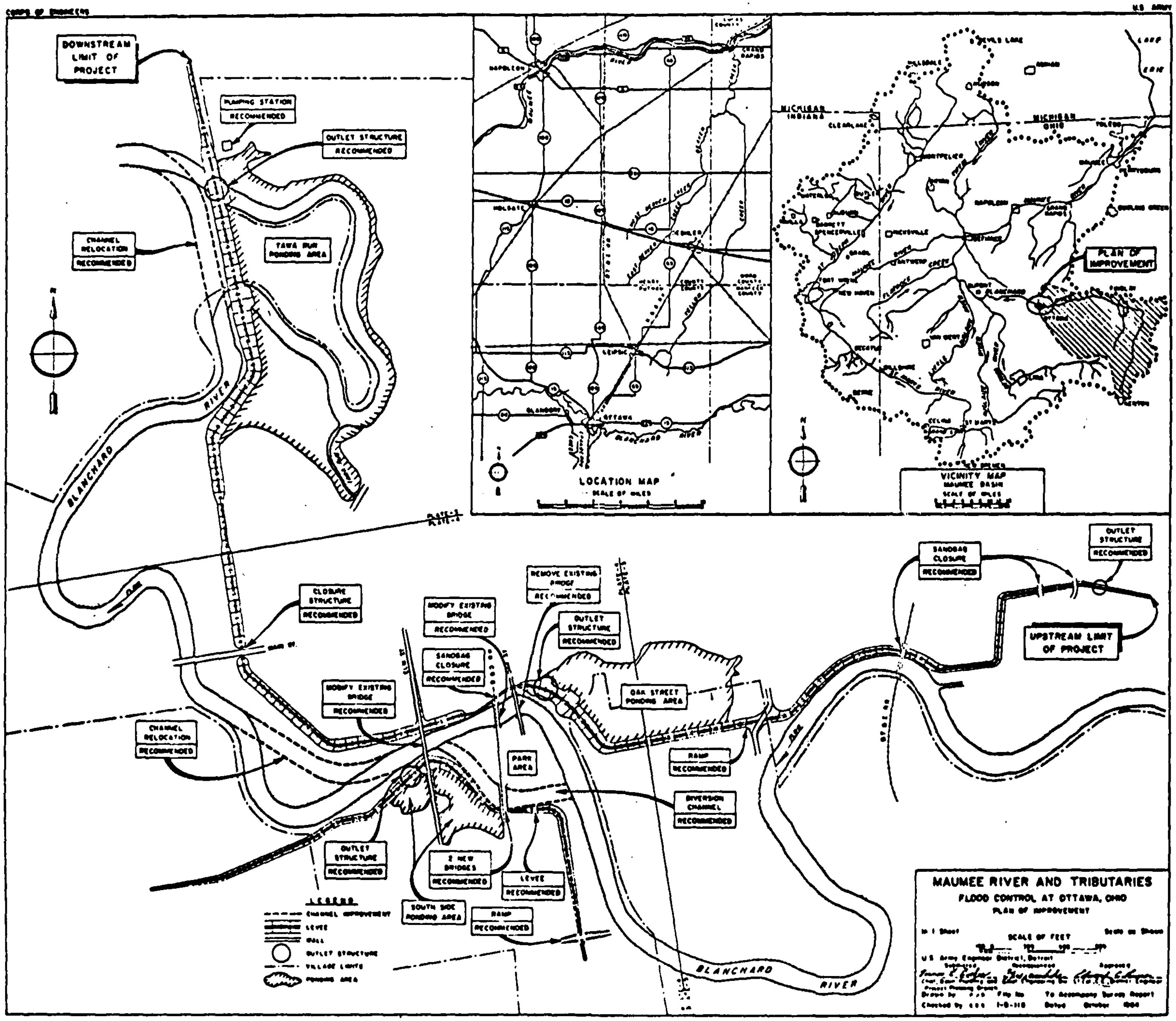
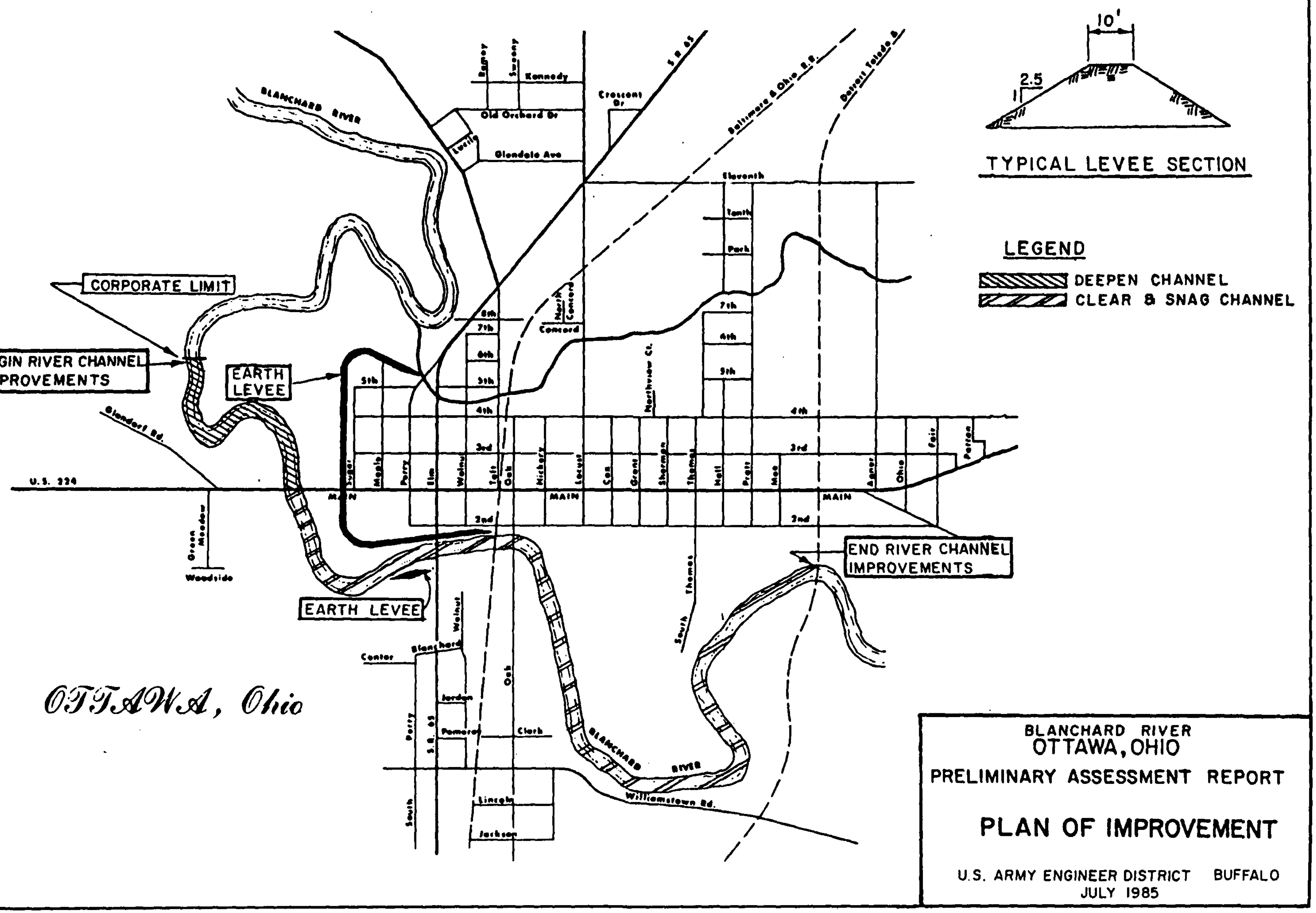

CORPS OF ENGINEERS
U.S. ARMY
DOWNSTREAM LIMIT OF PROJECT
PUMPING STATION RECOMMENDED
OUTLET STRUCTURE RECOMMENDED
CHANNEL RELOCATION RECOMMENDED
TAWA RUN PONDING AREA
BLANCHARD RIVER
LOCATION MAP
VICINITY MAP
MAUMEE BASIN
PLAN OF IMPROVEMENT
MICHIGAN
INDIANA
OHIO
CLOSURE STRUCTURE RECOMMENDED
MODIFY EXISTING BRIDGE RECOMMENDED
SANDBAG CLOSURE RECOMMENDED
REMOVE EXISTING BRIDGE RECOMMENDED
OUTLET STRUCTURE RECOMMENDED
OAK STREET PONDING AREA
PARK AREA
RAMP RECOMMENDED
DIVERSION CHANNEL RECOMMENDED
2 NEW BRIDGES RECOMMENDED
LEVEE RECOMMENDED
SOUTH SIDE PONDING AREA
UPSTREAM LIMIT OF PROJECT
LEGEND
CHANNEL IMPROVEMENT
LEVEE
WALL
OUTLET STRUCTURE
VILLAGE LIMITS
PONDING AREA
MAUMEE RIVER AND TRIBUTARIES
FLOOD CONTROL AT OTTAWA, OHIO
PLAN OF IMPROVEMENT
SCALE OF FEET
U.S. Army Engineer District, Detroit
To Accompany Survey Report

PLATE I

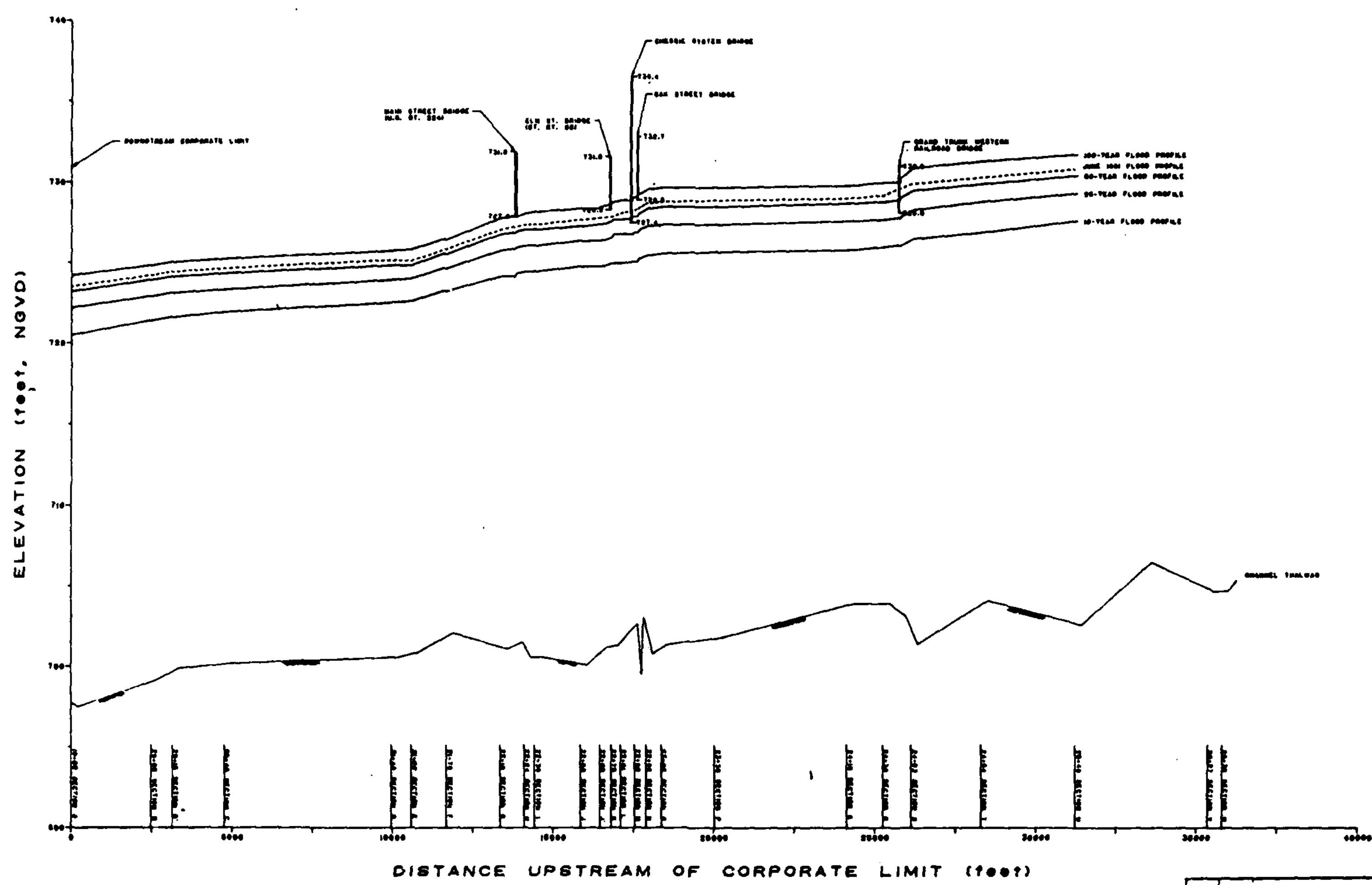


BLANCHARD RIVER
OTTAWA, OHIO
PRELIMINARY ASSESSMENT REPORT

PLAN OF IMPROVEMENT

U.S. ARMY ENGINEER DISTRICT BUFFALO
JULY 1985

PLATE 2

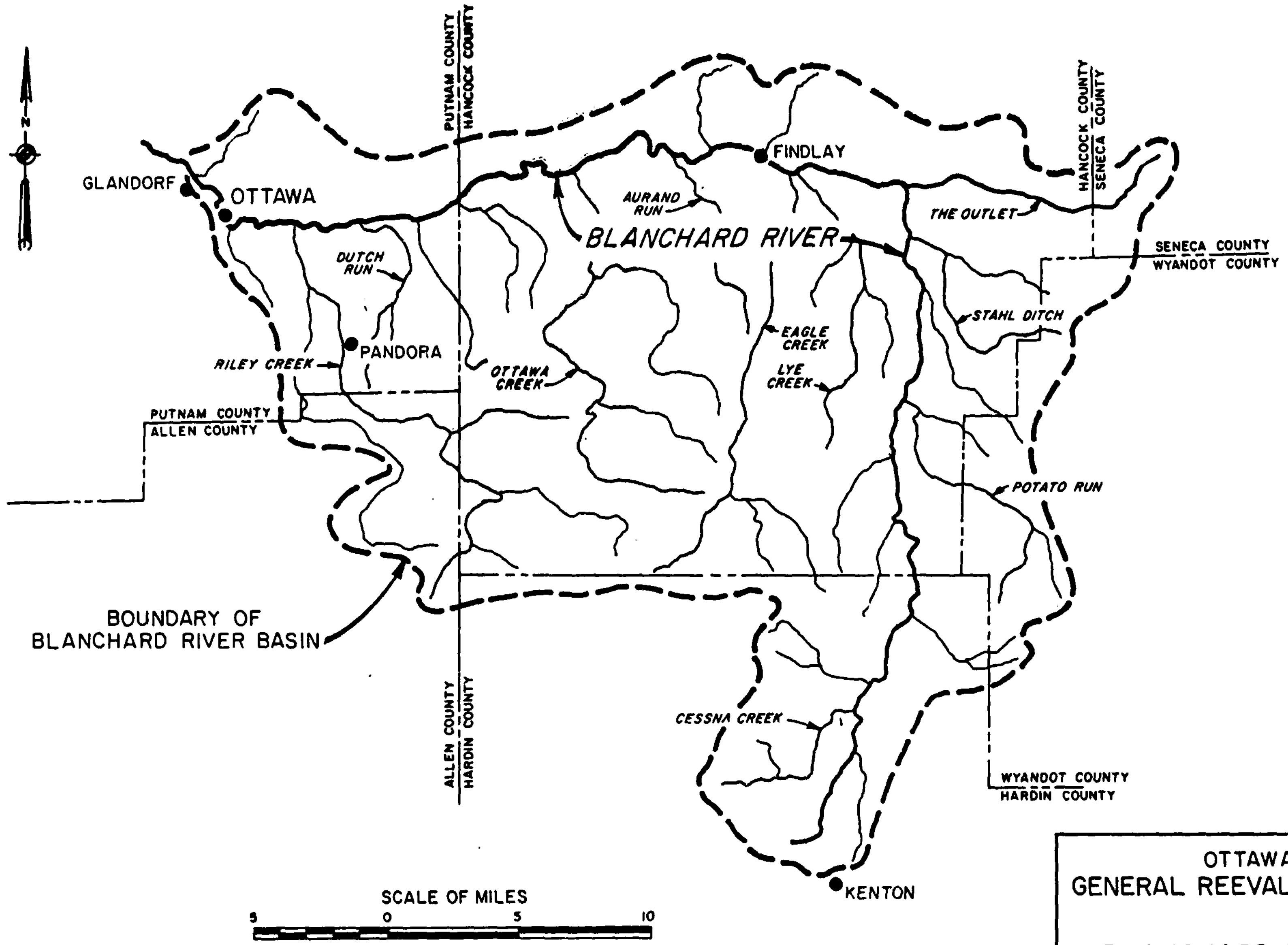


U.S. ARMY ENGINEER DISTRICT, BUFFALO
CORPS OF ENGINEERS
BUFFALO NEW YORK

VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
FLOOD PROFILES, BLANCHARD RIVER
AT OTTAWA
WITHOUT PROJECT PLAN
(EXISTING CONDITIONS)

AS NOTED
DRAWING NUMBER
SHEET OF

PLATE 3

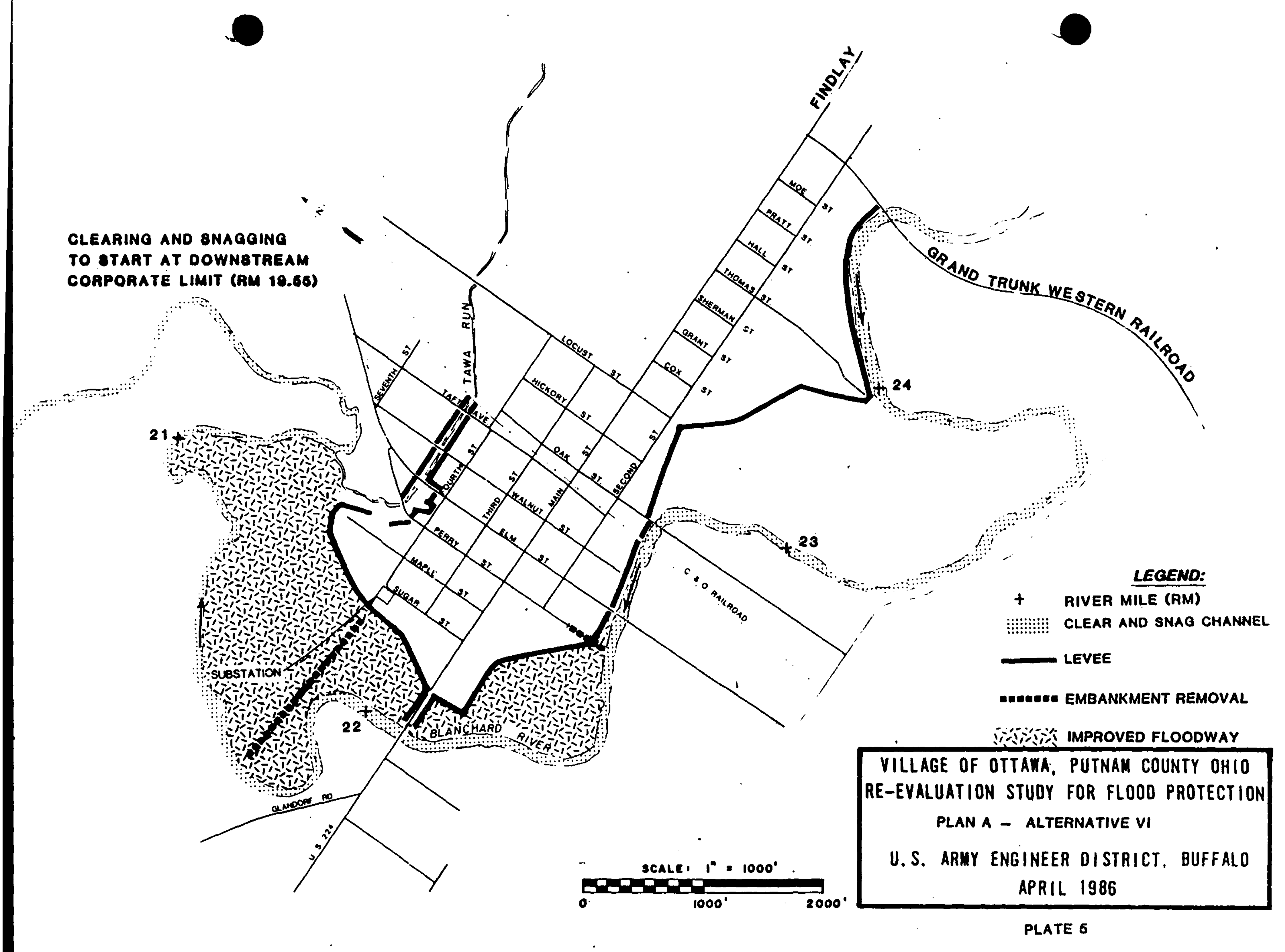


OTTAWA, OHIO
GENERAL REEVALUATION REPORT

BLANCHARD RIVER BASIN

U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

PLATE 4



VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
PLAN A – ALTERNATIVE VI
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986

PLATE 5

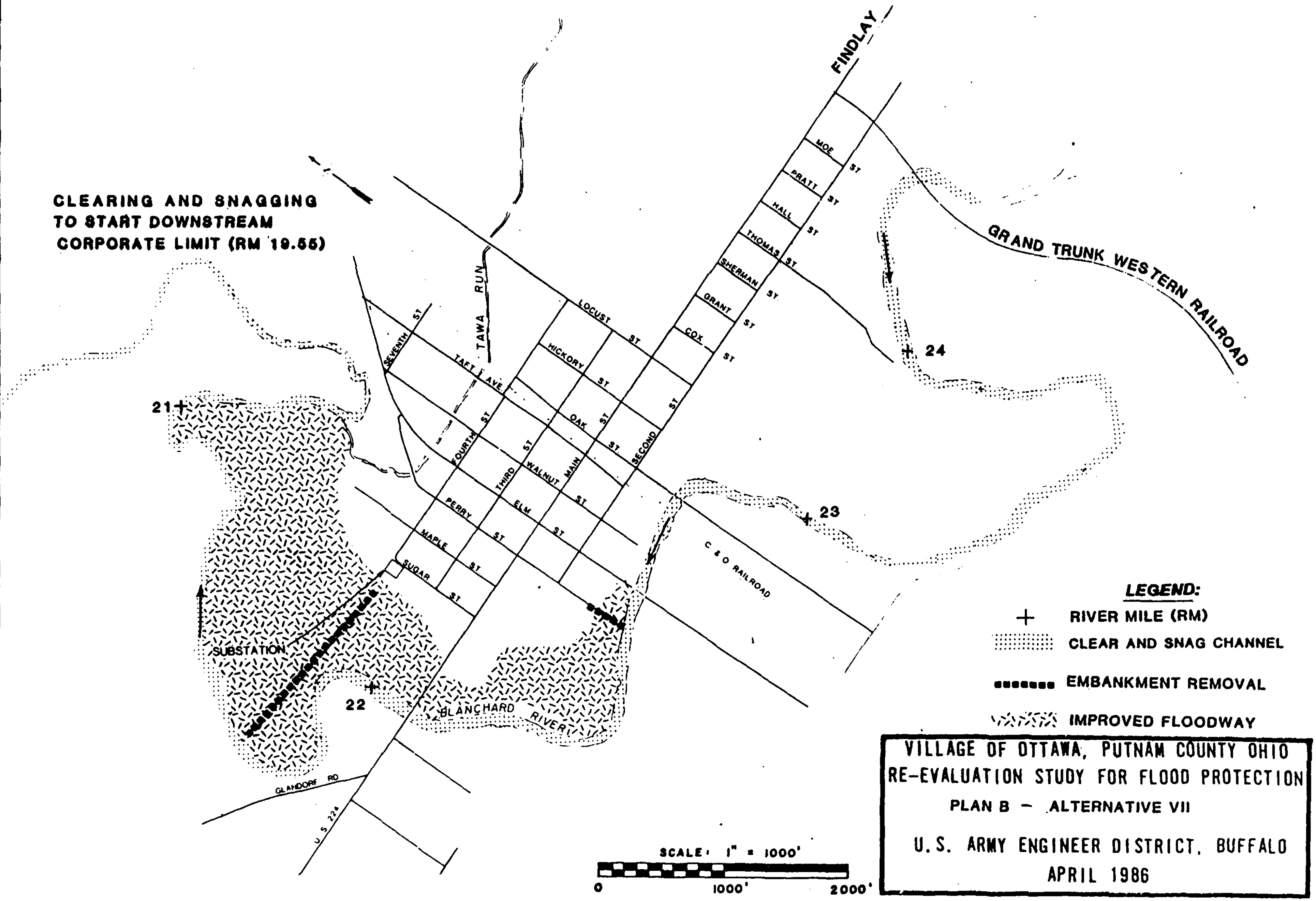
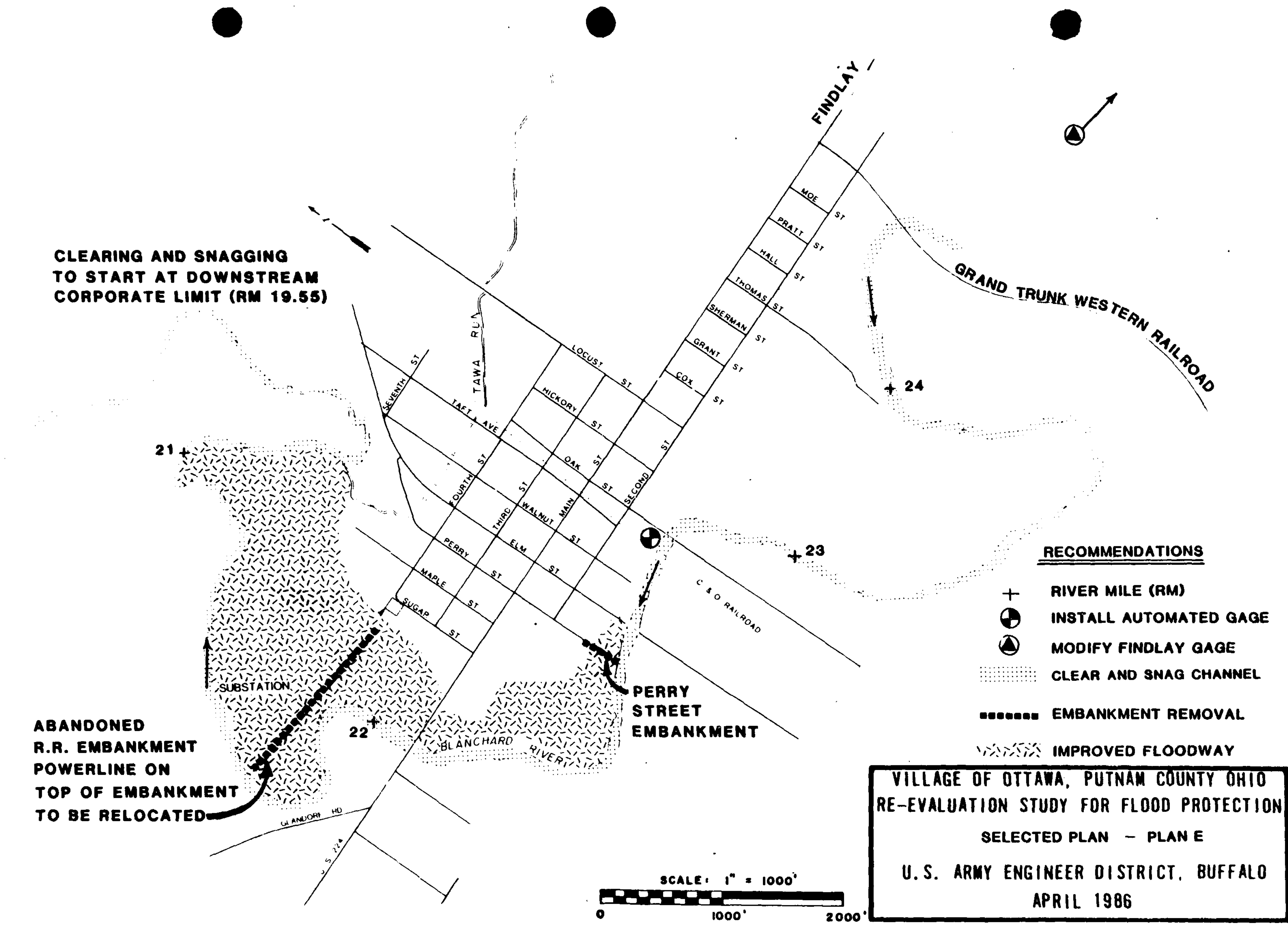
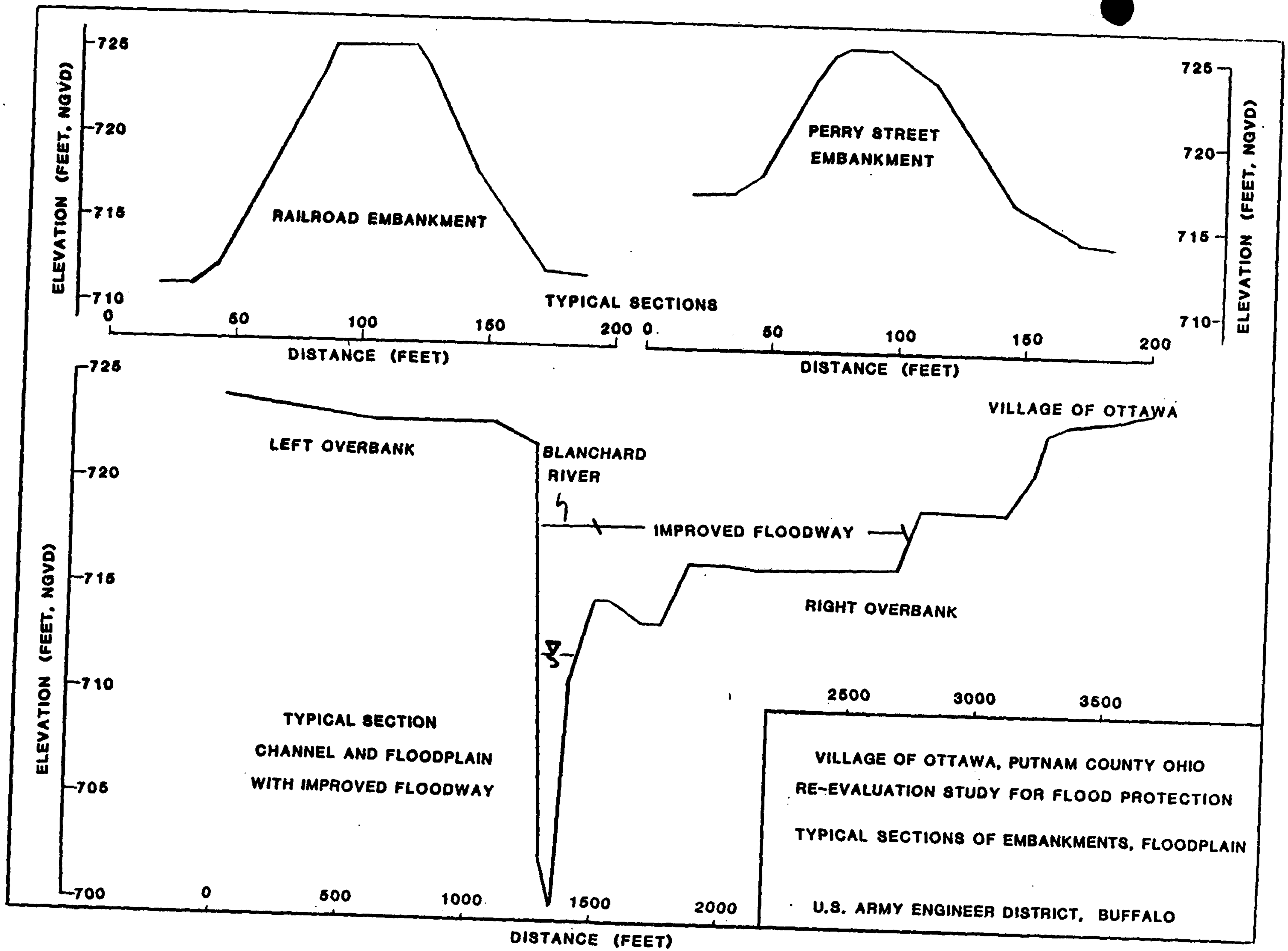

CLEARING AND SNAGGING
TO START DOWNSTREAM
CORPORATE LIMIT (RM 19.55)
FINDLAY
GRAND TRUNK WESTERN RAILROAD
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
LOCUST ST
HICKORY ST
OAK ST
SECOND ST
MAIN ST
WALNUT ST
THIRD ST
FOURTH ST
TAFT AVE.
SEVENTH ST
PERRY ST
ELM ST
MAPLE ST
SUGAR ST
TAWA RUN
C & O RAILROAD
BLANCHARD RIVER
SUBSTATION
GLANDORF RD
U S 224
21
22
23
24
SCALE: 1" = 1000'
0
1000'
2000'
LEGEND:
RIVER MILE (RM)
CLEAR AND SNAG CHANNEL
EMBANKMENT REMOVAL
IMPROVED FLOODWAY
VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
PLAN B – ALTERNATIVE VII
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986

PLATE 6



VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
SELECTED PLAN – PLAN E
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986

PLATE 7



VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO

RE-EVALUATION STUDY FOR FLOOD PROTECTION

TYPICAL SECTIONS OF EMBANKMENTS, FLOODPLAIN

U.S. ARMY ENGINEER DISTRICT, BUFFALO

PLATE 8

Emergency Instructions to Follow During Flooding or High Water Alerts

The Township of Wayne, surrounded by the Ramapo, Pequannock and Passaic Rivers and their tributaries, has in the past been subjected to flooding and high water levels after prolonged heavy rains.
Persons living in areas subject to flooding should:

1. Have a flashlight and a battery powered radio available in good condition.
2. Learn the locations of water supply pipeline valves, master electrical switches, and gas line shut-off valves.
3. Maintain a list of items which should be removed to a higher level in the event of a Flood Alert
4. Maintain your car's gas tank with reasonble quantity of gas.

FLOOD ALERT

When a Flood Alert has been declared by the Mayor, sound trucks will be dispatched in the areas concerned. Radio Stations WKER and WPAT will be on the air with up-to-the-minute information. Flood control center will be in operation at that time — **694-1863**

1. Keep children of all ages OUT of the flood waters — *the water is contaminated.*
2. Keep tuned to your radio for the latest warning and advice. **Do not call Police Headquarters** as you will only tie up urgently needed telephone lines. **694-1863** will be available for information, requests, and offers of assistance.
3. Keep in contact with your neighbors.
4. Secure all objects such as loose lumber, toys, picnic tables, lawn chairs, boats which could float away by rising waters.
5. Move everything possible above high water mark, particularly from cellars.
6. Put your valuable papers etc. in a metal box that you can take with you.
7. Comply with all conditions for coverage specified in flood insurance policies.
8. Pay no attention to rumors — verify information.

EMERGENCY – EVACUATION

If Your Area Is Ordered Evacuated, You Should:

1. Shut off gas and electric power. Make provision for water to enter cellar, either through open windows or cellar doors — the presence of water in a basement helps support the foundation walls against the pressure from outside and often prevents collapse. Then leave immediately. Don't risk being marooned.
2. Obey instructions and go to evacuation points indicated. (*This is in the gymnasium at* Wayne Valley High School)
3. Go there. Park in the high school parking lot. Report to the office where you will be registered. *This is important* It is the only way of establishing your whereabouts in case of inquiries from friends and relatives, or to inform you that the emergency is over. **Call 694-1863** if you cannot proceed to the High School.
4. After registering, you will be allowed to leave if you so desire. *Inform us where you expect to be.*
5. Food and shelter will be available.
6. If you bring pets, keep them in your car. Care of them is your responsibility.
7. If you use municipal water it will be safe to use UNLESS otherwise announced Water from private water systems, wells, springs, etc. should *not* be used without boiling for at least fifteen minutes. Instructions will be distributed after the flood waters have receded.

After The Emergency You Should:

1. Not touch loose or dangling wires. Report damage to police or your power and light company. If live wires fall on your car while you are driving, stay inside and wait for aid.
2. Guard against spoiled food in refrigerators and freezers.
3. If house is flooded or damaged, it must be inspected by public health officials and building inspectors before you may re-enter.
4. Unless you are qualified to render aid, stay away from disaster areas where you may hamper rescue or first aid work
5. Drive cautiously. Watch for debris; pavement may be undermined by water.
6. All living spaces, including cellars, that have been inundated should be scrubbed down with a strong solution of household bleach. Clothing must be washed thoroughly.
7. Printed instructions for rehabilitation, salvage and cleanup are on the reverse side of this poster.

Published As A Community Service
By The Township of Wayne

Your Flood Warden is: .... Phone ....

SAMPLE EMERGENCY INSTRUCTIONS

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX A

HYDROLOGY AND HYDRAULICS

88 12

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO
APPENDIX A
HYDROLOGY AND HYDRAULICS

TABLE OF CONTENTS

TABLES

FIGURES

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX A

HYDROLOGY AND HYDRAULICS

A1. INTRODUCTION

This appendix is part of the re-evaluation study report on flood control for Ottawa, Ohio. The following paragraphs contain descriptions of procedures, statistics, and basic supporting data considered in hydraulic and hydrologic analysis of the Ottawa, Ohio, flood problem.

A2. BASIN DESCRIPTION

A2.1 General.

The Maumee River drainage basin, one of the largest and most important tributaries of the Great Lakes-St. Lawrence System, covers a total area of about 6,580 square miles. The southeastern portion of the Maumee basin is drained by the Auglaize River which joins the Maumee River at Defiance, Ohio. The Auglaize River has two main tributaries, the Ottawa and Blanchard Rivers. The Maumee River Basin is shown on Figure A1, the Vicinity Map, and the project area on Plate A1.

A2.2 Blanchard River.

The Blanchard River drains about 765 square miles of the extreme southeastern corner of the Maumee basin. Ottawa, Ohio, is located on the Blanchard River approximately 22 miles upstream from its confluence with the Auglaize River. The Blanchard River basin upstream from Ottawa drains about 638 square miles and is roughly rectangular in shape. The character of the basin varies from flat plains along its main course to rolling hills in the headwaters. The southern border of the basin is formed by the Wabash moraine which rises over 1,000 feet above mean sea level, (USGS datum). All of the Blanchard River basin lies within the area covered by the prehistoric glacial ice sheet. The soils of the basin are typical heterogeneous material found in the till plains covering central Ohio. Glacial drift varies in thickness but does not generally extend to great depths.

The Blanchard River rises in Hardin County near Kenton, Ohio, flows north in Hancock County for about 26 miles and then veers sharply westward for a distance of about 36 miles through Findlay to Ottawa, Ohio. From Ottawa, the Blanchard River flows westerly for about 22 miles to join the Auglaize River near Dupont, Ohio. The location and drainage areas of the principal Blanchard River tributaries upstream from Ottawa are listed in Table A1. The Blanchard River basin is shown on Figure A2.

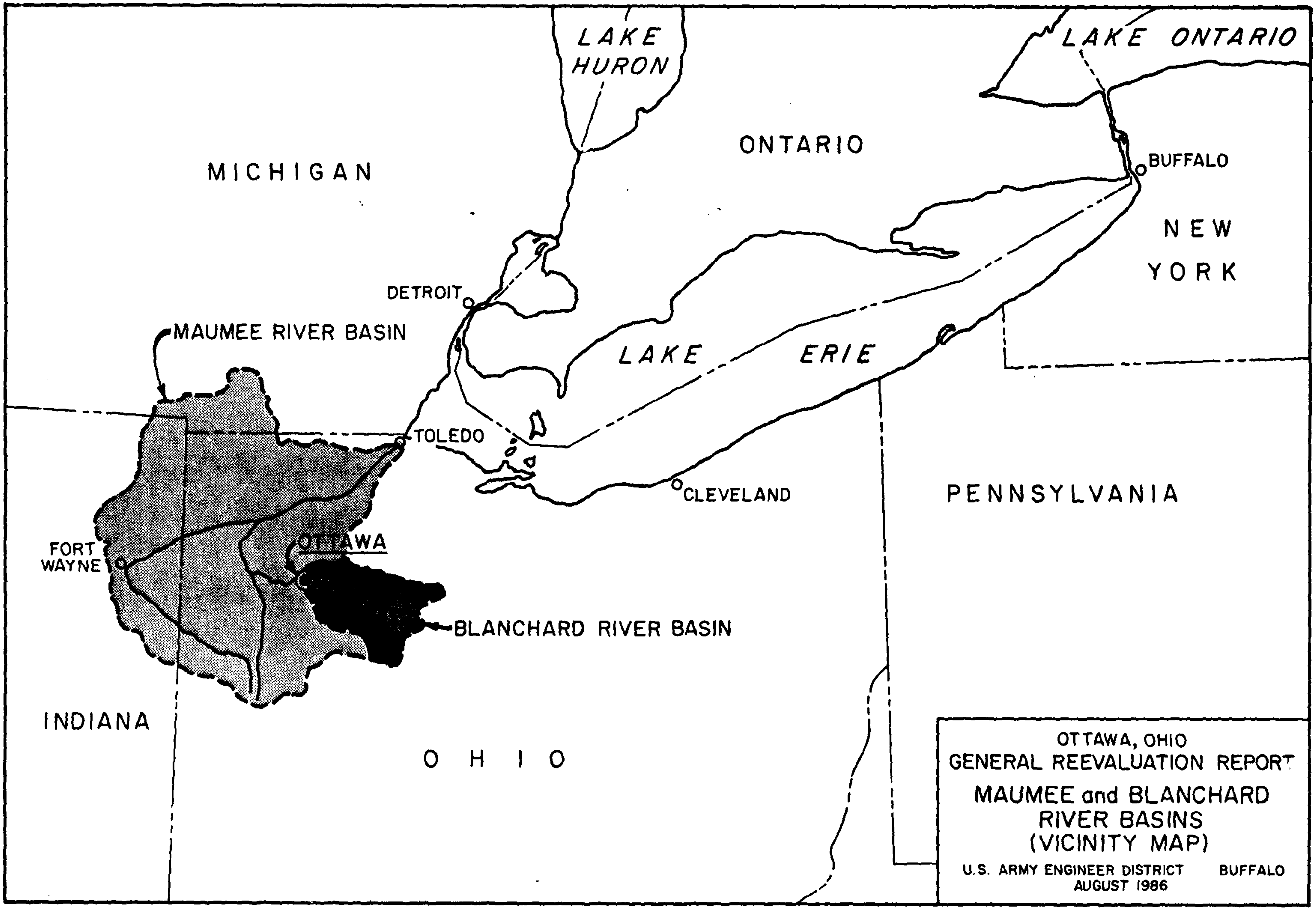

LAKE HURON
LAKE ONTARIO
ONTARIO
MICHIGAN
BUFFALO
NEW YORK
DETROIT
MAUMEE RIVER BASIN
LAKE ERIE
TOLEDO
CLEVELAND
PENNSYLVANIA
FORT WAYNE
OTTAWA
BLANCHARD RIVER BASIN
INDIANA
OHIO
OTTAWA, OHIO
GENERAL REEVALUATION REPORT
MAUMEE and BLANCHARD
RIVER BASINS
(VICINITY MAP)
U.S. ARMY ENGINEER DISTRICT BUFFALO
AUGUST 1986

FIGURE A1

Table A1 - Major Tributaries of the Blanchard River Upstream from Ottawa, Ohio

Name	Distance in Blanchard River miles above Blanchard River - Auglaize River confluence	Drainage area sq. mi.	Approximate Elevation USGS datum	
			Headwaters	Outlet
Blanchard River at Ottawa, Ohio	20.1	638	975	700
Riley Creek	27.5	88.2	893	712
Dutch Run	30.2	14.8	800	725
Ottawa Creek	42.1	64.3	860	745
Eagle Creek	53.3	51.1	950	760
Lye Creek	53.6	28.8	829	761
The Outlet	58.3	40.6	809	775
Brights Ditch	60.3	27.6	790	783
Potato Run	68.9	26.7	859	810
Outlet at Forest	80.9	12.5	896	874
Cessna Creek	86.6	22.8	936	893

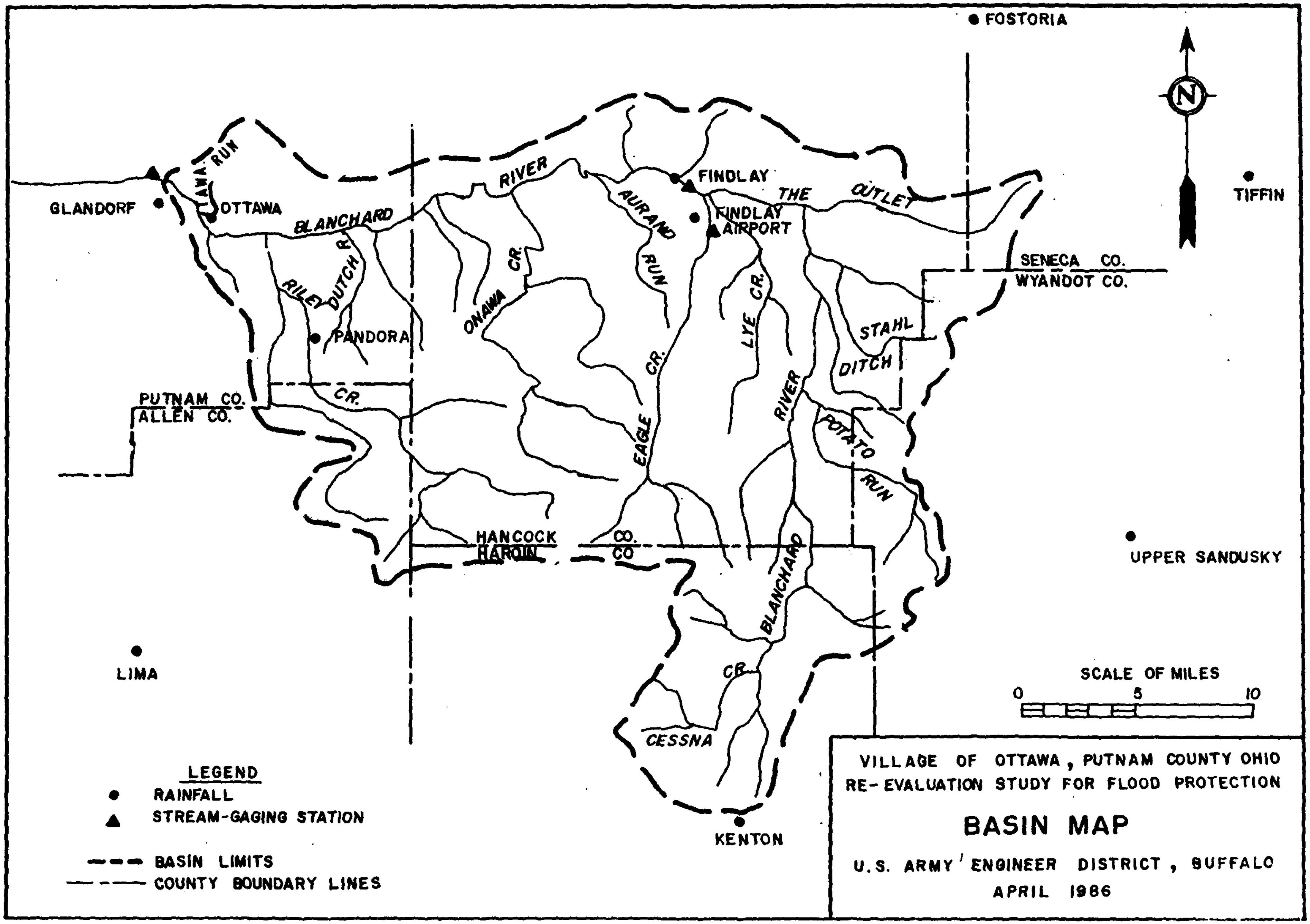

FOSTORIA
TIFFIN
GLANDORF
OTTAWA
LAWA RUN
BLANCHARD RIVER
FINDLAY
THE OUTLET
FINDLAY AIRPORT
AURAND RUN
RILEY
DUTCH R.
PANDORA
ONAWA CR.
EAGLE CR.
LYE CR.
RIVER
STAHL DITCH
POTATO RUN
SENECA CO.
WYANDOT CO.
PUTNAM CO.
ALLEN CO.
CR.
HANCOCK CO.
HARDIN CO.
BLANCHARD
CR.
CESSNA
UPPER SANDUSKY
LIMA
KENTON
SCALE OF MILES
0
5
10
LEGEND
RAINFALL
STREAM-GAGING STATION
BASIN LIMITS
COUNTY BOUNDARY LINES
VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
BASIN MAP
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986

FIGURE A2

Blanchard River stream slopes range from about 6 feet per mile in the headwater reaches to about 1.8 feet per mile in that reach from Findlay to Ottawa. Downstream from Ottawa the stream slope flattens to about 0.5 feet per mile.

Tawa Run, a small tributary to the Blanchard River draining about 3.8 square miles, flows southwest to northwest through Ottawa. The overall average stream slope of Tawa Run is about 10 feet per mile. The average slope of the lower reach through Ottawa is about 8 feet per mile.

The village of Ottawa, situated along the banks of the Blanchard River, is the commercial center of a farming district. Ottawa, with a population of about 3,874 persons, is the county seat of Putnam County. Ground elevations vary from riverbank elevation of 705 feet to a high of about elevation 740 feet in the northeastern part of the village. About one-half of the densely-populated area lies between the elevation 725 and 730 foot contours.

A3. HYDROLOGY

A3.1 General.

U.S. Weather Bureau records have been maintained for the Ottawa area since 1888. Four Weather Bureau stations are presently maintained within the Blanchard River basin. The locations of these stations are: Findlay Airport, Findlay Sewage Treatment Plant, Pandora, and Ottawa (Glandorf), Ohio.

There are no existing stream gaging stations on the Blanchard River at Ottawa. Stream-flow records were obtained at Glandorf about 3 miles downstream from Ottawa but this station was closed in 1951.

A3.2 Climatology.

The climate of Ottawa is tempered somewhat by the effect of the nearby Great Lakes but is, nevertheless, subject to extremes in temperature and precipitation resulting from cyclonic air masses moving across the continent. The average annual temperature of Ottawa is about 51 degrees Fahrenheit. The growing season extends about 160 days from the last killing frost in early May to the first killing frost in mid-October.

The mean annual precipitation for the Ottawa area is approximately 35 inches. Mean monthly rates, taken from the Pandora gage, vary from a minimum of 1.95 inches in February to a maximum of 3.56 inches in July. The average annual snowfall is about 26 inches.

Storms over the Blanchard River basin usually travel from the southwest to the northeast. The basin is subject to two major types of storms: large area storms of long duration and moderate intensities, and short-term, thunderstorm-type rainfalls of short duration and high intensities. The longer-duration storms occur any time throughout the year, but heavy local storms of the thunderstorm type usually occur in the late spring and throughout the summer.

A3.3 Stream Flow Data.

Stream-flow records in the Blanchard River basin have been obtained at five stations. The U.S. Geological Survey operated a stream gaging station at Glandorf, Ohio (River Mile 17.2) from August 1921 to July 1928 and from January 1947 to December 1951. The existing stream gaging station near Findlay has been in operation since November 1923. Stream-flow records were also made on Eagle Creek from January 1947 to July 1957, Tiderishi Creek near Jenera from 1947 to 1977, and on the Blanchard River near Dupont from August 1928 to December 1935. Table A2 summarizes Blanchard River basin stream-flow data.

A3.4 Flood History

The most severe storm of record was that of 23-27 March 1913 during which the precipitation over the Blanchard River basin was about 8.0 inches. The flood-producing 1913 rainfall was preceded by a rainstorm totaling 0.4 inches on 21 March 1913. This precipitation saturated the soil and cleared the basin of snow. Although the total of precipitation was unusual, no exceptional 24-hour rates were recorded. This storm extended from Arkansas to New York State. The heaviest precipitation center was located at Bellefontaine, Ohio, about 15 miles southeast of the Blanchard River basin.

The storm of 12-14 February 1950 was produced by tropical air masses advancing northward from the Gulf of Mexico. The precipitation commenced as snowfall in the early evening of 12 February 1950 and then changed to rainfall for approximately 45 hours. The snowfall accumulated to approximately two inches before being melted by subsequent warm rains. A total of 2.84 inches of precipitation fell on the watershed with a maximum recorded at Ottawa of 2.97 inches.

The storm of 19-22 January 1959 was produced by a mass of warm, moist air transported from the Gulf of Mexico to the Ohio Valley. This storm caused the most severe flood since 1913 in most parts of Ohio. However, the storm-caused flood at Ottawa is estimated to be slightly less than that of February 1950. Severe cold of December 1958 froze the ground generally to depths ranging from 6 to 24 inches. A storm of 14-17 January delivered from 0.50 to 1.84 inches of precipitation in the form of snow over most of northern Ohio. The Blanchard River basin was thus saturated, frozen, and covered with about one inch of snow just prior to the 19-22 January rainfall. Most of the flood-producing rains fell between midnight January 20-21 and noon on the 21st. Surface temperatures rose above freezing contributing to snowmelt. An average of 2.8 inches of rainfall was recorded in a period of about 63 hours. The total rainfall varied from a maximum of 3.36 inches at Lima, Ohio, to a minimum of 2.20 inches at nearby Glandorf, Ohio.

The storm of 9-10 February 1959 produced the highest discharge on the Blanchard River at Ottawa since the 1913 flood. This storm was similar to the storm of January 1959, produced by a low-pressure center moving across Ohio. The precipitation began in the early evening on 9 February 1959 and fell continuously for about 18 hours. The total rainfall varied from 1.75 inches at Kenton, Ohio, to 3.15 inches at Pandora, Ohio. The average rainfall over the basin totaled 2.73 inches. The runoff produced from this storm was high, and broken ice in the streams added to flood stages throughout the basin.

Table A2 - Stream Flow Data

Location of Station	River miles above mouth	Drainage area above station sq. mi.	Period of record From - To	Maximum discharge Q cfs	Maximum discharge Date	Minimum Discharge Q cfs	Minimum Discharge Date
Blanchard River near Dupont, Ohio	6.5	749	Wy 1929 - WY 1936	16,800	15 Jan. 1930	0.9	31 Aug. 1934 1 Sept. 1934
Blanchard River at Glandorf, Ohio	17.2	644	WY 1922 - WY 1928 WY 1947 - WY 1951 WY 1959	15,800	15 Feb. 1950	0.8	7 Oct. 1951
Blanchard River near Findlay, Ohio	50.5	346	WY 1913 WY 1924 - WY 1936 WY 1941 - Present	15,000	11 Feb. 1959	0.4	26 Aug. 1934 3 Sept. 1934
Eagle Creek near Findlay, Ohio	4.0	55	WY 1947 - WY 1957, 1958, 1959, 1981	2,920	7 June 1947	no flow	many days
Tiderishi Creek near Jenera, Ohio	-	4.65	WY 1947 - WY 1977	480	10 Feb. 1959	47	1958

Note: The June 1981 flood resulted in peak flows of 13,000 cfs at the Blanchard River gage near Findlay, and an estimated 17,900 cfs at the former Blanchard River gage at Glandorf. See Section A3.4 for further information.

Flood stages of the January and February 1959 floods were affected by ice jams that formed at constrictive channel sections. No specific ice observations were made near Ottawa.

The flood that followed the storm of 23-27 March 1913 is considered to be the most severe of modern records. The peak discharge of the March 1913 flood on the Blanchard River at Ottawa is estimated to be 29,000 cfs. The most severe flood subsequent to the 1913 flood occurred in June 1981. This flood was caused primarily by relatively high runoff from rainfall. The peak flow on the Blanchard River at Ottawa for the June 1981 flood is estimated to be about 17,900 cfs.

A4. FLOOD FREQUENCY

The U.S. Department of the Interior's publication, "Guidelines for Determining Flood Flow Frequencies" (Bulletin 17B) was used as guidance in developing the discharge-frequency curve presented in this report. The discharge-frequency curve for Blanchard River at Ottawa was updated using the guidelines in Appendix 7 of Bulletin 17B by adjusting the short-term record for Blanchard River at Glandorf, OH (DA = 644 sq. mi.), using the long-term record of Blanchard River at Findlay, OH (DA = 346 sq. mi.). The discharges used for this analysis can be found on Table A3. Adjustments were then made to the station statistics for Glandorf to account for high outliers and historical floods (Appendix 6 of Bulletin 17B); adjustment of the skew coefficient (Section V.B.4 of Bulletin 17B); and then making adjustments for expected probability using Appendix II of Bulletin 17B. The discharge-frequency curve for Blanchard River at Glandorf can be found on Figure A3. The tabular form of this curve can be found on Table A4 ("Peak Curve").

The initial station statistics for Glandorf developed using computer program HECWRC are:

Q (mean logarithm of flows) = 3.9761
S (standard deviation) = 0.2067
g (skew coefficient) = 0.0188

The final station statistics for Glandorf are:

Q = 3.8790
S = 0.1572
g = 0.3000

These statistics have been adjusted by the procedures discussed in the previous paragraph. The skew coefficient (g) represents the weighted skew value. The initial station skew was adjusted to reflect high outliers and historical events, then was adjusted using a regional skew value of -0.4000 and the guidelines in Section V.B.4 of Bulletin 17B. These values are computed values. Using the expected probability concepts of Appendix II of Bulletin 17B the expected probability discharge-frequency curve for Glandorf was calculated. This curve can be found on Figure A3.

Table A3
Discharges Used for Adjusting Frequency Curve
(Two Station Comparison using Bulletin 17B, Appendix 7)

Year	Discharge at Findlay (cfs)	Discharge at Glandorf (cfs)
1924	4,280	5,910
1925	2,980	4,460
1926	4,380	10,900
1927	7,460	12,500
1928	6,320	7,270
1947	8,160	11,300
1948	4,930	9,710
1949	3,900	5,310
1950	10,200	15,800
1951	4,900	6,790
1959	12,100	17,700
1981	13,000	17,900

Table A4
Peak and Partial Duration Discharge Frequency Curves
USGS Gage at Glandorf, Ohio

Probability (in %)	Peak Curve (cfs)	Partial Curve (cfs)
.2	26200	26200
.5	22200	22200
1.0	19700	19700
2.0	17100	17100
4.0	15000	15000
10.0	12200	12200
20.0	10400	10400
30.0	8800	9200
40.0	8000	8600
50.0	7300	8200
60.0	6600	8000
80.0	5500	7400
90.0	4800	7000
95.0	4300	6800
99.0	3500	6600

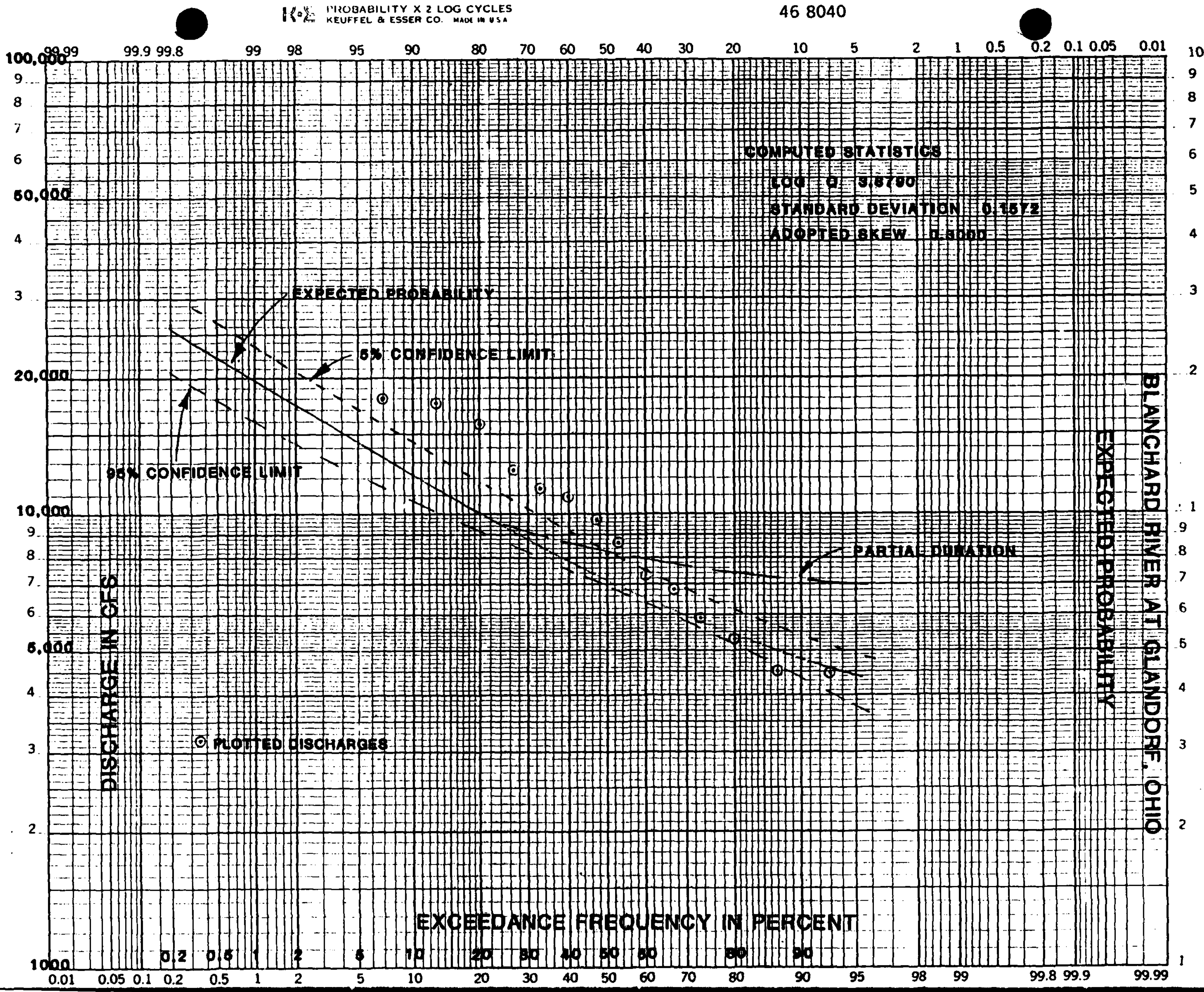

PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 8040
BLANCHARD RIVER AT GLANDORF, OHIO
EXPECTED PROBABILITY
COMPUTED STATISTICS
LOG Q 3.8790
STANDARD DEVIATION 0.1572
ADOPTED SKEW
EXPECTED PROBABILITY
5% CONFIDENCE LIMIT
95% CONFIDENCE LIMIT
PARTIAL DURATION
PLOTTED DISCHARGES
DISCHARGE IN CFS
EXCEEDANCE FREQUENCY IN PERCENT

FIGURE A3

The discharge-frequency curve at Glandorf was finally adjusted to reflect partial duration flows by using the partial duration curve developed for Blanchard River at Findlay. The partial duration curve for Findlay can be found on Figure A4, while the discharges used in determining the partial curve can be found on Table A5. The relationship between the peak and partial curve for Findlay was used to develop the partial duration curve at Glandorf. As can be seen by Table A5, the events are mostly independent of each other. The peak and partial duration discharge-frequency curves can be found on Figure A3, and are compared on Table A4.

Since the drainage areas at the project limits are within 5 percent of the drainage area at Glandorf, the partial duration discharge-frequency curve at Glandorf is applicable over the entire project reach. The discharge for the March 1913 storm of 29,000 cfs at Glandorf, was only used in the adjustment for high outliers and historical discharges.

Table A5
Partial Flow Values Used

Date	Discharge (cfs)	Date	Discharge (cfs)	Date	Discharge (cfs)
03-21-1927	7460*	03-22-1948	4930*	04-23-1972	5850*
01-30-1927	4600	02-15-1950	10200*	05-27-1973	6850*
07-31-1927	4710	11-21-1950	4900*	11-15-1972	5210
12-01-1927	11800*	01-27-1952	7020*	01-20-1974	7410*
12-15-1927	5040	03-12-1952	6440	04-05-1974	5120
03-31-1928	6920	03-04-1955	5100*	02-24-1975	8860*
01-19-1929	6010*	02-26-1956	4700*	02-17-1976	7070*
02-26-1929	5760	04-06-1957	6580*	03-17-1978	6400*
01-15-1930	8580*	06-29-1957	6040	12-15-1977	6010
12-18-1929	6400	02-11-1959	12100*	03-22-1978	5480
01-08-1930	7460	01-22-1959	11300	04-14-1979	6300*
03-14-1933	5760*	04-26-1961	5620*	03-05-1979	4800*
12-31-1932	4710	03-06-1963	7660*	03-22-1980	4980*
02-27-1936	6660*	04-22-1964	6830*	06-14-1981	13000*
04-10-1942	5760*	07-13-1966	7410*	09-02-1981	6800
04-12-1944	6340*	05-08-1967	5710*	03-13-1982	6320*
06-20-1945	6140*	12-11-1966	5680	04-23-1984	6510*
06-18-1946	6400*	05-19-1969	6410*	*1985	6380**
06-08-1947	8160*	01-30-1969	5340		

* Peak discharge for that water year
** Provisionary value

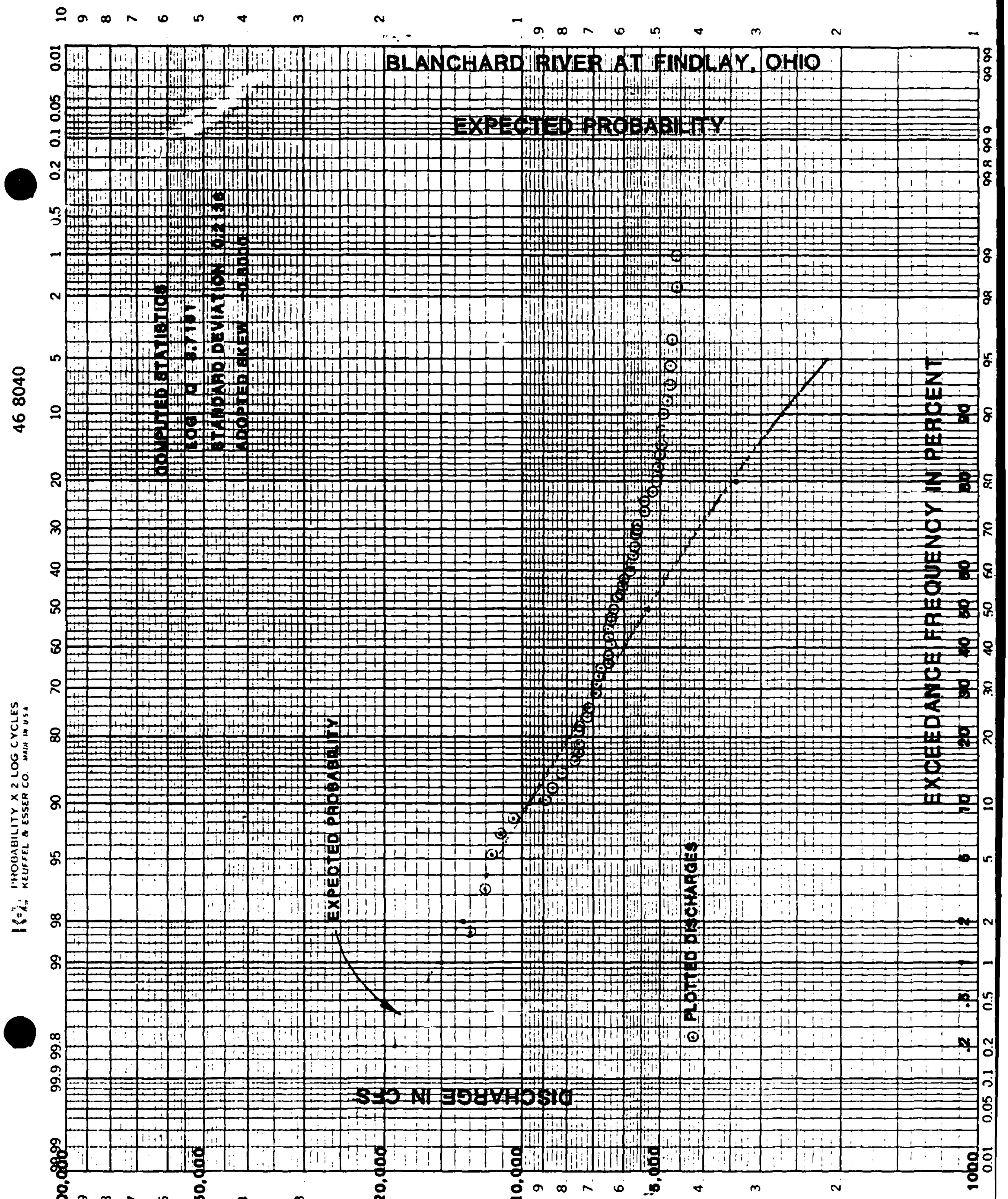

BLANCHARD RIVER AT FINDLAY, OHIO
EXPECTED PROBABILITY
COMPUTED STATISTICS
LOG Q
STANDARD DEVIATION
ADOPTED SKEW
EXPECTED PROBABILITY
PLOTTED DISCHARGES
EXCEEDANCE FREQUENCY IN PERCENT
DISCHARGE IN CFS
46 8040
PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO.

FIGURE A4

A5. HYDRAULIC ANALYSES

A5.1 General.

Hydraulic analyses for each plan studies were performed using the HEC-2 computer model "Water Surface Profiles." Cross section data of the channel, surveyed in 1984, was supplemented by mapping (1:600 scale) developed from aerial photography taken in 1985. Roughness coefficients were estimated in the field and from earlier analyses. The model was calibrated using high water marks for the June 1981 flood, which has a recurrence interval of about sixty (60) years. The proposed Oak Street bridge, which is to be built this year, was substituted for the existing bridge under all plans.

The various elements of the structural plans (Plans A, B, and the Plan B components of Plan E) were modeled by a modification of the roughness and the contraction and expansion coefficients, and of the overbank geometry. Roughness coefficients were reduced from 0.045-0.055 to 0.040-0.045 in the channel, and from 0.060-0.15 to 0.050-0.100 in the overbank areas. Further reduction of the channel roughness coefficients to model optimal overbank conditions was considered not feasible, due to environmental considerations. The reduced values for the roughness coefficients were inflated slightly to allow for some deterioration of conveyance, as a safety factor for any uncertainties.

The removal of the abandoned embankments was accomplished by deleting them from their respective cross sections. The contraction and expansion coefficients were decreased as a result of the reduce distortion of the flow lines. Certain miscellaneous elements of the plans, such as cleaning out of the left channel under the Chessie System Railroad bridge and removal of the reported rubble-rock dam by the old sugar beet factory, were not modeled as their beneficial effects would be relatively insignificant and local in nature.

The effects of the Plans B and E in reducing flood stages is presented in Figures A5 and A6. For Plan E, these effects are attributable to the structural, or Plan B, components of Plan E.

A5.2 Interior Drainage.

Interior drainage considerations were analyzed for those plans containing levees. It was subsequently determined that no plan (Plan A) that included levees would be economically feasible. Interior drainage would not be a pertinent element of Plans B, C, D or E, and therefore no further analyses were performed.

A6. SUMMARY

Plan E provides for flood stage reductions in the Village of Ottawa. The reduction would vary for different floods at different stations along the Blanchard River, but would average about 1.5 feet at the Oak Street Bridge for the June 1981 flood (Figures A5 and A6). Due to the relatively flat topography of the Village of Ottawa, a floods stage reduction of this magnitude could be significant. The water surface profiles for both the with and without project conditions are shown on (Figure A7). A flood outline map showing existing conditions along with improved conditions is provided on Plate A2.

Adequate maintenance need be performed to ensure the effectiveness of this plan.

BLANCHARD RIVER AT OTTAWA, OHIO
RIVER STATION 22.82

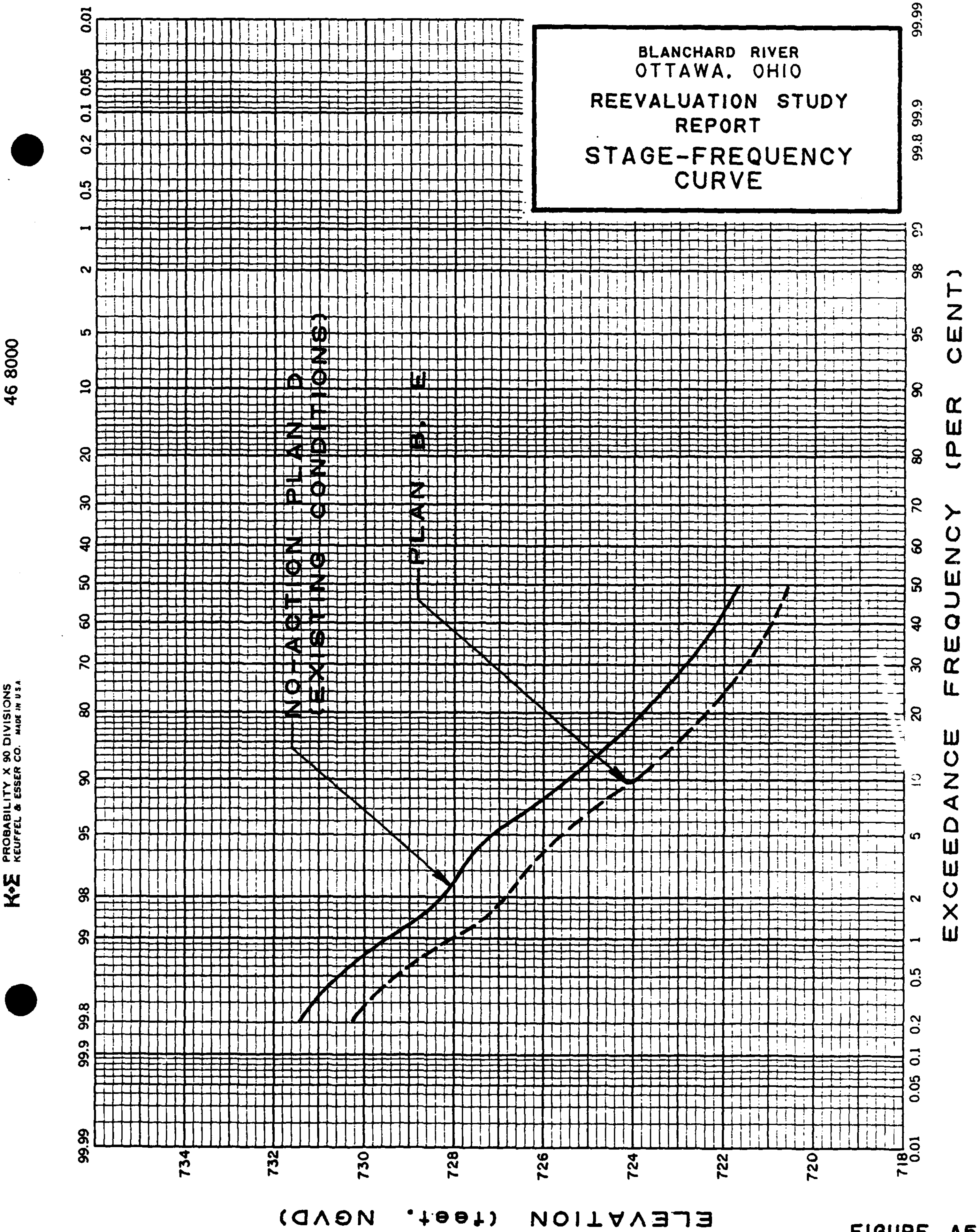


FIGURE A6

BLANCHARD RIVER AT OTTAWA, OHIO
RIVER STATION 22.82

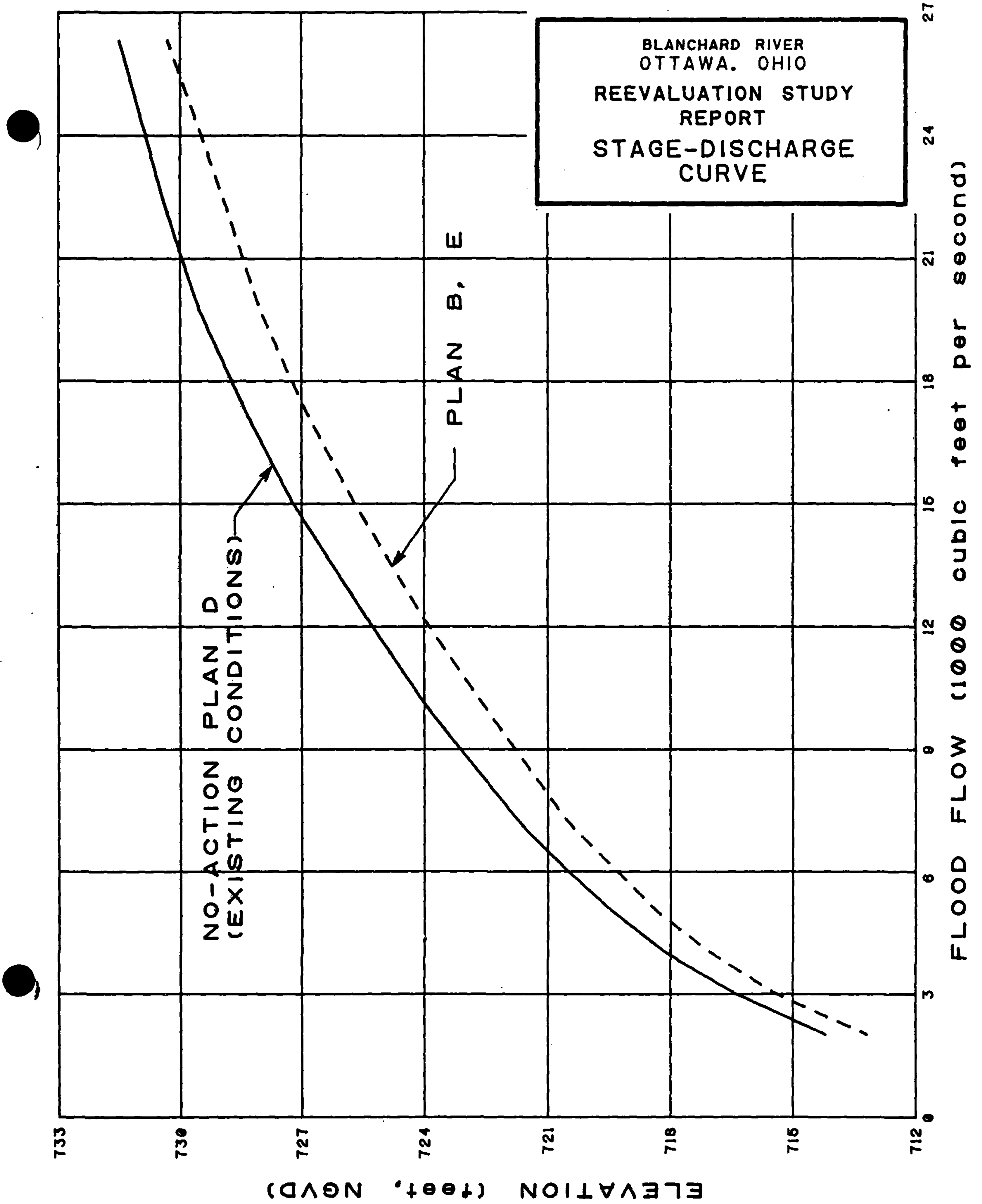
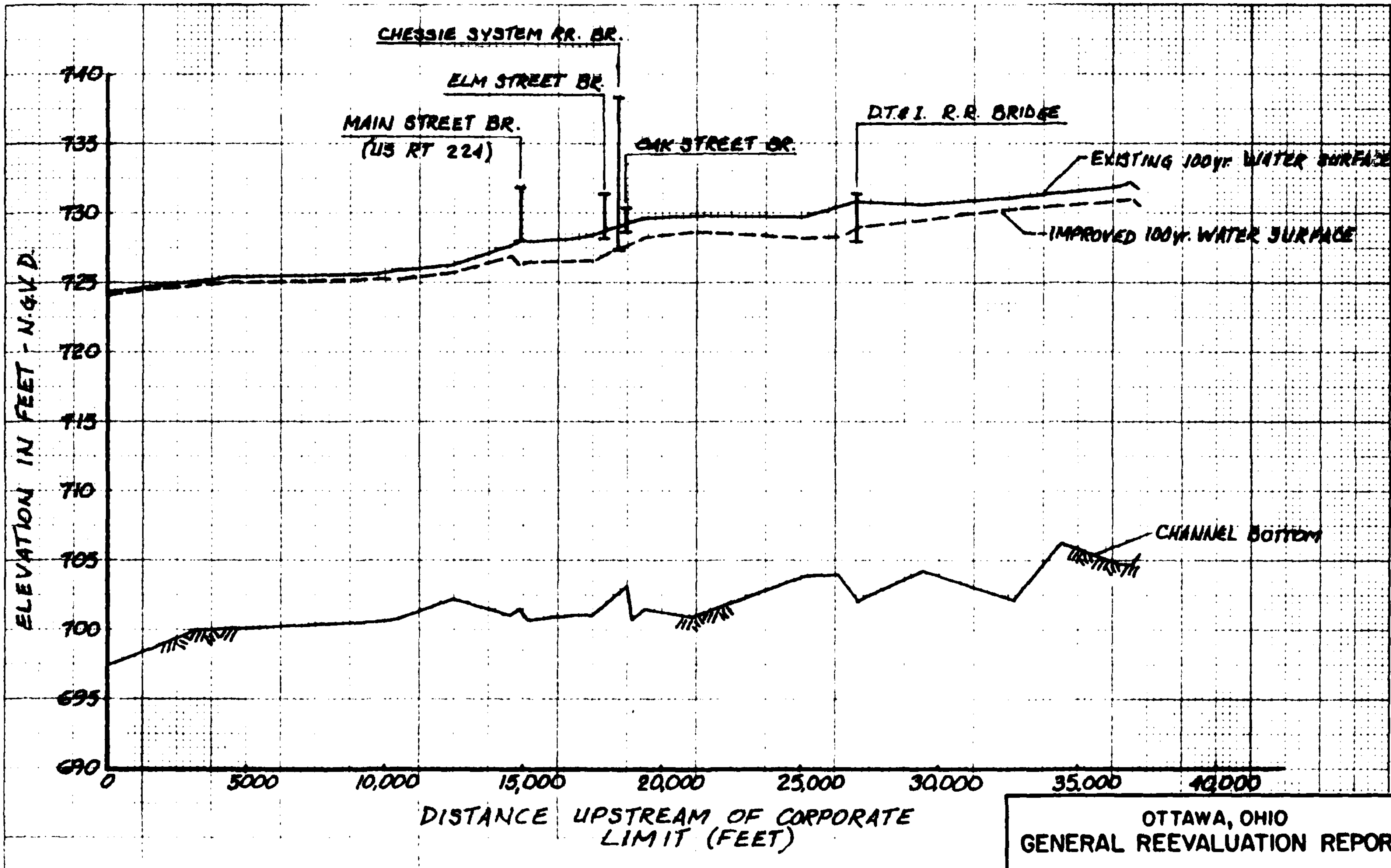


FIGURE A6

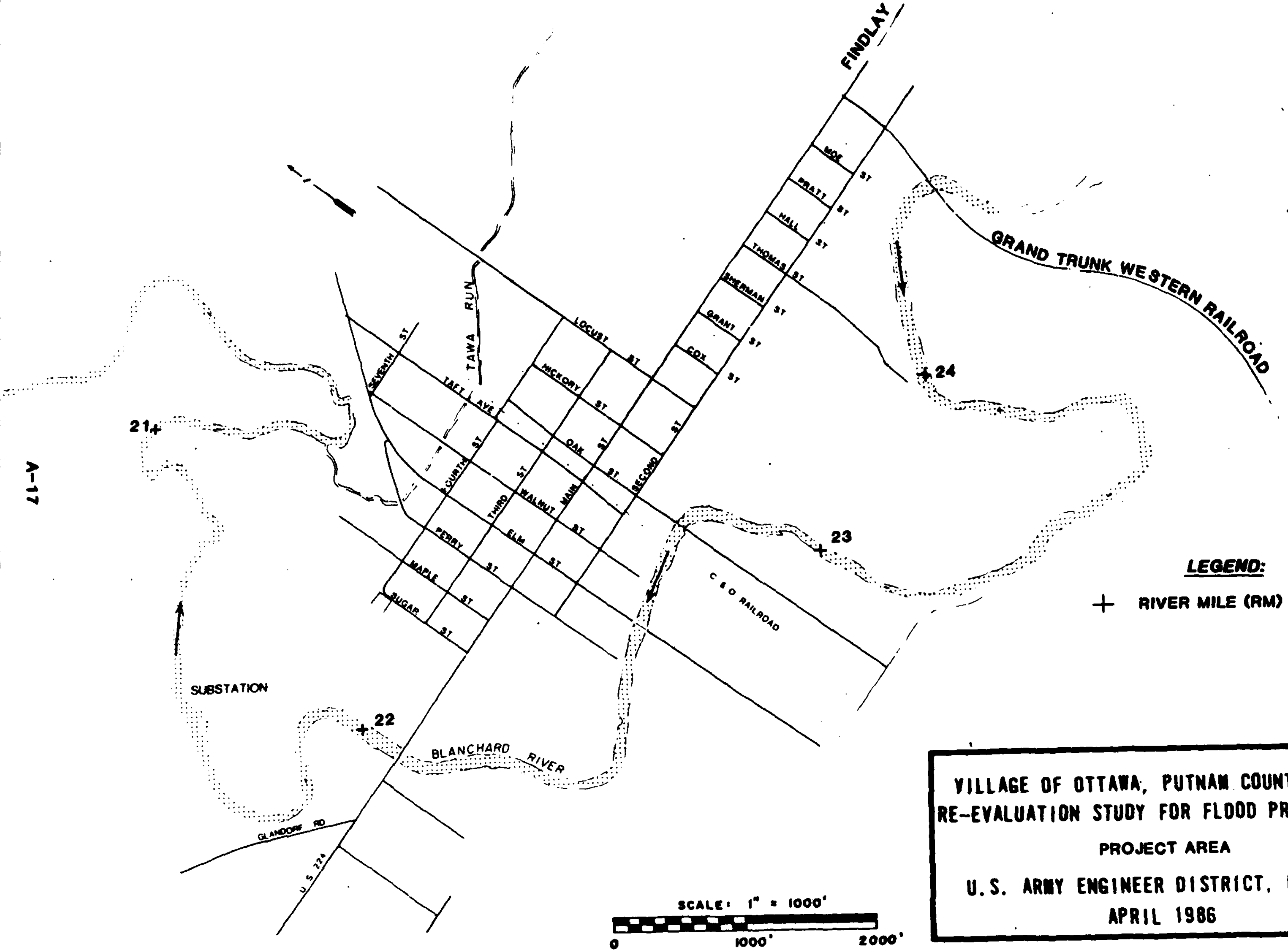


OTTAWA, OHIO
GENERAL REEVALUATION REPORT

WATER SURFACE PROFILES

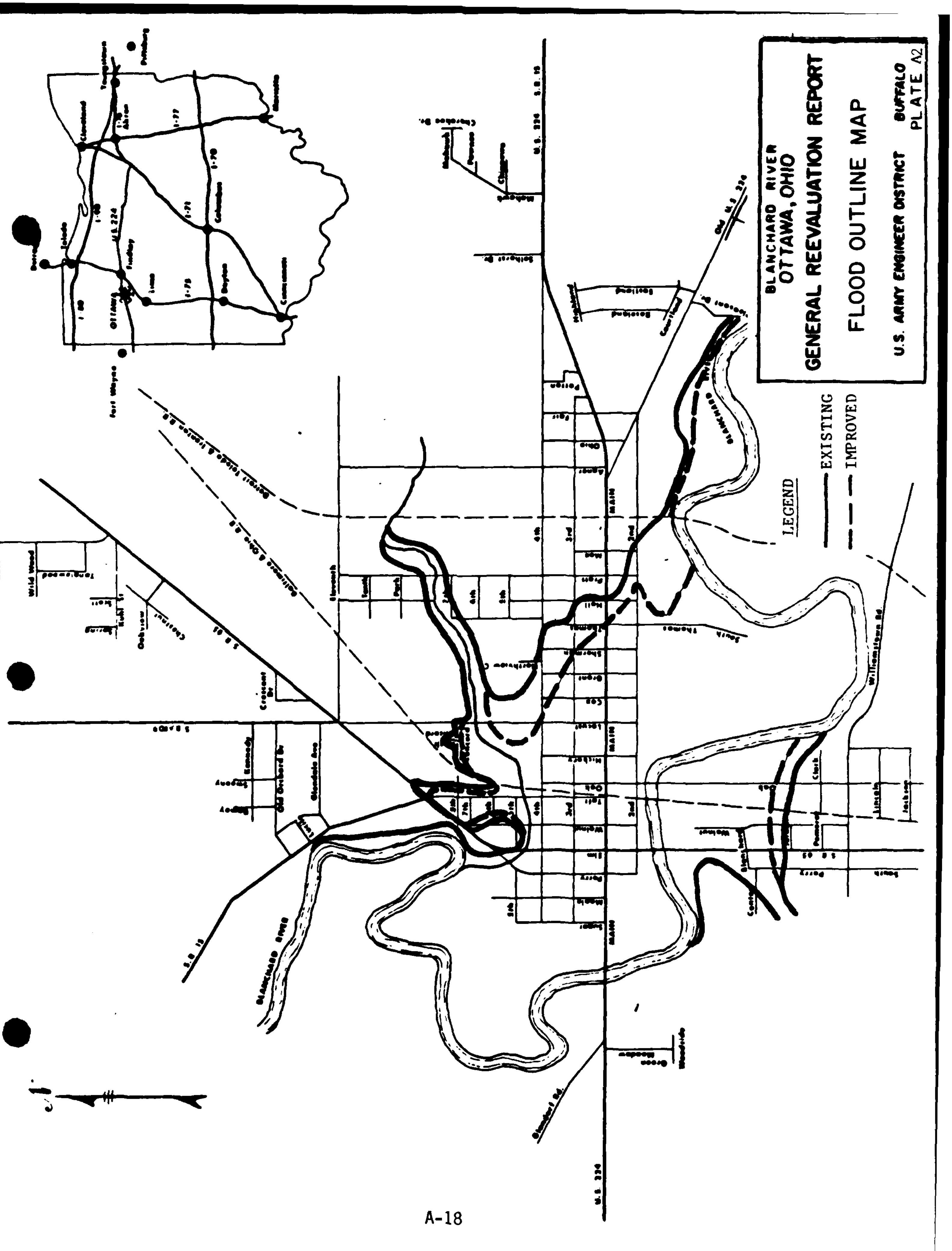
U.S. ARMY ENGINEER DISTRICT BUFFALO

FIGURE A



VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
PROJECT AREA
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986

PLATE A1


BLANCHARD RIVER
OTTAWA, OHIO
GENERAL REEVALUATION REPORT
FLOOD OUTLINE MAP
U.S. ARMY ENGINEER DISTRICT BUFFALO
PLATE A2
LEGEND
EXISTING
IMPROVED

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX B
ECONOMICS

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX B
ECONOMICS

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TABLE OF CONTENTS (Cont'd)

TABLES (Cont'd)

TABLE OF CONTENTS (Cont'd)

TABLES (Cont'd)

FIGURES

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX B
ECONOMICS

B1. DELINEATION OF THE PROJECT AREA AND THE AFFECTED AREA

Ottawa is located in Putnam County, Ohio and the project area is within the corporate limits of the village. Figure B1 shows an outline of the project area. The affected area for the flood plain activities is defined as the flood plain and all other sites likely to serve as alternative locations for any activity which might use the flood plain if it were protected. The affected area for each major activity was determined by examining the present land use of the flood plain, the Ottawa, Ohio area, as shown on Figure B2. The affected area for each major land use is defined below.

a. Residential.

The housing conditions within the affected area are portrayed in Table B1. The affected area for residential activity is contained entirely within the Village of Ottawa. Figure B3 presents the condition of housing units within each of 14 Ottawa neighborhoods (Comprehensive Plan - Village of Ottawa, September 1971). Because of frequent flooding, the housing stock nearest the river and on the lowest land tends to be of lowest value and in poorest condition.

b. Commercial/Industrial.

The affected area for commercial activity is limited to the village of Ottawa. There is a small business and commercial district within the village. There are no large department stores or shopping centers, but there are a wide range of small retail and service activities that provide for the immediate needs of the community and the surrounding rural population. More specialized economic goods are available in neighboring communities such as Lima, Findley, or even Toledo.

There are two banks within Ottawa with combined assets of more than $70 million and three savings and loan associations with more than $440 million in total assets.

The business district is subject to low flooding levels, and damages have been avoided in past floods (particularly 1981) by vigorous sand-bagging efforts by the locals.

Table B2 lists the major industrial firms within the village. Employment is concentrated in the industrial production of electrical equipment and in wood products. This means that Ottawa's economy is not particularly tied to the surrounding agricultural area. Rather, it is more closely connected to

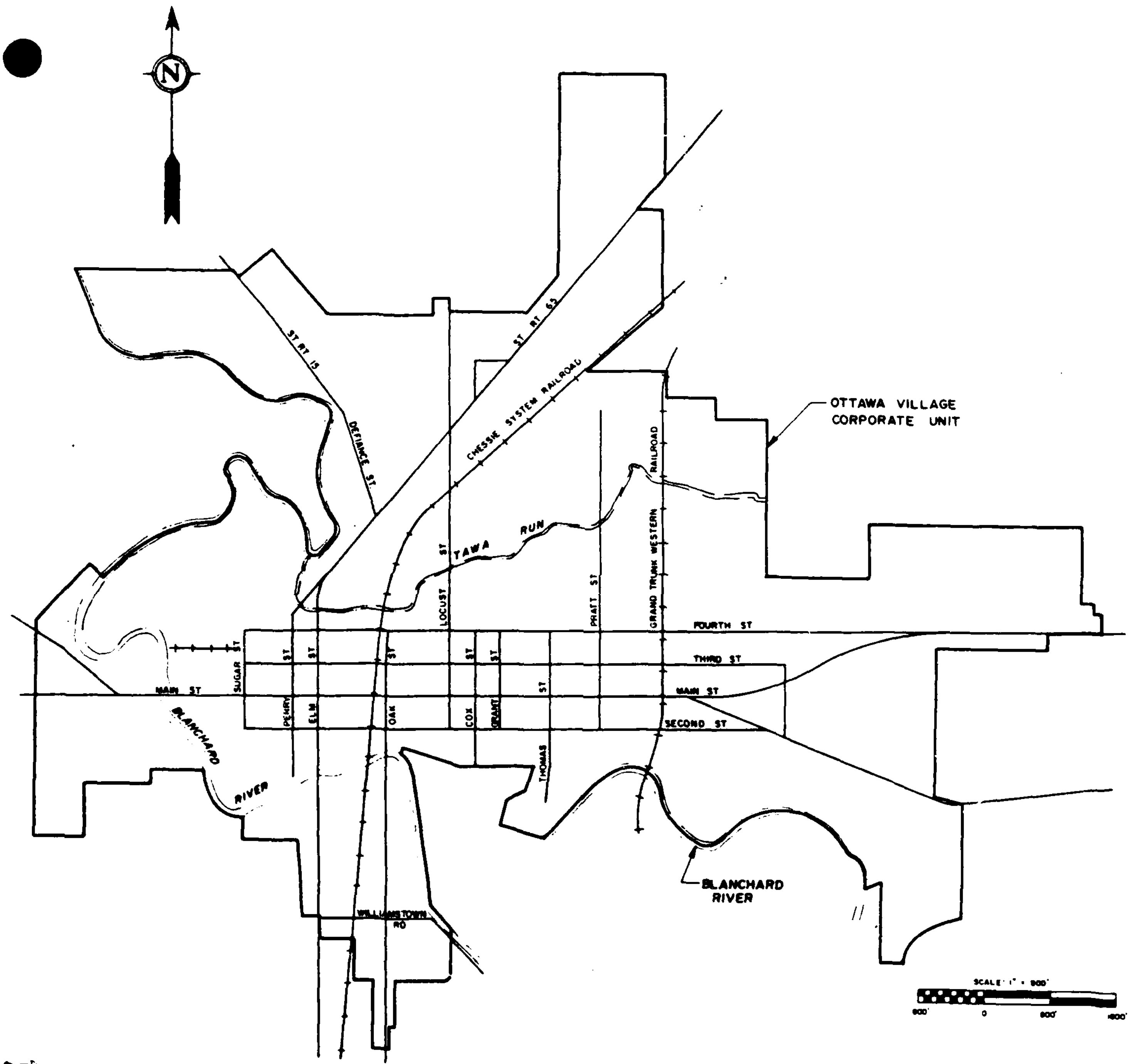

FIGURE B-1 PROJECT AREA MAP

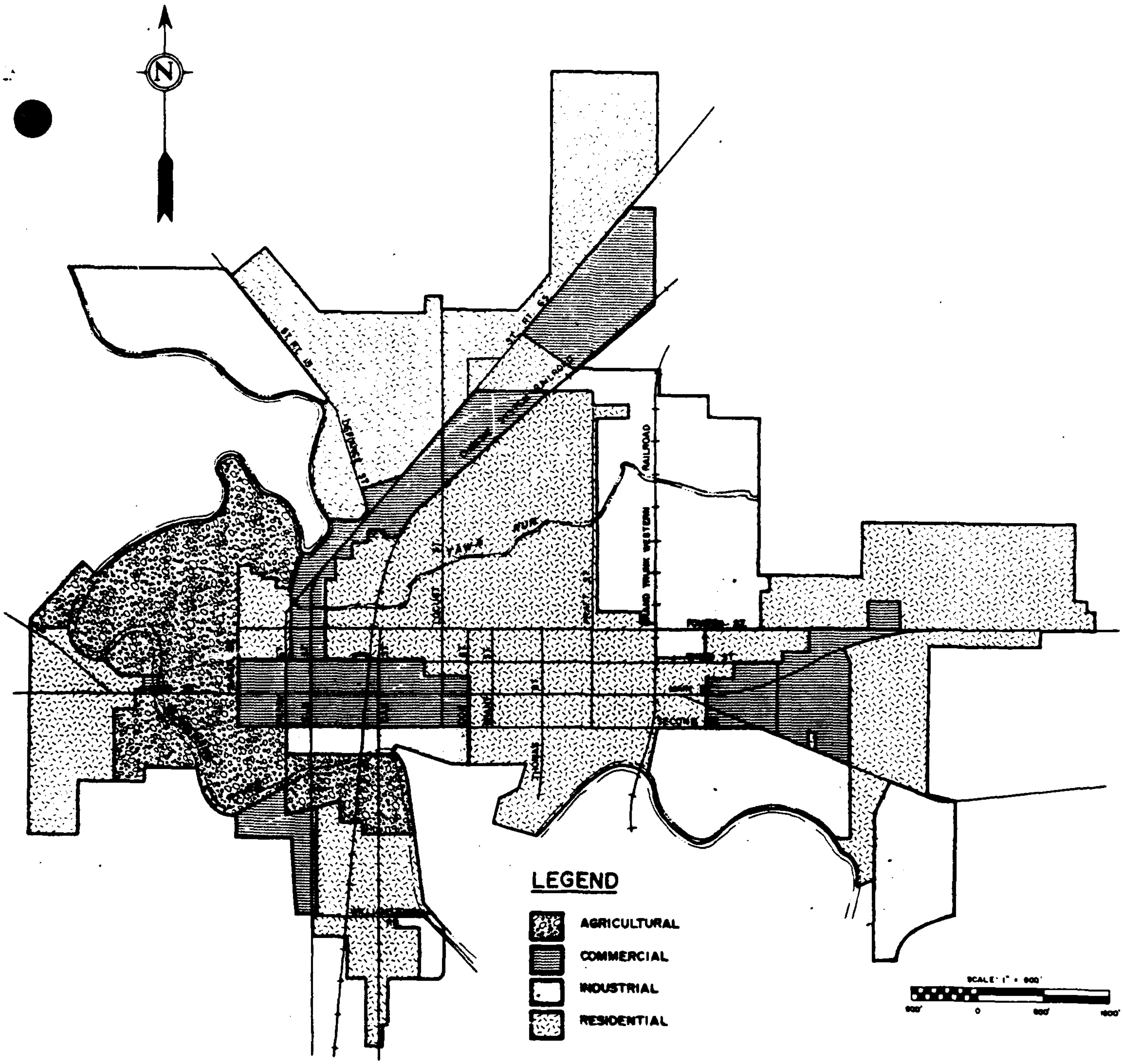

FIGURE B-2 PRESENT LAND USES IN OTTAWA,OHIO

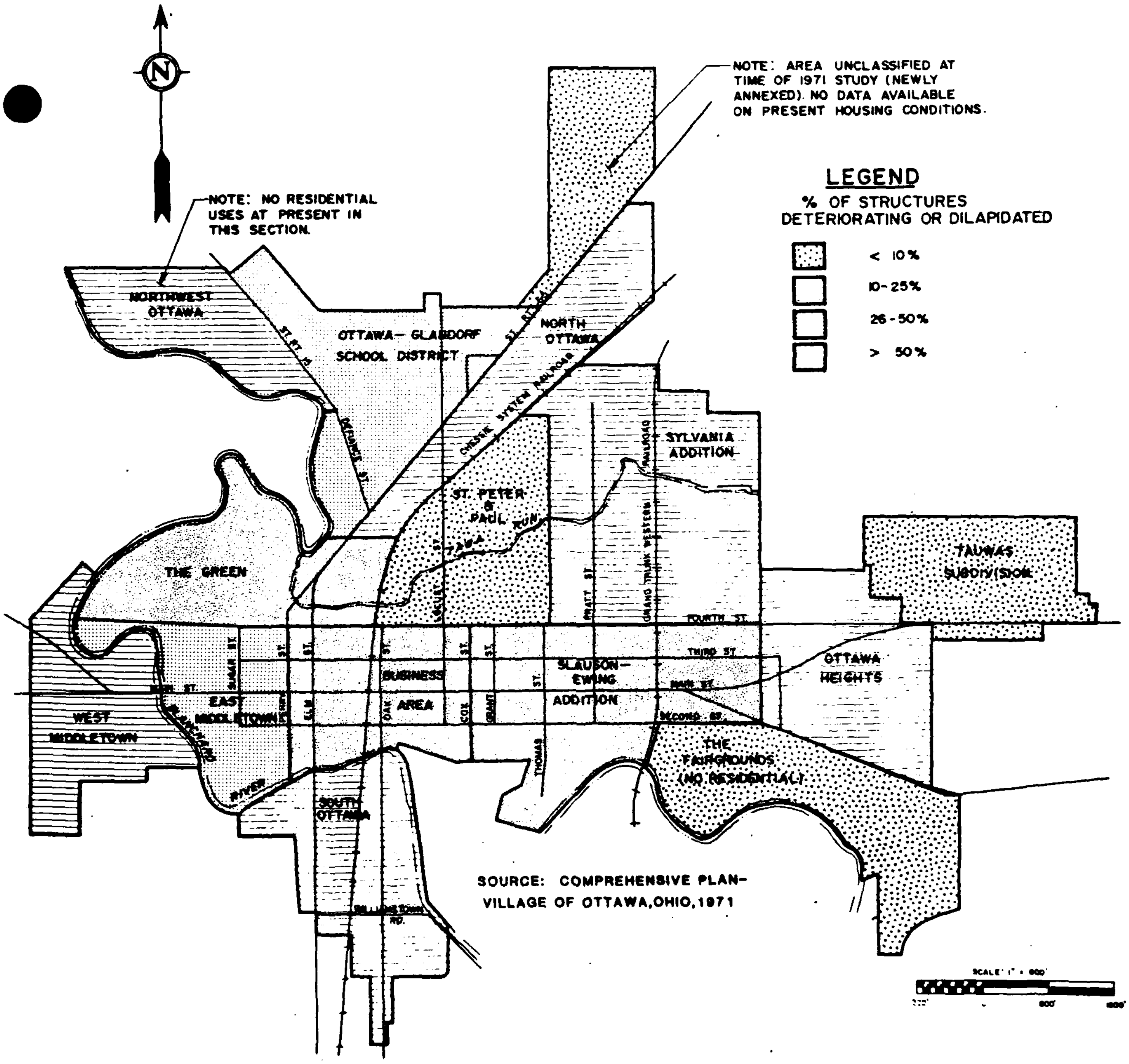

FIGURE B-3 CONDITION OF HOUSING UNITS (1969)

Table B1 - Condition of Housing Units in Ottawa, Ohio (1969)

	Neighborhood	Area in Acres	Area of Residential	% of Neighborhood	Standard[1]	Deteriorated[2]	Dilapidated[3]	Total
1.	W. Middletown	52.0	16.2	31.2	41	12	0	53
2.	E. Middletown	55.4	15.8	28.5	38	25	5	68
3.	S. Ottawa	52.0	16.2	45.0	41	12	0	53
4.	Business District	78.1	25.5	35.9	77	60	19	156
5.	Slauson & Ewing Addition	133.2	62.0	46.5	109	118	42	269
6.	The Fairgrounds	90.1	0.0	0.0	0	0	0	0
7.	Ottawa Heights	80.1	12.6	19.4	43	7	2	52
8.	Tauwas Subdivision	34.8	18.3	52.8	30	0	0	30
9.	Sylvania Addition	126.1	19.9	15.8	52	10	1	63
10.	St. Peter & Paul	95.7	13.2	13.7	32	3	0	35
11.	The Green	109.5	12.5	11.4	16	39	10	65
12.	N. Ottawa	89.6	9.2	10.3	34	7	4	45
13.	Ottawa-Galndorf School District	108.5	48.0	44.2	71	20	8	99
14.	N.W. Ottawa	109.1	6.2	5.7	22	3	0	25

SOURCE: Comprehensive Plan - Village of Ottawa, Ohio, September 1971, Community Development Associates, Inc., Cincinnati, Ohio.

[1]Standard - No Structural Deficiencies.

[2]Deteriorated - In need of minor repairs or maintenance.

[3]Dilapidated - Major repairs, probably cheaper to remove than replace.

Table B2 - Industrial Firms Within Ottawa, Ohio

Company	Products	Employees Male	Female	Total
Philips ECG, Inc.	Cathode Ray and TV Picture Tubes	1275	627	1902
Louisiana-Pacific Corp.	Doors, wood and vinyl-clad windows	105	28	133
Patrick Plastics, Inc.	Plastic products and bottles	23	66	89
Brookhill Workshop, Inc.	Wood Pallets and skids	-	-	80
Stanley Steel	Steel banding	15	2	27
Nelson Mfg. Co., Inc.	Truck trailers and chassis	25	1	26
Palpac Industries, Inc.	Plastic packaging	17	6	23
Sterling Industries, Inc.	Wooden pallets	-	-	22
Verhoff Alfalfa Mills	Alfalfa dehydrating	-	-	10

SOURCES: Putnam County Economic Development Handbook, Putnam County Community Improvement Corporation (1986).

Prospectus on the Community of Ottawa, Ohio for Business and Industry, Ohio Power Company (1986).

the regional industrial economy of Detroit, Toledo and Cleveland. Therefore, the local economy will tend to fluctuate with the cyclic behavior of the outside region.

c. Public and Other.

There are a number of roads and bridges in the village that are subject to inundation and closure during large floods. Ottawa is located on US 224 which extends from New Castle, Pennsylvania through Ottawa to points west. Ohio Route 65 passes through Ottawa on a north-south course from Toledo to Lima. Ohio 109 extends from Ottawa to the Michigan line. Ohio 694 connects Ottawa with Ohio 114 to the west and Ohio 15 extends from Michigan through Ottawa and on to Interstate 75, 22 miles to the east of the Village.

Three highway bridges cross the Blanchard River within Ottawa. Main Street (U.S. 224) crosses due west of town. Elm Street (Ohio 65) and Oak

Street cross in a north-south direction on the south side of town. Ohio 65 also crosses Tawa Run, a Blanchard River tributary, in north Ottawa. All of these bridges and highways could be affected during a large flood.

Ottawa is also served by two railroads. The Toledo to Cincinnati Division of the Chessie System passes through Ottawa on the way to Deshler, 15 miles north, where it connects to the New York-Chicago main line. Between 15 to 20 trains pass through the Village daily along this route. None of these trains make scheduled stops at Ottawa.

The Grand Trunk Western Railway Company (formerly the Detroit, Toledo and Ironton Railroad) extends from Detroit, Michigan, through Lima to Ironton, Ohio. Approximately ten trains pass through Ottawa without stopping each day.

Neither the Chessie System, nor the Grand Trunk Western are susceptible to any but the most severe floods.

d. Agriculture.

Agriculture is a principal industry within Putnam County and Ottawa is an agricultural center. Putnam County agricultural statistics are presented in Table B3. Within the study area, the flat areas that lie between the village and Blanchard River are under cultivation for field corn and a cash crop, soybeans. Yields are low, however, because frequent annual floods reportedly limit good harvests to one or two every five years.

B2. FLOOD PLAIN CHARACTERISTICS

a. Physical Characteristics.

(1) Soils - Much of the area surrounding Ottawa is devoted to agricultural pursuits which are primarily dependent on soil conditions. The soils may be the most valuable natural resource of this area given the high ranking of Putnam County within the State of Ohio in certain agricultural categories (Table B3).

There are two soil associations within the project area whose characteristics would have an impact on any proposed project. The Sloan-Shoals group occupies the right overbank fringing the Blanchard River in the area below the Main Street bridge and upstream, along the riverbank in Ottawa south of Main Street.

The remainder of Ottawa is underlain by soils of the Hoytville-Nappanee group. These soils are classified as silt loams to silty clay loams. There are limitations on the use of all of these soils for any but agricultural purposes for which they are very good to excellent. More specific information on the potentials and limitations of these soils for other uses are shown on Table B4.

Table B3 - Putnam County Agricultural Statistics

Population - 33,000
Average Farm Size - 181 Acres
Number of Farms - 1,600
Part-time Farmers - 900
Land in Farms - 290,000 acres
Total Farm Income - $83 million:
Crops - $54 million
Livestock - $28 million
Miscellaneous - $1 million
Enterprises: Hay - 12,000 acres
Oats - 3,000 acres
Wheat - 43,000 acres
Soybeans - 119, 500 acres
Corn - 70,000 acres
Tomatoes - 2,470 acres
Sugar Beets - 2,000 acres
Sheep - 2,100 head
Swine - 80,000 head
Cattle and Milk Cows - 14,000 head
Hens and Pullets - 200,000+ head

PUTNAM COUNTY RANK IN THE STATE OF OHIO:

5th in the State overall
3rd in the State for wheat production
5th in the State for soybean production
5th in the State for production of hogs and pigs
7th in the State for production of hens and pullets of laying age

SOURCE: Ohio Agricultural Statistics, 1984

(2) Mineral Resources - Mineral resources in Putnam County are relatively insignificant in terms of both supply and generated revenues. There are no gas, oil or coal reserves within the county with any significant potential for exploitation.

(3) Slope - The lands within the Village of Ottawa are located generally no more than ten vertical feet above the top of bank of the Blanchard River and Tawa Run. The topography is flat throughout most of the village except along or close to the banks of the streams where localized steepening joins the channels with the terraces above.

Table B4 - Soil Association Potentials and Limitations for Specified Land Uses-Ottawa, Ohio

Soil Association	Productivity	Septic Fields	Embankment Performance	Foundation Bearing	Subgrade	Slopes	Topsoil	General Urban Compatibility
Hoytville-Happanee	Moderate to very high	Poor to very poor	Poor	Poor to fair	Poor	0-5%	Fair to Excellent	Poor
Sloan-Shoals	Very high	Very poor	Poor	Poor to fair	Poor	0-5%	Excellent	Poor

b. Flooding.

Ottawa is situated on a low-lying terrace along the right bank of the Blanchard River. The village is subjected to frequent flooding of shallow depth. During these times, large portions of Ottawa are subject to inundation. The most recent flooding in Ottawa occurred in June 1981 with total damages of about $2 million (1981 price levels). Table B5 lists the flow rate and return period for the most significant historic floods.

Table B5 - Floods of Record at Ottawa, Ohio

Date	Flow (cfs)	Return Period (Years)
1883	18,500	71
1888	15,700	29
22 January 1904	16,500	40
1905	12,700	12
26 March 1913	29,000	910
2 January 1916	14,800	23
1919	11,800	9
7 April 1926	10,900	7
1 February 1927	10,150	5
22 March 1927	12,500	11
January 1930	10,200	5
January 1930	11,200	7
9 June 1947	11,300	8
15 February 1952	15,800	32
January 1952	10,050	5
22 January 1959	13,800	17
11 February 1959	17,700	55
June 1981	17,900	60

SOURCE: Preliminary Assessment Report, Flooding of Blanchard River at Ottawa, Ohio, July 1985

c. Available Services.

(1) Water Supply - Water is furnished by the Ottawa municipal water works using the Blanchard River and two deep wells as a source. The river supplies water to a 30-acre above ground reservoir (filled by pumping) and the two wells each produce 200 gallons per minute. The reservoir is located on high ground on the southeast side of town and is not threatened by flooding.

(2) Sanitary Sewage Service - Ottawa is served by a sanitary sewer system with a modern treatment plant located well above the river north of town along Ohio Route 15.

(3) Fire Protection - Fire protection is provided by 44 volunteer firemen.

(4) Park and Recreational Facilities - Putnam County has over 150 acres of shaded picnic areas and playgrounds. There are numerous baseball diamonds, tennis courts, swimming pools, football fields and four bowling centers. Hillbrook Recreational Center is a privately owned 26-acre campground with a lake and large recreation building.

(5) Power - Ohio Power Company provides electrical service to the study area. West Ohio Gas Company supplies natural gas to the village.

d. Alternative Plans of Improvement.

Seven structural alternatives were examined since completion of the Preliminary Assessment Report in July 1985. Each consists of one or more combinations of four basic components. Clearing and snagging of the Blanchard River channel was considered as the first component from the corporate boundary at the downstream end of the village to the Grand Trunk Western (GTW) railroad bridge. Levees, the second component, were considered along the north bank of the Blanchard River from the GTW bridge to Tawa Run. The levees would extend up both sides of Tawa Run to high ground at the Chessie railroad tracks. For lower levels of protection, the levee would be little more than a berm, or selective fill, in some areas. The third component is removal of the abandoned embankment at Perry Street and an abandoned railroad embankment that is used for an electric power transmission line located north and parallel to the Main Street bridge. The final component is construction of a floodway along the right overbank between Oak Street and Tawa Run. The components present in each of the seven alternatives are shown in Table B6.

Table B6 - Alternative Plans

Alternative	Clearing & Snagging	Levees	Remove Embankments	Floodway
I	Yes	No	No	No
II	No	Yes	No	No
III	Yes	Yes	No	No
IV	No	Yes	Yes	No
V	Yes	Yes	Yes	No
VI	Yes	Yes	Yes	Yes
VII	Yes	No	Yes	Yes

e. Existing Activities.

(1) Introduction - The land use in the Ottawa flood plain includes residential, commercial and agricultural uses. This is further illustrated in Table B7 and Figure B4, Zoning. Although the data in Table B7 reflect 1969 conditions, Ottawa has not changed substantially in the interim so these figures are still representative of present conditions.

(2) Residential - The characteristics of housing within Ottawa and surrounding areas are shown on Table B8.

Table B7 - Land Use, Village of Ottawa

Land Use Type	Acres		% of Total	
Residential	389.9		30.1	
Single Family		361.0		27.3
Two Family		6.5		.5
Multi-Family		3.9		.3
Mobile Home		.8		.6
Mobile Home Park		17.7		1.4
		389.9		30.1
Commercial	51.2		3.9	
Office		3.5		.3
Service		26.3		2.0
Retail		21.4		1.6
		51.2		3.9
Industrial	114.8		8.9	
Manufacturing		90.2		6.9
Non-Manufacturing		24.6		2.0
		114.8		8.9
Parking and Utilities	11.4		.9	
Parking		1.7		.7
Utilities		9.7		.2
		11.4		.9
Public and Semi-Public	44.9		3.5	
Public		20.8		1.6
Semi-Public		12.9		1.0
Religious		11.2		.9
		44.9		3.5
Educational	39.7		3.1	
Public Schools		35.0		2.7
Parochial Schools		4.7		.4
		39.7		3.1
Parks and Recreation	70.9		5.4	
Public		67.9		5.2
Private		3.0		.2
		70.9		5.4
Streets, Alleys and Railroad Rights of Way	194.6		15.0	
Streets and Alleys		163.5		12.6
Railroad Rights of Way		31.1		2.4
		194.6		15.0
Agricultural	104.3		8.0	
Vacant	275.3		21.2	
Total	1,297		100.0	

SOURCE: Comprehensive Plan, Village of Ottawa, Ohio, 1971.

Table B8 - Housing Characteristics - 1980

Area	Population	Housing Units	Year-Round Housing Units			Median No. Persons/Unit	Median Value	Contract Rent	Year Round Mobile Homes		
			Total	Total Occupied	Owner Occupied				Total	Owner Occupied	Renter Occupied
Ohio	10,798,000	4,108,100	4,077,300	3,833,800	2,622,900	2.40	$44,900	$165	138,600	105,745	22,403
Putnam County	32,990	10,990	10,660	10,110	8,570	3.03	$41,200	$125	652	537	76
Ottawa Township	7,[illegible]20	2,390	2,390	2,320	1,900	3.02	$47,800	$130	NA	NA	NA
Ottawa Village	3,870	1,450	1,450	1,395	1,052	2.32	$42,800	$130	NA	NA	NA

SOURCE: Ohio Data Users Center

NA = Not Available

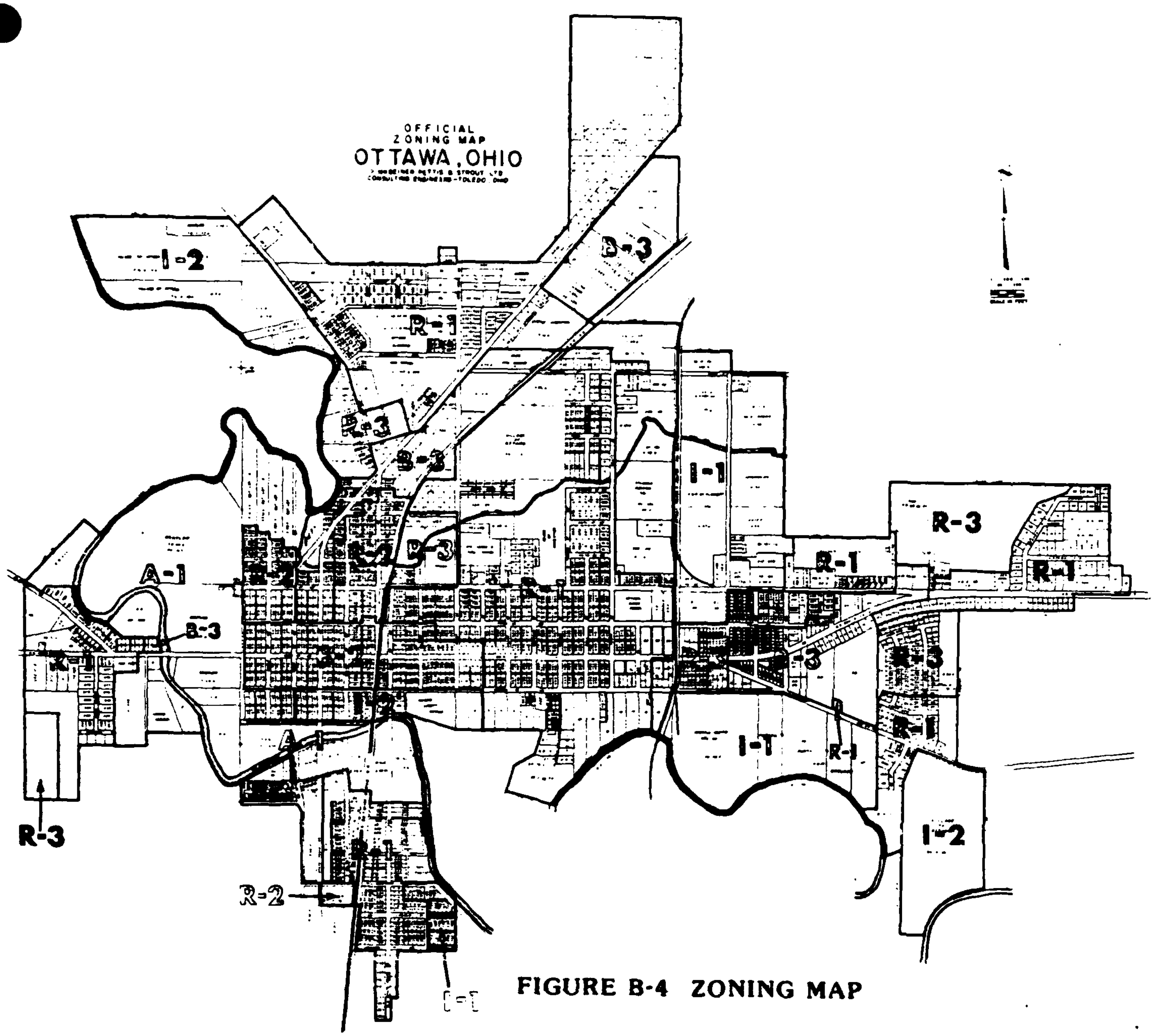

FIGURE B-4 ZONING MAP

(3) Commercial/Industrial - Principal employers in Ottawa are shown on Table B2. Philips ECG, a manufacturer of cathode ray and television picture tubes, is the largest employer within the village. Characteristics of industrial and commercial businesses within Putnam County are shown on Tables B9 and B10.

(4) Agriculture. Putnam County agricultural enterprise is summarized on Table B11.

B3. PROJECTIONS OF ACTIVITIES IN THE AFFECTED AREA

a. Population.

Table B12 presents a comparison of population in Ottawa and nearby areas between 1970 and 1980. Population projections for the study area are shown on Table B13. These data reveal that the study area and Putnam County have grown at a much higher rate than the State of Ohio from 1970 to 1980 and this trend is expected to continue into the future.

b. Income.

OBERS Series E projections (no change in share) indicate that constant-dollar per capita income for Putnam County is expected to grow from $6,453.78 in 1980 to $15,893.56 in 2030. This represents an annual growth rate of 2.02296% over that period.

c. Housing.

The growth in population results in added pressures to the existing housing stock. In order to comfortably accommodate the growing population there are requirements for additional housing. The housing needs for the increasing population in Putnam County are given in Table B14. A substantial number of new residential units will be required in Putnam County during the life of any project.

B4. ESTIMATION OF LAND USE DEMAND IN THE AFFECTED AREA

Local planning documents conclude that the heavy concentration of employment among a few employers renders the local economy vulnerable to cyclic or permanent downturns within those industries. Therefore, there is a need to diversify and broaden the industrial and employment base of Ottawa to provide for long-term growth and prosperity. Such growth in industrial output must be accompanied by a growth in the quantity and skills available within the labor pool and the commercial and service sectors of the community.

Additional housing must be provided to accommodate future employees within the village. This housing supply should include a wider mix of housing types than are presently available in Ottawa. More rental and multi-family units are needed to provide diversity and greater density within available lands.

Table B9 - Industrial and Commercial Businesses, 1980
Ottawa, Ohio

Type	No. of Employees	No. of Establishments	Receipts or Sales
Manufacturers	2,800	47	$1,747,000
Wholesale Trade	388	61	$91,333,000
Retail Trade	1,197	275	$73,361,000
Services	214	227	$9,097,000

SOURCE: Ohio Data Users Center

Table B10 - Putnam County Employment by Industry Sector (1984)

		%
Agricultural, Forestry and Fisheries	144	2
Construction	444	6
Manufacturing	3,286	41
Transportation and Utilities	152	2
Wholesale and Retail Trade	1,616	20
Financial, Insurance and Real Estate	270	3
Services	738	9
Government	1,377	17
Total	8,027	100

SOURCE: Ohio Data Users Center, 1986

Table B11 - Agriculture Income in Putnam County (1982)

Average Size of Farm	181 Acres
Average Value of Farms	$304,235
Total County Farm Value	$493,750,750
Estimated Income per Farm	$50,350
County Total Farm Income	$83,000,000
Crops	$54,000,000
Livestock	$28,000,000
Miscellaneous	$1,000,000
Major Commodity	Soybeans

SOURCE: Ohio Data Users Center, 1986

Table B12 - Population Data, 1970-1980

Area	Population 1970	Population 1980	Percent Change 1970-1980
State of Ohio	10,657,400	10,797,624	+1.3%
Putnam County	31,134	32,991	+6.0%
Ottawa Township	6,667	7,223	+8.3%
Glandorf Village	732	746	+1.9%
Ottawa Village	3,622	3,874	+7.0%

SOURCE: Ohio Data Users Center, June 1982

Table B13 - Population Projections (1985-2035)

Area	1985	1995	2005	2015	2035	Percent Change 1985-2035
State of Ohio	10,736,000	10,807,200	10,924,000	11,195,400	11,398,300	+6.2%
Putnam County	33,991	36,733	40,697	43,642	50,182	+47.6%

SOURCE: Ohio Data Users Center, June 1982 and 1985 OBERS BEA Regional Projections

Table B14 - Housing Projections
(Required Additional Housing Units)

Area	1980-1985	1985-1995	1995-2005	2005-2015	2015-2035	Total
County Putnam	330	905	1308	972	2158	5673

a. Residential.

All areas of Ottawa (except the Fairgrounds neighborhood, see Table B1) contain residential housing. Generally, areas that are subjected to frequent flooding contain lower-valued units. The Slauson-Ewing addition and the Green (see Figure B3), two of the neighborhoods most heavily impacted by flooding have the highest percentage of dilapidated housing within the village. The St. Peter and Paul and Sylvania addition neighborhoods are less affected by flooding and they have the lowest percentage of substandard housing in Ottawa.

The present area of the Village of Ottawa is insufficient to accommodate the future growth in housing needed to keep pace with planned industrial expansion. Additional land can and will be acquired through annexation of Ottawa Township lands. Given the frequent flooding experienced in neighborhoods close to the business district, the new homes will most likely be located in the non-flood prone areas. Thus, flood damages in the future would not be increasing due to the construction of new housing.

b. Commercial.

Commercial development within Ottawa is not always provided with appropriate support facilities. Some commercial uses have been permitted in locations outside of the central business district. Conversely, some residences, residential out-buildings and other non-commercial facilities can be found within the commercial core.

The vacant space within the commercial core is disorganized in places and some blight is present. There are vacant buildings within the business district. Local interests desire to renew these structures via a general program of urban rehabilitation. The village now participates in the federal flood insurance program. Virtually all of the commercial properties in Ottawa are within the 100-year floodplain. Therefore, new commercial or other ventures in the downtown area will have to comply with a strict floodplain ordinance. This requires new development to be located above the 100-year flood or the rehabilitated structure be floodproofed to prevent damages from a 100-year flood. For some existing structures this may not be possible; therefore, rehabilitation of those structures for new businesses may not occur.

c. Industrial.

Industrial development is unlikely to occur within the current boundaries of the village because of the lack of ample room for such activities. Any future industrial ventures would probably be located on land annexed from Ottawa Township. Such land, because of its distance from the Blanchard River, would probably not be subject to flooding by any but extreme floods.

d. Agriculture.

A small fringe of land between the developed portion of the village and the river is now under cultivation. However, since these lands are frequently flooded, good harvests are limited to one or two every five years. Prime farm land exists throughout the county and it is doubtful that these marginal lands close to the village would be more intensively used for agriculture given the flood situation. It is more likely that these fields could be taken out of cultivation and converted to open space, park lands or other uses as the village continues to grow.

B5. PROJECTION OF LAND USE

The local residents of Ottawa have learned to live with the low level flooding that they frequently experience. It is not expected that present land use patterns would change by an significant amount during the next 50 years in the absence of a project. The downtown merchants will continue to undertake private floodproofing efforts and dilapidated housing will eventually be replaced with homes placed above the 100-year flood level because of the local flood plain ordinance. This may not occur on a one-to-one basis, however, so that some dilapidated structures may be destroyed with the land left vacant thereafter. On the other hand, some presently vacant lands may later be developed for residential or commercial purposes.

Future residential content flood damage will increase, however, because the trend of rising per capita income will cause residents to increase the value of their personal property to reflect their affluence. This effect will be evaluated later in paragraph B7.

Plans involving levees that would provide greater than a 100-year level of protection could alter land use patterns. However, such levels of protection are not feasible because of the massive size and expense of the required structures and because of the lack of support for them among village residents. Therefore, protection plans considered in this study would provide at a maximum a 99-year level of protection.

B6. FLOOD DAMAGES

a. Damages Under Existing Conditions.

(1) Damage Surveys - Detailed damage surveys were performed by the Buffalo District in November 1984 and April 1985. The findings of the surveys were used along with data obtained from the Putnam County Assessors' Office to determine flood damages for Ottawa. Damage estimates from these surveys were updated to January 1986 price levels for this study.

(2) Reach Limits - The entire study area was considered as a single damage reach. The index station was taken at the upstream side of the Oak Street bridge (Section 22+82). It is here that flood stages and frequencies are coupled with damages to develop damage-frequency relationships.

(3) Stage-Damage Relationship -

(a) Residential - The type of structure and first floor elevation of each affected unit were determined. The market values of the individual structures were estimated based on recent sales of similar structures in the area. The structural value of each unit was the basis for determining the contents value of the unit.

Damages were estimated at various flood depths based on established depth-percent damage relationships for typical houses in Ottawa, Ohio. First floor elevations and the type of structure were needed to perform the damage computations.

(b) Commercial - All commercial damage estimates were based on personal interviews with the business establishments located in the project area. The interviews included estimated damages to structures, inventory and machinery, lost wages, pre-flooding prevention costs, and expected cleanup costs. Field personnel identified the overall conditions of the building and equipment during the interviews. The type and value of inventory and estimated flood damages relative to the first-floor elevation of individual commercial structures were determined using depth-percent damage curves.

(c) Public and Other - Damages to public structures and contents were evaluated in a manner similar to the commercial activities. Other costs included road repair, street cleanup, sewer cleanout, and emergency services provided by police, firemen and the Red Cross.

(d) Rail Traffic Detour Costs - The Chessie System bridge and tracks are a major obstruction to the flow of floodwaters through Ottawa. During the 1981 flood, the railroad bridge caused considerable backwater which then escaped into the right overbank, ponding behind the low track embankment, and then flowed across the tracks and into town. Rail traffic was not delayed, however, as it takes more than a foot of water above the tracks to stop rail traffic.

For very large floods, the railroads (Chessie and Grand Trunk Western) would have to detour trains over Norfolk and Western trackage that runs from Lima to Fostoria. The total detour length would be about 50 miles and would require approximately two extra hours of travel time. The Chessie System has approximately 18 trains per day that would have to be detoured and the Grand Trunk Western has about 10 per day.

The cost of each train detour would be dictated by a Standard Detour Agreement between the railroads. This agreement calls for $9.00 per train-mile plus $170 per day for a Norfolk and Western pilot and conductor. The rail traffic detour costs were computed by assuming that a one-day detour is in effect whenever the tracks are flooded one-foot deep. Each additional foot of flooding then causes an additional one day of detour. Table B15 contains a summary of these costs.

(e) Highway Detour Costs - The Village of Ottawa is served by a number of federal, state and local roads which cross the Blanchard River and Tawa Run. These are more fully described in paragraph B1.c. During flood events, these routes are closed and traffic must detour around flooded areas via other roads. Detour costs incurred consist of driver opportunity costs for time spent in detours and variable vehicle operating costs. Detour costs will vary with the depth of flooding and its duration, the detour length and travel time, and the traffic volume on the closed roadway.

Detour routes were determined through discussions with local officials. These detour costs are summarized on Table B16.

Table B17 contains a summary of without-project condition damages for various flood levels and for all damage categories previously discussed.

b. Existing Expected Annual Damages, Without-Project Condition.

Existing without-project expected annual damages are shown on Table B18. Expected annual damages are the expected value of flood damages for any given year. Total flood damages were estimated up to the 500-year flood. Discharge-frequency curves and stage-discharge (rating) curves were used in conjunction with stage-damage curves to determine damage frequency relationships under existing conditions. The value of expected annual damage for each category of damage is an approximation of the area under the damage-frequency curve.

Table B15 - Rail Traffic Detour Costs

Railroad	C&O	G.T.W.
Number of Trains per Day	18	10
Detour Length (miles)	50	50
Minimum Track Elevation	728.9	729.7
Detours Begin at Elevation	729.9	730.7
1981 Flood Elevation at Location	728.5	729.9
1981 Flood Elevation at Index Station	729.1	729.1
Difference	-0.6	+0.8
Flood Elevation at Index Station to Begin Detours	729.3	731.5
Standard Detour Rate (Train-Mile)	$9.00	$9.00
Pilot/Conductor Daily Rate	$170.00	$170.00
Daily Trains per Pilot/Conductor Crew	4	4
Daily Train-Mile Charges	$8,100	$4,500
Daily Pilot/Conductor Charges	$ 765	$ 425
Total Daily Detour Charges	$8,870	$4,930

Train Detour Rating:

Flood Elevation	Detour Duration	Detour Cost	Detour Duration	Detour Cost	Total
729.3	1 Day	$8,870	0 Days	$0	$8,870
730.3	2 Days	$17,740	0 Days	$0	$17,740
731.5	3 Days	$26,610	1 Day	$4,930	$31,540
732.5	4 Days	$35,480	2 Days	$9,860	$45,340

Table B16 - Highway Detour Costs

Number of Vehicles Affected Daily	Main St. Route 224	S.R. 15	S.R. 109	Elm St. S.R. 65	All Routes
Autos	4,100	1,847	1,550	4,150	
Trucks	500	153	150	350	
Total	4,600	2,000	1,700	4,500	
Low Roadway Elevation	724.6	725.3	725.3	725.3	
Water Surface to Start Detour	725.1	725.8	725.8	725.8	
1981 Flood Elev. at Location	727.4	728.3	728.3	728.3	
1981 Flood Elev. at 22+82	729.1	729.1	729.1	729.1	
Difference	1.7	.8	.8	.8	
Water Surface at 22+82 to Start Detour at Location	726.8	726.6	726.6	726.6	
Detour Duration/Ft of Flooding	2.2	2.0	2.0	2.0	
Net Detour Distance (Miles)	7	11	13	14	
Average Detour Speed (MPH)	25	25	25	25	
Average Detour Time (Hours)	.3	.4	.5	.6	
Variable Auto Cost/Mile	$.138	$.138	$.138	$.138	
Auto Driver Opportunity Cst/Hr	$4.02	$4.02	$4.02	$4.02	
Adult Auto Passenger Cost/Hr	$4.02	$4.02	$4.02	$4.02	
Child Auto Passenger Cost/Hr	$1.01	$1.01	$1.01	$1.01	
Truck Costs/Mile (Opportunity & Vehicle)	$1.31	$1.31	$1.31	$1.31	
Total Auto Detour Cost/Day	$14,340	$10,150	$10,070	$29,040	
Total Truck Detour Cost/Day	$ 4,590	$ 2,200	$ 2,550	$ 6,420	
Total Detour Costs/Day	$18,930	$12,350	$12,620	$35,460	$79,360

Table B16 (Cont'd)

Detour Cost Rating-Elevation at Sta. 22+82	Duration (Days)	U.S. 224	Duration (Days)	S.R. 15	S.R. 109	S.R. 65	Total
726.6		$0		$0	$0	$0	$0
727.1	.7	$12,350	1.0	$12,350	$12,620	$35,460	$ 72,800
727.6	1.7	$32,920	2.0	$24,700	$25,240	$70,920	$153,800
728.1	2.8	$53,500	3.0	$37,050	$37,860	$106,380	$234,800
728.6	3.9	$74,070	4.0	$49,400	$50,480	$141,840	$315,800
729.1	5.0	$94,650	5.0	$61,750	$63,100	$177,300	$396,800
729.6	6.0	$113,580	6.0	$74,100	$75,720	$212,760	$476,200*

*No increase in detour costs above this level.

Table B17 - Flood Damages by Category, January 1986 Price Levels
Without-Project Condition

Category	Return Period (yrs)	Stage (ft)	Structure Damages	Total Damages
Residential	10	725.4	$81,000	$157,000
	50	728.3	$440,000	$720,000
	100	729.5	$1,020,000	$1,550,000
	500	731.5	$2,120,000	$3,560,000
Commercial	10	725.4	$4,000	$7,100
	50	728.3	$90,000	$319,000
	100	729.5	$400,000	$1,410,000
	500	731.5	$680,000	$3,330,000
Public & Other	10	725.4	-	$28,000
	50	728.3	-	$155,000
	100	729.5	-	$335,000
	500	731.5	-	$970,000
Detours	10	725.4	-	$0
	50	728.3	-	$267,000
	100	729.5	-	$463,000
	500	731.5	-	$505,000

Total damages include expected annual damages to structures and contents for residential and commercial categories as well as expected annual damages to public structures and contents and to other activities in the flood plain. Total existing expected annual damages under without-project conditions, at January 1986 price levels are $166,550.

c. Future Conditions Expected Annual Damages, Without-Project Condition. Future residential content damages will rise due to an increase in residential content value over time. The value of residential contents is expected to increase as a result of rising regional per capita income. This increase in flood damage due to residential affluence is calculated as follows.

Current guidance states that the value of residential contents can rise to 75 percent of a structure's value. The value of residential contents with respect to the value of residential structures during the study year (1986) was 33 percent.

The value of the residential contents are allowed to grow at a given percent per year. This growth rate is assumed to equal regional per capita income growth for Putnam County for the evaluation period. OBERS Series E projections (no change in share) forecast that constant dollar per capital income will grow from $6,453 in 1985 to $15,893 in 2030. Therefore, per capita income will increase 2.46 times in 45 years at an annualized rate of

Table B18 - Projection of Existing Expected Annual Flood Damages by Decade with Affluence[1]

Damage Category	Existing 1986	Base Year 1990	2000	2010	2020	2030	2040	Average Annual Equivalent
Year		0	10	20	30	40	50	
Residential								
Structure	$ 56,200	$ 56,200	$ 56,200	$ 56,200	$ 56,200	$56,200	$ 56,200	$ 56,200
Contents[2]	39,640	42,950	52,400	64,000	78,100	89,800	89,800	59,000
Subtotal	$ 95,840	$ 99,150	$108,600	$120,200	$134,300	$146,000	$146,000	$115,200
Commercial								
Structure	$ 10,220	$ 10,220	$ 10,220	$ 10,220	$ 10,220	$ 10,220	$ 10,220	$ 10,200
Contents	24,920	24,920	24,920	24,920	24,920	24,920	24,920	24,920
Income Lost	4,830	4,830	4,830	4,830	4,830	4,830	4,830	4,830
Subtotal	$ 39,970	$ 39,970	$ 39,970	$ 39,970	$ 39,970	$ 39,970	$ 39,970	$ 39,970
Public and Other	$ 15,490	$ 15,490	$ 15,490	$ 15,490	$ 15,490	$ 15,490	$ 15,490	$ 15,490
Detours	$ 15,250	$ 15,250	$ 15,250	$ 15,250	$ 15,250	$ 15,250	$ 15,250	$ 15,250
Total	$166,550	$169,860	$179,310	$190,910	$205,010	$216,710	$216,710	$185,910

[1]Residual flood damages are calculated assuming an 8.625% annual interest rate.
[2]The value of residential contents are assumed to grow at an annual rate of 2.023% for 41 years starting in the study year 1986.

2.02296 percent. It is assumed that the residential content value growth rate is the same as the regional per capita income growth rate. At a 2.02296 per cent annual rate, residential content value will increase from 33 percent to 75 percent of residential structure value in 41 years. This value is derived using the following equation.

$$(1+r)^r = X_t/X_i$$

$$n = \frac{\text{Ln } (X_t/X_i)}{\text{Ln } (1+r)}$$

$$= \frac{\text{Ln } (0.75/0.33)}{\text{Ln } (1+0.0202296)}$$

$$n = 41 \text{ years}$$

where:

n = Number of years of residential content growth
r = Annual compound growth rate = 2.02296%
X_t = Ratio of content value to structure value in the terminal year of growth = 0.75
X_i = Ratio of content value to structure value in the initial year of growth = 0.33

Table B18 shows the projected growth of without-project condition content damages from 1986 to 2040. The project base year is 1990. This means residential content value and damages will grow for four years before the project is in place. This will leave 37 years of annual compounding during the project evaluation period of 1990 to 2040. The value of residential content values will stop growing in project year 2027, 41 years from the study year, 1986. Expected annual damages at that time will be $89,800 for residential contents. They will remain at this level until 2040. Without-project total average annual residential content damages are $59,000, residential content damages are $42,950 in the base year of 1990. Therefore, future affluence results in an additional $16,050 of annual content damages over base year conditions.

Total without-project average annual inundation damages are shown on Table B18. These damages total $185,910 at January 1986 price levels and an annual interest rate of 8.625 percent. The breakdown of without-project average annual flood damages are: residential - $115,200, commercial - $39,970, public and other - $15,490, and detour - $15,250.

d. Future Conditions Expected Annual Damages, With-Project Condition.

With-project expected annual damages were calculated for floods out to a 0.2 percent chance of occurrence (500-year event). Alternates II through VI include levees that would protect Ottawa against floods of up to the one percent frequency (100 year). Protection against larger floods would not be economically feasible because even small increments of protection above the 100-year level require substantial increases in the length of levee to provide proper tie-in to high ground. Therefore, none of the plans considered in this study would eliminate all of the damages that occur within the study area.

Existing and future damages (with growth in residential content value) were developed for each alternative. For Alternatives II through VI, residual damages were calculated for levels of protection equal to the 10-, 25-, 50-, and 99-year floods. These damages were expressed at January 1986 price levels using a federal discount rate of 8.625 percent, and a 50-year project life. For comparison purposes, the residual damages of the levee alternatives (II through VI) are displayed at the 99-year level of protection. Tables B-19 through B-25 are a summary of residual damages for Alternatives I through VII.

B7. COMPUTATION OF NED BENEFITS

a. Flood Inundation Reduction Benefits.

The inundation reduction benefit is the value of reduced flood damages and losses over the project evaluation period. This benefit is measured by subtracting the residual average annual damages under with-project conditions from the average annual damages under without-project conditions. Flood damages and benefits reflect the growth in residential content value due to affluence and are presented at January 1986 price levels. The average annual flood inundation benefit for each alternative is shown in Table B26.

b. Location Benefits.

Location benefits can be claimed if, under with-project conditions, there is a net improvement in economic returns on project-impacted lands, and these greater returns will attract activities that would not use those lands without the project. Because of the modest level of protection being provided by all of the plan alternates, it is not anticipated that higher value activities would be attracted to the Ottawa flood plain where residual annual flood damages will still remain after the project. Future land use in the flood plain is not projected to change with a project.

Table B19 - Projection of Residual Flood Damages by Decade with Affluence[1]-Alternative I

Damage Category	Existing 1986	Base Year 1990	2000	2010	2020	2030	2040	Average Annual Equiv
Year		0	10	20	30	40	50	
Residential	$	$	$	$	$	$	$	$
Structure	43,030	43,030	43,030	43,030	43,030	43,030	43,030	43,030
Contents[2]	30,450	32,990	40,400	49,300	60,200	69,200	69,200	45,400
Subtotal	73,480	76,020	83,430	92,330	103,230	112,230	112,230	88,430
Commercial								
Structure	8,350	8,350	8,350	8,350	8,350	8,350	8,350	8,350
Contents	20,320	20,320	20,320	20,320	20,320	20,320	20,320	20,320
Income Lost	3,680	3,680	3,680	3,680	3,680	3,680	3,680	3,680
Subtotal	32,350	32,350	32,350	32,350	32,350	32,350	32,350	32,350
Public and Other	12,150	12,150	12,150	12,150	12,150	12,150	12,150	12,150
Detours	9,490	9,490	9,490	9,490	9,490	9,490	9,490	9,490
Total	127,470	130,010	137,420	146,320	157,220	166,220	166,220	142,420

[1]Residual flood damages are calculated assuming an 8.625% annual interest rate.
[2]The value of residential contents are assumed to grow at an annual rate of 2.023% for 41 years, starting in the study year; 1986.

Table B20 - Projection of Residual Flood Damages by Decade with Affluence[1]-Alternative II (99-Yr. Protection)

Damage Category	Existing 1986	Base Year 1990	2000	2010	2020	2030	2040	Average Annual Equiv
Year		0	10	20	30	40	50	
Residential	$	$	$	$	$	$	$	$
Structure	19,930	19,930	19,930	19,930	19,930	19,930	19,930	19,930
Contents[2]	14,240	15,430	18,700	22,800	27,900	32,100	32,100	21,100
Subtotal	34,170	35,360	38,630	42,730	47,830	52,030	52,030	41,030
Commercial								
Structure	6,370	6,370	6,370	6,370	6,370	6,370	6,370	6,370
Contents	21,760	21,760	21,760	21,760	21,760	21,760	21,760	21,760
Income Lost	3,820	3,820	3,820	3,820	3,820	3,820	3,820	3,820
Subtotal	31,950	31,950	31,950	31,950	31,950	31,950	31,950	31,950
Public and Other	9,240	9,240	9,240	9,240	9,240	9,240	9,240	9,240
Detours	14,450	14,450	14,450	14,450	14,450	14,450	14,450	14,450
Total	89,810	91,000	94,270	98,370	103,470	107,670	107,670	96,670

[1]Residual flood damages are calculated assuming an 8.625% annual interest rate.
[2]The value of residential contents are assumed to grow at an annual rate of 2.023% for 41 years, starting in the study year; 1986.

Table B21 - Projection of Residual Flood Damages by Decade with Affluence[1]-Alternative III (99-Yr. Protection)

Damage Category	Existing 1986	Base Year 1990	2000	2010	2020	2030	2040	Average Annual Equiv
Year		0	10	20	30	40	50	
Residential	$	$	$	$	$	$	$	$
Structure	17,840	17,840	17,840	17,840	17,840	17,840	17,840	17,840
Contents[2]	12,330	16,360	17,300	19,900	24,300	27,900	27,900	18,300
Subtotal	30,170	31,200	34,140	37,740	42,140	45,740	45,740	36,140
Commercial								
Structure	5,790	5,790	5,790	5,790	5,790	5,790	5,790	5,790
Contents	19,050	19,050	19,050	19,050	19,050	19,050	19,050	19,050
Income Lost	2,910	2,910	2,910	2,910	2,910	2,910	2,910	2,910
Subtotal	27,750	27,750	27,750	27,750	27,750	27,750	27,750	27,750
Public and Other	8,010	8,010	8,010	8,010	8,010	8,010	8,010	8,010
Detours	9,760	9,760	9,760	9,760	9,760	9,760	9,760	9,760
Total	75,690	76,720	79,660	83,260	87,660	91,260	91,260	81,660

[1]Residual flood damages are calculated assuming an 8.625% annual interest rate.
[2]The value of residential contents are assumed to grow at an annual rate of 2.023% for 41 years, starting in the study year; 1986.

Table B22 - Projection of Residual Flood Damages by Decade with Affluence[1]-Alternative IV (99-Yr. Protection)

Damage Category	Existing 1986	Base Year 1990	2000	2010	2020	2030	2040	Average Annual Equiv
Year		0	10	20	30	40	50	
Residential	$	$	$	$	$	$	$	$
Structure	14,980	14,980	14,980	14,980	14,980	14,980	14,980	14,980
Contents[2]	10,120	10,960	13,300	16,300	19,900	22,800	22,800	15,000
Subtotal	25,100	25,940	28,280	31,280	34,880	37,780	37,780	29,980
Commercial								
Structure	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200
Contents	15,510	15,510	15,510	15,510	15,510	15,510	15,510	15,510
Income Lost	2,660	2,660	2,660	2,660	2,660	2,660	2,660	2,660
Subtotal	23,370	23,370	23,370	23,370	23,370	23,370	23,370	23,370
Public and Other	6,430	6,430	6,430	6,430	6,430	6,430	6,430	6,430
Detours	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500
Total	63,400	64,240	66,580	69,580	73,180	76,080	76,080	68,280

[1]Residual flood damages are calculated assuming an 8.625% annual interest rate.
[2]The value of residential contents are assumed to grow at an annual rate of 2.023% for 41 years, starting in the study year; 1986.

Table B23 - Projection of Residual Flood Damages by Decade with Affluence[1]-Alternative V (99-Yr. Protection)

Damage Category	Existing 1986	Base Year 1990	2000	2010	2020	2030	2040	Average Annual Equiv
Year		0	10	20	30	40	50	
Residential	$	$	$	$	$	$	$	$
Structure	13,180	13,180	13,180	13,180	13,180	13,180	13,180	13,180
Contents[2]	9,000	9,750	11,700	14,300	17,300	20,000	20,000	13,200
Subtotal	22,180	22,930	24,880	27,480	30,480	33,180	33,180	26,380
Commercial								
Structure	4,450	4,450	4,450	4,450	4,450	4,450	4,450	4,450
Contents	13,390	13,390	13,390	13,390	13,390	13,390	13,390	13,390
Income Lost	2,380	2,380	2,380	2,380	2,380	2,380	2,380	2,380
Subtotal	20,220	20,220	20,220	20,220	20,220	20,220	20,220	20,220
Public and Other	5,710	5,710	5,710	5,710	5,710	5,710	5,710	5,710
Detours	6,920	6,920	6,920	6,920	6,920	6,920	6,920	6,920
Total	55,030	55,780	57,730	60,330	63,330	66,030	66,030	59,230

[1]Residual flood damages are calculated assuming an 8.625% annual interest rate.
[2]The value of residential contents are assumed to grow at an annual rate of 2.023% for 41 years, starting in the study year; 1986.

Table B24 - Projection of Residual Flood Damages by Decade with Affluence[1]-Alternative VI (99 Yr. Protection)

Damage Category	Existing 1986	Base Year 1990	2000	2010	2020	2030	2040	Average Annual Equiv
Year		0	10	20	30	40	50	
Residential	$	$	$	$	$	$	$	$
Structure	12,490	12,490	12,490	12,490	12,490	12,490	12,490	12,490
Contents[2]	7,900	8,560	10,500	12,500	15,500	17,600	17,600	11,700
Subtotal	20,390	21,050	22,990	24,990	27,990	30,090	30,090	24,190
Commercial								
Structure	3,820	3,820	3,820	3,820	3,820	3,820	3,820	3,820
Contents	11,410	11,410	11,410	11,410	11,410	11,410	11,410	11,410
Income Lost	2,050	2,050	2,050	2,050	2,050	2,050	2,050	2,050
Subtotal	17,280	17,280	17,280	17,280	17,280	17,280	17,280	17,280
Public and Other	5,050	5,050	5,050	5,050	5,050	5,050	5,050	5,050
Detours	5,460	5,460	5,460	5,460	5,460	5,460	5,460	5,460
Total	48,180	48,840	50,780	52,780	55,780	57,880	57,880	51,980

[1]Residual flood damages are calculated assuming an 8.625% annual interest rate.
[2]The value of residential contents are assumed to grow at an annual rate of 2.023% for 41 years, starting in the study year; 1986.

Table B25 - Projection of Flood Damages by Decade with Affluence[1]-Alternative VII

Damage Category	Existing 1986	Base Year 1990	2000	2010	2020	2030	2040	Average Annual Equiv
Year		0	10	20	30	40	50	
Residential	$	$	$	$	$	$	$	$
Structure	24,110	24,110	24,110	24,110	24,110	24,110	24,110	24,110
Contents[2]	17,970	19,470	23,800	29,100	35,500	40,800	40,800	26,800
Subtotal	42,080	43,580	47,910	53,210	59,610	64,910	64,910	50,910
Commercial								
Structure	3,760	3,760	3,760	3,760	3,760	3,760	3,760	3,760
Contents	8,620	8,620	8,620	8,620	8,620	8,620	8,620	8,620
Income Lost	1,730	1,730	1,730	1,730	1,730	1,730	1,730	1,730
Subtotal	14,110	14,110	14,110	14,110	14,110	14,110	14,110	14,110
Public and Other	6,520	6,520	6,520	6,520	6,520	6,520	6,520	6,520
Detours	4,970	4,970	4,970	4,970	4,970	4,970	4,970	4,970
Total	67,680	69,180	73,510	78,810	85,210	90,510	90,510	76,510

[1] Residual flood damages are calculated assuming an 8.625% annual interest rate.
[2] The value of residential contents are assumed to grow at an annual rate of 2.023% for 41 years, starting in the study year; 1986.

Table B26 - Annual Flood Inundation Reduction Benefits

Plan		Without-Project Expected Annual Damages	With-Project Residual Annual Damages	Expected Annual Inundation Reduction Benefit
I	Residential	115,200	88,430	26,770
	Commercial	39,970	32,350	7,620
	Public	15,490	12,150	3,340
		170,660	132,930	37,730
II	(99 YEAR PROTECTION)			
	Residential	115,200	41,030	74,170
	Commercial	39,970	31,950	8,020
	Public	15,490	9,240	6,250
		170,660	82,220	88,440
III	(99 YEAR PROTECTION)			
	Residential	115,200	36,140	79,060
	Commercial	39,970	27,750	12,220
	Public	15,490	8,010	7,480
		170,660	71,900	98,760
IV	(99 YEAR PROTECTION)			
	Residential	115,200	29,980	85,220
	Commercial	39,970	23,370	16,600
	Public	15,490	6,430	9,060
		170,660	59,780	110,880
V	(99 YEAR PROTECTION)			
	Residential	115,200	26,380	88,820
	Commercial	39,970	20,220	19,750
	Public	15,490	5,710	9,780
		170,660	52,310	118,350
VI	(99 YEAR PROTECTION)			
	Residential	115,200	24,190	91,010
	Commercial	39,970	17,280	22,690
	Public	15,490	5,050	10,440
		170,660	46,520	124,140
VII	Residential	115,200	50,910	64,290
	Commercial	39,970	14,110	25,860
	Public	15,490	6,520	8,970
		170,660	71,540	99,120

c. Intensification Benefits.

An intensification benefit can be claimed when a project provides protection sufficient for existing activities to increase their output levels because of the economic incentives (flood damage reductions) provided by the project. The land uses must remain the same with and without the project to classify such benefits under intensification. As stated in the previous paragraph, land uses should not change because of project construction. The level of residual damages with a project, however, should limit intensification of flood plain activities to a modest amount. Therefore, no intensification benefit appears to be justified at Ottawa.

d. Flood Insurance Savings.

For with-project conditions in which protection is provided in excess of the 100-year flood, the administration costs avoided of federal flood insurance policies within the protected area (126 policies) can be claimed as a NED benefit. None of the envisioned alternatives provide a sufficient level of protection to capture this benefit.

e. Detour Costs Avoided.

The construction of a project changes the stage-discharge relationship. Improvements to the channel tend to reduce the flood elevation for a given flow rate, while levees tend to increase flood elevations by reducing the available cross-sectional area of flow in the overbank. The net effect of a given project alternative is to change the frequency and duration of detours as compared to without-project conditions. The expected annual detours costs without a project minus the expected annual costs with a project is a NED benefit detour costs avoided. These are summarized on Table B27 for each plan alternative.

Table B27 - Detour Costs Avoided

Plan	Without-Project Expected Annual Detour Costs	With-Project Residual Annual Detour Costs	Expected Annual Detour Costs Avoided
I	15,250	9,490	5,760
II (99 Year Protection)	15,250	14,450	800
III (99 Year Protection)	15,250	9,760	5,490
IV (99 Year Protection)	15,250	8,500	6,750
V (99 Year Protection)	15,250	6,920	8,330
VI (99 Year Protection)	15,250	5,460	9,790
VII	15,250	4,970	10,280

f. Employment Benefits.

The economic effects of the direct use of otherwise unemployed or underemployed labor resources during project construction may be included as a NED benefit under certain conditions. In labor market areas designated as redevelopment areas, it is assumed such labor would not be utilized or would be underutilized. A region must meet established criteria for substantial and persistent unemployment to achieve designation as a redevelopment area.

The evaluation criteria state that an area can be considered to have substantial and persistent unemployment when:

(1) The current rate of employment, as determined by appropriate annual statistics for the most recent 12 consecutive months, is 6 percent or more and has averaged at least 6 percent for the qualifying time periods specified below, and

(2) The annual average rate of unemployment has been at least: (a) 50 percent above the national average for three of the preceding four calendar years, or (b) 75 percent above the national average for two of the preceding three calendar years, or (3) 100 percent above the national average for one of the preceding two calendar years.

Putnam County has experienced at least six percent unemployment over the preceding four years as shown in Table B28. The 1986 Reference Handbook states that Putnam County qualifies for including benefits from use of otherwise unemployed or underemployed labor resources. Table B29 shows the calculation of this benefit for each plan alternative.

Table B28 - Annual Putnam County Unemployment Rates

Year	Putnam County
1981	13.5%
1982	15.1%
1983	13.1%
1984	10.4%
1985	10.9%

g. Summary of Benefits.

All categories of benefits for each plan alternative are summarized on Table B30.

B8. AVERAGE ANNUAL COSTS

Project first costs and average annual costs for all seven alternatives are presented in Table B31. Annual charges are based on an 8.625% annual

Table B29 - Area Employment Benefits[1]

Alternate	I	II	III	IV	V	VI	VII
Construction Cost	$208,510	$2,010,700	$2,147,300	$2,266,800	$2,398,675	$2,711,570	$548,470
% Allocated to Labor	33.33%	33.33%	33.33%	33.33%	33.33%	33.33%	33.33%
On-Site Labor	$ 69,469	$ 670,166	$ 715,695	$ 755,524	$ 799,478	$ 903,766	$182,805
% Skilled	40%	40%	40%	40%	40%	40%	40%
% Unskilled	50%	50%	50%	50%	50%	50%	50%
% Administrative	10%	10%	10%	10%	10%	10%	10%
Wages							
Skilled	$ 27,799	$ 268,067	$ 286,278	$ 302,210	$ 319,791	$ 361,507	$ 73,122
Unskilled	34,748	335,083	357,848	377,762	399,739	451,883	91,403
Administrative	6,950	67,017	71,570	75,552	79,948	90,377	18,281
% to Unemployed Local							
Skilled	30%	30%	30%	30%	30%	30%	30%
Unskilled	45%	45%	45%	45%	45%	45%	45%
Administrative	35%	35%	35%	35%	35%	35%	35%
Wages to Unemployed Labor							
Skilled	$ 8,340	$ 80,420	$ 85,883	$ 90,663	$ 95,937	$ 108,452	$ 21,937
Unskilled	15,637	150,787	161,031	169,993	179,883	203,347	41,131
Administrative	2,432	23,456	25,049	26,443	27,982	31,632	6,398
	$ 26,140	$ 254,660	$ 271,960	$ 287,100	$ 303,800	$ 343,430	$ 69,470
Annual Benefit	$ 2,310	$ 22,320	$ 23,840	$ 25,160	$ 26,630	$ 30,100	$ 6,090

[1]All benefits are at January 1986 price levels and were calculated assuming a 50-year project life on 8.625% annual interest rate.

Table B30 - Summary of Benefits by Alternative[1]

Alternative	I	II	III	IV	V	VI	VII
Inundation Reduction	37,730	88,440	98,760	110,880	118,350	124,140	99,120
Detourss Avoided	5,760	800	5,490	6,750	8,330	9,790	10,280
Employment	2,310	22,320	23,840	25,160	26,630	30,100	6,090
Total Average Annual Benefits	45,800	111,560	128,090	142,790	153,310	164,030	115,490

[1] All benefits are at January 1986 price levels and assumed a 50-year project life and an 8.625 percent annual interest rate.

interest rate and a 50-year project life. Annual maintenance costs applicable to each plan are also included.

B9. BENEFIT COST ANALYSIS

a. Structural Alternatives.

Average annual costs, average annual benefits, net benefits, and B/C ratio for each of the seven alternatives are presented on Table B32.

The benefit/cost ratio (BCR) is the ratio of average annual benefits to average annual costs evaluated at a project interest rate of 8.625 percent and a 50-year project life. Total average annual benefits by alternative are detailed in Table B30 and total average annual costs are detailed in Table B31. The totals, based on January 1986 price levels, are then presented in Table B32. Benefit/cost ratios for the seven alternatives are shown on Table B32.

Net discounted benefits by alternative, displayed in Table B32, represent the excess of average annual benefits over average annual costs.

Alternative VII, of all of the structural alternatives, maximizes net discounted benefits. This alternative has a BCR of .99 with average annual benefits of $115,490 and average annual costs of $116,626. All alternatives had negative net benefits.

b. Candidate Plans.

The benefit/cost ratio (BCR is the ratio of average annual benefits to average annual costs evaluated at a project interest rate of 8.625 percent and a

Table B31 - Project Costs by Alternative

Alternative	I	II	III	IV	V	VI	VII
Construction Cost	$ 208,510	$2,010,700	$2,147,300	$2,266,800	$2,398,675	$2,711,570	$ 693,805
% Contingencies	15%	25%	25%	25%	25%	25%	15%
Contingency Amount	$ 31,280	$ 502,680	$ 536,830	$ 566,700	$ 599,670	677,890	104,015
Cost & Contingencies	$ 239,790	$2,513,380	$2,684,130	$2,833,500	$2,998,345	$3,389,460	$ 797,820
Interest During Construction	$ 0	$ 48,780	$ 52,090	$ 54,990	$ 58,190	$ 65,780	$ 0
Subtotal	$ 239,790	$2,562,160	$2,736,220	$2,888,490	$3,056,535	$3,455,240	$ 797,820
Engineering & Design	$ 364,800	$ 397,700	$ 400,260	$ 402,500	$ 404,980	$ 410,840	$ 272,620
S & A	$ 71,380	$ 233,080	$ 245,240	$ 255,890	$ 267,630	$ 295,500	$ 99,730
Subtotal	$ 675,970	$3,192,940	$3,381,720	$3,546,880	$3,729,145	$4,161,580	$1,170,120
Real Estate	$	$ 80,300	$ 79,900	$ 91,100	$ 90,800	$ 179,900	$ 100,000
Total Project Cost	$ 675,970	$3,273,240	$3,461,620	$3,637,980	$3,819,945	$4,341,480	$1,270,120
Annual Costs[2]							
Interest and Amortization	$ 59,250	$ 286,900	$ 303,410	$ 318,870	$ 334,820	$ 380,530	$ 111,326
O&M	$ 8,560	$ 2,400	$ 10,960	$ 10,960	$ 10,960	$ 10,960	$ 5,300
Total Average Annual Costs	$ 67,810	$ 289,300	$ 314,370	$ 329,830	$ 345,780	$ 391,490	$ 116,626

1 Periods of construction for Alternatives I & VII would be less than 3 months. No adjustment was made for interest during construction (IDC). Periods of construction for Alternatives II through VI would be approximately 9 months. Adjustment was made for IDC at 8.625%, applied to each additional quarter and amortized over 50 years.

2 Project annual costs are at January 1986 price levels and were calculated assuming a 50-year project life and on an 8.625% annual interest rate.

Table B32 - Benefit-Cost Ratios and Net Benefits by Alternative[1]

Alternative	I	II	III	IV	V	VI	VII
Average Annual Costs	$ 67,810	$ 289,300	$ 314,370	$ 329,830	$ 345,780	$ 391,490	$ 116,626
Average Annual Benefits	$ 45,800	$ 111,560	$ 128,090	$ 142,790	$ 153,310	$ 164,030	115,490
B/C Ratio	.675	.386	.407	.433	.443	.419	.99
Net Benefits	($ 22,010)	($ 177,740)	($ 186,280)	($ 187,040)	($ 192,470)	($ 227,460)	($ 1,136)

1 Benefits and costs are at January 1986 price levels and an assumed 50-year project life at an 8.625% annual interest rate.

50-year project life. Total average annual benefits by plan are detailed in Table B33 and total average annual costs are detailed in Table B34. The totals, based on January 1986 price levels, are then presented in Table B35. Average annual costs, average annual benefits, net benefits, and B/C ratios for five plans are presented on Table B35.

Net discounted benefits by plan, displayed in Table B35, represent the excess of average annual benefits over average annual costs.

Plan E maximizes net discounted benefits. This plan has a BCR of 1.08 with net benefits of $10,170, average annual benefits of $132,270 and average annual costs of $122,100. Plan C would not yield the average annual benefits shown in Table B35 without the implementation of Plan B. Implementation of Plan C (nonstructural plan) with Plan B, which is Plan E, enhances the protection provided to the Village of Ottawa. Plan A has negative net benefits, and Plan D is the No-Action Plan.

Table B33 - Summary of Benefits by Plan[1]

Plan	A	B	C	D	E
Alternative	VI	VII	Nonstructural	No-Action	Plans B+C
	$	$	$		$
Inundation Reduction	124,140	99,120	16,780[2]	-	115,900[3]
Detourss Avoided	9,790	10,280	0	-	10,280
Employment	30,100	6,090	0	-	6,090
Total Average Annual Benefits	164,030	115,490	16,780	-	132,270

1 All benefits are at January 1986 price levels and assumed a 50-year project life and an 8.625% annual interest rate.

2 Plan C has benefits equal to 40% of the total average annual content damages for existing conditions (0.4 X $83,920 = $33,570). Assuming only 50% of the people respond to the early warning system announcements. Benefits for the early warning systems, nonstructural Plan C, are $16,785 ($33,570 X 0.5 = $16,785).

3 Plan E has benefits equal to Plan B and Plan C. Net benefits due to the implementation of Plan C, the nonstructural plan, with Plan B are $10,170.

Table B34 - Project Costs by Plan

Plan	A	B	C	D	E
Alternative	VI	VII	Nonstructural	No-Action	Plans B+C
	$	$	$		$
Construction Cost	2,711,570	693,805	32,000	0	725,805
% Contingencies	25%	15%	20%	0	15%
Contingency Amount	677,890	104,015	6,400	0	87,070
Cost & Contingencies	3,389,460	797,820	38,400	0	836,220
Interest During Construction (1)	65,780	0	0	0	0
Subtotal	3,455,240	797,820	38,400	0	836,220
Engineering & Design	410,840	272,620	3,840	0	276,460
S & A	295,500	99,730	1,920	0	101,650
Subtotal	4,161,580	1,170,120	44,160	0	1,214,280
Real Estate	179,900	100,000	0	0	100,000
Total Project Cost	4,341,480	1,270,120	44,160	0	1,314,280
Annual Costs[2]					
Interest and Amortization	380,530	111,326	3,870	0	115,200
O&M	10,960	5,300	1,600	0	6,900
Total Average Annual Costs	391,490	116,626	5,470	0	122,100

1 Periods of construction for Plans B, C, and E would be less than 3 months. Interest during construction (IDC) for these plans was zero. The period of construction for Plan A would would be approximately 9 months. IDC costs were computed at 8.625%, with quarterly compounding and amoritized over 50 years.

2 Project annual costs are at January 1986 price levels and were calculated assuming a 50-year project life and a 8.625% annual interest rate.

Table B35 - Benefit Cost Ratios and Net Benefits by Plan[1]

Plan	A	B	C	D	E
Alternative	VI	VII	Nonstructural	No-Action	Plans B+C
Average Annual Cost	$ 391,490	$ 116,626	$ 5,470	$ 0	$ 122,100
Average Annual Benefits	$ 164,030	$ 115,490	$ 16,780[2]	$ 0	$ 132,270[3]
B/C Ratio	$ .419	$ .99	$ 3.07	$ -	$ 1.08
Net Benefits	$(227,460)	$ (1,136)	$ 11,310	$ 0	$ 10,170

1 Benefits and costs are at January 1986 price levels and an assumed 50-year project life at an 8.625% annual interest rate.

2 Plan C has benefits equal to 40$ of the total average annual content damages for existing conditions (0.4 X $83,920 = $33,570). Assuming only 50% of the people respond to the early warning announcements. Benefits for the early system are $16,785 ($33,570 X 0.5 = $16,785).

3 Plan E has benefits equal to Plan B and Plan C. Net benefits due to the implementation of Plan C, the nonstructural plan, with Plan B, are $10,170.

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX C

COST ESTIMATES

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MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
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MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
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APPENDIX C
COST ESTIMATES

LIST OF CONTACTS

Individual	Representing
Mr. John Schrade	Ohio Power Company Public Projects Coordinator
Mr. Donald Kimmett	Putnam County Extension Office County Agent
Mr. Terry Schroeder	U.S.D.A. Soil Conservation Service
Mr. Dewey Williams	Village of Ottawa Director of Municipal Services
-	Putnam County Auditors Office
Mr. Donald Brown	House Mover's, Inc. Pittsburgh, PA

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX C

COST ESTIMATES

C1. PLANS EVALUATED

The cost estimates for construction and ancillary costs, and for the annual maintenance costs are presented for the four alternative plans.

- Plan A - levees, floodwalls, clearing and snagging, removal of embankments and enlarged floodway;
- Plan B - clearing and snagging, removal of embankments, and enlarged floodway;
- Plan C - Non-Structural Alternatives - flood warning and action;
- Plan D - No Action.

C2. PRICE LEVEL COMPARISON

All cost estimates provided are based on January 1986 price levels for both labor, equipment, and materials, for comparison purposes. Actual costs may vary slightly during 1986, but such variation will not alter the conclusions drawn.

C3. COST ESTIMATES DEVELOPED

Only one cost estimate was developed for Alternative VII. For comparison purposes, however, two scenarios of Alternative VI were evaluated, each for four levels of protection. The first scenario is for uniform protection throughout the town. The second scenario provides for levee and floodwall protection upstream of the Chessie System Railroad bridge only. No protection from levees would be provided downstream. This scenario is considered to adequately describe additional scenarios in which a split in the levels of protection would be provided. The four levels of protection analyzed were for the 10-year, 25-year, 50-year, and 99-year events. The plans outlined in paragraph C1 thus can be described:

- Plan A - Alternative VI, with levees and floodwalls

    Scenario 1--uniform protection throughout the town
        10-year protection
        25-year protection
        50-year protection
        99-year protection
    Scenario 2--split levels of protection in the town

10-year protection
25-year protection
50-year protection
99-year protection

- Plan B - Alternative VII;

- Plan C - The non-structural alternative; and

- Plan D - The No-Action alternative.

C4. SOURCE FOR COST ESTIMATES

Each plan's first costs were developed for the various components of each plan. Where possible, estimates were obtained from local officials, contractors, and the appropriate agencies. A list of contacts made for this study is provided in this appendix.

C5. ANNUAL MAINTENANCE COSTS

Annual maintenance costs were based on probable local manpower and equipment. A fifty-year economic life and interest rates of 8-5/8 and 8-7/8 per cent were used to estimate annual costs. Alternative VII will reduce damages as designed for an indefinite period of time, with continued maintenance. Alternative VI would not require as much maintenance to the levee and floodwalls during its life, but the river channel and floodway would require the same maintenance as Alternative VII to provide the designed level of protection.

SUBJECT C/E Buffalo District
Unit Costs, Levees & Floodwalls

BY KLL DATE 6/16/86 PROJ. NO. 83-159-30

CHKD. BY ______ DATE ______ SHEET NO. 2 OF 36

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C6 PLAN A

C6.1 UNIT COST ESTIMATES, LEVEE/FLOODWALL ALTERNATIVES

All unit costs developed in this appendix are based upon the most current data available and are of sufficient accuracy to develop and compare the cost of the measures and alternative plans developed in this re-evaluation study.

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE, OTTAWA, OHIO
BY JDP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY KLF DATE 4/16/86 SHEET NO. 1 OF 36

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UNIT PRICE SUMMARY, LEVEES/FLOODWALLS

			Cost	Cost+O+P Bid
MOBILIZATION + DEMOBILIZATION (INCLUDES FIELD OFFICE + SURVEY PERSONNEL)	L.S		$93,750.00	$117,200.00
CLEARING + GRUBBING	2 Ac.	(SUB)	$2,000.00/Ac	$2,200.00/Ac
STRIP TOPSOIL (1' DEPTH)	7,421 c.y		$2.19/c.y	$2.74/c.y
PROOF ROLL + SCARIFY	22,260 s.y.		0.35/s.y.	$0.44/s.y.
EXCAVATION - TRENCH	7,403 c.y.		4.60/c.y	$5.75/c.y
EMBANKMENT (INCLUDES BORROW AREA RESTORATION)	42,704 c.y		$4.14/c.y	$5.18/c.y
PLACE TOPSOIL (6" DEPTH)	4,258 c.y		$5.45/c.y	$6.81/c.y
DRESS, SEED + MULCH PERMANENT	27,100 s.y	(PARTIALLY SUB)	$0.40/s.y	$0.46/s.y
MAINTENANCE + PROTECTION OF TRAFFIC	L.S.		$21,082.00	$26,350.00
LEVEE RETAINING WALL	470 L.F.		$322.34/L.F.	$403.00
EROSION + SEDIMENTATION CONTROL	L.S.	(SUB)	$29,360.50	$32,300.00
DEMOLITION + REMOVAL OF WHAREHOUSE	L.S.		$21,078.96	$26,350.00

25% MARK UP O+P ON CONTRACTORS WORK
15% MARK UP O+P ON MOSTLY SUB WORK
10% MARK UP O+P ON ALL SUB WORK

SUBJECT COE BUFFALO
BLANCHARD LEVEE, OTTAWA, OHIO
BY JDP DATE 2/26/86 PROJ. NO. 85-109-30
CHKD. BY KLC DATE 4/16/86 SHEET NO. 2 OF 36

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ITEMS NOT INCLUDED IN COSTS FOR LEVEE/FLOODWALLS

1) ANY RIGHT OF WAY ACQUISITION COSTS OR REAL ESTATE COSTS
2) ANY PAYMENTS FOR BORROW MATERIAL (ASSUMED OWNED BY THE CORPS)
3) ANY SPECIAL PLACEMENT OF TOPSOIL i.e. (HAND RAKING)
4) ANY MOWING OF GRASS (MAINTENANCE COSTS)
5) ANY REPLANTING OF TREES OR FURNISHING OF SEEDLINGS
6) ANY HEADWALLS + FLAPGATES FOR CULVERTS
7) ANY REROUTING OR CHANGING OF THE EXISTING STORM SEWER SYSTEM
8) ANY COSTS ASSOCIATED WITH REROUTING EXISTING UTILITIES
9) ANY ALLOWANCE FOR UNSUITABLE MATERIAL REMOVED FROM INSPECTION TRENCH
10) ANY MAJOR DEWATERING OF TRENCHES REQUIRED i.e. (WELLPOINT SYSTEM, OR LARGE CENTRIFICAL PUMPING REQUIREMENTS) OCCASIONAL WATER ONLY
11) ANY EXCAVATION IN EXISTING ROADBEDS i.e. (US 224 or OHIO 65 or CITY STREETS)
12) ANY RESURFACING REPLACEMENT - EXCEPT TOPSOIL AND GRASS
13) ANY LEVEE SYSTEM DESIGN COSTS

COSTS FOR THESE ITEMS WERE DEVELOPED SEPARATELY, AS NEEDED, AND ARE PRESENTED IN THE SUBSECTIONS THAT FOLLOW. SEE THE APPENDIX C INDEX FOR SPECIFIC ITEMS.

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE; OTTAWA, OH.

BY SGM DATE 18 FEB. 86 PROJ. NO. 85-109-30
CHKD. BY KL DATE 4/16/86 SHEET NO. 3 OF 36

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TOTALS:

CUT = 300,210 C.F. (COMPACT) x 1.25 = 375,263 C.F. = 13,899 C.Y. (LOOSE)

FILL = 1,837,465 C.F. (COMPACT) x 1.25 = 2,296,831 C.F. = 85,068 C.Y. (LOOSE)

STRIP = 275,031 S.F. = 6.3 ACRES

COVER = 327,125 S.F. = 7.5 ACRES.

SUMMARY OF LEVEE QUANTITIES

ITEM	TRIAL I	TRIAL II	TRIAL III
		BCY	
CUT (C.Y.)	9,321	$\frac{9,254}{1.25}$ = 7,403	13,899
FILL (C.Y.)	57,182	$\frac{57,776}{1.25}$ = 46,221	85,068
STRIP (ACRES)	4.5	4.6	6.3
COVER (ACRES)	5.6	5.6	7.5
LENGTH OF LEVEE (FEET)	4,652	4,722	6,052

Trial 1: levee ties into Main Street bridge approach embankment

Trial 2: levee alignment through trailer park (requires relocation of park)

Trial 3: levee alignment around trailer park (park protected).

Trial 3 was the locally-preferred [illegible], and was adopted for this study.

SUBJECT C OF BUFFALO
BLANCHARD LEVEE, OTTAWA, OHIO
BY JDP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY KLF DATE 4/16/86 SHEET NO. 4 OF 36

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EARTHWORK BALANCE

	CUTS	FILLS
INSPECTION TRENCH	7,403 c.y.	
LEVEE FILL		46,221 c.y.
TOPSOIL PLACEMENT $\frac{52' \times .5 \times 4422}{27}$		-4,258 c.y.
BORROW AREAS		
RAILROAD EMBANKMENT	23,731 c.y.	
PERRY STREET	2,641 c.y.	
	33,775 c.y.	41,963 c.y.

$\frac{41,963 \text{ c.y.}}{.90 \text{ (SHRINKAGE FACTOR)}} =$ 46,626 c.y. EQUIVALENT CUT REQUIRED

33,775 c.y. CUT AVAILABLE

12,851 c.y. BORROW REQUIRED

SUBJECT C.O.E Buffalo
Blanchard Levee Ottawa, Ohio
BY JDP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY KLL DATE 4/11/86 SHEET NO. 5 OF 36

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EMBANKMENT SUMMARY

Inspection Trench Backfill	7,403 c.y ×	4^{14} pg. 11	=	\$30,648 ^{42}
Borrow-Existing Embankments	23,735 cy ×	4^{12} pg. 20	=	\$97,788 ^{20}
Borrow - Borrow Pit	11,566 cy ×	4^{18} pg. 26	=	\$48,345 ^{88}
	42,704 cy		=	\$176,782 ^{50} \$4^{14}

PLACE TOPSOIL 6" Depth

4,258 cy × \$5^{45} \$23,206 ^{10}

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE OTTAWA, OHIO

BY JDP DATE 2/21/86 PROJ. NO. 85-109-30

CHKD. BY KLF DATE 4/16/86 SHEET NO. 6 OF 36

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STRIP TOPSOIL SAY 500' HAUL

MASS STRIPPING COST

DESCRIPTION	$/HR	PER DAY COST LABOR	PER DAY COST EQUIPMENT
FOREMAN	24.00	$192.00	
PICK UP TRUCK	$8.00		$64.00
3 EA. SCRAPERS 627B'S.	3($125.00)		$3,000.00
3 EA. OPERATORS	3(23.48)	$563.50	
D-9 DOZER	145.00		1,160.00
OPERATOR	23.48	187.85	
12 GRADER	53.00		424.00
OPERATOR	22.17	177.40	
D-8 DOZER (STOCKPILE)	$117.00		936.00
OPERATOR	$23.48	187.85	
MECHANIC + TRUCK	$23.48 + $15.00	$187.85	120.00
	$7200.45/DAY =	$1,496.45 +	5704.00

CITY INDEX CORRECTION 2%, 2 YRS INFLATION 13% x 1.15

1986 PRICE: $8280.52

PRODUCTION - NOT CUTTING TO ANY SPECIFIED GRADE - USE ONLY 3 DOUBLE BARREL SCRAPERS - SITE TO CONFINED FOR MORE

170 C.Y./SCRAPER/HR (SEE ATTACHED SHEET) x 3 SCRAPERS x 8 HRS/DAY = 4,080 C.Y./

SCRAPER COST/UNIT

$8,280.52 / 4,080 C.Y. = $2.03/C.Y.

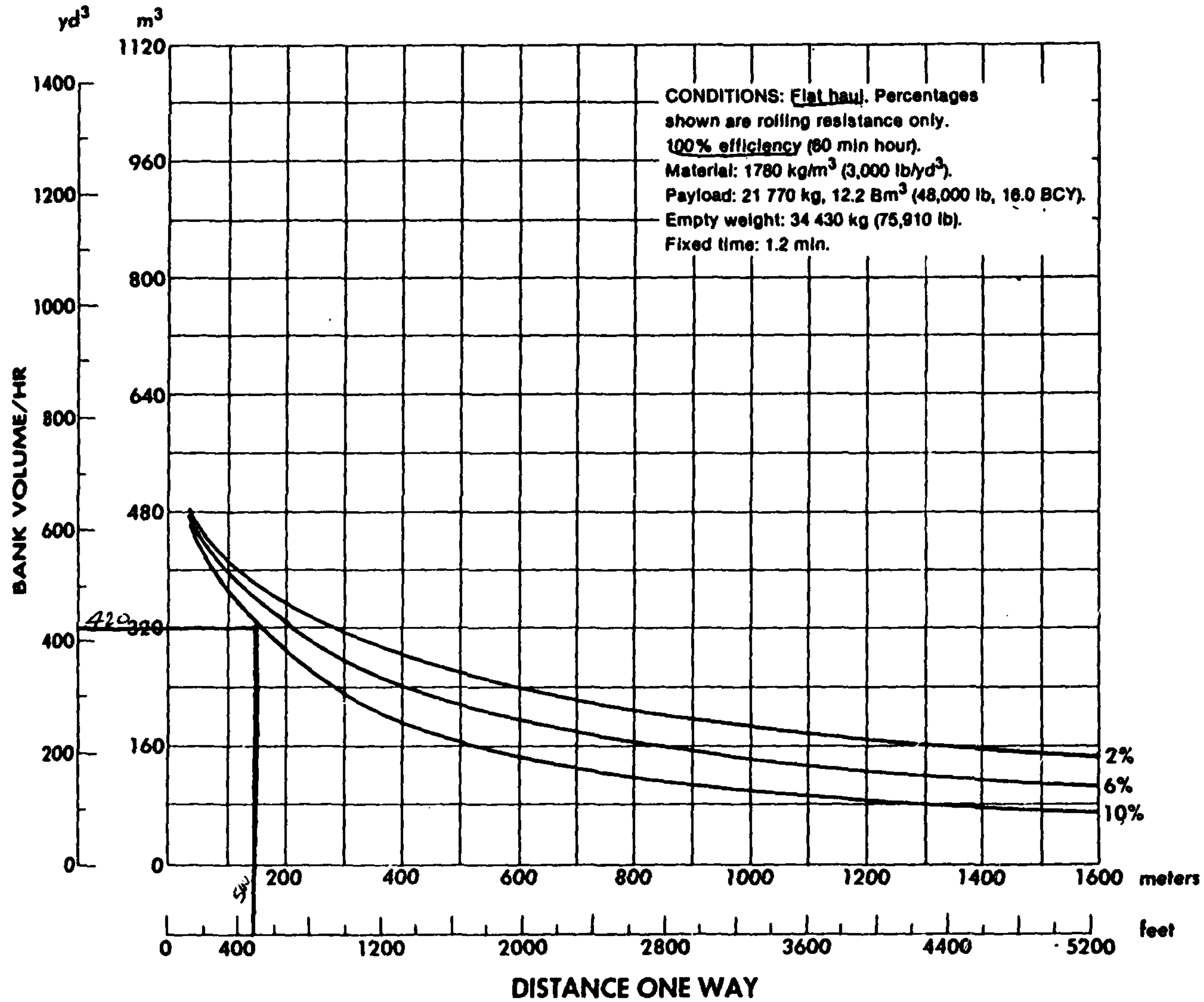
BUT NOT ALL TOPSOIL CAN BE STRIPPED USING SCRAPERS, SAY 5% MUST BE PERFORMED USING LOADER AND TRUCKS IN SMALL AREAS

LOADER STRIPPING COST - LOW PRODUCTION

Stripping Topsoil

627B Bm^3 (BCY)/hr
- Distance vs. Production
- 29.5 - 29 Tires

Wheel Tractor-Scrapers



420 c.y/Hr.
× .75 (45 Min/Hr.)

315 c.y/Hr
× $\frac{14}{16}$ Actual BCY / Chart BCY

276 c.y/Hr.
× .75 Site Efficiencies

207 c.y/Hr.
Too High

use 170 c.y/Hr.
For Daily Average

600

Site F... — Deficits Due To Congested Site, Hauling Across Streets + Highways

C-10

Sheet 7 of 36
- KCL Allison

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE OTTAWA, OHIO

BY JDP DATE 2/21/86 PROJ. NO. 85-109-30
CHKD. BY KL DATE 4/11/86 SHEET NO. 8 OF 36

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DESCRIPTION	$/HR.	PER DAY COST LABOR	PER DAY COST EQUIPMENT
FOREMAN	$24.00	$192.00	
PICK UP TRUCK	$8.00		$64.00
966 LOADER	$68.00		$544.00
OPERATOR	$23.48	$187.85	
2 EA. TRIAXLE TRUCKS	2($35.00)		$560.00
2 EA. TEAMSTERS	2($18.92)	$302.75	
LABORER	$18.13	145.05	
	$1,995.65	= $827.65	+ $1168.00 = $1995.65

2% CITY INDEX + 13% 2 YRS INFLATION x1.15

1986 PRICE = $2,295.00

PRODUCTION

SMALL AREAS, FREQUENT MOVES OF LOADING AREA - NON PRODUCTION WORK 3.4 c.y. B.
3 CYCLES PER TRUCK LOAD · LOADER MUST DIG + STOCKPILE AND LOAD TR...
ASSUME LOADING 6 TRUCKS/HR.

6 TRUCKS/HR × 9 CY/TR. × 8 HRS/DAY = 432 c.y./DAY

LOADER COST/UNIT

$2,295.00 / 432 c.y. = $5.31 /c.y.

TOTAL STRIPPING COST

($2.03 × .95) + ($5.31 × .05) = $\boxed{\$2.19/\text{c.y.}}$

DOES NOT INCLUDE:
ANY FLAGMAN TIME
SEEDING OF STOCKPILES
SURVEY TIME
ANY CLEARING + GRUBBING

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE OTTAWA, OHIO
BY JDP DATE 2/21/86 PROJ. NO. 85-109-30
CHKD. BY KLL DATE 4/16/86 SHEET NO. 9 OF 36

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INSPECTION TRENCH EXCAVATION

GRADALL OPERATION - 3' BOTTOM 1:1 SIDE SLOPES AVG. 5' DEPTH = 1.48cy/L.F.
STOCKPILE FIRST MATERIAL BUT HAULBACK SHORTLY THEREAFTER
SAY 500' HAULBACK

DESCRIPTION	$/HR	LABOR	EQUIPMENT
½ TIME { FOREMAN	$24.00	$96.00	
PICK UP TRUCK	$8.00		$32.00 } ½ TIME SPENT IN BACKFILL OF TRENCH
1 C.Y. GRADALL	79.00		$632.00
OPERATOR	$24.00	$192.00	
2 EA. TRIAXLE TRUCKS	2($35.00)		560.00
2 EA. TEAMSTERS	2($18.92)	302.72	

$1814.72/DAY = 590.72 + 1,224.00 = $1,814.72

CITY CORRECTION (2%) + 2 YRS INFLATION (13%) × 1.15

1986 PRICE = $2086.93

PRODUCTION

BUCKET FILL FACTOR

1 C.Y. GRADALL BUCKET × .8 = .8cy / CYCLE
TRIAXLE TRUCK HAULS 9c.y. 9/.8 = 11.25 CYCLES/LOAD USE 12 CYCLES/TRUCK LOAD

12 BUCKETS × 35 SECS/CYCLE = 420 SEC.
TRUCK LEAVING + SPOTTING NEW TRUCK = 5 SEC.
425 SEC. / 60 SEC = 7.08 MIN/TRUCK

45 MIN/HR / 7.08 = 6.3 TRUCKS/HR LOADED

6.3 TRUCKS/HR × 9 c.y/TRUCK × 8 HRS/DAY = 453.6 cy/DAY
453.6/1.48 = 306 L.F./DAY

INSPECTION TRENCH EXCAVATION UNIT COST

$2,086.93 / 453.6 c.y. = $\boxed{\$4.60/c.y.}$

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE OTTAWA, OHIO
BY JDP DATE 2/21/86 PROJ. NO. 85-109-30
CHKD. BY KL DATE 4/16/86 SHEET NO. 10 OF 36

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DOES NOT INCLUDE:
1 FLAGMAN
SURVEY TIME
DOUBLE HANDLING OF EXCAVATION

SUBJECT C O E Buffalo
Blanchard Levee Ottawa, Ohio

BY JDP DATE 2/24/86 PROJ. NO. 85-109-30
CHKD. BY KLL DATE 4/16/86 SHEET NO. 11 OF 36

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Fill Placement

Inspection Trench Backfill = 7,403 c.y. From Inspection Trench Excavation

	Description	$/Hr.	Labor	Equipment	
½ Time	Foreman	$24.00	$96.00		½ Time $ In Trench Ex
½ Time	Pick Up Truck	$8.00		$32.00	½ Time $ In Trench Ex
	930 Loader 100HP	41.00		$328.00	
	Operator	23.48	$187.84		
	Small Dozer 100HP	$44.00		$352.00	
	Operator	23.48	$187.84		
	Small Roller	$16.00		$128.00	
	Operator	22.17	177.36		
	Laborer	18.13	145.04		
		$1634.03/Day =	$794.03 +	840.00	

City Correction (2%) + 2 yrs Inflation (13%) x 1.15
1986 Price = $1879.19

Production

Same As Trench Excavation 453.6 c.y./Day

Inspection Trench Backfill Unit Cost

$1,879.19 / 453.6 c.y = $\boxed{\$4.14/\text{c.y.}}$

Does Not Include:
Exc. And Hauling (Paid Elsewhere)

SUBJECT C. O. E. BUFFALO
BLANCHARD LEVEE OTTAWA, OHIO

BY JDP DATE 2/24/86 PROJ. NO. 85-109-30
CHKD. BY KLL DATE 4/16/86 SHEET NO. 12 OF 36

gai CONSULTANTS, INC
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TOPSOIL PLACEMENT - USING LOADER, TRUCKS + DOZERS
DUE TO 2.5:1 SLOPES + CONFINED AREA - 500 FT HAUL

DESCRIPTION	$/HR.	LABOR	EQUIPMENT
FOREMAN	$24.00	$192.00	
PICK UP TRUCK	$8.00		$64.00
966 LOADER 3.4 C.Y.	$68.00		$544.00
OPERATOR	23.48	$187.84	
2 EA. TRIAXLES	2($35.00)		$560.00
2 EA. TEAMSTERS	2($18.92)	$302.72	
12 GRADER	$53.00		$424.00
OPERATOR	$22.17	$177.36	
2 EA. D-8 DOZER (DRESSING)	2($117.00)		$1,872.00
2 EA. OPERATORS	2(23.48)	$375.68	
LABORER	18.13	$145.04	
	$4844.64/DAY =	$1380.64 +	$3,464.00

(2%) (13%)
CITY CORRECTION + 2 YRS INFLATION × 1.15
$5,571.34/DAY

PRODUCTION 966 LOADER 3.4 cy BUCKET (STRUCK) USE 3 c.y. AVG.
AVG LOADER CYCLE TIME = .55 MIN. USE 1 MIN.
TRUCK HAULS 9 cy. LOAD = 3 × 60 SEC = 180 SECS
SPOTTING 10 SECS
LOAD TRUCK EVERY 190 SECS. /60 = 3.17 MIN./TRK.
45 MIN/HR ÷ 3.17 MIN = 14.2 TRUCKS/HR. USE 2 TRUCKS 500' HAUL
14.2 TRUCKS/HR × 9 c.y./TRUCK × 8 HRS/DAY = 1022.4 c.y.

TOPSOIL PLACEMENT UNIT COST

$5,571.34/1022.4 cy. = $5.45/cy.

DOES NOT INCLUDE:
ANY RAKING OR PICKING OF STONES
ANY DISCING

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE OTTAWA, OH

BY JDP DATE 2/24/86 PROJ. NO. 85-109-30

CHKD. BY KLC DATE 4/16/86 SHEET NO. 13 OF 36

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LEVEE FILL - FROM EXISTING EMBANKMENTS

PREPARATION AND RESTORE COSTS

	PERRY ST.		R.R.		
CLEARING AND GRUBBING	(250 x 100)	+	(1600 x 50) /43,560		2.41 Ac.
STRIP AND REPLACE GRANULAR *	768 cy	+	2,090 c.y.	=	2,858 c.y.
REMOVE BLOCK ABUTMENTS *	1 Ea.	+	1 Ea.	=	2 Ea.
DRESS + SEED + MULCH	(250 x 100)	+	(1600 x 100) /43,560	=	4.25 Ac.

* SEE ATTACHED SHEETS

COHESIVE EXCAVATION
ASSUMING 2,000' HAUL

	DESCRIPTION	$/HR	LABOR	EQUIPMENT
	MECHANIC + TRUCK	$23.48 + $15.00	187.84	$120.00
	FOREMAN	$24.00	$192.00	
	PICK UP TRUCK	$8.00		$64.00
5 Ea	SCRAPERS 627	5($125.00)		$5,000.00
5 Ea	OPERATORS	5(23.48)	$939.20	
	D-9 DOZER	$145.00		$1,160.00
	OPERATOR	23.48	$187.84	
	D-8 DOZER	$117.00		$936.00
	OPERATOR	$23.48	$187.84	
	ROLLER 300 HP	$50.00		$400.00
	OPERATOR	$22.17	$177.36	
	12 GRADER	$53.00		424.00
	OPERATOR	$22.17	$177.36	

$\$10,153^{44}$/DAY = $2049.44 + $8,104.00

(2%) CITY CORRECTION + 2 YRS INFLATION (13%) x 1.15

1986 PRICE $11,676.46/DAY

PRODUCTION CYCLE TIME 6.15 MIN. (see attached sheets) use 5 SCRAPERS

45 MIN/HR ÷ 6.15 MIN = 7.3 CYCLES PER HOUR x 14 BCY/LOAD = 102.2 c.y./Scraper/hr

102.2 cy/HR x 5 SCRAPERS x 8 HRS/DAY = 4,088 CY/DAY

COHESIVE EXCAVATION FROM EXISTING EMBANKMENTS UNIT PRICE

$11,676.46 / 4,088 /DAY = $2.86/c.y.

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE: OTTAWA, OH
BY SGM DATE 21 FEB. 86 PROJ. NO. 85-109-30
CHKD. BY KLL DATE 4/16/86 SHEET NO. 14 OF 36

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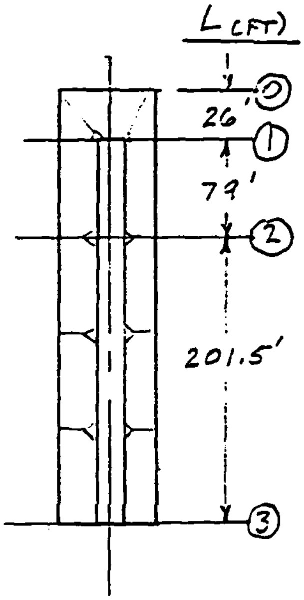
PERRY ST. EMBANKMENT – BORROW SITE



$A = 0$

$A_T = 445.0$ S.F. $A_F = 365.0$ S.F. $A_S = 80.0$ S.F.

$A_T = 399.0$ S.F. $A_F = 319.0$ S.F. $A_S = 80.0$ S.F.

$A_T = 163.0$ S.F. $A_F = 108.0$ S.F. $A_S = 55.0$ S.F.

A_T = TOTAL AREA OF SECTION
A_F = TOTAL USABLE FILL = COHESIVE FILL FOR LEVEE CONSTR.
A_S = AREA TO BE STRIPPED FROM SECTION
$(A_T - A_F = A_S)$

A_{COVER} = AREA TO BE SEEDED AFTER FILL HAS BEEN REMOVED
$\left(A_{COVER} = L \times \left(\frac{L_{c_i} + L_{c_{i+1}}}{2}\right)\right)$

$\forall(\text{VOLUME}) = \left[\frac{L}{3}\left(A_i + A_{i+1} + \sqrt{A_i \cdot A_{i+1}}\right)\right]/27 = \forall$ IN C.Y. w/ L IN FT + A IN FT.

SECTION	L (FT)	$\forall_T$ (C.Y.)	$\forall_F$ (C.Y.)	$\forall_S = \forall_T - \forall_F$ (C.Y.)	L_c (FT)	A_{COVER} (S.F.)
0					40.0	
	26	143	117	26		1,625
1					85.0	
	79	1,234	1,000	234		6,600
2					82.1	
	201.5	2,032	1,524	508		13,762
3					54.5	
	ΣL	$\Sigma \forall_T$	$\Sigma \forall_F$	$\Sigma \forall_S$		ΣA_{COVER}

$\Sigma L = 306.5$ FT.
$\Sigma \forall_T = 3,409$ C.Y.
$\Sigma \forall_F = 2641$ C.Y.
$\Sigma \forall_S = 763$ C.Y.
$\Sigma A_{COVER} = 21,937$ S.F. or
$\Sigma A_{COVER} = 0.5$ ACRES

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE ; OTTAWA, OH
BY SGM DATE 22 FEB. 86 PROJ. NO. 85-109-32
CHKD. BY KLT DATE 4/16/86 SHEET NO. 15 OF 36

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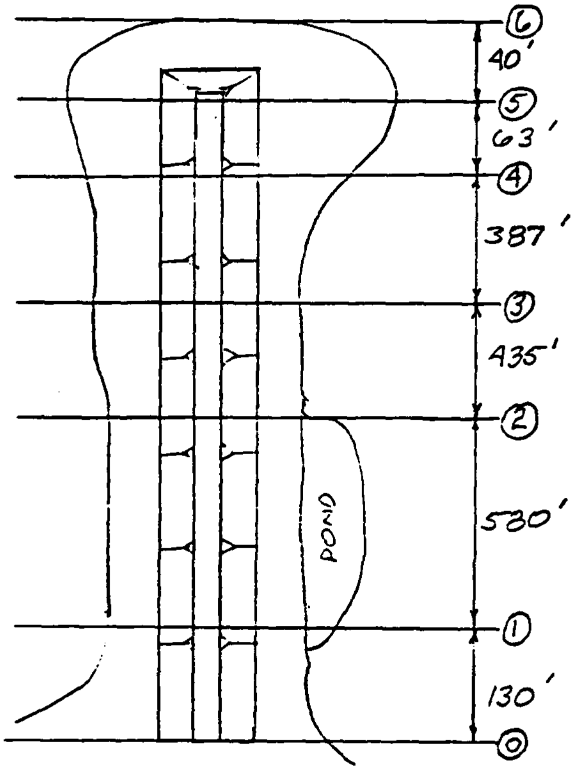
ABANDONED RAILROAD EMBANKMENT — BORROW SITE



Section	L (FT)	AT (S.F.)	AS (S.F.)	AF (S.F.)	AG (S.F.)
6		0	0	0	0
	40'				
5		1072.3	197.59	874.71	26.86
	63'				
4		505.13	85.58	419.55	28.61
	387'				
3		657.80	118.81	538.99	40.98
	435'				
2		491.90	73.33	418.57	35.41
	580'				
1		472.53	77.61	394.92	42.21
	130'				
0		0	0	0	0

A_T = TOTAL AREA OF SECTION

A_S = AREA TO BE STRIPPED FROM SECTION

A_F = TOTAL USABLE FILL = $A_T - A_S$

A_G = GRANULAR FILL

A_C = COHESIVE FILL (LEVEE CONSTR.) = $A_F - A_G$

A_{COVER} = AREA TO BE SEEDED AFTER FILL HAS BEEN REMOVED

$A_{COVER} = L \times \left(\frac{L_{C_i} + L_{C_{i+1}}}{2}\right)$; FOR VALUES OF L_{C_i}, SEE SECTIONS.

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE ; OTTAWA CO
BY SGM DATE 22 FEB. 86 PROJ. NO. 85-109-30
CHKD. BY KLC DATE 4/16/86 SHEET NO. 16 OF 36

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$$\forall \text{(VOLUME)} = \left[\tfrac{L}{3} \left(A_i + A_{i+1} + \sqrt{A_i \cdot A_{i+1}} \right) \right] / 27 = \forall \text{ IN C.Y.} \quad \text{w/ } L \text{ IN FT.}, \ A \text{ IN S.F.}$$

SECTION	LENGTH (FT.)	$\forall_T$ (C.Y.)	$\forall_S$ (C.Y.)	$\forall_F = \forall_T - \forall_S$ (C.Y.)	$\forall_G$ (C.Y.)	$\forall_C = \forall_F - \forall_G$ (C.Y.)	A_{COVER} (S.F.)
0 - 1	130	758	125	633	68	565	10,319
1 - 2	580	10,358	1,621	8737	833	7904	40,815
2 - 3	435	9,229	1,533	7696	615	7081	39,281
3 - 4	387	8,310	1,458	6852	496	6356	37,351
4 - 5	63	1,799	321	1478	65	1413	8,507
5 - 6	40	530	105	425	13	412	5,213
	ΣL = 1635 L.F.	$\Sigma \forall_T$	$\Sigma \forall_S$	$\Sigma \forall_F$	$\Sigma \forall_G$	$\Sigma \forall_C$	ΣA_{COVER}

$\Sigma \forall_T$ = 30,984 C.Y.

$\Sigma \forall_S$ = 5,163 C.Y. Topsoil

$\Sigma \forall_F$ = 25,321 C.Y. — COMPACT VOLUMES

$\Sigma \forall_G$ = 2,090 C.Y. GRANULAR

$\Sigma \forall_C$ = 23,731 C.Y.

ΣA_{COVER} = 141,436 S.F. = 3.25 ACRES

Cycle Time —

= load* + haul + maneuver & spread* + return
= 0.7 + 1.4 + .7 + 1.0
= 3.8 min.

*For fixed times (load, maneuver and spread) see the table below.

When cycle time and payload are known, productivity can be calculated. For a more complete example see the Earthmoving Section.

• • •

TYPICAL FIXED TIMES FOR SCRAPERS

(Times may vary depending on job conditions)

Model	Loaded By	Load Time (min.)	Maneuver and Spread or Maneuver and Dump (Min.)
613B	Self loading	0.9	0.7
615	Self loading	0.9	0.7
621B	One D8K	0.7	0.7
623B	Self loading	0.9	0.7
627B	One D8K	0.6	0.8
627B/PP	Self loading	0.8*	0.7
631D	One D9L	0.6	0.7
633D	Self loading	0.9	0.7
637D	One D9L	0.5	0.8
637D/PP	Self loading	0.9*	0.7
639D	Self loading	0.9	0.7
651B	Two D9L's	0.6	0.7
657B	Two D9L's	0.4	0.8
657B/PP	Self loading	1.0*	0.7

*Load time per pair, including transfer time

use .75 Congested
Tight Maneuvering

NOTE: Vehicle Empty Weights shown on the following charts includes ROPS Canopy. The travel times will remain within acceptable limits when applied to a non-ROPS equipped machine. When calculating TMPH loadings *any* additional weight must be considered in establishing mean tire loads.

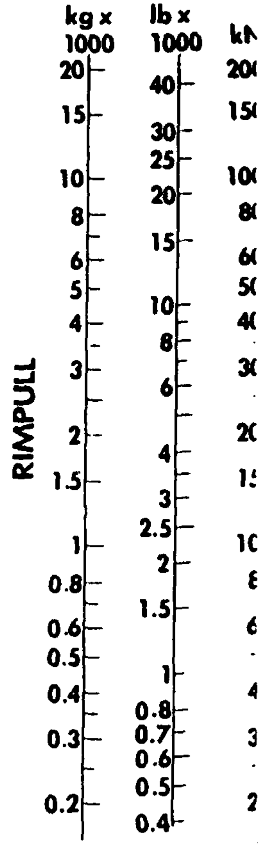
Cycle Time

Load + Haul + Man + Spread + Return
= .75 + 2.90 + .75 + 1.75

= 6.15 Min Cycle Time

D-9 Pusher Say 1 Min Cycle Time
6.15/1 = 6.15 Scrapers

use 5 Scrapers
To Avoid Congestion

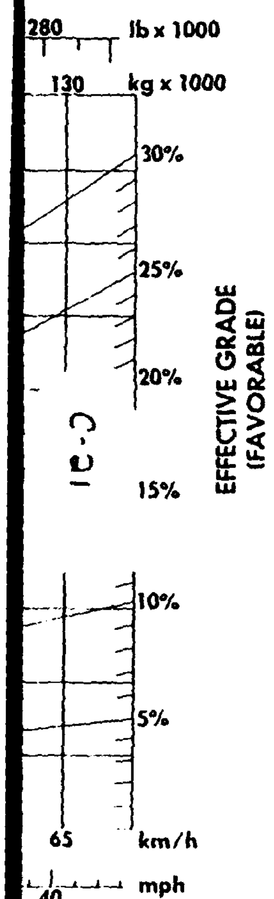


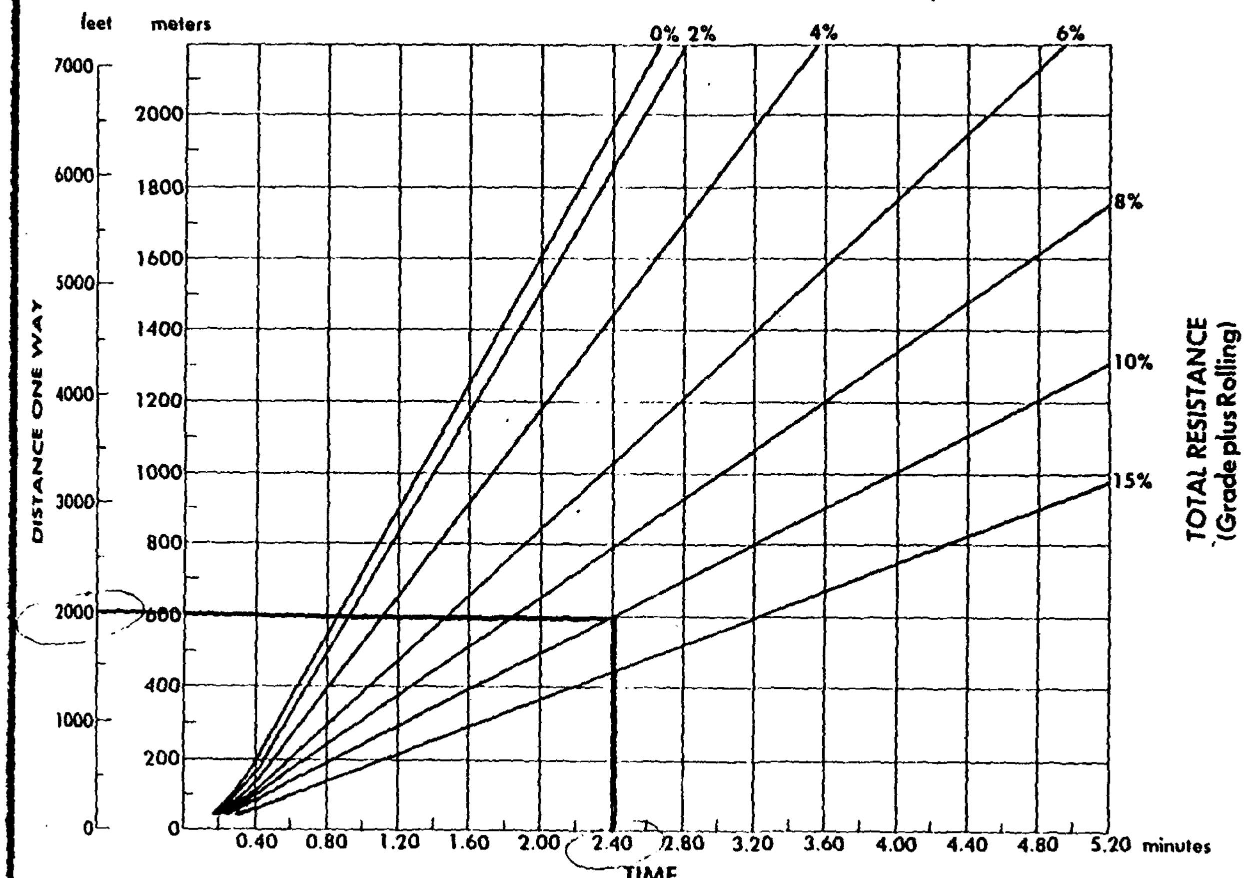
Sheet No. 17 of 3...

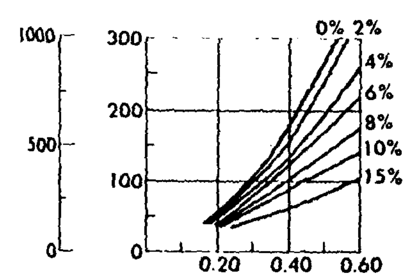
C-20

Wheel Tractor Scrapers

627B LOADED
- Distance vs. Time
- 29.5 - 29 Tires
- Standard and Push-Pull







Vehicle empty weight: 34 430 kg (75,910 lb).
Payload: 21 770 kg, 12.2 Bm^3 (48,000 lb, 16.0 BCY).

C-21

2.40 Min. Loaded Travel Time
.50 Min Road Crossings, Congestion

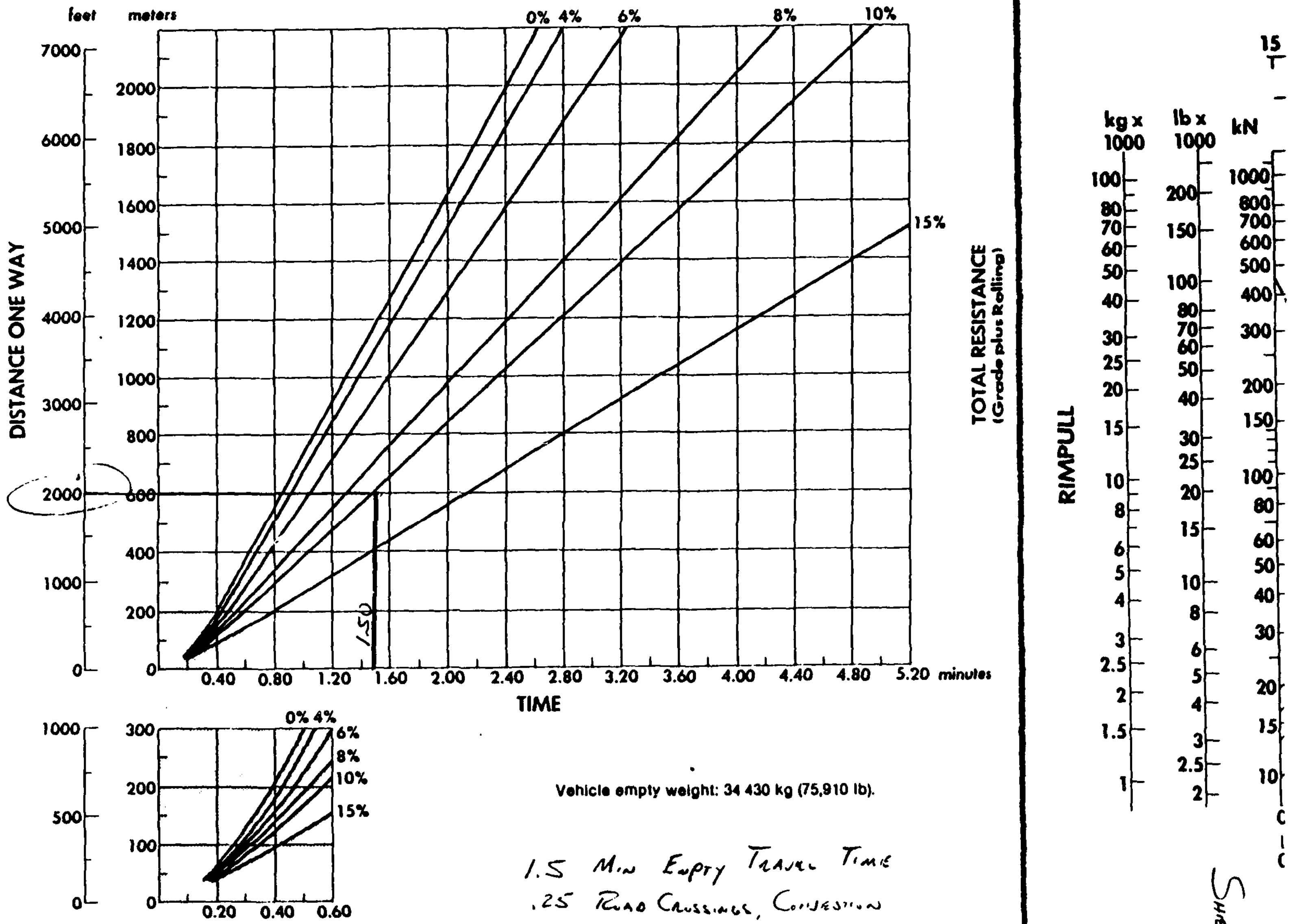
2.90 Min. Loaded Travel Time

600

Sheet No. 18 of 36

Wheel Tractor-Scrapers

627B EMPTY
- Distance vs. . ime
- 29.5 - 29 Tires
- Standard and Push-Pull



Vehicle empty weight: 34 430 kg (75,910 lb).

1.5 Min Empty Travel Time
.25 Road Crossings, Congestion

1.75 Min Empty Travel Time

Sheet No. 19 of 36

CC-D

SUBJECT C.O.E. Buffalo
Blanchard Levee Ottawa, Ohio
BY JDP DATE 2/24/86 PROJ. NO. 85-109-30
CHKD. BY KLF DATE 4/16/86 SHEET NO. 20 OF 36

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Total Cost Including Preparation + Restoring Costs

Clear + Grub	2.41 Ac × $2,000.00	$4,820.00
Strip + Replace Granular	2,858 c.y. × $2.00/c.y. (Approx.)	$5,716.00
Remove Block Abutments	(See Attached Sheet)	$3,600.00
Dress + Seed + Mulch + Fertilizer	4.25 Ac. × (43,560/9) × 0.40	$8,228.00
Cohesive Soil Excavation	(23,731 + 2,641) × 2.86	$75,423.92
Total Cost		$97,787.92

$97,787.92 / 26,372 c.y. Cut × (.9 Shrinkage) = $4.12/c.y. Levee Fill

Does Not Include:

Any Sedimentation + Erosion Control
Any Proofrolling

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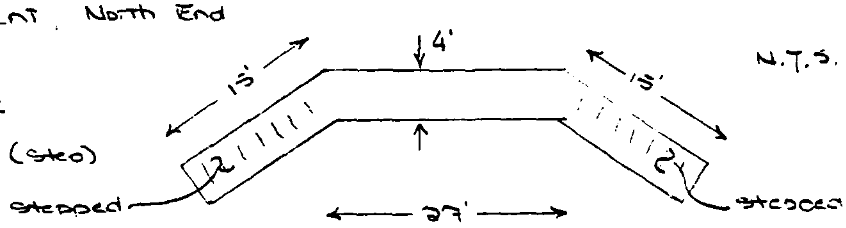
ABUTMENT REMOVAL

Perry Street abutment, North End

Height 12' ± to 3' ± (step)



Sandstone Block w/ Mortar Joints

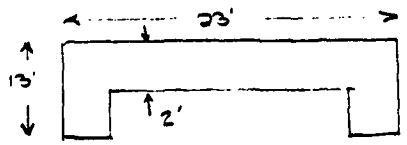
Volume ≈ 27' × (12'+3') × 4' + 2(15' × (15'+3')/2 × 4') / 27 cf/cy

Volume ~ 100 cy, @ 150#/cf ⇒ 202.5 tons

using 16 ton triaxials, 202.5 tons/16 tons ⇒ 12.7 truckloads

Use 14 truckloads with dirt

Railroad abutment, North End



Volume ≈ (23') × (13'+3') × 2'
+ 2(11' × (13'+3') × 2') / 27 cf/cy

Height 13' ±

↳ 54 cy ⇒ 110 tons

Sandstone Block w/ Mortar Joints

↳ 6.8 truckloads ⇒ Use 8 truckloads with dirt

Costs

Foreman	$24/hr	$192/d
Pick-Up Truck	$8/hr	$64/d
Backhoe 2 cy	$100/hr	$800/d
Operator	$24/hr	$192/d
Triaxial Trucks (2)	2 @ $35/hr	$560/d
Teamsters (2)	2 @ $18.92/hr	$302.72/d
Laborer	$18.13/hr	$145.04/d
		$2256

11/8 days (× 1.375)
2% city index (× 1.02)
13% inflation (× 1.13)

↳ 2256 × 1.375 × 1.15

↳ $3600

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE OTTAWA, OHIO
BY JDP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY KLF DATE 4/11/86 SHEET NO. 22 OF 36

GAI CONSULTANTS, INC
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LEVEE FILL - FROM BORROW SITE

PREPARATION AND RESTORE COSTS

CLEAR & GRUB	500' x 70' / 43,560	= .8 ACRES
STRIP TOPSOIL	500' x 150' x 1/27	= 2,780 C.Y.
REPLACE TOPSOIL		2,780 C.Y.
DRESS & SEED + MULCH	500 x 250 / 43,560	2.9 ACRES

COHESIVE EXCAVATION
ASSUME 1200' HAUL

	DESCRIPTION	$/HR	LABOR	EQUIPMENT
	MECHANIC & TRUCK	$23.48 & 15.00	$187.84	$120.00
	FOREMAN	$24.00	$192.00	
	PICK UP TRUCK	$8.00		$64.00
3 Ea.	SCRAPERS 627B's	3 (125.00)		$3,000.00
3 Ea.	OPERATORS	3 (23.48)	$563.52	
	D-9 DOZER	$145.00		$1,160.00
	OPERATOR	$23.48	$187.84	
	D-8 DOZER	$117.00		$936.00
	OPERATOR	$23.48	$187.84	
	ROLLER 300HP	$50.00		$400.00
	OPERATOR	$22.17	$177.36	
	12 GRADER	$53.00		$424.00
	OPERATOR	$22.17	$177.36	
		$7,777.76 =	$1,673.76 +	$6,104.00

CITY CORRECTION (2%) + 2 YRS INFLATION (13%) x 1.15
$8,944.42 / DAY

PRODUCTION CYCLE TIME 4.75 MIN (see attached chart) use 3 SCRAPERS

45 MIN/HR ÷ 4.75 MIN = 9.5 CYCLES PER HOUR x 14 B.C.Y/LOAD = 133 B.C.Y/SCRAPER/HR
133 BCY/HR x 3 SCRAPERS x 8 HR/DAY = 3,192 BCY/DAY

COHESIVE SOIL EXCAVATION UNIT PRICE
$8944.42 / 3,192 CY/day ≈ $2.80/CY

Cycle Time —

= load* + haul + maneuver & spread* + return
= 0.7 + 1.4 + .7 + 1.0
= 3.8 min.

*For fixed times (load, maneuver and spread) see the table below.

When cycle time and payload are known, productivity can be calculated. For a more complete example see the Earthmoving Section.

• • •

TYPICAL FIXED TIMES FOR SCRAPERS

(Times may vary depending on job conditions)

Model	Loaded By	Load Time (min.)	Maneuver and Spread or Maneuver and Dump (Min.)
613B	Self loading	0.9	0.7
615	Self loading	0.9	0.7
621B	One D8K	0.7	0.7
623B	Self loading	0.9	0.7
627B	One D8K	0.6	0.6
627B/PP	Self loading	0.8*	0.7
631D	One D9L	0.6	0.7
633D	Self loading	0.9	0.7
637D	One D9L	0.5	0.6
637D/PP	Self loading	0.9*	0.7
639D	Self loading	0.9	0.7
651B	Two D9L's	0.6	0.7
657B	Two D9L's	0.4	0.6
657B/PP	Self loading	1.0*	0.7

*Load time per pair, including transfer time

use .65 Min Load
.8 Min Unload
Due To Congestion

NOTE: Vehicle Empty Weights shown on the following charts includes ROPS Canopy. The travel times will remain within acceptable limits when applied to a non-ROPS equipped machine. When calculating TMPH loadings *any* additional weight must be considered in establishing mean tire loads.

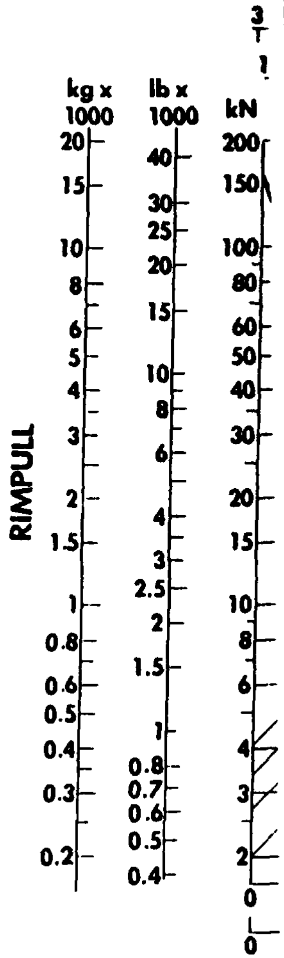
Cycle Time

Load + Haul + Manu.Spread + Return
.65 Min + 2.1 Min + .8 Min + 1.2 Min
4.75 Min Cycle Time

D-9 Pusher Cycle Time
say 1 Min Cycle Time

4.75 Min / 1 = 4.75 Scrapers

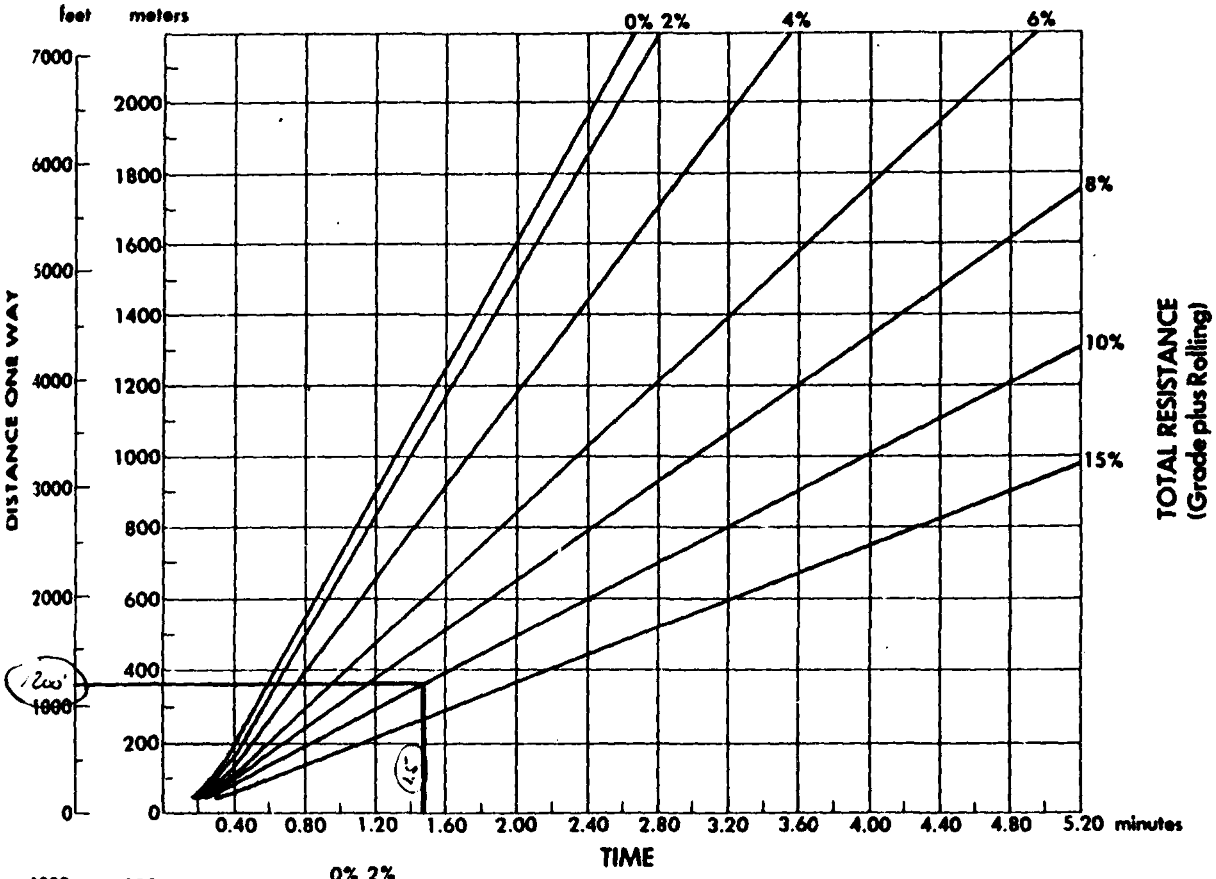
use 3 Scraper To Avoid Congestion

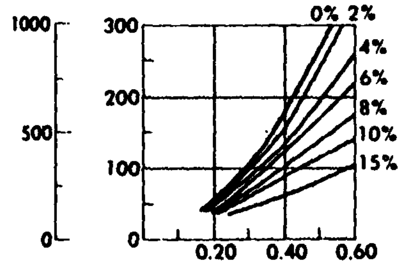


Sheet No. 23 of 30
-KLK 9/11/95

Wheel Tractor Scrapers

627B LOADED
- Distance vs. Time
- 29.5 - 29 Tires
- Standard and Push-Pull





Vehicle empty weight: 34 430 kg (75,910 lb).
Payload: 21 770 kg, 12.2 Bm^3 (48,000 lb, 16.0 BCY).

1.5 Min Travel Loaded
.6 Min Congestion + Traffic

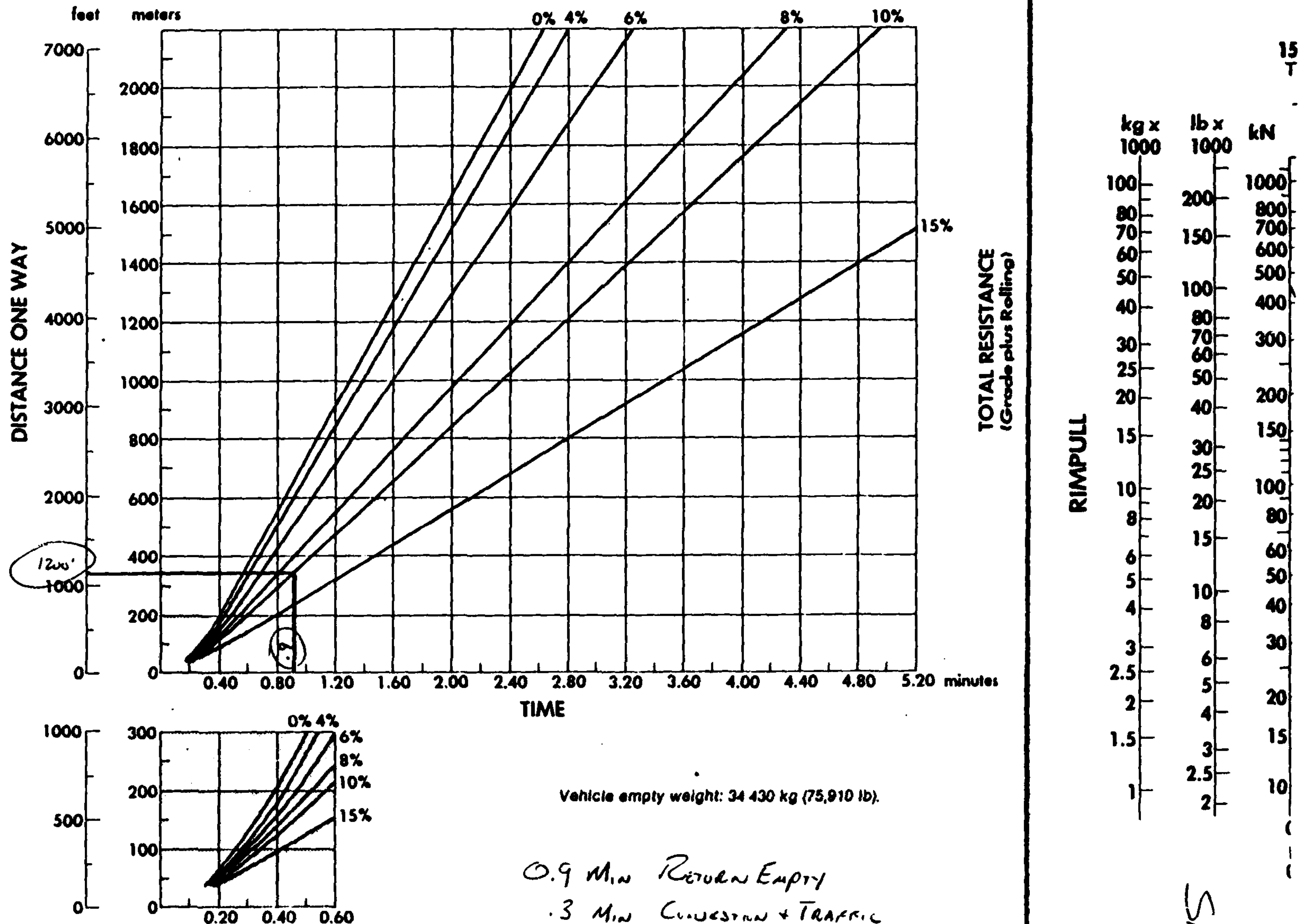
2.1 Min Travel Loaded

EFFECTIVE GRADE
(FAVORABLE)

600

Wheel Tractor-Scrapers

627B EMPTY
- Distance vs. Time
- 29.5 - 29 Tires
- Standard and Push-Pull



Vehicle empty weight: 34 430 kg (75,910 lb).

0.9 Min Return Empty
.3 Min Congestion + Traffic

1.2 Min Travel Empty

Sheet No. 25 of 36

SUBJECT C.O.E. BUFFALO

BLANCHARD LEVEE, OTTAWA, OHIO

BY JDP DATE 2/25/86 PROJ. NO. 85-109-30

CHKD. BY KLL DATE 4/14/86 SHEET NO. 26 OF 36

gai CONSULTANTS, INC

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TOTAL COST INCLUDING PREPARATN + RESTORING COSTS

CLEARING + GRUB	0.8 ACRES × \$2,000.00	=	\$1,600.00
STRIP TOPSOIL WITH D-8 DOZER *	(117.00 + 23.48) × 8 HRS × 2 DAYS × 1.15 CORR	=	\$2,584.83
REPLACE TOPSOIL	SAME	=	\$2,584.83
DRESS + SEED + MULCH + FERTILIZE	2.9 ACRES × (43,560/9) × 0.40	=	\$5614.40
COHESIVE SOIL EXCAVATION =	12,851 × \$2.80	=	\$35,982.80

* see attached sheets

TOTAL COST = \$48,366.86

\$48,366.86 / 12,851 × (.9 SHRINKAGE) = \$4.18 /C.Y. LEVEE FILL

DOES NOT INCLUDE:

ANY SEDIMENTATION + EROSION CONTROL

ANY PROOF ROLLING

Sheet No. 27 of 36
✓ KLK 1/16/96

E-JOB

...sing the pro-
...ction factors

...orrection
...actors

...maximum un-
...iversal blades
...:

... fixed times.
...n drifts blade

...g/Lm³), 3,000

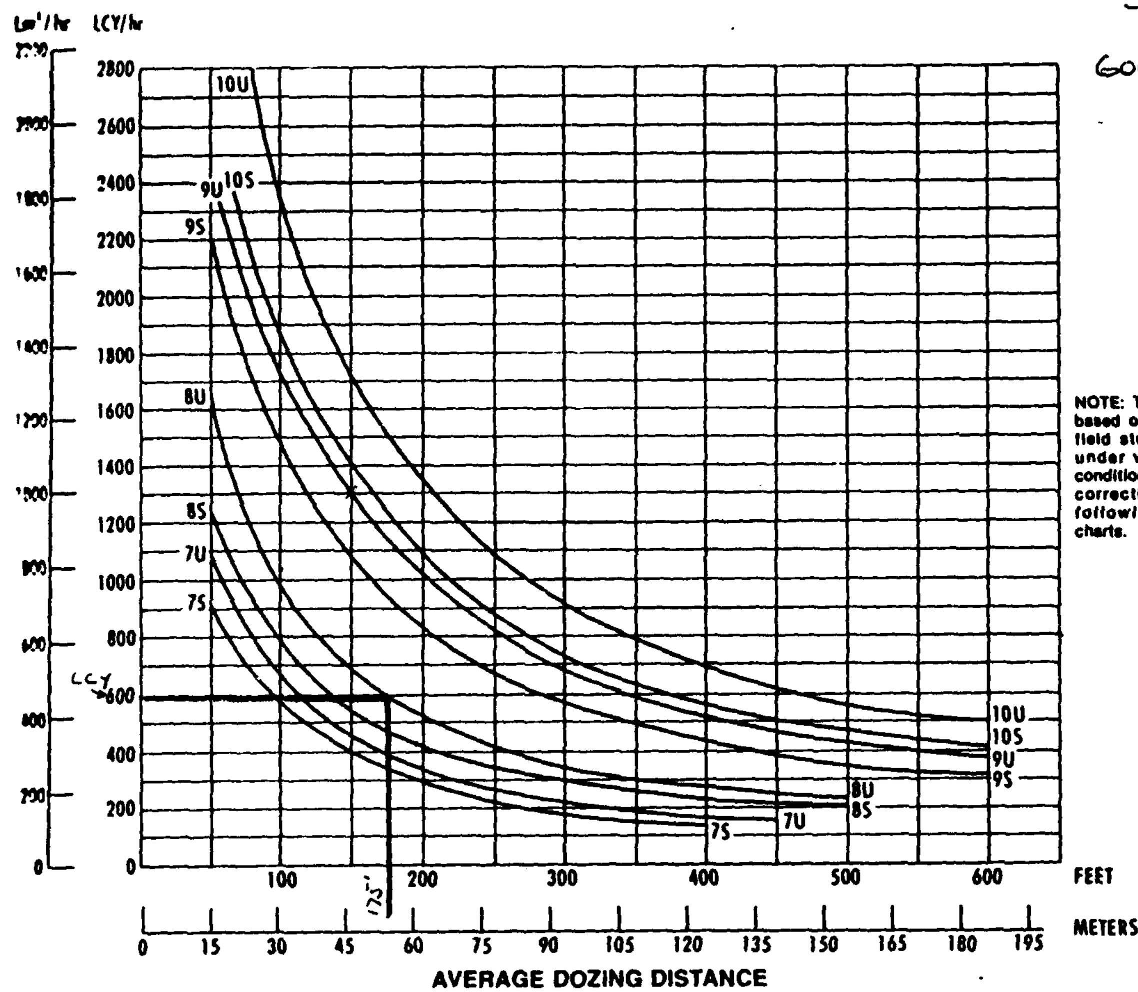
...769).

...k cubic yards
...d factor from
... the corrected

... 0.4. While poor
..., causing them
...e affected more
...pidly. While no
... a rough rule of
... off 4% for each
...tion below 0.40.
... the difference is
...(10 x 4% = 40%

C-30

ESTIMATED DOZING PRODUCTION • Universal and Straight Blades • D7 through D10



NOTE: This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.

Stripping Topsoil

600 LCY × (.75) × (.75) × (.80) × (.75) × (.95) =

Avg. Oper. — Cohesive — 30% Swell — 45 min/hr — Slope

192 CY/Hr × 8 Hrs/Day = 1536 CY/Day

$\frac{2{,}780 \text{ LCY}}{1536}$ = 1.80 Days

call 2 Days

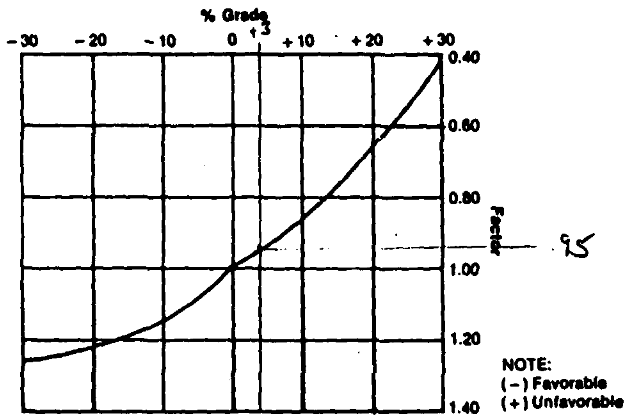
Sheet No. 20 of 36
KLL [illegible]

JOB CONDITION CORRECTION FACTORS

	TRACK-TYPE TRACTOR	WHEEL-TYPE TRACTOR
OPERATOR —		
Excellent	1.00	1.00
Average	0.75	0.60
Poor	0.60	0.50
MATERIAL —		
Loose stockpile	1.20	1.20
Hard to cut; frozen —		
with tilt cylinder	0.80	0.75
without tilt cylinder	0.70	—
cable controlled blade	0.60	—
Hard to drift; "dead" (dry, non-cohesive material) or very sticky material	0.80	0.80
Rock, ripped or blasted	0.60-0.80	—
SLOT DOZING	1.20	1.20
SIDE BY SIDE DOZING	1.15-1.25	1.15-1.25
VISIBILITY —		
Dust, rain, snow, fog or darkness	0.80	0.70
JOB EFFICIENCY —		
50 min/hr	0.84	0.84
40 min/hr	0.67	0.67
DIRECT DRIVE TRANSMISSION (0.1 min. fixed time)	0.80	—
BULLDOZER*		
Angling (A) blade	0.50-0.75	—
Cushioned (C) blade	0.50-0.75	0.50-0.75
D5 narrow gauge	0.90	—
Light material U-blade (coal)	1.20	1.20
Blade bowl (stockpiles)	1.30	1.30
GRADES — See following graph.		

*Note: Angling blades and cushion blades are not considered production dozing tools. Depending on job conditions, the A-blade and C-blade will average 50-75% of straight blade production.

% Grade vs. Dozing Factor



ESTIMATING DOZER PRODUCTION OFF-THE-JOB

Example problem:

Determine average hourly production of a D8/8S (with tilt cylinder) moving hard-packed clay an average distance of 150 feet (45 m) down a 15% grade, using a slot dozing technique.

Estimated material weight is 2650 lb/LCY (1600 kg/Lm³). Operator is average. Job efficiency is estimated at 50 min/hr.

Uncorrected Maximum Production — 550 LCY/hr (420 Lm³/h) (from bulldozer curves)

Applicable Correction Factors:

Hard-packed clay is "hard to cut" material . . −0.80
Grade correction (from graph) . . . . −1.19
Slot dozing . . . . −1.20
Average operator . . . . −0.75
Job efficiency (50 min/hr) . . . . −0.84
Weight correction . . . . (2300/2650) −0.87

SUBJECT C. O. E. BUFFALO
BLANCHARD LEVEE, OTTAWA, OHIO

BY JDP DATE 2/25/86 PROJ. NO. 85-109-30

CHKD. BY [illegible] DATE [illegible] SHEET NO. 29 OF 36

GAI CONSULTANTS, INC
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MOBILIZATION + DEMOBILIZATION

EQUIPMENT

627 SCRAPERS	5 Ea.	x $500	2500.00	
D-9 DOZER	1 Ea.	x $500	500.00	
D-8 DOZERS	2 Ea.	x $500	1,000.00	
D-5 DOZER	1 Ea.	x $250	250.00	
966 LOADER	1 Ea.	x 500	500.00	
930 LOADER	1 Ea	x $200	200.00	
800 GRADALL	1 Ea.	x 200	200.00	
12 GRADER	1 Ea.	x $200	200.00	
ROLLER	1 Ea	x 250	250.00	
SMALL ROLLER	1 Ea.	x 200	200.00	
TRIAXLE TRUCKS	3 Ea.	x 150.00	450.00	
CHERRY PICKER	1 Ea.	x 200.00	200.00	
WATER TRUCK	1 Ea	x 150.00	150.00	
	Equipment Mob + Demob		$6,600.00	$6,600.00

TRAILERS

2 OFFICE	x 5 MONTHS	x $400	$4,000	
1 LAB	x 4 MONTHS	x $300	$1,200	
3 PARTS	x 4 MONTHS	x $100	$1,200	
SET UP	2 x $500		$1,000	
UTILITIES	5 x 350.00		$1,750	
			$9,150.00	$9,150.00

CONSTRUCTION STAFF

SUPERINTENDENT	$1,000 x	22 WEEKS	= 22,000
ENGINEER	650 x	22 WEEKS	= $14,300
TECHNICIAN	450 x	18 WEEKS	= $8,100
SECRETARY	250 x	20 WEEKS	= $5,000
TIMEKEEPER	300 x	20 WEEKS	= $6,000

 (cont.)

SUBJECT C. O. E. BUFFALO
BLANCHARD LEVEE OTTAWA OHIO
BY JOP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY KLF DATE 4/86 SHEET NO. 30 OF 36

gai CONSULTANTS, INC.
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SURVEY CREW	$1350 x 16 WEEKS	$21,600	
		$77,000.00	$77,000.00
OUTSIDE LAB SERVICES			$1,000.00
	TOTAL COST =		$93,750.00

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE OTTAWA, OHIO

BY JDP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY KLL DATE 4/16/86 SHEET NO. 31 OF 36

GAI CONSULTANTS, INC
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MAINTENANCE + PROTECTION OF TRAFFIC

U.S. 224	8 SIGNS,	× 300.00	$2400.00
	4 FLASHERS	× $3.00/DAY × 7DAYS × 20 WEEKS	$1680.00
OHIO 65	6 SIGNS	× 300.00	$1800.00
	4 FLASHERS	× 3 × 7 × 20 WEEKS	$1680.00

FLAGMAN

2 MEN × ($18.13) × 8 × 5 × 6 WEEKS × 1.15 — $10,007.76

$17,567.76

CLEAN ROADS, PATCH ROADS, MAINTAIN SIGNS 20% — $3,513.55

$21,082.00

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE OTTAWA OHIO

BY JDP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY [illegible] DATE [illegible] SHEET NO. 32 OF 36

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SUB ITEMS

CLEARING + GRUBBING - USE $2,000.00/AC. COST

DRESS, SEEDING + MULCHING - USE $0.40/S.Y COST

SUBJECT C.O.E. BUFFALO

BLANCHARD LEVEE OTTAWA, OHIO

BY JOP DATE 2/25/86 PROJ. NO. 85-109-30

CHKD. BY KLK DATE 4/16/86 SHEET NO. 33 OF 36

GAI CONSULTANTS, INC.

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Environmental Specialists

LEVEE RETAINING WALL

COST

EXCAVATION: USE SAME CREW + PRODUCTION AS INSPECTION TRENCH

4 C.Y./L.F. × \$4.00	= \$16.00/L.F.
DRESS STOCKPILE 4 CY/L.F. \$1.00	\$4.00/L.F.

CONCRETE: INCLUDING FORMING

FOOTING .64 C.Y./L.F. × 190.00	= \$121.60/L.F.
WALL .37 C.Y./L.F. × \$250.00	= \$92.50/L.F.

REINFORCING STEEL: ASSUME 110#/C.Y.

110#/C.Y. × 1 L.F./C.Y. × \$0.45/#	\$49.50/L.F.

BACKFILL: USE COMBINATION OF INSPECTION TRENCH EXC. + BACKFILL COSTS

4 C.Y./L.F. × (\$4.60 + 4.14)	\$34.96/L.F.

DRESS + SEED + MULCH

40 FT WIDE × 1 FT/9 × \$0.40	1.79/L.F.

WATERSTOP	\$2.00/L.F.
TOTAL COST/L.F.	\$322.34/L.F.

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE
BY SGM DATE 25 FEB. 86 PROJ. NO. 85-109-30
CHKD. BY K. DATE 4/16/86 SHEET NO. 34 OF 36

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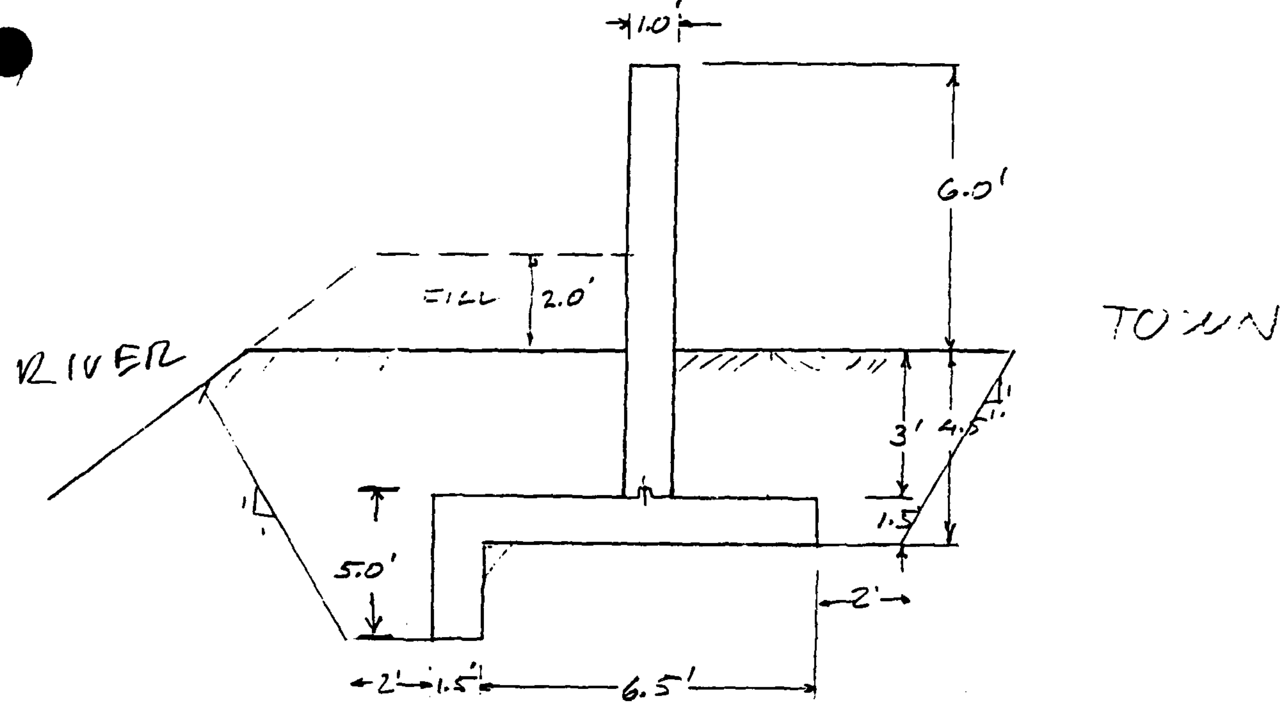

OAK ST. LENGTH = 160 FT.

TANN RUN LENGTH = 310 FT.

470 L.F.

TYPICAL QUANTITIES

EXCAVATION $\left(\overset{18.375}{\frac{3.5+7}{2} \times 3.5}\right) + \left(\overset{90}{\frac{15.5+24.5}{2} \times 4.5}\right) / 27 = 4.01\ CY/L.F.$

CONCRETE $\overset{\text{FOOTING}\ .64\ CY.}{(5 \times 1.5) + (6.5 \times 1.5)} + \overset{.33\ CY}{(9.0 \times 1.0)} / 27 = 0.97\ CY/L.F.$

BACKFILL use 4 CY/L.F.

SUBJECT C.O.E Buffalo
Blanchard Levee Ottawa Ohio
BY JOP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY [illegible] DATE [illegible] SHEET NO. 35 OF 36

GAI CONSULTANTS, INC
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Erosion + Sedimentation Control

Silt Fence

Low Side Of Levee	4,722 L.F
Along Borrow Area	800 L.F.
Along R.R. Embankment	3,200 L.F.
Along Perry Road Embankment	500 L.F.

9,222 L.F. × 2.75 = $25,360.50

Temporary Seeding
4 Ac. × $1000.00 $4000.00

$29,360.50

SUBJECT C. O. E. BUFFALO
BLANCHARD LEVEE OTTAWA, OHIO

BY JDP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY [illegible] DATE 4/11/86 SHEET NO. 36 OF 36

GAI CONSULTANTS, INC
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WHAREHOUSE DEMOLITION -

	DESCRIPTION	$/HR	LABOR	EQUIPMENT
	FOREMAN	$24.00	$192.00	
	PICK UP TRUCK	$8.00		$64.00
½ TIME	D-8 DOZER	$117.00		$468.00
½ TIME	OPERATOR	$23.48	$93.92	
	966 LOADER	$68.00		$544.00
	OPERATOR	23.48	$187.84	
5 Ea.	TRIAXLES	5($35.00)		$1,400.00
5 Ea.	TEAMSTERS	5($18.92)	$756.80	
½ TIME	CHERRY PICKER 25 TN	$50.00		$200.00
½ TIME	OPERATOR	$24.00	$96.00	
	LABORER	$18.13	145.04	

$4,147.60 = $1,471.60 + $2,676.00

CITY CORRECTANT (2%) 2 YRS INFLATION (13%) : x 1.15
$4,769.74

PRODUCTION

(120' x 20' x 1.5) 2 + (70' x 20' x 1.5) 2 + (120 x 70 x 1) 3 + (70 x 20 x 1) 2 / 27
: 1,460 C.Y

LOAD TRUCKS TOPSOIL EVERY 3.17 MIN
USE 6 MIN. LOAD/TRUCK

45 MIN/HR / 6 MIN/TRUCK = 7.5 TRUCKS/HR.

7.5 TRUCKS/HR. x 9 C.Y. x 8 HRS = 540 C.Y./DAY

1460 C.Y/540 C.Y. = 2.7 DAYS USE 4 DAYS HARD LOADING

$4,769.74 x 4 = $19,078.96
RESHAPE AREA & SEED 180 x 100/9 x $1.00 $2,000.00

C-39 COST = $21,078.96

SUBJECT [illegible]

BY [illegible] DATE [illegible] PROJ. NO. [illegible]

CHKD. BY ______ DATE ______ SHEET NO. ______ OF ______

CONSULTANTS, INC.

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C6.2 Summary of Unit Costs, Levee/Floodwall Alternatives

Index To Summary

SUBJECT C/E Buffalo District Ottawa

BY KLF DATE 4/14/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF ______

GAI CONSULTANTS, INC.
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Summary of Unit Costs, Levee/Floodwall Alternatives

Based On "Unit Cost Price Estimates" JDP, 2/25/86
(see attached sheet, sheet 3)

For All Levee-Floodwall Construction Activities, the following Tasks & Unit Costs Are Applicable.

1. Mobilization / Demobilization	L.S.	$114,440
2. Clearing & Grubbing	Acre	$2,200
3. Levee Construction		
Strip Topsoil	CY	$2.74
Proof-Roll / Scarify	SY	$0.44
Inspection Trench Excavation	CY	$3.73
Building Levee	CY	$4.40
4. Placing Topsoil on Disturbed Areas (6" depth)	CY	$6.81
5. Dress, Seed, Mulch	SY	$0.45
6. Maintenance of Traffic	LS.	$24,330
7. Demolition & Removal of Warehouse	L.S.	$23,240

8. Floodwall
based on average height:

SUBJECT C/E Butler District Ottawa

BY KLF DATE 4/14/96 PROJ. NO. 95-109-30

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9.	Erosion & Sedimentation Controls	L.S.	$50,135
10.	Interior Drainage		
	culverts, flap gates, installation	LS	$103,500
	miscellaneous grading	LF	$1.50
11.	Real Estate Costs		
	easements	LF	$
	land purchase	AC	$1500
12.	Closure Structures (materials & installation only)	LS	$110,000
13.	Sewer Backflow Valves	LS	$34,000

SUBJECT C.O.E. BUFFALO
BLANCHARD LEVEE, OTTAWA, OHIO
BY JDP DATE 2/25/86 PROJ. NO. 85-109-30
CHKD. BY KLF DATE [illegible] SHEET NO. 1 OF 36

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UNIT PRICE SUMMARY

			Cost	Cost + O+P Bid
MOBILIZATION + DEMOBILIZATION (INCLUDES FIELD OFFICE + SURVEY PERSONNEL)	L.S		$93,750.00	$117,200.00
CLEARING + GRUBBING	2 Ac.	(SUB)	$2,000.00/Ac	$2,200.00/Ac
STRIP TOPSOIL (1' DEPTH)	7,421 c.y		$2.19/c.y	$2.74/c.y
PROOF ROLL + SCARIFY	22,260 s.y.		0.35/s.y	0.44/s.y.
EXCAVATION - TRENCH	7,403 c.y		4.60/c.y	$5.75/c.y
EMBANKMENT (INCLUDES BORROW AREA RESTORATION)	42,704 c.y		$4.14/c.y	$5.18/c.y
PLACE TOPSOIL (6" DEPTH)	4,258 c.y		$5.45/c.y	$6.81/c.y
DRESS, SEED + MULCH PERMANENT	27,100 s.y	(PARTIAL, SUB)	$0.40/s.y	$0.46/s.y
MAINTENANCE + PROTECTION OF TRAFFIC	L.S.		$21,080.00	$26,350.00
LEVEE RETAINING WALL	470 L.F.		$322.34/L.F.	$403.00
EROSION + SEDIMENTATION CONTROL	L.S	(SUB)	$29,360.00	$32,300.00
DEMOLITION + REMOVAL OF WAREHOUSE	L.S.		$21,075.00	$26,350.00

25% MARK UP O+P ON CONTRACTORS WORK
15% MARK UP O+P ON MOSTLY SUB WORK
10% MARK UP O+P ON ALL SUB WORK

SUBJECT C/E Buffalo District Ottawa

BY KLF DATE 4/14/86 PROJ. NO. 85-107-30

CHKD. BY ______ DATE ______ SHEET NO. 4 OF ______

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For Any / All Alternatives Including Levees or Floodwalls, Certain Items Shall Be Required. These Items Are:

Mobilization / Demobilization	LS	$114,400
Maintenance of Traffic	LS	$24,330
Demolition & Removal of Warehouse	LS	$23,240
Erosion & Sedimentation Controls	LS	$50,135
Interior Drainage Structures	LS	$103,500
Closure Structures	LS	$110,000
Sewer Backflow Valves	LS	$84,000

Interior Drainage Structures:

approximately 28 culverts required,
with the following estimated culverts:

1 - 60" ϕ @ $6,000 /
3 - 48" ϕ @ $4,500 /
24 - 36" ϕ @ $3,500 /
} $103,500

Closure Structures:

9-11 closure structures required, dependent upon level of protection

11 @ $10,000 / ≈ $110,000

SUBJECT C/E Buffalo District

BY KLF DATE 4/14/86 PROJ. NO. 35-109-30

CHKD. BY ______ DATE ______ SHEET NO. 5 OF ______

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Sewer Backflow Valves:

exact number dependent somewhat on level of protection.

estimated 240 valves required for 99-yr event

240 @ $350/ → $84,000

All Total, these Items: $509,605

SUBJECT C/E Buffalo District Ottawa

BY KLF DATE 4/14/86 PROJ. NO. 85-109-30

CHKD. BY DATE SHEET NO. 6 OF

GAI CONSULTANTS, INC.

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Based On Alternative II -- 10-Yr Protection

ITEM

Borrow Sites				
purchase	2.4 ac	$1,500/	$3,600	
easement fee	6.0 ac	$500/	$3,000	
clear & grub	2.4 ac	$2,200/	$5,280	
strip topsoil (6")	4,340 cy	$2.74/	$13,262	
place topsoil (6")	6,776 cy	$6.81/	$46,145	
dress, seed, mulch	40,656 sy	$0.46/	$18,702	
				$89,789
Levee Construction				
easement fee	11.7 ac	$1,000/	$11,700	
strip topsoil	5,243 cy	$2.74/	$14,366	
proofroll/scarify	31,438 sy	$0.44/	$13,842	
trench excavation	9,517 cy	$5.75/	$54,734	
build levee (3.5')	43,596 cy	$4.90/	$213,622	
place topsoil (6")	5,539 cy	$6.81/	$37,721	
dress, seed, mulch	33,220 sy	$0.46/	$15,281	
				$361,466
Floodwall				
Taco Loan (1.1')	300 LF	$127.86	$38,358	
Chessie to Oak	0 LF	-	0	
Oak to SCS	0 LF	-	0	
SCS (2.5')	470 LF	$233.61	$110,147	
Thomas (5')	130 LF	$334.36	$43,467	
Thomas to GTW	0			
easement fee (+400' @ 2.5')	900 LF	$20/LF	$1,800	
				$195,772

SUBTOTAL $647,027

SUBJECT C/E Buffalo District Ottawa

BY KL DATE 4/14/86 PROJ. NO. 85-109-30

CHKD. BY DATE SHEET NO. 7 OF

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Based On Alternative VI -- 25-Yr Protection

ITEM			
Borrow Sites			
purchase	2.4 ac	$1,500/	$3,600
easement fee	6.0 ac	$500/	$3,000
clear & grub	2.4 ac	$2,200/	$5,280
strip topsoil (6")	4840 cy	$2.74/	$13,262
place topsoil (6")	6776 cy	$6.81/	$46,145
dress, seed, mulch	40,656 sy	$0.45/	$18,702
			$89,989
Levee Construction			
easement fee	13.0 ac	$1,000/	$13,000
strip topsoil (6")	6,292 cy	$2.74/	$17,240
proofroll/scarify	37,750 sy	$0.44/	$16,610
trench excavation	11,066 cy	$5.75/	$63,630
build levee (7.0')	67,903 cy	$4.40/	$298,795
place topsoil (6")	6,669 cy	$6.81/	$45,416
dress, seed, mulch	40,015 sy	$0.46/	$18,407
			$473,098
Floodwall			
Tawa Run (2.6')	300 LF	$238.61	$71,583
Chessie to Oak (1.3')	170 LF	$189.36	$32,191
Oak to SCS (2.1')	210 LF	$189.36	$39,766
SCS (4.2')	470 LF	$285.11	$134,002
Thomas (6.8')	130 LF	$430.11	$55,914
Thomas to GTW (1.6')	1580 LF	$189.36	$299,189
easement fee	2860 LF	$20/LF	$57,200
(+400' @ 4.2')			$689,845

$1,252,932

SUBJECT C/E Buffalo District

BY K.L. DATE 4/14/86 PROJ. NO. 85-109-30

CHKD. BY DATE SHEET NO. 9 OF

GAI CONSULTANTS, INC.
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Based on Alternative VI -- 50-Yr Protection

Borrow Sites				
purchase	2.4 ac	$1,500/		
easement fees	6.0 ac	$500/		
clear & grub	2.4 ac	$2,200/		
strip topsoil (6")	4840 cy	$2.74/		
place topsoil (6")	6776 cy	$6.81/		
dress, seed, mulch	40,656 sy	$0.46/		
				$89,989
Levee Construction				
easement fee	13.9 ac	$1,000/	$13,900	
strip topsoil (6")	6,991 cy	$2.74/	$19,155	
proofroll/scarify	41,944 sy	$0.44/	$18,455	
trench excavation	11,733 cy	$5.45/	$63,931	
build levee (8')	78,045 cy	$4.40/	$343,398	
place topsoil (6")	7,424 cy	$6.81/	$50,557	
dress seed, mulch	44,545 sy	$0.46/	$20,491	
				$529,887
Floodwall				
Tawa Run (3.5')	300 LF	$285.11/	$85,533	
Chessie to Oak (2.5')	170 LF	$238.61/	$40,564	
Oak to SCS (3.3')	210 LF	$238.61/	$50,108	
SCS (5.4')	470 LF	$334.36/	$157,149	
Thomas (7.9')	130 LF	$476.61/	$61,959	
Thomas to GTW (2.7')	1580 LF	$238.61/	$377,004	
easement fee	2860 LF	$20/	$57,200	
(1400' @ 5.4')				$829,517

$1,449,393

SUBJECT 1/2 Buffalo District Ottawa

BY KLF DATE 4/15/86 PROJ. NO. 85-109-30

CHKD. BY DATE SHEET NO. 9 OF

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Based On Alternative VI .. 99.4% Protection

ITEM

Borrow Sites				
purchase	2.4 ac	$1,200/		
easement fee	6.0 ac	$500/		
clear & grub	2.4 ac	$2,200/		
strip topsoil (6")	4840 cy	$2.73/		
place topsoil (6")	6776 cy	$6.81/		
dress, seed, mulch	40,656 sy	$0.46/		
				$89,989
Levee Construction				
easement fee	14.7 ac	$1,000/	$14,700	
strip topsoil (6")	7,690 cy	$2.74/	$21,071	
proof roll / scarify	46,139 sy	$0.44/	$20,301	
trench excavation	12,943 cy	$5.75/	$74,422	
build levee (9')	94,351 cy	$4.43/	$417,784	
place topsoil (6")	8,179 cy	$6.81/	$55,699	
dress, seed, mulch	49,075 sy	$0.46/	$22,575	
				$626,552
Floodwall				
Tawa Run (4.4')	300 LF	$285.11/	$85,533	
Chessie to Oak (3.8')	170 LF	$255.70/	$43,469	
Oak to SCS (4.6')	210 LF	$334.36/	$70,216	
SCS (6.7')	470 LF	$430.11/	$202,152	
Thomas (9.2')	130 LF	$525.86/	$68,362	
Thomas to GTW (4.0')	1580 LF	$285.11/	$450,474	
easement fee (1,400' @ 6.7')	2860 LF	$20/	$57,200	
				$977,406
				$1,693,947

SUBJECT COE BUFFALO - OTTAWA

BY RFD DATE 5/21/85 PROJ. NO. 85-109-36

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 1

GAI CONSULTANTS, INC.
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C6.3 SUMMARY OF COST ESTIMATES (FIRST COSTS) FOR ALTERNATIVES I TO VII

Index to Summary of Cost Estimates

SUBJECT C/E Buffalo District Ottawa

BY KL DATE 4/16/86 PROJ. NO. 83-109-30

CHKD. BY ____ DATE ____ SHEET NO. 1 OF ____

gai CONSULTANTS, INC

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Summary of Cost Estimates (First Costs) for Alternatives I - VII

Alternative		Contractor Bid	Land	Subtotal
I	Clear & Snag	$208,510		$208,510
II	Levee, 99-Yr Protection	$2,010,700		
	+ land purchase		0	
	+ easement fees		$80,300	
				$2,091,000
III	Levee, 99-Yr Protection	$1,938,790		
	+ land purchase		0	
	+ easement fees		$79,900	
	Clear & Snag	$208,510		
				$2,946,300
IV	Levee, 99-Yr Protection	$2,045,230		
	+ land purchase		0	
	+ easement fees		$30,500	
	Remove Embankments	$262,440		
	+ land purchase		$3,600	
	+ easement fees		$7,000	
	+ relocate power line	$77,520		
				$2,476,340

SUBJECT C/E Buffalo District Ottawa

BY KLF DATE 4/16/86 PROJ. NO. 85-129-30

CHKD. BY DATE SHEET NO. 2 OF

GAI CONSULTANTS, INC.
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SUMMARY OF COST ESTIMATES (1987) FOR ALTERNATIVES I - VII

ALTERNATE	DESCRIPTION	CONTRACTOR BID	LAND	SUBTOTAL
V	Levee, 99-Yr Protection	$1,948,315		
	+ land purchase		0	
	+ easement fees		$30,700	
	Clear & Snag	$208,510		
	Remove Embankments	$144,000		
	+ land purchase		$3,600	
	+ easement fees		$7,000	
	+ relocate power line	$77,520		
				$2,469,345
VI	Levee, 10-Year Protection	$1,169,730		
	+ land purchase		0	
	+ easement fees		$39,700	
	Levee, 25-Year Protection	$1,713,740		
	+ easement fees		$78,760	
	Levee, 50-Year Protection	$1,719,300		
	+ easement fees		$77,100	
	Levee, 99-Yr Protection	$2,163,100		
	+ easement fees		$77,700	
	Clear & Snag	$208,510		
	Floodway & Remove Embankments	$262,440		
	+ relocate power line	$77,520		
	+ land purchase		$100,000	
	+ easement fees		0	

SUBJECT C/E Buffalo District Ottawa

BY KLL DATE 4/16/86 PROJ. NO 85-109-30

CHKD. BY ________ DATE ________ SHEET NO. 3 ____ OF ________

GAI CONSULTANTS, INC

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Alternative	Description	Contractor Bid	Land	Subtotal
VI (con't)	10-Yr	$1,718,200	$137,700	$1,855,900
	25-Yr	$2,267,210	$178,260	$2,445,470
	50-Yr	$2,467,770	$179,100	$2,646,870
	99-Yr	$2,711,570	$179,900	$2,891,470

VII	Clear & Snag	$203,510		
	Floodway & Embankments	$262,440		
	+ land purchase		$100,000	
	+ easement fees		0	
	+ relocate power line	$77,520		
				$643,470

SUBJECT COE BUFFALO - OTTAWA

BY RFD DATE 5/21/85 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 1

GAI CONSULTANTS, INC.

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C6.4 ANNUAL MAINTENANCE COSTS - LEVEES

Index to Annual Maintenance Costs

SUBJECT C/E Buffalo District Ottawa

BY KLF DATE 4/17/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF ______

GAI CONSULTANTS, INC

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Annual Maintenance -- Levees

Maintenance of Levees
1. Clean-out / maintenance of storm water culverts
2. Mowing of levees

1. Clean-out / maintenance of storm water culverts

Assume lump sum, $1,000 /year

2. Mowing of levees

mowing by tractor with cylinder mower + cutting arm

levee length ~ 7330 LF (99-yr protection)

average levee height ~ 7 ft

∴ slope face length ~ 24.2 ft

Cutting Bar can cut 5' / swath (pass)

∴ 5 passes / levee side, + 2 passes for crest

↳ 10 passes for slope faces

2 passes for crest

SUBJECT C/E Buffalo District Options

BY KL DATE 4/17/86 PROJ. NO. 85-107-30

CHKD. BY ______ DATE ______ SHEET NO. 3 OF ______

CONSULTANTS, INC.

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Tractor Production Rate 3 mph

Tractor Cost Rate

tractor \$100/day

operator \$144/day

→ \$244/day

$$7330\ \text{Lf} \times \frac{1\ \text{mile}}{5280\ \text{Lf}} \times \frac{1\ \text{Hr}}{3\ \text{Mi}} \times \frac{1\ \text{day}}{8\ \text{Hr}} \times \frac{\$244}{\text{day}} \times 12\ \text{passes}$$

\$175/mowing

Say 8 mowings/year

→ \$1400/year

Total O&M Costs for Any Levee Plan

\$2,400/year

SUBJECT COE BUFFALO - OTTAWA

BY RFD DATE 5/21/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 1

gai CONSULTANTS, INC

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C7.1 CLEARING + SNAGGING COSTS

Index

* THESE ITEMS ARE NOT INCLUDED IN THE WORK ITEMS FOR CLEARING & SNAGGING. THEY ARE INCLUDED FOR COMPLETENESS.

SUBJECT C.O.E. BUFFALO DISTRICT - OTTAWA
CLEARING + SNAGGING ESTIMATE

BY JOP DATE 4/7/86 PROJ. NO. 85-109-30

CHKD. BY [illegible] DATE 4/10/86 SHEET NO. 1 OF 9

GAI CONSULTANTS, INC.
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JOB SUMMARY

ITEM	QUANTITY	BID UNIT PRICE	TOTAL BID
CLEARING	29.3 Ac.	$2,275.00	$66,650.00
SNAGGING	25,555 L.F.	$2.76	$70,532.00
REMOVAL RUBBLE ROCK DAM	L.S.	—	$16,733.00
DREDGING @ BRIDGE OPENING	L.S.	—	$3,400.00
MOBILIZATION + DEMOBILIZATION	L.S.	—	$6,000.00
SEEDING + MULCHING (SUBCONTRACT	142,000 S.Y.	$0.46	$65,320.00

TOTAL BID : $228,643.00

Delete Dredging @ Bridge Opening - $3,400
Delete Removal of Rubble Rock Dam - $16,733

- $20,133

REVISED BID, CLEARING & SNAGGING $208,510

SUBJECT C.O.E Buffalo District - Ottawa
Clearing + Snagging Estimate
BY JDP DATE 4/7/86 PROJ. NO. ES-109-30
CHKD. BY KLF DATE 4/16/86 SHEET NO. 2 OF 9

CONSULTANTS, INC.
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Clearing Crew

Description	Means Rate/Hour	Per Day Costs Labor	Per Day Costs Equipment
Foreman	$24.00	$192.00	
Pick Up Truck	$8.00		$64.00
4Ea Chain Saw Operators	4($18.13)	$580.00	
4Ea Chain Saws	4($3.50)		$112.00
Laborer	18.13	$145.00	
Dozer Operator	23.48	$188.00	
105 HP Dozer	$43.25		$346.00
Skidder Operator	23.48	$188.00	
Log Skidder - Grapple			$236.00
Mechanic	$23.48	188.00	
Mechanics Truck, 1 Ton	$15.00		$120.00
	$2,359.00/Day =	$1,481.00 +	$878.00

(City Index Correction 1.02 + 2yrs Inflation 13%) · 1.15

1986 Price: $2,713.00/Day

Production: Thin Stand of Trees Say 100-200 Trees/Acre
Generally Small Trees <12" Diameter
Use 150 Trees/Acre

Chain Saw Operators Cut A Tree Every 6 Min. 10/hr
45 Min/HR ÷ 6 Min/tree = 7.5 Trees/Manhour use 7
150 Trees/Ac ÷ (7 Trees/Manhour × 8 Hrs/Day) =
2.68 Man Days/Acre
4 Chain Saw Operators
$\frac{2.68 \text{ Man Days/Acre}}{4 \text{ Men}}$ = 0.67 Days/Acre

\$2713/day · 0.67 ac/day = \$1820/acre
\$1820/ac × 1.25 (O+P) = \$2275/Acre

SUBJECT C.O.E. Buffalo District - Ottawa
Clearing + Snagging Estimate

BY JDP DATE 4/7/86 PROJ. NO. 85-109-30

CHKD. BY KL DATE 4/16/86 SHEET NO. 3 OF 9

CONSULTANTS, INC.
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Snagging Crew - Trees Only

Description	Means Rate/Hr.	Per Day Costs Labor	Per Day Costs Equipment
Foreman	\$24.00	\$192.00	
Pick Up Truck	\$8.00		\$64.00
Backhoe Operator	\$24.00	\$192.00	
Backhoe, 135HP, Grapple	\$60.50		\$484.00
Laborer	\$18.13	\$145.00	
Dozer Operator	\$23.48	\$188.00	
Dozer 105 HP	\$43.25		\$346.00
Mechanic + Truck	\$23.48 + 15.00	\$188.00	\$120.00
	\$1919/Day =	\$905.00 +	\$1014.00

(City Index Correction 1.02 + 2yrs Inflation 13%) × 1.15

1986 Price = \$2207.50/Day

Production Assuming 1000 L.F. of Bank/Day 25,555 L.F. Tot

\$2,207.00/Day ÷ 1000 L.F./Day = \$2.21/L.F. Bank Cost

\$2.21 L.F. Bank (Cost) × 1.25 (O.+P.) $\boxed{= \$2.76/\text{L.F. Bid}}$

SUBJECT	C.O.E. Buffalo District - Ottawa Clearing + Snagging Estimate
BY JDP	DATE 4/7/86
PROJ. NO.	85-109-30
CHKD. BY KLF	DATE 4/16/86
SHEET NO. 4	OF 9

GAI CONSULTANTS, INC.
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Removal Of Rubble Rock Dam

Description	Means Rate/Hr	Per Day Costs: Labor	Per Day Costs: Equipment
Foreman	\$24.00	\$192.00	
Pick Up Truck	\$8.00		\$64.00
Backhoe Operator	\$24.00	\$192.00	
Backhoe 135HP	\$60.50		\$484.00
2 Ea. Truck Drivers	2 (\$18.93)	\$303.00	
2 Ea. Triaxle Trucks	2 (\$34.95)		\$560.00
Laborer	\$18.13	\$145.00	

\$1940/Day = \$832.00 + \$1,108.00

(City Index Correction 2% + 2 yrs Inflation 13%) x1.15

1986 Price \$2,231.00/Day

Production: Assuming 1000 CY To Be Removed. Slow Work - Underwater
Set Up From Both Sides Of Channel
Three Days Each Side Of Channel

\$2,231.00 x 6 Days = \$13,386.00 Cost

\$13,386.00 x 1.25 O+P = $\boxed{\text{\$16,733.00 Bid Price}}$

NOTE: THIS ITEM IS NOT INCLUDED IN THE PROPOSED WORK. IT IS INCLUDED FOR COMPLETENESS ONLY. ITS SIGNIFICANCE IS LOCAL, AND NO BENEFITS HAVE BEEN ATTRIBUTED TO ITS REMOVAL.

SUBJECT C.O.E. Buffalo District - Ottawa Clearing + Snagging Estimate

BY JDP DATE 4/7/86 PROJ. NO. 85-169-30

CHKD. BY KLL DATE 4/16/86 SHEET NO. 5 OF 9

GAI CONSULTANTS, INC
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Dredging @ Bridge Opening

Description	Means Rate/Hr.	Per Day Costs: Labor	Per Day Costs: Equipment
Foreman	\$24.00	\$192.00	
Pick Up Truck	\$8.00		\$64.00
Dozer Operator	\$23.48	188.00	
Dozer 105 HP	\$43.25		\$346.00
	\$790.00 =	\$380.00 +	\$410.00

(City Index Corr. 2% + 2 yrs Inflation 13%) 1.15

1986 Price \$909.00 / Day

Production   Estimated 1000 C.Y. Excavation
Avg. 300' Push with 105 HP. Dozer

Production Rate (see attached sheets)

Adjusted Rate = 44.5 Bcy/Hr.

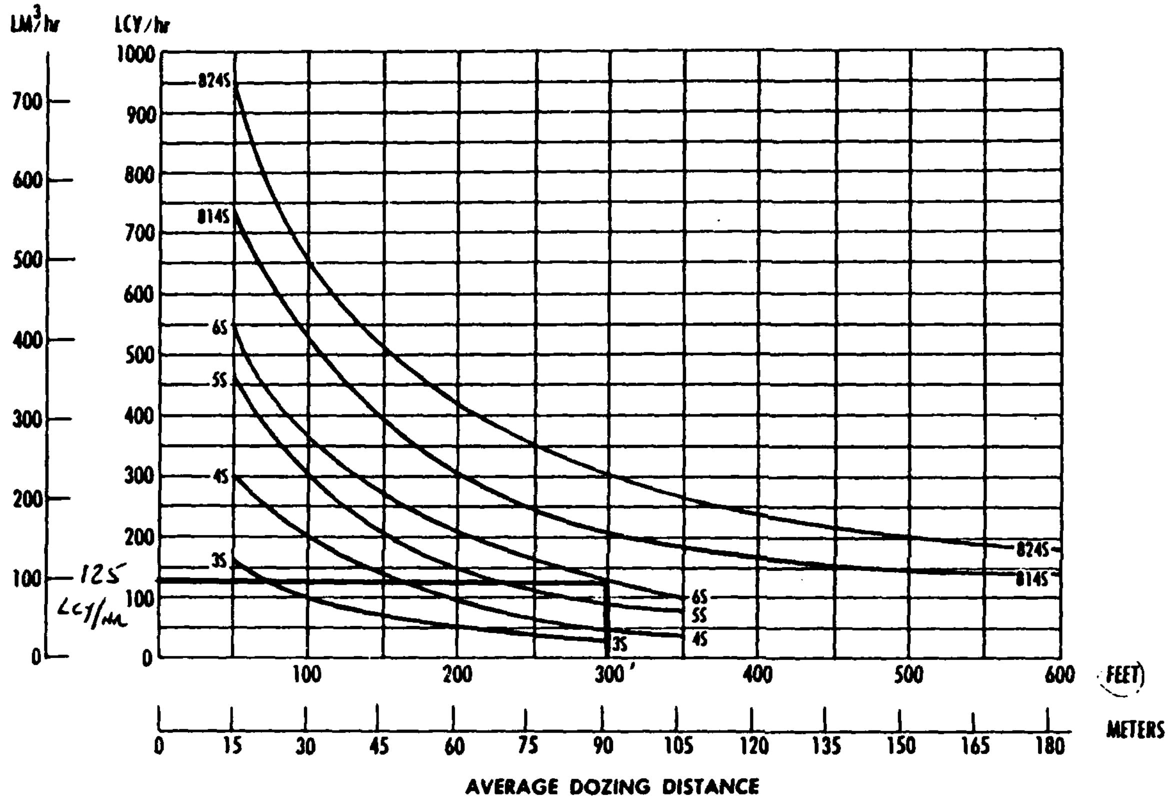
44.5 Bcy/Hr × 8 Hrs/Day = 356 c.y./Day

$\frac{1000 \text{ CY}}{356 \text{ Bcy/Day}}$ = 2.8 Days Use 3 Days

\$909.00 × 3 = \$2,727.00 Cost

\$2,727.00 × 1.25 (O+P) = $\boxed{\text{\$3,400.00 B.O. Price}}$

ESTIMATED DOZING PRODUCTION • Straight Blades • D3, D4, D5, D6, 814, 824



NOTE: This chart is based on numerous field studies made under varying job conditions. Refer to correction factors on the next page. The 3S represented is for the D3B LGP.

300' Push Distance 125 LCY/HR

JOB CONDITION CORRECTI

OPERATOR —
- Excellent
- Average
- Poor

MATERIAL —
- Loose stockpile
- Hard to cut; frozen —
  - with tilt cylinder
  - without tilt cylinder
  - cable controlled blade
- Hard to drift; "dead" (dry, non-cohesive material) or very sticky material
- Rock, ripped or blasted

SLOT DOZING

SIDE BY SIDE DOZING

VISIBILITY —
- Dust, rain, snow, fog or darkness

JOB EFFICIENCY —
- 50 min/hr
- 40 min/hr

DIRECT DRIVE TRANSMISSION
- (0.1 min. fixed time)

BULLDOZER*
- Angling (A) blade
- Cushioned (C) blade
- D5 narrow gauge
- Light material U-blade (coal)
- Blade bowl (stockpiles)

GRADES — See following graph.

*Note: Angling blades and cushion blad[e] dozing tools. Depending on job conditions [...]age 50-75% of straight blade production.

Sheet #6 of 9
4/16/86

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Correction Factors
(Avg. Oper.) (Sticky) (45 Min/Hr) (20% Swell) +3% Grade
125 LCY/HR × 0.75 × 0.80 × 0.75 × $\frac{1}{1.2}$ × .95

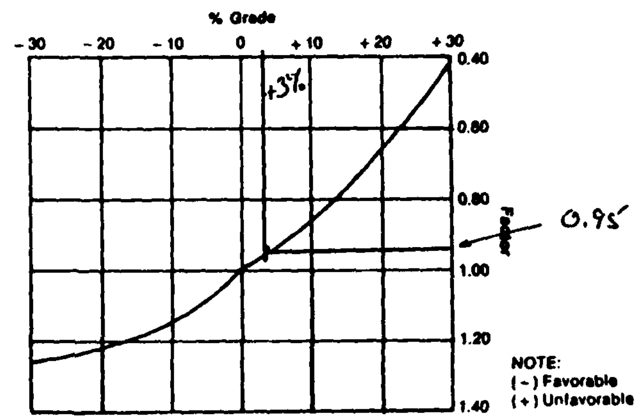
Adjusted Rate $\boxed{= 44.5\ \text{BCY/Hr.}}$

JOB CONDITION CORRECTION FACTORS

	TRACK-TYPE TRACTOR	WHEEL-TYPE TRACTOR
OPERATOR —		
Excellent	1.00	1.00
Average	0.75	0.60
Poor	0.60	0.50
MATERIAL —		
Loose stockpile	1.20	1.20
Hard to cut; frozen —		
with tilt cylinder	0.80	0.75
without tilt cylinder	0.70	—
cable controlled blade	0.60	—
Hard to drift; "dead" (dry, non-cohesive material) or very sticky material	0.80	0.80
Rock, ripped or blasted	0.60-0.80	—
SLOT DOZING	1.20	1.20
SIDE BY SIDE DOZING	1.15-1.25	1.15-1.25
VISIBILITY —		
Dust, rain, snow, fog or darkness	0.80	0.70
JOB EFFICIENCY —		
50 min/hr 45 Min/Hr	0.84 0.75	0.84
40 min/hr	0.67	0.67
DIRECT DRIVE TRANSMISSION		
(0.1 min. fixed time)	0.80	—
BULLDOZER*		
Angling (A) blade	0.50-0.75	—
Cushioned (C) blade	0.50-0.75	0.50-0.75
D5 narrow gauge	0.90	—
Light material U-blade (coal)	1.20	1.20
Blade bowl (stockpiles)	1.30	1.30
GRADES — See following graph.		

*Note: Angling blades and cushion blades are not considered production dozing tools. Depending on job conditions, the A-blade and C-blade will average 50-75% of straight blade production.

% Grade vs. Dozing Factor



ESTIMATING DOZER PRODUCTION OFF-THE-JOB

Example problem:

Determine average hourly production of a D8/8S (with tilt cylinder) moving hard-packed clay an average distance of 150 feet (45 m) down a 15% grade, using a slot dozing technique.

Estimated material weight is 2650 lb/LCY (1600 kg/Lm³). Operator is average. Job efficiency is estimated at 50 min/hr.

Uncorrected Maximum Production — 550 LCY/hr (420 Lm³/h) (from bulldozer curves)

Applicable Correction Factors:

Hard-packed clay is "hard to cut" material . . −0.80
Grade correction (from graph) . . . . −1.19
Slot dozing . . . . −1.20
Average operator . . . . −0.75
Job efficiency (50 min/hr) . . . . −0.84
Weight correction . . . . (2300/2650) −0.87

Sheet # 7 of 9
KLL 4/16/86

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SUBJECT C.O.E. BUFFALO DISTRICT - OTTAWA
CLEARING + SNAGGING ESTIMATE

BY JDP DATE 4/7/86 PROJ. NO. 85-109-30

CHKD. BY [illegible] DATE 4/10/86 SHEET NO. 8 OF 9

gai CONSULTANTS, INC.
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MOBILIZATION + DEMOBILIZATION

DESCRIPTION	# REQUIRED	RATE	TOTAL
BACKHOE w/GRAPPLE	1	$500	$500.00
DOZER 105 HP	2	$250	$500.00
LOG SKIDDER	1	$300	$300.00
DUMP TRUCKS	2	$150	$300.00
		SUBTOTAL =	$1,600.00

JOB DURATION

CLEARING	29.3 Ac × .67 DAYS/Ac =	20 WORKING DAYS
SNAGGING	25,555 LF ÷ 1000 LF/DAY =	26 WORKING DAYS
RUBBER ROCK DAM		6 WORKING DAYS
DREDGING BRIDGE		3 WORKING DAYS
		55 WORKING DAYS

say 17 WORKING DAYS MONTH — 21 DAYS MON → FRI MINUS 4 RAIN DAYS
INCLUDES RAIN DAYS, RAIN DELAYS, etc.

55/17 = 3.24 MONTHS say 3½ MONTHS

JOB OFFICE TRAILER	3.5 MONTHS × $400/MONTH	= $1,400.00
PARTS TRAILER	3 MONTHS × $100/MONTH	= $300.00
UTILITIES, SET UP & REMOVAL		$1,500.00
	SUBTOTAL	= $3,200.00
	GRAND TOTAL	= $4,800.00
	O + P	× 1.25
		$6,000.00

SUBJECT C.O.E. BUFFALO DISTRICT - OTTAWA
CLEARING + SNAGGING ESTIMATE

BY JDP DATE 4/7/86 PROJ. NO. 85-109-30

CHKD. BY KL DATE 4/10/86 SHEET NO. 9 OF 9

gai CONSULTANTS, INC.

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SEEDING + MULCHING

SUBCONTRACT

1,277,750 S.F. / 9 S.F./S.Y = 142,000 S.Y.

SUB QUOTE × $0.40 /S.Y.

15% MARK UP × 1.15

$65,320.00

SUBJECT COE BUFFALO- OTTAWA

BY RFD DATE 5/21/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 1

GAI CONSULTANTS, INC.
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C7.2 FLOODWAY IMPROVEMENTS WITH EMBANKMENT REMOVAL COSTS

Index

SUBJECT	C.O.E. Buffalo District Ottawa
	Floodway Improvement Estimate
BY JDP	DATE 4/9/86	PROJ. NO. 05-109-30
CHKD. BY KLF	DATE 4/16/86	SHEET NO. 1 OF 12

GAI CONSULTANTS, INC.
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Cost Estimate

Floodway Clear + Grub - Burning Allowed -

Clear + Grub Sub
- Wooded 18 Ac + 2.4 Ac (Embankment) = 20.4 Ac × \$2,200.00/Ac = \$44,880
- Brush 9 Ac × 1,000.00/Ac = \$9,000
- Cropland 73 Ac × \$0 /Ac = \$0

Seeding Sub < Seed + Mulch 20.4+9 Ac = 29.4 Ac × 43,560/9 × \$0.46/s.y = \$65,460

Bid Total \$119,340

Removal Of Embankments Cost × O.P.

Removal Of Block Abutments \$3,600 × 1.25 = \$4,500.00
(see sheet 21 of 36 previous calcs.)

Stripping Of Disposal Area
5,163 c.y. × \$1.84/cy × 1.25 \$11,875.00

Mass Excavation
34,393 c.y. × \$1.96/c.y × 1.25 \$84,263.00

Replace Topsoil
5,163 c.y. × \$1.84/c.y × 1.25 \$11,875.00

Seeding Sub < Seed + Mulch Disposal Area (Field)
7 Ac × 43,560/9 × \$0.46 \$15,590 -

Bid Total = \$128,103

Mobilization + Demobilization

\$15,000.00

Grand Total = $\boxed{\$262,440}$

Does Not Include:
1. Relocation Of Power Line Or Any Utilities
2. Real Estate Costs
3. Any Disposal Fee For Embankment Material (7 Acres Of Field Disturbed

SUBJECT C.O.E. Buffalo District Ottawa
Floodway Improvement Estimate
BY JDP DATE 4/8/86 PROJ. NO. 85-109-30
CHKD. BY KLF DATE 4/16/86 SHEET NO. 2 OF 12

GAI CONSULTANTS, INC.
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Removal Of Old Embankments

Assuming Clearing + Grubbing Is Paid Elsewhere
Assuming Placement Of Existing Embankment In Adjacent Fields With Avg. Haul Of 1250', Placing In 3.5 Avg. Depth
Assuming Field Will Require Stripping Of 6" Of Topsoil Which Will Be Stripped, Stockpiled And Then Replaced On Top Of The 3.5 Avg. Depth Of Disposed Material

From Unit Cost Calculations

Parry St Embankment		+	Abandoned Railroad Embankment		
Total Exc. =	3,409 c.y.		Total Exc. =	30,984 c.y.	= 34,393
Strip Topsoil =	768 c.y.	+	Strip Topsoil =	5,163 c.y.	= 5931 c.y.
Waste =	2,641 c.y.		Waste =	25,821 c.y.	28,462

Assume All Existing Material Is To Be Wasted, Topsoil Would Be Of Somewhat Questionable Quality

Abandoned Railroad Embankment

Use Dozer To Cut Through Abandoned Railroad Embankment To Drain Pond Into Stream, Pump If Required To Drain Pond
Use Scrapers And Dozers To Strip Topsoil Of Disposal Area
Use Scrapers To Load Embankment And Haul To Disposal Area. Place In One Foot Lifts Track In With Dozer 3.5' Avg Depth Total
Use Dozers To Push Existing Embankment Into Old Pond, Grade To Drain
Use Scrapers And Dozers To Load And Replace Topsoil Over Waste Material

SUBJECT C.O.E. Buffalo District - Ottawa
Floodway Improvement Estimate
BY JDP DATE 4/8/86 PROJ. NO. 85-109-30
CHKD. BY KLF DATE 4/16/86 SHEET NO. 3 OF 12

gai CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

Description	Means Rate/Hr	Labor	Equipment
Mechanic + Truck	$23.48 + $15.00	187.84	120.00
Forman	$24.00	$192.00	
Pickup Truck	$8.00		$64.00
4 Ea Scrapers 225Hp Tandem	4 ($125.00)		$4,000.00
4 Ea Scraper Operators	4 ($23.48)	$751.36	
Dozer 460HP	$145.00		$1160.00
Dozer Operator	$23.48	$187.84	
Dozer 300HP	$117.00		$936.00
Dozer Operator	$23.48	$187.84	
Grader 135HP	$53.00		$424.00
Grader Operator	$22.17	$177.36	

$8,388.24 = $1,684.24 + $6,704.00

(City Index Correction 2% + 2 Yrs Inflation 13%) × 1.15

$9,646.48

Production Using 627B Scrapers - Mass Excavation

Cycle Time = 4.1 Minutes (see attached sheets)
45 Min/Hr ÷ 4.1 Min = 10.97 Cycles/Hour
10.97 Cycles/Hour × 14 Bcy/Cycle × 8 Hours/Day = 1229 Bcy/Scraper/Day

D-9 Push Loader - Cycle Time = 1 Min
$\dfrac{4.1\text{ Min/Cycle (Scraper)}}{1\text{ Min/Cycle (Dozer)}}$ = 4 Scrapers
1229 × 4 Scrapers = 4916 Bcy/Day

$9646.48 / 4916 Bcy/Day = $1.96/Bcy Cost

Strip Topsoil (34,393 c.y. Waste × 27 ft³/c.y.)/(3.5' Ave Depth × 43,560 ft²)

= 6.1 Acres say 5% Extra - Haul Rds, etc
6.4 Acres
(6.4 Ac. × 6"/12"/FT × 43,560 ft²/Ac)/27 ft³/c.y. = 5,163 c.y.

651B

410 kW	550 HP
58 310 kg	128,550 lb
24.5 m³	32 yd³
33.6 m³	44 yd³
47 170 kg	104,000 lb
67%	
33%	
52%	
48%	
D346	
1900	
19.5 L	1190 in³
50 km/h	31 mph
13.5 m	44'2"
16.4 m	53'10"
37.5-39, 36 PR (E-3)	
37.5-39, 36 PR (E-3)	
3.63 m	11'11"
405 mm	16"
510 mm	20"
1060 L	280 gal
4.29 m	14'1"
9.73 m	31'11"
15.34 m	50'4"
4.32 m	14'2"
3.81 m	12'6"
2.72 m	8'11"
2.59 m	8'6"

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Specifications
- Tandem Powered
- Push-Pull

Wheel Tractor-Scrapers



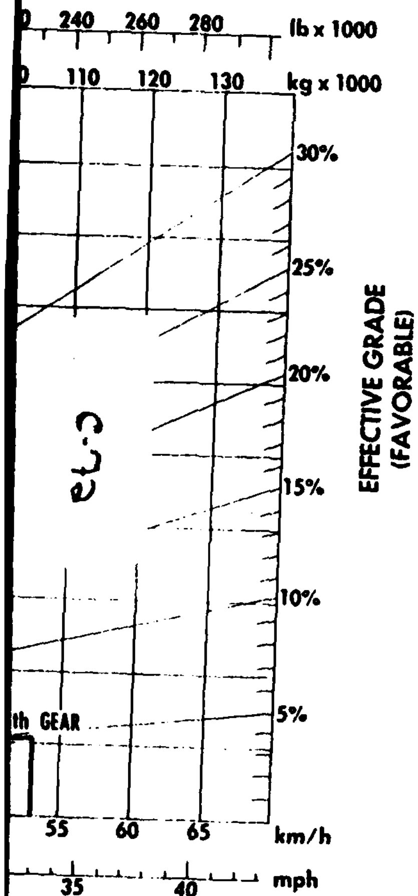
	627B		637D		657B	
Flywheel power: Tractor	168 kW	225 HP	336 kW	450 HP	410 kW	550 HP
Scraper	168 kW	225 HP	186 kW	250 HP	298 kW	400 HP
*Operating weight (empty)**	34 430 kg	75,910 lb	48 625 kg	107,200 lb	69 320 kg	152,830 lb
Scraper capacity: Struck	10.7 m³	14 yd³	16.1 m³	21 yd³	24.5 m³	32 yd³
Heaped	15.3 m³	20 yd³	23.7 m³	31 yd³	33.6 m³	44 yd³
Rated load	21 770 kg	48,000 lb	34 020 kg	75,000 lb	47 175 kg	104,000 lb
Weight distribution — Empty: Drive	58%		61%		59%	
Rear	42%		39%		41%	
Weight distribution — Loaded: Drive	49%		50%		49%	
Rear	51%		50%		51%	
Engine model: Tractor	3306		3408		D346	
Scraper	3306		3306		D343	
Rated engine RPM: Tractor	2100		2000		1900	
Scraper	2200		2200		1900	
Displacement: Tractor	10.5 L	638 in³	18.0 L	1099 in³	19.5 L	1190 in³
Scraper	10.5 L	638 in³	10.5 L	638 in³	14.6 L	893 in³
Top speed (loaded)	55 km/h	34 mph	53 km/h	33 mph	53 km/h	33 mph
Non-stop turning circle	11.1 m	36'6"	12.2 m	40'1"	13.7 m	45'1"
With ROPS restriction	—		—		16.8 m	55'1"
Tires: Tractor drive	29.5-29, 28 PR (E-3)		33.25-35, 38 PR (E-3)		37.5-39, 44 PR (E-3)	
Scraper	29.5-29, 28 PR (E-3)		33.25-35, 38 PR (E-3)		37.5-39, 44 PR (E-3)	
Width of cut	3.02 m	9'11"	3.49 m	11'5.5"	3.63 m	11'11"
Maximum depth of cut	340 mm	13.4"	483 mm	19"	406 mm	16"
Maximum depth of spread	460 mm	18"	425 mm	16.7"	510 mm	20"
Fuel tank refill capacity: Tractor	511 L	135 gal	946 L	250 gal	1060 L	280 gal
Scraper	492 L	130 gal	643 L	170 gal	757 L	200 gal
GENERAL DIMENSIONS:						
Height to top of scraper	3.63 m	11'11"	4.17 m	13'8"	4.21 m	13'10"
Wheelbase	7.72 m	25'4"	8.74 m	28'8"	10.03 m	32'11"
Overall length	13.3 m	43'9"	14.8 m	48'8"	15.7 m	51'8"
Overall width	3.45 m	11'4"	3.96 m	13'	4.32 m	14'2"
Shipping width (draft arms on inside of bowl)	—		3.66 m	12'0"	3.56 m	11'8"
Scraper tread	2.18 m	7'2"	2.46 m	8'1"	2.67 m	8'9"
Tractor tread	2.21 m	7'3"	2.46 m	8'1"	2.59 m	8'6"
PUSH-PULL GENERAL DIMENSIONS:						
Operating weight *(empty)**	35 990 kg	79,350 lb	50 140 kg	110,540 lb	71 320 kg	157,230 lb
Overall length	14.91 m	48'11"	16.53 m	54'3"	17.63 m	57'10"
Weight distribution — Empty: Drive	60%		63%		60%	
Rear	40%		38%		40%	
Weight distribution — Loaded: Drive	51%		51%		49%	
Rear	49%		49%		51%	

* [illegible] includes coolant, lubricants, full fuel tank, ROPS and operator.

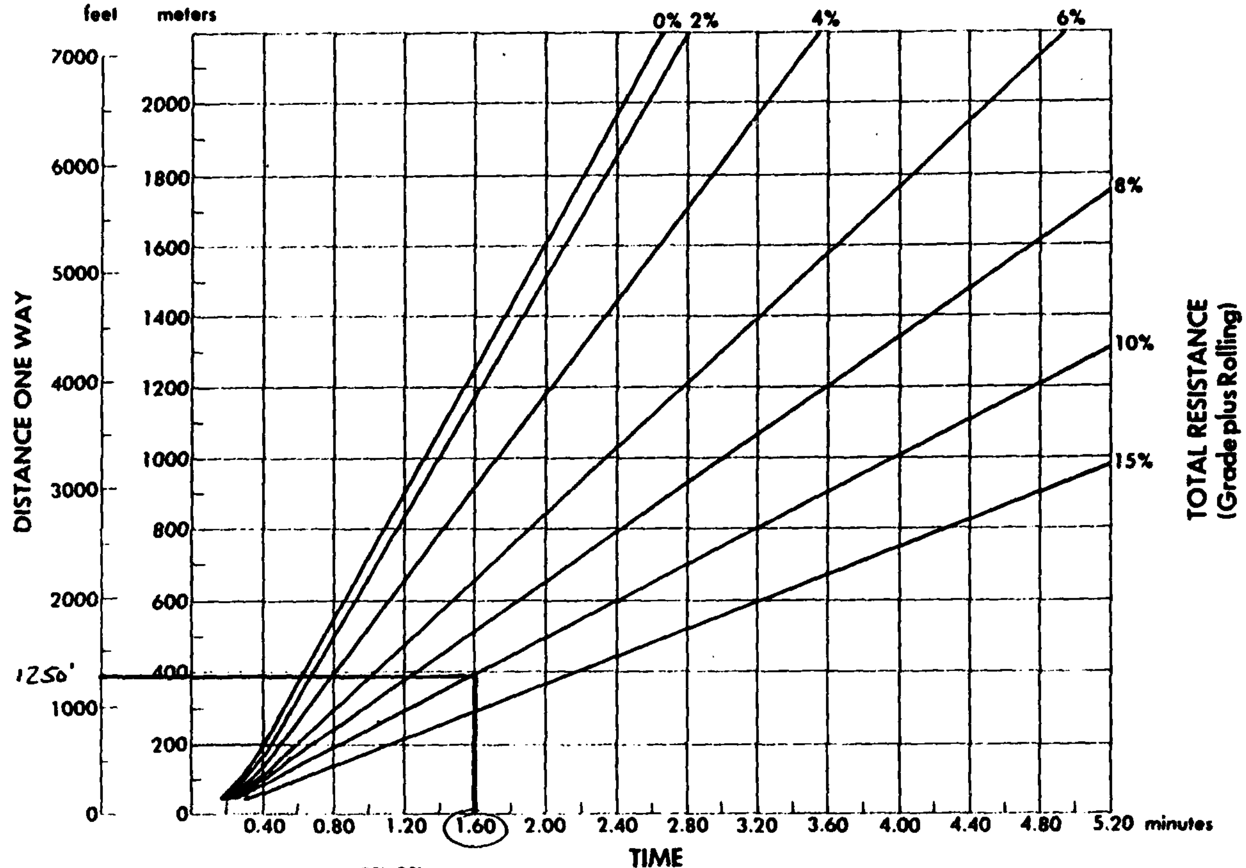
600

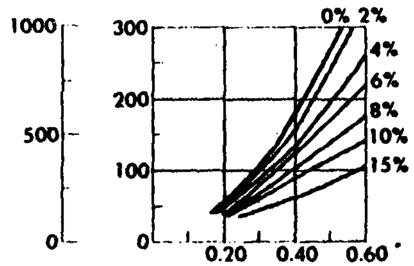
Sheet No. 4 of 12

Sheet No. 5 of 12
– KLF 4/16/86



627B LOADED
- Distance vs. Time
- 29.5 - 29 Tires
- Standard and Push-Pull

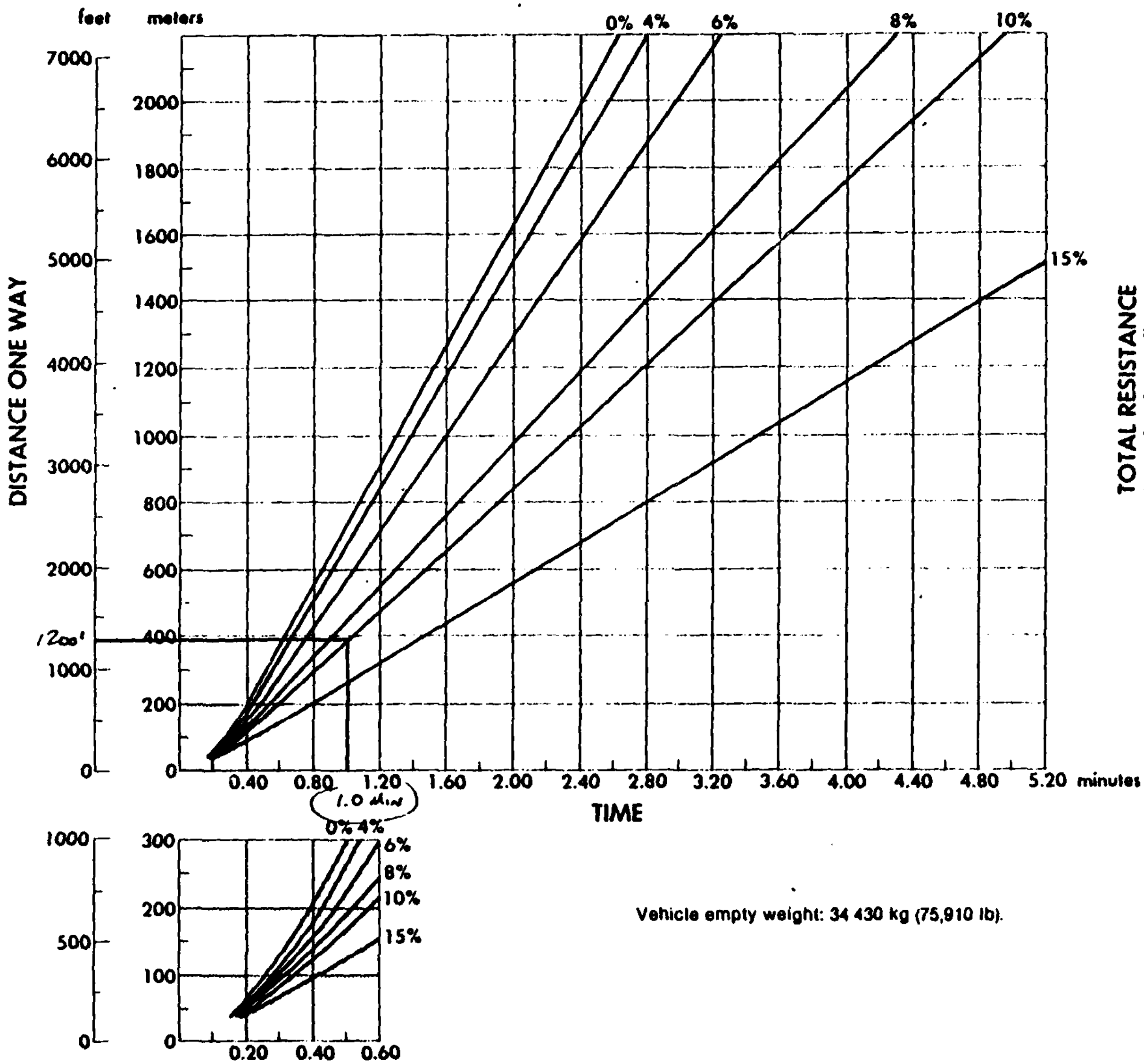




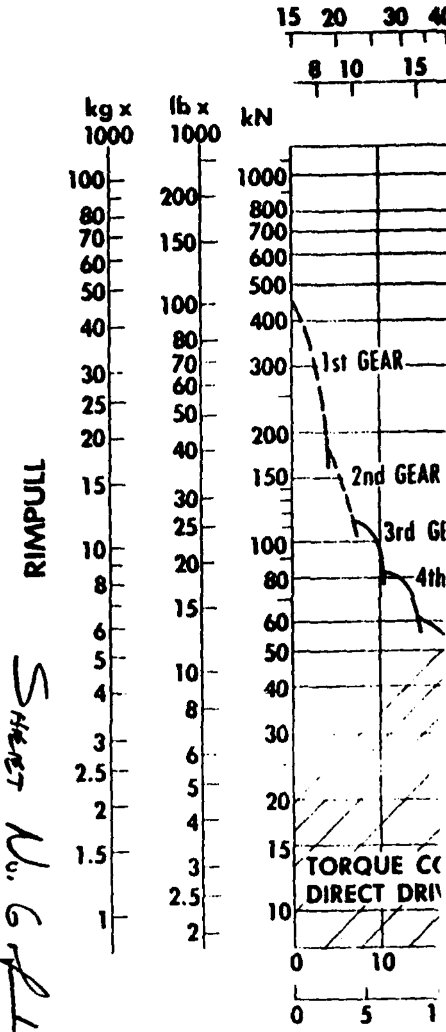
Vehicle empty weight: 34 430 kg (75,910 lb).
Payload: 21 770 kg, 12.2 Bm³ (48,000 lb, 16.0 BCY).

Wheel Tractor-Scrapers

627B EMPTY
- Distance vs. Time
- 29.5 - 29 Tires
- Standard and Push-Pull



Sheet No. 6 of 12
✓ KLC 4/10/86



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Cycle Time —

= load* + haul + maneuver & spread* + return
= 0.7 + 1.4 + .7 + 1.0
= 3.8 min.

*For fixed times (load, maneuver and spread) see the table below.

When cycle time and payload are known, productivity can be calculated. For a more complete example see the Earthmoving Section.

• • •

TYPICAL FIXED TIMES FOR SCRAPERS
(Times may vary depending on job conditions)

Model	Loaded By	Load Time (min.)	Maneuver and Spread or Maneuver and Dump (Min.)
613B	Self loading	0.9	0.7
615	Self loading	0.9	0.7
621B	One D8K	0.7	0.7
623B	Self loading	0.9	0.7
627B	One D8K	0.6	0.6
627B/PP	Self loading	0.8*	0.7
631D	One D9L	0.6	0.7
633D	Self loading	0.9	0.7
637D	One D9L	0.5	0.6
637D/PP	Self loading	0.9*	0.7
639D	Self loading	0.9	0.7
651B	Two D9L's	0.6	0.7
657B	Two D9L's	0.4	0.6
657B/PP	Self loading	1.0*	0.7

Use 0.75 Min
Tight Quarters

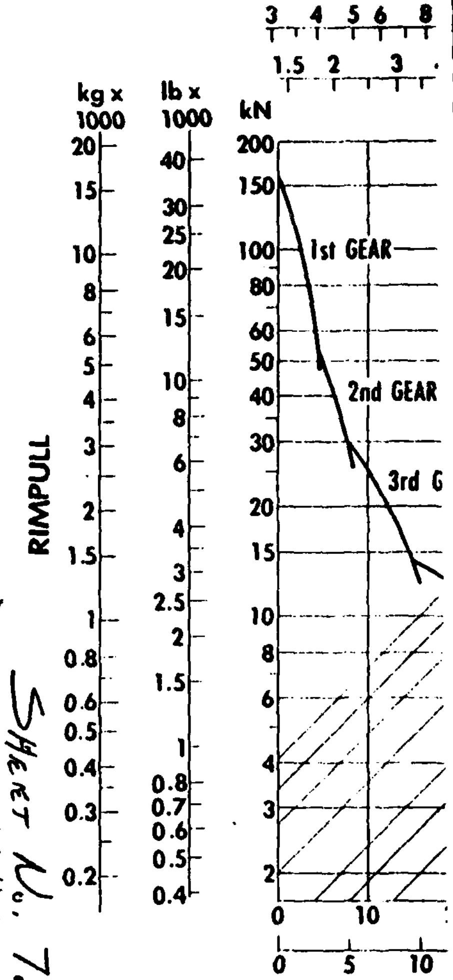
*Load time per pair, including transfer time

NOTE: Vehicle Empty Weights shown on the following charts includes ROPS Canopy. The travel times will remain within acceptable limits when applied to a non-ROPS equipped machine. When calculating TMPH loadings *any* additional weight must be considered in establishing mean tire loads.

Cycle Time =

Load + Haul + Maneuver + Spread + Return
0.75 + 1.6 + 0.75 + 1.0

= 4.1 Min



Sheet No. 7 of 12
- KLF 4/16/86

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SUBJECT C.O.E. Buffalo District - Ottawa
Floodway Improvement Estimate
BY JDP DATE 4/8/86 PROJ. NO. 85-109-30
CHKD. BY KL DATE 4/16/86 SHEET NO. 8 OF 12

gai CONSULTANTS, INC
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Environmental Specialists

Strip Topsoil (Cont)

Cycle Time Scrapers = 2.9 Min (see attached calcs)

D-9 Dozer Pushing - Cycle Time = 1 Min

$\frac{2.9 \text{ Min/cycle Scraper}}{1 \text{ Min/cycle Dozer}} = 2.9$ use 3 Scrapers
(.75 Min Load + .25 Min Reposition)

45 Min/Hr ÷ 3 Min/cycle (3 Scrapers) × 14 Bcy/Hr. = 210 Bcy/Hr.

210 Bcy/Hr × 8 Hrs × 3 Scrapers = 5040 Bcy/Day

5,163 Bcy / 5040 Bcy/Day = 1.02 Days But Stripping Is At

Two Locations Will Take Time To Set Up At Each Location

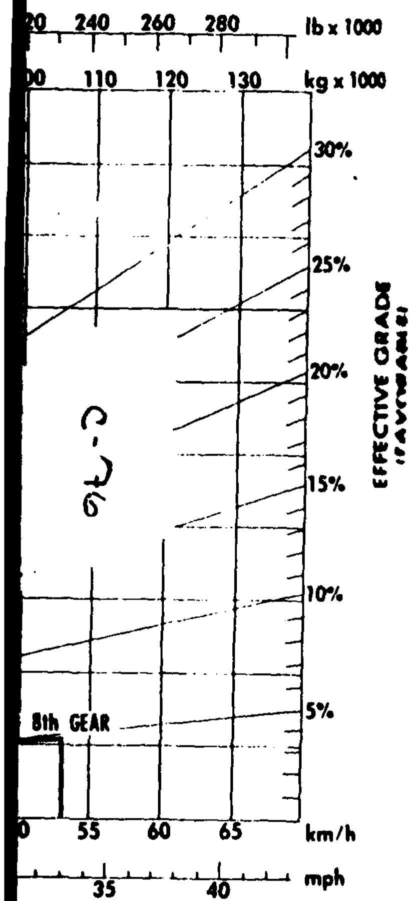
use 1.15 Days 1 Extra Hour Or Set-Up + Move

\$9,646.40 - (1000.00 + 188.00)1.15 = \$8280.20 × 1.15 Days / 5163
(1 Scraper) (1 Operator)

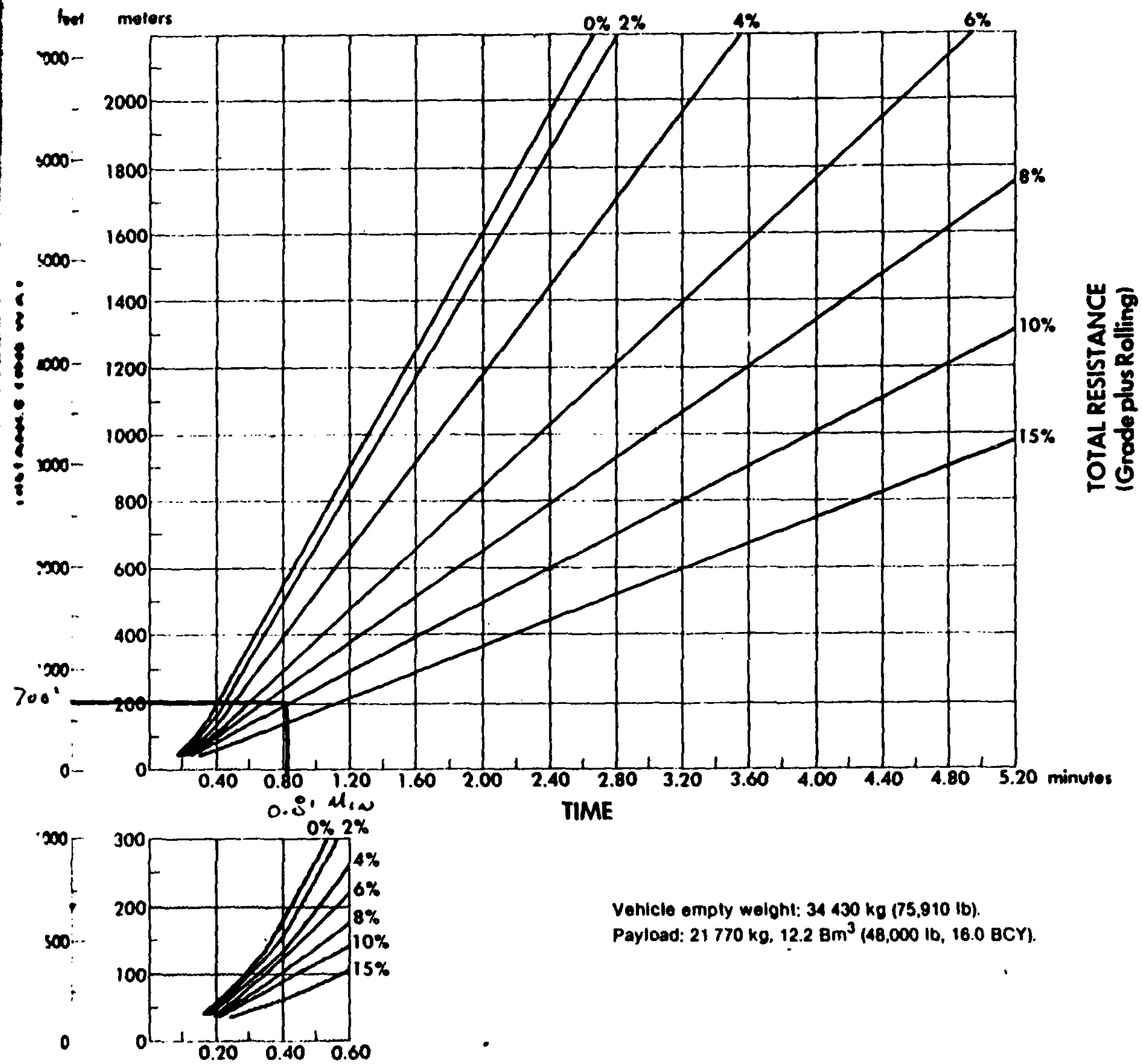
\$1.84/c.y. Cost

Sheet No. 9 of 12

600



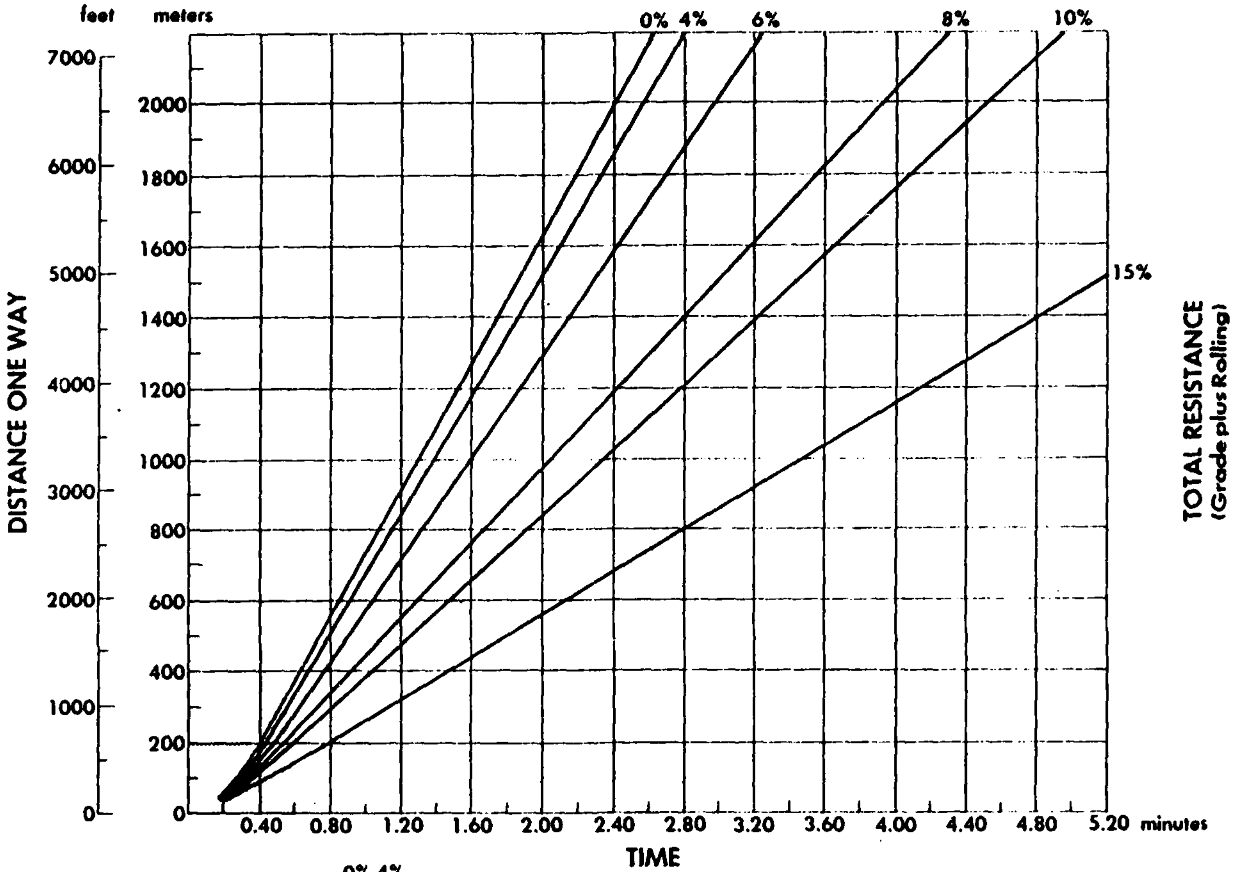
627B LOADED
- Distance vs. Time
- 29.5 - 29 Tires
- Standard and Push-Pull

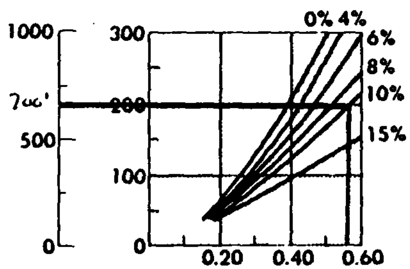


Vehicle empty weight: 34 430 kg (75,910 lb).
Payload: 21 770 kg, 12.2 Bm^3 (48,000 lb, 16.0 BCY).

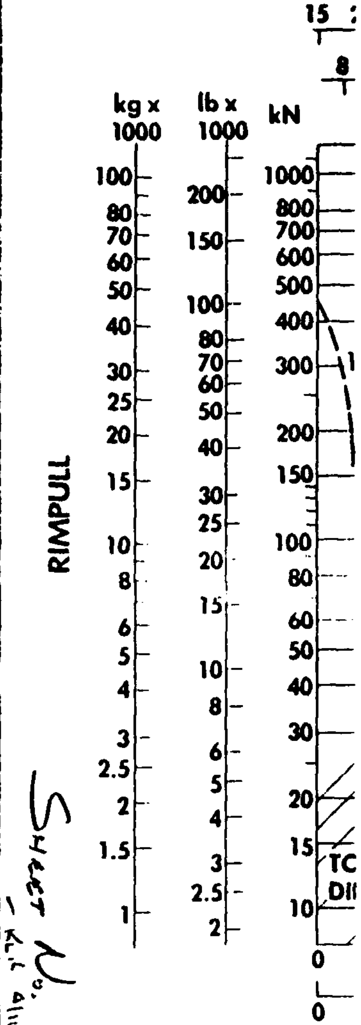
Wheel Tractor-Scrapers

627B EMPTY
- Distance vs. Ti...e
- 29.5 - 29 Tires
- Standard and Push-Pull





Vehicle empty weight: 34 430 kg (75,910 lb).



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- KLK 4/11/86

0.56 Min use .60 Min

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Cycle Time —

= load* + haul + maneuver & spread* + return
= 0.7 + 1.4 + .7 + 1.0
= 3.8 min.

*For fixed times (load, maneuver and spread) see the table below.

When cycle time and payload are known, productivity can be calculated. For a more complete example see the Earthmoving Section.

• • •

TYPICAL FIXED TIMES FOR SCRAPERS

(Times may vary depending on job conditions)

Model	Loaded By	Load Time (min.)	Maneuver and Spread or Maneuver and Dump (Min.)
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621B	One D8K	0.7	0.7
623B	Self loading	0.9	0.7
627B	One D8K	0.8	0.6
627B/PP	Self loading	0.8*	0.7
631D	One D9L	0.6	0.7
633D	Self loading	0.9	0.7
637D	One D9L	0.5	0.6
637D/PP	Self loading	0.9*	0.7
639D	Self loading	0.9	0.7
651B	Two D9L's	0.6	0.7
657B	Two D9L's	0.4	0.6
657B/PP	Self loading	1.0*	0.7

*Load time per pair, including transfer time

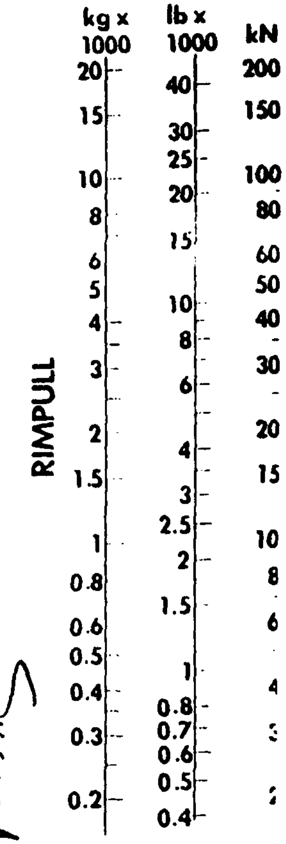
ave .75 Min

NOTE: Vehicle Empty Weights shown on the following charts includes ROPS Canopy. The travel times will remain within acceptable limits when applied to a non-ROPS equipped machine. When calculating TMPH loadings *any* additional weight must be considered in establishing mean tire loads.

Cycle Time =

Load + Haul + Maneuver + Spread + Return
.75 + .8 + .75 + .6

= 2.9 Min Cycle Time



Sheet No. 11 of 12
– KLL 4/16/85

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SUBJECT C.O.E. Buffalo District - Ottawa
Floodway Improvement Estimate

BY JDP DATE 4/9/86 PROJ. NO. 85-109-30
CHKD. BY [illegible] DATE [illegible] SHEET NO. 12 OF 12

GAI CONSULTANTS, INC.
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Environmental Specialists

Mobilization / Demobilization

Equipment

			Cost
4 Ea	Scrapers 627B's	@ $500	$2,000.00
1 Ea.	D-9 Dozer	@ $500	$500.00
1 Ea.	D-8 Dozer	@ $500	$500.00
1 Ea.	2cy Backhoe	@ $500	$500.00
1 Ea.	12 Grader	@ $200	$200.00
2 Ea.	Trailer Tanks	@ $150	$300.00

Equipment Subtotal = $4,000.00 Cost

Office

1 Ea.	Office Trailer	1.5 Month @ $400	$600.00
1 Ea.	Parts Trailer	1 Month @ $100	100.00
1 Ea	Set Up	1 Ea @ $750	$750.00
LS	Utilities		$500.00

Office Subtotal $1,950.00 Cost

Supervision

1 Ea Superintendent 6 Weeks @ $1,000.00/wk $6,000.00 Cost

Grand Total = $11,950.00 Cost
O+P × 1.25

$14,940.00

use $15,000.00

SUBJECT COE BUFFALO - OTTAWA

BY RFO DATE 5/21/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 1

gai CONSULTANTS, INC.

Engineers • Geologists • Planners
Environmental Specialists

C7.3 REAL ESTATE COSTS

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SUBJECT C/E Buffalo District Ottawa

BY KLL DATE 3/22/86 PROJ. NO. 85-109-30

CHKD. BY JHF DATE 4/16/86 SHEET NO. ____ OF ____

gai CONSULTANTS, INC.
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Environmental Specialists

Real Estate Costs

Based on telephone conversations with the Putnam County auditors office and the Soil Conservation Service • County Extension Office (Mr. Don Kimmet)

Residential Property

buildings	$16940	100% assessed value
property (land)	$1630	

based on lot 362, on Perry St near Tawa Ron

Agricultural Land

typical farmland ~ $3,000 /acre
typical bottom land ~ $1,000 - $1,200 /acre

Say $1,000 /acre for bottom land

Estimated 100 acres of land to be purchased

@ $1,000 acre

→ $100,000 first cost only

(see attached telephone memos)

TELEPHONE MEMO

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists
570 Beatty Rd. • Pittsburgh.
Monroeville, Pa. 15146
412-856-6400

Call By: KLF

of GAI

Call To: Kim, Auditor's Office 419 523 6686

of Putnam County Ohio

Project No. 83-109-30

Date: 3/6/86 Time: 9:45

Subject C/E Buffalo District Ottawa

Real Estate Values in/near Ottawa

Summary of Discussion, Decisions and Commitments

No known average values, so obtained site specific info.

Lot 362 on Perry St -- house by the Borough garage bldg, white wood-frame, 2-story, fairly typical of older homes in Ottawa

land \$1630 } 100% assessed (true value)

bldgs \$16940 }

taxes are at 35%

Our Lots 3 & 4 -- open land on right floodplain overbank of Blanchard River, just upstream of confluence with Tawa Run (between extension of Sugar & Maple Sts).

O.L. 3 \$10,000 (~0.9 ac)

O.L. 4 \$3830 (~1.3 ac)

(acreages estimated from tax map in our office).

TELEPHONE MEMO

CONSULTANTS, INC
Engineers • Geologists • Planners
Environmental Specialists
570 Beatty Rd. • Pittsburgh.
Monroeville, Pa. 15146
412-856-6400

Call By: KLF

of GAI

Call To: Terry Schroeder 419 323 5159

of SCS in Ottawa

Project No. 85-109-30

Date: 3/7/86 Time: 2:30

Subject c/e Buffalo District Ottawa
Real Estate Costs

Summary of Discussion, Decisions and Commitments

Farmland prices have dropped significantly in last few years. Top-of-his-head bottom-land (such as the Eight overbank floodplain upstream of Town Run) might run $1,000/acre, $1,200 tops. Better farmland would run $2,000/acre or more.

SUBJECT COE BUFFALO - OTTAWA

BY RFD DATE 5/21/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 1

gai CONSULTANTS, INC.

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Environmental Specialists

C7.4 AGRICULTURAL COSTS

Index

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Agricultural Costs

from telephone conversations with Mr. Don Kimmet, Putnam County Extension Office, County Agent, 4/14/86

- crops generally grown in floodplain area of concern are soybeans & field corn
- recommended rotation is 2 yrs soybeans, 1 yr field corn, repeat cycle
- harvests are usually
  - 2 yrs / 5 yrs good harvest
  - 2 yrs / 5 yrs average harvest
  - 1 yr / 5 yrs complete loss
- yields are typically as

soybeans	good harvest	40 bu/ac
	average harvest	25 bu/ac
field corn	good harvest	120 bu/ac
	average harvest	80 bu/ac

- prices currently are
  - soybeans $5.03/bu
  - field corn $2.32/bu

- "cash rental" program by federal gov't -- payment to farmers to keep land out of production
  - for similar land, $60 - $70 /ac/yr

- outright purchase of land, similar land went for $1,000/ac; good range is $1,000 - $1,200/ac

- Approximately 83.6 acres of cropland currently

SUBJECT S/R Buffalo District Ottawa

BY KL DATE 4/14/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 2 OF ______

gai CONSULTANTS, INC.

Engineers • Geologists • Planners
Environmental Specialists

Agricultural Costs

1. Outright Purchase of land

   @ $1,200/ac, 82.6 ac ≈ $99,120

2. Cash Rental Program

   @ $65/ac/yr, 82.6 ac ≈ $5,369/yr

3. Agricultural Crop Value

good harvest, soybeans	40 b/ac	@ $5.07/b	$202.80/ac
good harvest, field corn	120 b/ac	@ $2.57/b	$308.40/ac
average harvest, soybeans	25 b/ac	@ $5.07/b	$126.75/ac
average harvest, field corn	80 b/ac	@ $2.57/b	$205.60/ac

for any given year, weight by expected value

2/3	soybean	1/3	field corn
2/5	good harvest	2/5	good harvest
2/5	average harvest	2/5	average harvest
1/5	bust	1/5	bust

$$\tfrac{2}{3}\left\{(\tfrac{2}{5})(\$202.80/ac) + (\tfrac{2}{5})(\$126.75/ac) + (\tfrac{1}{5})(\$0/ac)\right\}$$

$$+\ \tfrac{1}{3}\left\{(\tfrac{2}{5})(\$308.40/ac) + (\tfrac{2}{5})(\$205.60/ac) + (\tfrac{1}{5})(\$0/ac)\right\}$$

↳ $87.88 + $68.53

↳ $156.41/ac @ 82.6 ac

↳ $12,919

TELEPHONE MEMO

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists
570 Beatty Rd. • Pittsburgh.
Monroeville, Pa. 15146
412-856-6400

Call By: Don Kimmet 419 523 6294

of County Agent, Putnam County Ohio

Call To: KLC

of GAI

Project No. 85-109-30

Date: 4/14/86 Time: 1^{30}

Subject: C/E Buffalo District Ottawa
Agricultural Economic Info

Summary of Discussion, Decisions and Commitments

Typical Land Prices, Bottomland or "Floodable Plain"
Say $\$1,000 - \$1,200$ / acre; based on recent price for similar land ~1 mile east of Ottawa, land along Blanchard River, went for $\$1,000$/ac.

Typical Yields: soybeans & field corn are crops grown:
good harvest 2/5 years
fair/average (break-even) harvest 2/5 years
complete bust, no harvest 1/5 years

gov't prices -- standard subsidy
soybeans
good harvest $40^{b}/ac$ @ $\$5^{03}/b$
average harvest $25^{b}/ac$ @ $\$5^{03}/b$

field corn
good harvest $120^{b}/ac$ @ $\$2^{37}/b$
average harvest $80^{b}/ac$ @ $\$2^{37}/b$

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Distribution: File KLC

SUBJECT COE BUFFALO – OTTAWA

BY RED DATE 5/21/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 1

GAI CONSULTANTS, INC.

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Environmental Specialists

C7.5 POWER LINE RELOCATION COSTS

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SUBJECT C/E Buffalo District Ottawa

BY K.L. DATE 4/18/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 2

GAI CONSULTANTS, INC.

Engineers • Geologists • Planners
Environmental Specialists

RELOCATION OF THE OHIO POWER COMPANY 69-kV TRANSMISSION LINE

Cost Estimates Provided by Mr. John Schrade, Public Projects Coordinator, Ohio Power Company.

option 1 Relocation of the line parallel to existing alignment (not preferred)

$77,330

option 2 Relocation of the power line along an alignment recommended by Ohio Power Company (preferred).

$143,290

see attached memos SGM to Mr. John Schrade

NOTE: Ohio Power Company much prefers option 2, due to better all-weather access and reduced rotting of poles.

TELEPHONE MEMO
(PART II)

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

Call By: SGM
of GAI

Call To: JOHN SCHRADE
of OHIO POWER COMPANY

Project No. 85-109-30
Date: 24 MAR. 86 Time: 1130 AM

Subject POWER LINE RELOCATION

calc sheet 2 of 2
memo sheet 2 of
(sheet 1 not provided)

Summary of Discussion, Decisions and Commitments

SGM: RETURNING YOUR CALL

JS: THE FIGURES ARE:

A) $77,520 FOR MOVING THE POWER LINE 50 FT TO ONE SIDE OR THE OTHER SIDE OF THE EMBANKMENT.

B) $143,290 FOR RELOCATING THE ~~FLOOD~~ 69 KV POWER LINE OUT OF THE FLOOD PLAIN.

ITEM A) WOULD NOT BE DESIRABLE IN THAT THE POLES WOULD ROT FASTER IN THE FLOOD PLAIN AND THAT IN AN EMERGENCY (FLOOD), THEY (THE POLES) WOULD BE INACCESSABLE IF DAMAGED. I'LL HAVE THIS INFORMATION PUT INTO A LETTER & SEND IT TO KLF.

*Note - see following page for latest cost estimate (Oct '86')

Distribution: ~~$~~ JRL, KLF, SGM, FILE

American Electric Power System OHIO POWER COMPANY

GENERAL OFFICE
301 CLEVELAND AVE., S. W.
P.O. BOX 400
CANTON, OHIO 44701
(216) 456-8173

October 31, 1986

Mr. Joe Hassey
U. S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207

Blanchard River, Ottawa Flood Control, Putnam County, Ohio
Kalida-East Ottawa 69 KV Line

Dear Mr. Hassey

As a result of your meeting with our Mr. D. L. Buchanan, Mr. W. P. Homan, and Mr. J. M. Stankey and your request to our Company to relocate our facilities located on the old traction right of way near the Blanchard River and north of U. S. Route 224, we have prepared and are attaching a relocation plan and a preliminary estimate as requested.

Our proposal is to build a new 69 KV line from our Ottawa Station near Sugar Street and Fourth Street south to State Route 224, then west along State Route 224 for a distance of approximately 4,000 feet to Pole 4184-563/24. Distribution work would also be involved. A rough cost estimate to do this work would be $222,855 and does not include right of way acquisition.

Your suggestion to move our pole line off of the traction right of way onto the flood plain would not be practical for the following reasons:

1. Our pole line would be inaccessable during floodstages (we are now able to drive the entire length of the traction right of way to maintain the pole line).

2. Much of the surrounding floodplain is swampy with standing water year round. Setting and maintaining a pole line would be difficult and expensive.

Please review the preliminary estimate and advise us as to your future plans.

Cordially,

OHIO POWER COMPANY

John Schrade, Jr.

John Schrade, Jr.
Public Projects Coordinator

sel
Attachments

SUBJECT COE BUFFALO - OTTAWA

BY RED DATE 5/21/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 1

GAI CONSULTANTS, INC.

Engineers • Geologists • Planners
Environmental Specialists

C7.6 ANNUAL MAINTENANCE Plan B

Index

SUBJECT C/E Buffalo District Ottawa

BY KL DATE 4/17/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 1 OF 6

GAI CONSULTANTS, INC.
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Estimate Maintenance for Plan B

Costs assume purchase of floodway lands

Approximately 100 Acres of floodway Area (floodplain)
Approximately 29.3 Acres of Channel Bank Area

Maintenance Items

1. snagging in channel
2. maintenance of banks
3. maintenance of floodway

1. Snagging in Channel

Initial Cost is $70,532, or approximately $2.26/LF, at a production rate of 1000 LF/day, 25,555 LF total (see "Clearing & Snagging Cost Estimate", JDP)

↳ 26 days (effective)

↳ $2713 / day work only

Assume bi-annual snagging costs equal 1 day's work, using available equipment (since channel banks have been cleared, the work should be facilitated).

Annual snagging $2713
say $2,800 for clean-up, revegetation . . .
(on-site burning is assumed).

SUBJECT C/E Buffalo District Ottawa
Maintenance Costs
BY KLK DATE 4/17/86 PROJ. NO. 33-109-30
CHKD. BY ______ DATE ______ SHEET NO. 2 OF 6

GAI CONSULTANTS, INC.
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Plan B -- Maintenance Cost Estimate

Further, Assume a major snagging operation every 10 years, with work lasting 3 days

using a daily rate of $2333/day for 3 days

$7,000

Ottawa Ohio Clearing And Snagging Maintenance Costs

Annual Interest Rate	8.625	.08625
Cl&sng Costs Every 2 Years	2800	
Major Clr&Sng every 10 Yrs	7000	

PROJ YEAR	CLRING COSTS	MAJOR CLRING COSTS	TOTAL CLRING COSTS	PRS WRTH $ IN FUT	PRES WORTH
2	2800		2800	.8475014	2373
4	2800		2800	.7182586	2011
6	2800		2800	.6087252	1704
8	2800		2800	.5158954	1445
10	2800	7000	9800	.4372221	4285
12	2800		2800	.3705463	1038
14	2800		2800	.3140385	879
16	2800		2800	.2661481	745
18	2800		2800	.2255609	632
20	2800	7000	9800	.1911632	1873
22	2800		2800	.1620110	454
24	2800		2800	.1373046	384
26	2800		2800	.1163658	326
28	2800		2800	.0986202	276
30	2800	7000	9800	.0835808	819
32	2800		2800	.0708348	198
34	2800		2800	.0600326	168
36	2800		2800	.0508777	142
38	2800		2800	.0431189	121
40	2800	7000	9800	.0365434	358
42	2800		2800	.0309705	87
44	2800		2800	.0262476	73
46	2800		2800	.0222449	62
48	2800		2800	.0188526	53
50	2800	7000	9800	.0159776	157
					20664
		PART PAYMENT FACTOR			.0876504
		AVE ANN $ VALUE			1811

SUBJECT C/E Buffalo District Ottawa

BY KL DATE 4/17/86 PROJ. NO. 35-109-30

CHKD. BY DATE SHEET NO. 3 OF 6

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Plan B -- Maintenance Cost Estimate

$\therefore \quad F_A = \$1,999,370 \qquad (\$2,183,570)$

$F_P = \sum P(1+i)^n$

$P = \$9,000$
$i = 0.08625, (0.08875)$
$n = 40$ yrs
30 yrs
20 yrs
10 yrs
0 yrs

$F_P = \$246,730 + \$107,080 + \$47,080 + \$20,580 + \$9,000$
$(\$270,000 + \$115,370 + \$49,300 + \$21,060 + \$9,000)$

$\therefore \quad F_P = \$430,620 \qquad (\$464,730)$

TOTAL $= F_A + F_P = \$2,430,000 = F \qquad (\$2,648,300)$

Annual Costs of Total O&M Costs for Snagging

$$AC = \frac{i}{(1+i)^n - 1} \times F$$

$n = 50$ years
$i = 0.08625, (0.08875)$
$F = \$2,430,000, (\$2,648,300)$

$AC \approx \$3,400 \qquad (\$3,700)$

SUBJECT C/E Buffalo District Ottawa

BY KLF DATE 4/17/86 PROJ. NO. 83-107-30

CHKD. BY DATE SHEET NO. 4 OF 6

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Plan 7D -- Maintenance Cost Estimate

2. Maintenance of Banks

annual maintenance should be sufficient

mowing by tractor with cutting arm + extension, similar to road berm mowing

Tractor Rate	\$100 / day
Operator Rate	\$18 / hr ≈ \$144 / day
Total	\$244 / day

Tractor Production Rate (Mowing) ~ 1 mph (net)
(slow due to conditions) ≈ (1.5 fps, ok)

Quantity: 23,333 Lf
Assume 4 passes

$$4 \text{ passes} \times 23{,}333 \text{ Lf} \cdot \frac{1 \text{ mile}}{5280 \text{ Lf}} \times \frac{1 \text{ hr}}{1 \text{ mile}} \times \frac{1 \text{ day}}{8 \text{ hrs}} \times \frac{\$244}{1 \text{ day}}$$

\$590 / mowing

Assume 1 mowing / ~~1~~ 2 months
May to October ≈ 4 mowings

~~2,360~~

1770

SUBJECT C/E Buffalo District Ottawa

BY KLL DATE 7/17/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 5 OF 6

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Plan B -- Maintenance Cost Estimate

3. Maintenance of floodway

annual maintenance should be sufficient

tractor mowing (cylinder mower)

100 acres ≈ 4,356,000 SF

tractor production rate 7.5 mph (rel. includes turning)

cylinder cutting swath ~ 6 ft

for 1 hour, production ≈ 237,600 SF/HR

4,356,000 SF @ 237,600 SF/HR

↳ 18.3 HRS

Assume 3 mowings/yr ⇒ 55 hrs

Tractor Rate @ $244/day

$\frac{55\text{ hrs}}{8} = 18.3 \times 3 = \frac{55}{8} = 6.9$

$6.9 \times 244 = 1684$

$1700/year

Project O+M Costs

Plan VII and Non Structural

pC97 p48

CLEARING + SNAGGING

2	2800
4	2800
6	2800
8	2800
10	~~[illegible]~~ + 8,000
↓	
50	

$ $\boxed{1600}$

BANK MOWING ~~2,360~~ = $\boxed{1770}$

$\boxed{1678}$

FLOODWAY - MOWING ~~2,6~~

4,060

Clearing + Snagging	1,811
Bank Mowing	1,770
Flooding Mowing	1,684
Non Struct	1,600
	6,865

12,500
- 6,859
= 5,641

$\frac{136,100}{135,200} = 1.00$

SUBJECT C/E Buffalo District Ottawa

BY KLK DATE 4/17/86 PROJ. NO. 85-109-30

CHKD. BY ______ DATE ______ SHEET NO. 6 OF 6

GAI CONSULTANTS, INC.

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Estimate Annual O & M Costs for Plan B (Alternative VII)

Snagging ~~$3,400~~ $1,700 ($3,700) sheet 3

Clearing

banks ~~$2,300~~ $1,770

Floodway ~~$2,800~~ $811

Subtotal ~~$3,560~~ $5265 ($8,860)

@ 8 3/8 % @ 8 7/8 %

Note: this estimate is valid for use in Alternatives I, III, V, VI.

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX D

GEOTECHNICAL DESIGN

U.S. ARMY ENGINEER DISTRICT, BUFFALO
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

APRIL 1986

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO
APPENDIX D
GEOTECHNICAL DESIGN

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TABLES

PLATES

MAUMEE RIVER BASIN, INDIANA AND OHIO
RE-EVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX D

GEOTECHNICAL DESIGN

D1. INTRODUCTION

The purpose of this Appendix is to present the subsurface investigation, laboratory testing data, geotechnical analysis and preliminary recommendations for the flood control study at Ottawa, Ohio. The flood control study encompasses a re-evaluation of the initially proposed flood control measures, a feasibility study on the current flood control measures and plans and a preliminary design analysis of the structures involved.

The "Maumee River Basin, Indiana and Ohio, Interim Survey Report on Flood Control on the Blanchard River at Ottawa, Ohio" dated 20 November 1964 (Paragraph D6, Reference 1) contained the detailed information and test data in Appendix E, "Soils Investigation" that was carefully reviewed and incorporated into the development of this Geotechnical Design Appendix.

For the purpose of this re-evaluation study, the term "Dike" is employed to define an earth embankment whose sole purpose is to provide the required freeboard (3.5 feet or less) for the existing ground surface elevation during the 99-yr. flood conditions. A "Levee" is an earth embankment whose primary purpose is to provide normal flood protection from seasonal highwater for periods of only a few days or weeks a year.

As a result of this study, it was determined that any plan containing levees or floodwalls would be economically infeasible. To support this conclusion, Plan A was evaluated in detail. Sections D2 through D5 contain the applicable geotechnical analysis used for the levees and floodwalls. Plans B and E, do not contain either levees or floodwalls, and thus the geotechnical analysis contained herein are not directly applicable.

D2. SUBSURFACE INVESTIGATION

D2.1 Background.

The subsurface soils investigation performed in August 1962, for the 1964 Interim Survey Report included borings made for the City of Ottawa's sanitary sewer project of 1953. This information, along with three hand auger borings made in 1986, provided the subsurface information about the project area for this re-evaluation study.

On February 12 and 13, 1986, three-inch diameter hand auger holes were drilled to estimate the soil profiles of the abandoned Perry Street embankment, located at the south end of Perry Street, and the abandoned railroad embankment located west of the west end of W. Fourth Street. These borings were made in order to determine the suitability of the aforementioned embankments as sources of borrow material for potential dike and levee construction in the event that removing these embankments would establish a more efficient floodway.

D2.2 Geology.

The geologic data contained in Paragraph 2, Appendix E of the interim survey report (see Paragraph D6, Reference 1) was reviewed during preparation of this re-evaluation study. This data was not included since it was not considered pertinent to this appendix.

D2.3 Field Investigation.

The field investigation consisted of 3 hand auger borings drilled on February 12 and 13, 1986. Boring HA-1 was drilled into the west slope of the abandoned Perry Street embankment for a depth of 7.2 feet. Borings HA-2 and HA-3 were drilled into the crest of the abandoned railroad embankment to depths of 9.7 feet and 6.7 feet, respectively.

Soil samples were collected of the various types of soil encountered in each boring. A summary of the hand auger boring logs is given in Table D1, and their locations are shown on the boring location plan, Plate B1.

Table D1 - Summary of Hand Auger Boring Logs

Auger Boring	Soil Description	Depth Below Surface
HA-1 (El. 726.4)	Dark Brown Silty Clay	0 to 3.5 ft.
	Dark Brown Clayey Silt	3.5 ft. to 7.2 ft.
HA-2 (El. 725.2)	Dark Brown Silt; Some Clay and Coarse Sand, Trace Gravel	0 to 2.0 ft.
	Dark Brown Sand; Trace Silt and Gravel	2.0 ft. to 2.7 ft.
	Dark Brown Clayey Silt; Some Sand Trace Gravel	2.7 ft. to 4.4 ft.
	Dark Brown Silt and Clay	4.4 ft. to 6.8 ft.
	Dark Brown Silt; Some Clay, Trace to Some Fine Sand	6.8 ft. to 9.7 ft.
HA-3 (El. 727.5)	Dark Brown to Black Silt; Some Sand, Coal Frags and Cinders	0.0 to 1.0 ft.
	Dark Brown Clayey Sand	1.0 ft. to 2.3 ft.
	Dark Brown Sand; Some Silt	2.3 ft. to 3.0 ft.
	Dark Brown Sandy Silt	3.0 ft. to 4.4 ft.
	Dark Brown Silt; Trace Clay, Some Sand Seams at 4.4 to 5.0 ft.	4.4 ft. 6.5 ft.
	Dark Brown Silt; Some Clay	6.5 ft. to 6.7 ft.

D2.4 Subsurface Investigation.

The soil encountered in HA-1 consisted of fill comprised of a 3.5 feet thick zone of dark brown silty clay above a dark brown clayey silt zone. The boring was not augered deep enough to encounter the naturally-deposited flood plain soils. The soils encountered in HA-2 consisted of granular fill over top of a cohesive fill. The fill zone was underlain by naturally-occurring flood plain soil (alluvium). The granular fill is comprised of layers of dark brown clayey sand and a dark brown sand with some gravel and silt. The cohesive fill is comprised of layers of dark reddish-brown clayey silt with some sand and trace gravel and a dark reddish-brown silty clay with trace sand. The alluvium consists of a dark reddish-brown silty clay with traces of staining. The soil stratum encountered in HA-3 was similar to that found in HA-2. The granular fill is comprised of a dark brown to black silt with some sand, coal fragments and cinders, a dark brown clayey sand, a dark reddish-brown clayey sand with gravel and a dark reddish-brown silty sand with trace gravel. The alluvium is a dark reddish-brown silty clay with traces of staining.

D3. LABORATORY TESTING

Laboratory tests were conducted on the bag samples collected from the auger cuttings in Borings HA-1, HA-2, and HA-3. Natural water contents were performed on each type of soil sampled.

A grain-size analysis, without hydrometer analysis, was performed on Samples S-1 and S-2 from Boring HA-2 and Sample S-1 from Boring HA-3.

Laboratory tests were conducted on the soils in order to determine the material's suitability as borrow for levee construction. To simulate the blending of the soil as a result of excavation, transport and recompaction, soil samples comprised of equal parts by weight were blended for the cohesive soils encountered at each boring. Each blend had a water content, grain-size analysis, including hydrometer analysis, and an Atterberg Limits test performed. Constant head permeability tests were run on the blends from borings HA-1 and HA-2. The samples for the constant head permeability tests were compacted at natural moisture content and according to Standard Proctor specifications (ASTM D-698, Method A).

After reviewing the results of the grain-size analysis on the blend from HA-3, a constant head permeability test was not performed as this material would not be recommended for levee construction.

A summary of the laboratory test results is contained in Table D2.

Table D2 - Summary of Laboratory Test Results

Boring and Samples Numbers	Sample Depth (ft)	Material Description		Natural Water Content (%)	Grain Size Analysis with or w/out Hydrometer	Atterberg Limits: Liquid Limit (%)	Atterberg Limits: Plastic Limit (%)	Atterberg Limits: Plasticity Index (%)	Unified Soil Classification Symbol	Permeability Data: Initial Water Content (%)	Permeability Data: Initial Dry Density (pcf)	Permeability Data: Coefficient of Permeability (ft/min)
HA-1 S-1	0-3.5	Silty Clay	(4)	30.7	-							
Ha-1 S-2	3.5-7.2	Clayey Silty, trace Shell Fragment	(4)	21.6	-							
HA-1 Blend(1)	0-7.2	Silty Clay, some Fine Sand	(5)	24.5	with	48.1	26.6	21.5	CL-ML	24.5	95.7	5.79×10^{-8}
HA-2 S-1	0-2.0	Clayey Sand	(5)	15.3	w/out							
HA-2 S-2	2.0-2.7	Sand, some Gravel and Silt	(5)	10.2	w/out							
HA-2 S-3	2.7-4.4	Clayey Silt, some Sand, trace Gravel	(4)	15.1	-							
HA-2 S-4	4.4-6.8	Silty Clay, trace Sand	(4)	23.9	-							
HA-2 S-5	6.8-9.7	Clayey Silt	(4)	27.5	-							
HA-2 Blend(2)	2.7-9.7	Sandy Lean Clay	(5)	22.8	with	37.1	19.6	17.5	CL	22.8	100.7	2.81×10^{-8}
HA-3 S-1	2.3-3.0	Clayey Sand with Gravel	(5)	13.0	w/out							
HA-3 S-2	3.0-4.4	Silty Sand, trace Gravel	(4)	14.8	-							
HA-3 S-3	4.4-6.5	Silty Clay	(4)	24.5	-							
HA-3 Blend(3)	3.0-6.5	Clayey Sand	(5)	18.7	with	35.3	18.7	16.6	SC	-	-	-

NOTES:

(1) Sample comprised of equal parts of soil by weight from samples HA-1, S-1 and HA-1, S-2.

(2) Sample comprised of equal parts of soil be weight from samples HA-2, S-3; H-2, S-4 and H-2, S-5.

(3) Sample comprised of equal parts of soil be weight from samples HS-3, S-2 and HA-3, S-3.

(4) Material description based upon visual classification.

(5) Material description based upon visual classification and grain size analysis.

D4. ANALYSIS

D4.1 General.

For flood control at Ottawa, Ohio, compacted-earth fill levees and dikes and I-walls were considered. A dike would extend upstream on either bank of Tawa Run from the Chessie System culvert to the Grand Trunk Western Railroad embankment. The main levee section would extend from the Ottawa Village Maintenance Building, located off Perry Street on Tawa Run, around the perimeter of the Ottawa to the west side of the Chessie System Railroad embankment on the Blanchard River. There would be two other sections of levee east of the Oak Street bridge. The I-wall sections would be used along Tawa Run between the west side of Elm Street and the east side of Perry Street and along the Blanchard River between the east side of the Chessie Railroad embankment and the west side of the Oak Street Bridge. The I-wall would continue on the east side of the Oak Street Bridge for 300 feet and then transition to a compacted earth fill levee for 460 feet. An I-wall would resume for 600 feet at the end of this levee, then transition to another levee for 750 feet, and then transition to an I-wall for 1,980 feet where it would be tied into the west side of the Grand Trunk Western Railroad embankment.

D4.2 Dikes.

The dikes along Tawa Run would be necessary to accommodate the freeboard requirements for the 99-year flood elevation of approximately 728.4 (feet, NGVD). The natural ground surface in this area is elev. 725 or higher. Due to the magnitude of the dike height (3 feet or less), inspection trenches, seepage analysis and slope stability analysis would not be necessary as these items are for the mainstream levee.

D4.3 Levees.

Levees considered from Perry Street to Oak Street were analyzed for maximum uplift gradient, underseepage and uplift by pervious substratum and unsteady state seepage. Sections of levee east of Oak Street were not analyzed in this phase but are similar in location and geometry to the levee previously investigated (see Paragraph D6, Reference 1).

The stability analyses performed during the Interim Survey study utilized a trapazoidal cross-section with a 10-foot wide crest and 2.5H:1V riverward and landward side slopes with the factor of safety for a deep-seated failure at 2.45. This same cross-section was assumed for the current study, but with a minimum berm distance of 50 feet between the riverward toe and the existing channel bank crest. The Blanchard River channel bank is not being modified as it was in the Interim Survey study, therefore the channel side slopes will remain at approximately 3.75H:1V. The required height of the levee was correspondingly decreased. These changes from the levee and channel cross sections in the Interim Survey study assist in developing a cross-section for this study that is no less stable than the one in the Interim Survey study analysis. Therefore, additional slope stability analyses were not necessary during this re-evaluation study.

The maximum uplift gradient was analyzed for the landward toe of the levee assuming any sand layers, that were evident in the borings from the Interim Survey Report, to be a reservoir and develops full hydrostatic pressure from the 100-year flood pool. Most areas of the levee met the criterion of the allowable uplift gradient (i_a) to be less than or equal to 0.5. Two areas that did not meet the criterion were the levee considered at the south side of the Main Street trailer court and at the north end of Maple Street near Tawa Run. A third location, at the south end of Walnut Street near the Blanchard River, did not meet the criterion but the inspection trench will cut off the sand layer and reduce the possibility of seepage through the sand layer.

Underseepage and uplift by pervious substratum analysis was performed in accordance with Appendix B of the Engineer Manual EM 1110-2-1913, 31 March 1978, "Design and Construction of Levees", (see Paragraph D6, Reference 4). The assumptions used in this analysis were similar to those stated in Section B2 of Appendix B, EM1110-2-1913. Analysis was based on an impervious top stratum both riverside and landside and an assumed seepage block occurring at the landward toe. At a levee section at the west end of W. Third Street, the seepage at the landward toe was estimated to be 4.0×10^{-3} ft^3/hour per unit foot of levee and at a levee section at the north end of Maple Street, near Tawa Run, the seepage at the landward toe was estimated to be 3.2×10^{-2} $feet^3$/hour per unit foot of levee. For the levee section at the end of W. Third Street, subsurface information exists as to locate the pervious substratum and to estimate of the uplift gradient (i_a) to be 0.4. However, for the section at the north end of Maple Street, near Tawa Run, little subsurface information exists concerning the actual pervious substratum. The substratum location and the vertical coefficient of permeability were based on data from Appendix E, Boring 8-62 of the Interim Survey study (see Paragraph D6, Reference 1).

Unsteady state seepage was based on the assumed coefficient of permeability of the recompacted on-site borrow material (Appendix E; Boring 6-62, Samples S-3 and S-5 and Boring 9-62, Sample S-2 of Reference 1) of 1×10^{-7} feet/minute and an assumed effective void ratio. Following the analysis procedures of Huang of Reference 2, it is estimated that steady state seepage would not develop in the short (2-day) flood water inundation period experienced by the levee. The calculations show that seepage from the riverward levee slope would take approximately 45 years to reach the landward toe for a 4-foot high levee and approximately 54 years to reach the landward toe for a 9-foot high levee.

D4.4 Flood Walls.

Flood walls were investigated for flood protection at various locations mentioned in Section D4.1 of this appendix. The I-wall type is recommended because the difference between existing ground surface elevation and the top of the I-wall (including 3 feet of freeboard) is less than 10 feet at the proposed locations. The flood wall would be a cantilever sheet pile of PZ27 section with a reinforced concrete crown. The reinforced concrete crown would be 12 inches wide at the top, increasing to 24 inches at ground surface. The 24-inch wide portion of the crown is extended 3 feet below ground surface to provide adequate protection against potentially damaging frost heave.

A flood wall between the Chessie railroad bridge and the Oak Street bridge adjacent to the Blanchard River was analyzed to determine the approximate sheet pile embedment depth. Test data from the Interim Survey study, using Boring 2-62, Sample 7, was used to obtain total unit weight of soil of 130 pcf and total stress parameters of cohesion (c) = 2.0 TSF and internal angle of friction (ϕ) = 0.0°. For a 99-year flood wall height of 7 feet, the required embedment depth is approximately 6.3 feet. When considering seepage along and through the sheet pile, an embedment depth of 12.1 feet is required. If hydrostatic forces remain against the crown of the I-wall long enough for effective stress soil parameters to develop, c = 0.0 TSF and ϕ = 25°. With these parameters, the solution for hydrostatically loaded cantilevered walls in granular soil (Teng; see Paragraph D6, Reference 3), requires an embedment depth for a wall height of 7 feet to be 14.5 feet.

D5. RECOMMENDATIONS

D5.1 Borrow Material.

Most of the soils encountered in the abandoned Perry Street and railroad embankments would be acceptable for levee construction. However, zones of granular material exist in the railroad embankment and should not be used in levee construction. This granular material could be used for dike construction along Tawa Run or berm fill at the landward toe of the levee.

D5.2 Dikes.

Category I (compacted) or II (semi-compacted) construction methods as defined in Chapter 7, Section I, Table 7-1 on page 7-2 of Reference 4 (see Paragraph D6) should be utilized for dike construction.

D5.3 Levees.

Berms are required on the landward toes in the areas mentioned in Section D4-3 were the allowable uplift gradients are greater than 0.5. For a final levee alignment, additional subsurface information is required where the levee has been proposed for this re-evaluation study from the alignment used in the interim survey report (Paragraph D6, Reference 1).

D5.4 Flood Walls.

For final I-wall design, effective stress parameters must be determined at the wall locations along with any horizontal earth pressures that could develop against the embedded portion of the sheet pile due to existing adjacent structures (i.e. Ottawa Feed and Grain storage silos).

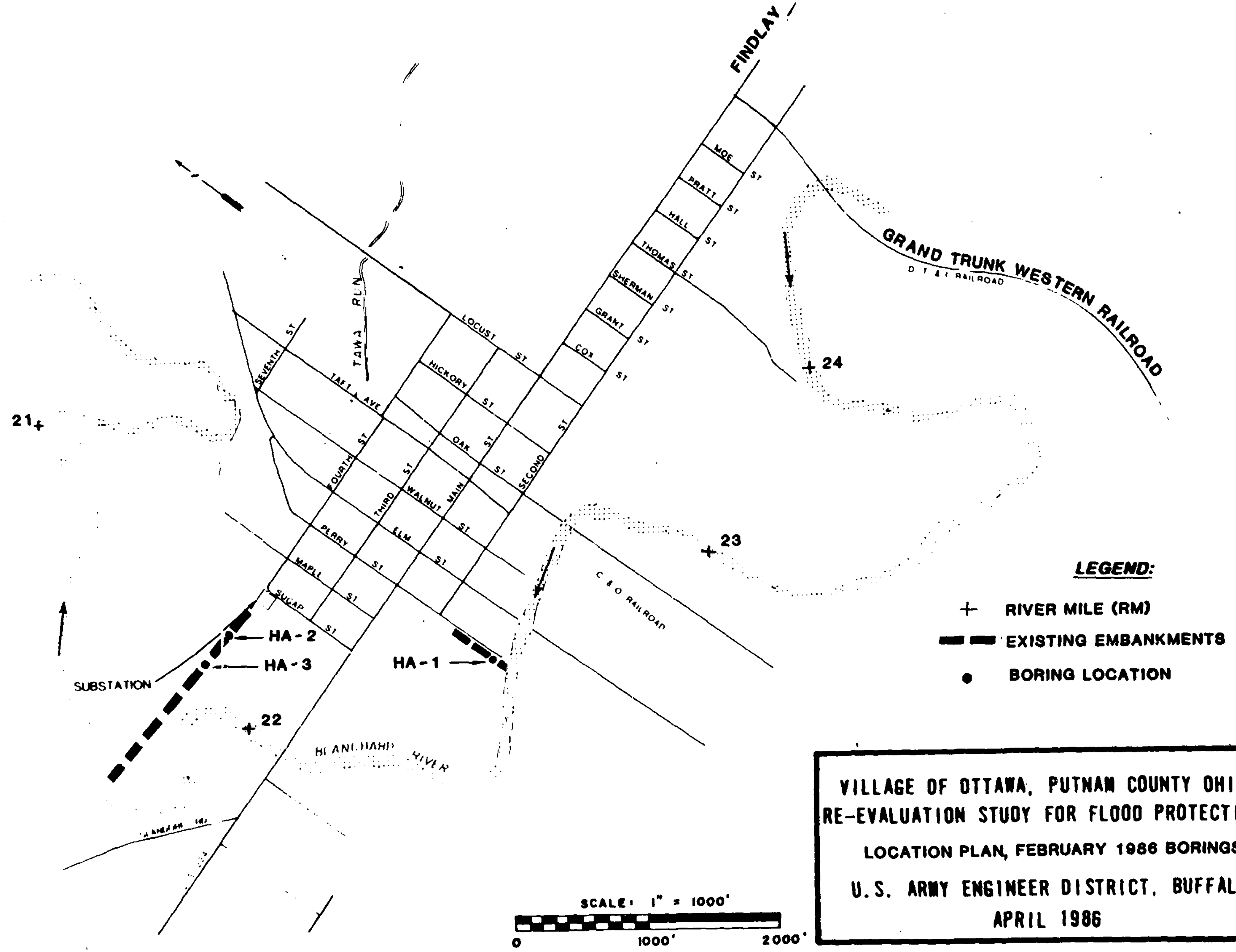
D6. REFERENCES

1. "Maumee River Basin, Indiana and Ohio, Interim Survey Report on Flood Control on the Blanchard River at Ottawa, Ohio", U.S. Army Engineer District, Detroit, Detroit, Michigan, dated 1964.

2. Huang, Y. M., "Unsteady State Phreatic Surface in Earth Dams", J. of Geotechnical Engineering, ASCE, Vol. 112, No. GT1, January 1986, pp. 93-98.

3. Teng, Wayne C., Foundation Design, Prentice-Hall, Inc. Englewood Cliffs, New Jersey, 1965, pp 359-362.

4. Engineer Manual, EM 1110-2-1913, 31 March 1978, "Design and Construction of Levees," Department of the Army, Office of the Chief of Engineers, Washington, D.C.



VILLAGE OF OTTAWA, PUTNAM COUNTY OHIO
RE-EVALUATION STUDY FOR FLOOD PROTECTION
LOCATION PLAN, FEBRUARY 1986 BORINGS
U.S. ARMY ENGINEER DISTRICT, BUFFALO
APRIL 1986

PLATE D1

MAUMEE RIVER BASIN, INDIANA AND OHIO
REEVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX E

PUBLIC INVOLVEMENT AND PERTINENT CORRESPONDENCE

U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, New York 14207

August 1986

MAUMEE WATERSHED CONSERVANCY DISTRICT
FIRST FEDERAL BUILDING, ROOM 309
601 CLINTON STREET
DEFIANCE, OHIO 43512
PHONE (419) 782-8746

August 8, 1986

Colonel Daniel R. Clark
District Commander
U. S. Army Engineer District-Buffalo
1776 Niagara Street
Buffalo, NY 14207

Re: Village of Ottawa
Flood Protection Plan

Dear Colonel Clark:

As per my meeting with Mr. Joe Hassey of your office, and Mayor Mackie of the Village of Ottawa, on Tuesday July 15, 1986, following are my comments regarding flood protection alternative plans which were proposed by GAI Consultants, Monroeville, PA, at their presentation to Village of Ottawa officials and residents on March 19, 1986.

It is my conclusion that Alternative Plan VII, (Selected Plan E), which consists of clearing and snagging the channel within the corporate limits, removal of two abandoned railroad embankments at the end of Fourth Street extended west and Perry Street extended south, and clearing of the floodway is the only plan that has an effective cost/benefit ratio, and seems to be the only plan that is esthetically acceptable to Village of Ottawa officials and local residents.

It is my understanding that cost participation for the structural portion of the plan would be 75% federal and 25% local. The non-structural improvements (flood gauges at Oak Street in Ottawa and in Findlay) which have been proposed would also be 75% federal and 25% local cost participation.

This proposed plan is acceptable to the District, provided the Village of Ottawa concurs in its acceptability.

Sincerely,

Melvin H. Wachtmann

Melvin H. Wachtmann
Executive Officer

MHW
cc: Village of Ottawa

Flood control plan favored

A flood control plan for Ottawa calling for removal of two natural barriers along the Blanchard River Valley inside the village's corporation limits has apparently won the favor of United States Army Corps of Engineers officials.

Ottawa village officials learned last week that a proposed river flood control plan calling for elimination of abutments leading to the sites of two former bridges would be approved.

The abutments are at the sites of the former South Perry Street bridge and at the former Findlay and Fort Wayne Railroad bridge west of West Fourth Street.

A public hearing in mid-March by the U.S. Army Corps revealed that west side residents did not favor proposals calling for installation of dikes along the Blanchard River and Tawa Run.

Engineer Joseph Hassey, along with Karey L. Frech and John R. Lesnik of G.E.I. Associates of Pittsburgh, PA. learned that Ottawa residents attending the public hearing on flood control proposals favored removal of the bridge abutments.

The proposal, which also calls for snagging the Blanchard River and clearing its north and east banks, was one of seven studied by the U.S. Army Corps and the private engineering firm.

Plans also include use limitations for the flood plain between the river's intersection with Tawa Run, on the village's west side, and the present South Oak Street bridge.

It was also the one ultimately recommended as most economically feasible by the engineers during the mid-March meeting.

Had the two bridge abutments been removed and the floodway cleared of crops and underbrush during the time of the 1981 flood, studies indicated that the river would have crested 1½ feet lower.

Engineering studies showed that the Blanchard River's fall within the village's corporation limits amounted to only three feet within four miles.

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF

NCBPD

SUBJECT: Possible FY87 New Start - Blanchard River-Ottawa, OH

Mr. Melvin H. Watchman
Executive Officer and Secretary-Treasurer
Maumee Watershed Conservancy District
601 Clinton Street
First Federal Building
Defiance, OH 43512

Dear Mr. Watchman:

The Blanchard River-Ottawa, OH study is one of a number that the Corps of Engineers has under consideration as a potential new Advanced Engineering and Design (AE&D) planning start in Fiscal Year 1987. However, as you probably are aware, efforts to control the budget deficits have limited the amount of Federal funds made available for such programs as development of water resources. Also, this Administration and Congress believe that a higher degree of non-Federal cost sharing and financing of water projects is both desirable and necessary to put the water program on a sound basis.

To stretch funds that may be made available for new AE&D planning starts, the Corps is seeking to work with those potential project sponsors who are willing to increase their share of the construction and financing costs and jointly move ahead in implementing their project which may be implemented as a result of this study. These cost sharing and financing arrangements would be consistent with S. 366, as reported out by the Senate Environment and Public Works Committee on July 18, 1985, which reflects a compromise previously reached between the Administration and the Senate majority leadership.

We would like to discuss with you the possibility of proceeding with the Blanchard River-Ottawa, OH study which may result in project implementation under these project cost sharing arrangements. To that end, Mr. Joseph C. Hassey of my Plan Formulation Branch has arranged for a meeting with you, to be held in the Council Chambers in Ottawa on 25 September 1985 at 1:00 p.m. The purpose of this meeting is to discuss the new study start program and what would be involved in the construction of the resulting project. To assist you in preparing for this meeting, I have enclosed: (1) A copy of the "Cost Sharing and Financial Requirements" table as contained in S.366 with the applicable Administration/Senate cost-sharing arrangement for the Ottawa flood control project identified in yellow (Enclosure 1); (2) A "Sample Letter of Assurance" for your consideration in replying to this letter (Enclosure 2); and (3) A copy of our recently completed "Preliminary Assessment Report on the Ottawa, OH flood control project (Enclosure 3).

Any AE&D study that we may include in the Fiscal Year 1987 budget is subject to review and approval by both the OMB and the Congress. However, I might point out that the House of Representatives has under consideration a bill which also will increase the non-Federal share of project funding; this bill needs to be reconciled with the Administration/Senate majority leadership bill. Of course, we fully understand that you will want to weigh the advantages and disadvantages in your own situation, as well as all the options open to you. Whether or not you wish to support initiation of the study is entirely your option.

In any case, I want to offer what I believe is a realistic program for moving ahead with good water projects in Fiscal Year 1987. I hope that our meeting with you on the 25th will assist to clarify questions you may have regarding non-Federal cooperation required for the Ottawa, Ohio project. It is important that we expedite these matters if the study is to be a candidate for the Fiscal Year 1987 program now being developed.

Correspondence pertaining to this matter should be addressed to the District Commander, U.S. Army Engineer District, Buffalo, 1776 Niagara Street, Buffalo, NY, ATTN: Mr. John Zorich. If you have any questions or require additional information, please contact Mr. Zorich, Chief of my Planning Division at (716) 876-5454, extension 2274.

The Buffalo District — Leadership in Engineering.

Sincerely,

DANIEL R. CLARK
Colonel, Corps of Engineers
District Commander

3 Enclosures
as stated

Copy Furnished:
Mr. Robert Lucas, Corps Liaison (w/o Encl.)
Ohio Department of Natural Resources
Fountain Square
Columbus, OH 43224

SAMPLE LETTER OF ASSURANCE FOR THE BLANCHARD RIVER-OTTAWA, OH
FLOOD PROTECTION PROJECT

Colonel Daniel R. Clark
District Commander
U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, NY 14207

Dear Colonel Clark:

Reference is made to your letter of 13 September 1985, and to our discussions regarding initiation of Advanced Engineering and Design (AE&D) that may lead to construction of the Blachard River-Ottawa, OH flood protection project held on 25 September 1985. This letter constitutes an expression of intent by the Maumee Watershed Conservancy District to cooperate with the Federal Government in initiating construction of the Blanchard River-Ottawa, OH flood protection project as soon as possible.

I have reviewed the current Preliminary Assessment Report, dated July 1985, and the project cost sharing arrangements that you now believe will be applicable at the time of construction. Based on my analysis of this information, I would be required to do the following:

a. Provide, without cost to the United States, all lands, easements, and rights-of-way necessary for the construction and subsequent maintenance of the project, as required;

b. Hold and save the United States free from damages due to construction of the project except for damages due to the fault or negligence of the United States or its Contractors;

c. Maintain and operate the project, or integral parts, after completion in accordance with regulations prescribed by the Secretary of the Army;

d. Provide, without cost to the United States, all alterations and relocations of existing improvements including bridges, highways, buildings, utilities, sewers, and other facilities;

e. Comply with the applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, "Public Law 91-646, approved 2 January 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with the said Act; and

f. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (PL 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 and operation of the project.

Since the Maumee Watershed Conservancy District is the agency empowered by law to provide the non-Federal cooperation required for the Blanchard River-Ottawa, OH flood protection project, I thereby inform you that it is our intent to enter into a binding written agreement with appropriate representatives of the Corps of Engineers which addresses project construction and satisfies the requirements of Section 221 of Public Law 91-611 prior to construction. Attached as Exhibit A is an assessment of the Maumee Watershed Conservancy District's ability to pay the non-Federal portion of costs for the project.

It is further understood that if this letter of assurance is acceptable to the ASA(CW), he will recommend to the Office of Management and Budget that an appropriate request for funds to initiate study for (AE&D) be included in the President's budget for Fiscal Year 1987. In the event that the share of project construction costs assigned to me are substantially modified by future legislation or administrative action, I reserve the right to reconsider my position.

Sincerely,

MELVIN H. WATCHMAN
Executive Officer and Secretary-Treasurer
Maumee Watershed Conservancy District

FACT SHEET

FOR

25 September 1985 Coordination Meeting on "Letter of Assurance" with Maumee Watershed Conservancy District and other Local Interests

1. Project Name: Ottawa, Ohio

2. Congressional District: 5 - Delbert Latta

3. Project Description: The present plan consists of earth levees on both banks of the Blanchard River near the west side of the village, channel improvement work downstream of the Main Street Bridge, snagging and clearing between the Grand Truck Western bridge and Main Street bridge, and the installation of storm sewer check valves.

4. Project Costs (1985 Price Level): (9-month construction period)

	Traditional	Administration/Senate Agreement (75/25)	(65/35)
Federal	$864,000	$657,000	- $569,400
Non-Federal	12,000	219,000 (1)	306,600 (2)
Total	$876,000	$876,000	$876,000

(1) Credit may be given for lands, easements, and rights-of-way ($12,000). The $219,000 represents cash upfront in the amount of $207,000 and lands, easements and rights-of-way of $12,000.

(2) The other option (65/35) with 5 percent cash upfront in the amount of $43,200, $12,000 credit for lands, easements, and rights-of-ways, and the balance ($251,400) to be amortized over 30 years which could amount to between $25,000 to $30,000 each year.

5. Required Schedule of Events:

25 Sep 85 - Meet with local sponsor regarding letter of assurance.
2 Oct 85 - Local sponsor makes decision on draft letter of assurance and provides to Buffalo District (unsigned).
4 Oct 85 - Buffalo District transmits draft letter of assurance to Office, Chief of Engineers (OCE).
7 Oct 85 - OCE transmits draft letter of assurance to Assistant Secretary of the Army for Civil Works (ASA (CW)).
15 Oct 85 - ASA (CW) approves draft letter of assurance.
18 Oct 85 - Local sponsor provides signed letter of assurance to Buffalo District.
22 Oct 85 - Buffalo District transmits signed letter of assurance to OCE.
24 Oct 85 - Receipt of signed letter of assurance at OCE.
Oct 86 - Buffalo District receives funds to initiate Advanced Engineering and Design.

ENCL 2

Putnam County Sentinel/Ottawa, Ohio/September 11, 1985

Army Corps to visit Ottawa

Congressman Delbert L. Latta was advised by the Army Corps of Engineers that on Wednesday and Thursday, September 11 and 12, two archeologists and an engineer from the Corps will visit the Village of Ottawa for the purpose of doing a flood reconnaissance study of the Blanchard River.

Dave Stanley and Bob Lucey, archeologists from the St. Paul Corps of Engineers office and Bill Butler from the Buffalo District Corps of Engineers office will do the study.

"The Corps has informed me," stated Congressman Latta, "that they will be asking for additional money in the '87 budget for flood control in this area."

Pandora times, Pandora, Ohio, August 1, 1985

Blanchard River study update given

By Terry Schroeder
District Conservationist

Whatever happened to all the studies being performed on the Blanchard River? The answer is that everything is moving smoothly and on schedule.

The Soil Conservation Service is in the process of preparing the Floodplain Management Study. This Study will evaluate different construction alternatives for the river in the agricultural areas located outside the corporation limits of Ottawa and Findlay.

The Army Corps of Engineers has already performed some studies and has lots of data on the river inside these two communities. Therefore, the Corps will perform all the Flood Studies for Ottawa and Findlay.

The SCS will study the rest of the river. Both of these agenices are cooperating and sharing data in order for the results to be compatible.

The Blanchard was surveyed last fall by both foot crews and by aerial photography. This survey data has been plotted and at the present time is being loaded into a computer. The computer will perform many trials to evaluate an endless assortment of possible improvements to the river.

Just a few being considered are: different channel bottom widths, different channel depths, various side slopes, and various methods of construction.

The computer will compare the construction and maintenance costs of the different combinations of channel improvements to the benefits achieved by reduced flooding. Those alternatives that provide the most benefits for the least cost will be considered for the final recommendation.

Also being evaluated is what effect these changes will have on downstream landowners. Any alternative that causes a noticeable increase in damages downstream will be discarded.

After all alternatives are considered, one, several, or possibly even none would be recommended in the Flood Plain Management Study.

One item that complicates this particular study is that an extensive length of the Blanchard River flows on bedrock. This bedrock would be expensive to remove in order to increase the depth of the channel.

Any alternative dealing with lowering the channel must be studied very closely from an economic standpoint.

Unless there are tremendous flood damages, an alternative considering channel deepening could easily be cost prohibitive.

In this case, channel deepening must be given special attention and may make other alternatives such as widening and/or diking of the stream the most feasible alternative.

This Floodplain Management Study is on schedule and should be completed by April, 1986. However, by November of this year, the Technical Evaluation will be complete and we will know what, if any alternatives are feasible. Our office will keep you posted of any new developments.

NCBPD-PF 11 JUN 1985

SUBJECT: Flood Control, Blanchard River, OH - Oak Street Bridge

Mr. Daniel G. Bucher, P.E.
Kohli & Kaliher Associates, Limited
311 East Market
Lima, OH 45801

Dear Mr. Bucher:

Reference is made to your letter of 17 May 1985 which provided Plan and Profile, channel cross sections, and an aerial photograph marked to highlight the proposed Oak Street bridge and channel cross sections.

The Corps would prefer that the new Oak Street bridge provide unrestricted flow for the 100-year recurrence interval. At the upstream side, or east side, of the bridge, the flood stage of a 100-year flood is at about elevation 729.0. In addition a freeboard allowance of 3 feet is usually required for earth levees and 2 feet for concrete floodwalls. We have not completed our plan to reduce flooding at Ottawa and at this time cannot tell you what the level of protection will be. However, I note that the minimum bottom elevation of the proposed bridge would be about 728.5 and the 4 span structure would provide a net effective area of 4851 square feet or about 881 square feet of additional waterway area than the existing bridge. Therefore, I recommend that the 4 span bridge with the bottom of super structure at the proposed elevation be built rather then the 3 span bridge.

I trust the above will assist you in finalizing your plans for construction of the Oak Street bridge.

Correspondence pertaining to this matter should be addressed to the District Commander, U.S. Army Engineer District, Buffalo, 1776 Niagara Street, Buffalo, NY 14207, ATTN: Mr. Joseph C. Hassey. If you have any questions or require additional information, please contact Mr. Hassey of my Plan Formulation Branch at (716) 876-5454, extension 2276.

The Buffalo District — Leadership in Engineering.

Sincerely,

Lawrence C. Usbell, LTC
Deputy District Commander
for
ROBERT R. HARDIMAN
Colonel, Corps of Engineers
District Commander

KOHLI & KALIHER ASSOCIATES, LIMITED
CONSULTING ENGINEERS & SURVEYORS 311 EAST MARKET, LIMA, OHIO 45801 PH. 419-227-1135

May 17, 1985

District Commander
Department Of The Army
Buffalo District, Corps Of Engineers
1776 Niagara Street
Buffalo, New York 14207

Attention: Mr. Joe Hassey

Re: Flood Control, Blanchard River, OH
Putman - Ottawa - Oak Street
Bridge Replacement

Gentlemen

Reference is made to the Corps' letter by Mr. Robert R. Hardiman, Colonel, dated October 29, 1984 to Mr. Michael Logan, O.D.O.T Planning & Design Engineer. In response to the referenced letter, Mike Logan forwarded said letter to our office and requested that we make whatever contacts necessary with the Corps to be assured that all parties concerned are aware of and in agreement with our proposed design for the replacement bridge.

Reference is made to my telephone conversation with Mr. Joe Hassey on March 26, 1985 and on April 26, 1985 concerning our proposed Oak Street Bridge and the Corps Flood Control Plan. Mr. Hassey indicated that they had insufficient information to evaluate our proposal via telephone. Mr. Hassey also indicated that they could not require the Village or State to provide unrestricted flows for the 100 year recurrence interval. However, since Major floods have occurred recently in Ottawa, and the Corps of Engineers is in the process of developing a new flood control plan, it makes sense and we ask for the Corps recommendations and comments regarding our proposed structure plans and their compatablility with the flood control plans to reduce overbank flooding.

Two copies of the following information are transmitted herewith: Title sheet; Plan and Prófile - sta. 36 + 00 to 52 + 00; channel cross sections - N & M, 100' & 50' east of bridge, east opening of bridge, west opening of bridge, 50' west of bridge, 100' west of bridge, east opening of RR. bridge, and east opening of SR 65 bridge; Site plan; Transverse cross sections of superstructures; and aerial photograph on which the channel cross sections and proposed structure are highlighted for an overview of the project.

Channel cross sections N & M correspond to those shown on the Floodway Map which is a part of the Flood Insurance Study for the Village of Ottawa. This study was completed in February 1984. We will patch these cross sections into those used in the flood insurance study, for our final hydraulic analysis. These partial sections were taken so that the channelization work performed during early 1985 can be considered in our hydraulic study.

Waterway areas for the existing structures and proposed structure are shown on the channel cross section sheets. The waterway areas are summarized as follows:

BRIDGE & OPENING	EXISTING SF	*EXISTING EFFECTIVE SF	PROPOSED	*PROPOSED EFFECTIVE
Oak St. - East Opening	4671			
Oak St. - West Opening	4390	3970	5017	4851
RR BR - East Opening	4284			
SR 65 - East Opening	3984			

*The effective waterway area has been determined by deducting the North bank which encroaches into the north span (see cross sections and site plan).

We are considering eliminating the south span of our Proposed structure. The resulting waterway area would be 4242 SF. and the effective waterway area would be 4076 SF. The proposed structures is 258.5 ft c/c abutment bearings. From the aerial photograph at is evident that the south span does match the RR structure and does provide the opportunity for widening and lowering the channel on the south side. If the corps is not planning work on the south side of the river or does not feel that the south span is necessary, we will convert to a 3 span structure. We have the option of changing from four 65 ft spans to three 70 ft spans, with out increasing our beam size. This would result in a waterway area of 4463 SF and an effective area of 4297 SF. We are interest in your recommendation and comments as to which proposal is compatiable with the corps flood control plan.

We are also interest in your comments as to our proposed bridge elevations and location relative to the flood control plan. O.D.O.T likes their projects to be as short as possible and consequently, generally, the bridge elevations as low as is acceptable.

Therefore, we are interested in your recommendations for minimum bottom of super structure elevations.

This project is a high priority to The Village of Ottawa as fire trucks are not recommended to cross the existing bridge and therefore must cross railroad tracks twice to access a considerable area south of the river.

If you require any additional information please call at your earliest convenient.

Very truly yours

Daniel G. Bucher

Daniel G. Bucher P.E.
Associate

DGB/ef

Enclosure

cc: Mike Logan, ODOT Design & Planning Engineer (No Enclosures)
Louis H. Macke, Mayor of Ottawa (No Enclosures)
Dewey Williams, Director of Municipal Services

The lima News, Lima, ohio, April 29, 1985

Ottawa flood study launched

By LORI NIMS
News Staff Writer

OTTAWA — In efforts to resolve recurring flooding problems along the Blanchard River here, the Army Corps of Engineers has initiated a re-evaluation study of the authorized flood control project.

Purpose of the 23-month study is "basically to look for any possible solution to the flood problem," said Ross Fredenburg, corps district chief of public affairs.

The flood project was authorized by an act of Congress in 1964. Levies and floodwalls along the entire course of the river in Ottawa were to be built. But, the project was dropped due to a lack of funds.

Dewey Williams, director of municipal services for the village of Ottawa, said that the flood of 1981 was the catalyst for pursuing the project. Village officials asked U.S. Rep. Delbert L. Latta, R-Bowling Green, to update the 20-year-old study. The initial study was made at the request of the Maumee Conservancy District.

The 1981 flood was the most severe since 1959. Two construction projects to ease flooding were completed in February. A clearing and snagging project was completed on a 1,000 foot stretch of the river near the Oak Street Bridge. Also, some work was done to control bank erosion near state Route 15.

A small scale study on the flood problem was completed last summer, Fredenburg said. As a result of that study, he said, officials "decided to push for funding for this study." Federal funds will be used for the study, which is expected to cost approximately $250,000.

Fredenburg added that it is not unusual for large scale projects to be delayed for years because "it literally takes an act of Congress to authorize it." Had the recommended construction been done in 1964, cost of the project would have been $10 million. Fredenburg could not make any projection on construction costs following the re-evaluation study.

Some preliminary work already has begun, Williams said. Members of the corps of engineers from its Buffalo District have taken elevations and some aerial photographs of the Blanchard River.

Flooding was a problem this spring. Some main streets were closed and six to eight houses within the village were evacuated.

Selection of a plan will be based on engineering feasibility and economic justification. "I'm sure the project will have to be presented to (village) council in its entirety after completion" of the study, Williams said. This will include new cost estimates.

Construction based on the recommendations of the study could begin within two years, provided funds for such a project are available, Latta's office reported.

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

NCBPD-PF

22 APR 1985

SUBJECT: Ottawa, Ohio - Reevaluation Study

This is to inform you that I have initiated a Reevaluation Study of the authorized flood control project at Ottawa, Ohio.

The objective of this study is to identify the best plan that will reduce overbank flood damage of the Blanchard River at Ottawa, Ohio. Selection of a plan will be based on the criteria that the plan must be engineeringly feasible, economically justified, environmentally sound, and socially acceptable.

Funds have recently been provided to Buffalo District to initiate the Reevaluation Study, which will take 23 months to complete. Detailed design, plans and specifications, and initiation of construction will occur within 2 years after completion of the Reevaluation Study Report, assuming funds for these purposes are available. Public involvement and interagency coordination will be an integral part of the study process.

Correspondence pertaining to this matter should be addressed to the District Commander, U. S. Army Engineer District, Buffalo, 1776 Niagara Street, Buffalo, NY 14207, ATTN: Mr. Joseph C. Hassey. If you have any questions or require additional information, please contact Mr. Hassey of my Planning Division at (716)876-5454, extension 2276.

Sincerely,

LTC, EN

FOR ROBERT R. HARDIMAN
Colonel, Corps of Engineers
District Commander

The attached letter was sent to the following:

Mr. Harry W. Oneth
State Conservationist
U.S. Soil Conservation Service
200 North High Street, Room 522
Columbus, OH 43215

Mr. Kent E. Kroonemeyer
U.S. Fish and Wildlife Service
Division of Economic Services
Columbus Field Office
3990 East Broad Street
Columbus, OH 43215

Ms. Joyce M. Wood
Director
Office of Ecology and Conservation
NOAA, Department of Commerce
Room 5813
14th and Constitution Avenue, NW
Washington, DC 20230

Mr. Robert Stern
Division of NEPA Affairs
Department of Energy, Room 4G064
1000 Independence Avenue, SW
Washington, DC 20585

Ms. Margaret M. Heckler
Secretary
Department of Health and Human
Services
Room 537F Humphrey Building
200 Independence Avenue, SW
Washington, DC 20201

Mr. Stephen Grossman
Acting Director
Ohio Environmental Protection Agency
P.O. Box 1040
361 East Broad Street
Columbus, OH 43216

Mr. Melvin D. Wachtman
Executive Officer and Secretary-Treasurer
Maumee Watershed Conservancy Distribution
601 Clinton Street
First Federal Building
Defiance, OH 43512

Mrs. Mimi Becker
Project Director
Great Lakes Tomorrow
P.O. Box 1935
Hiram, OH 44234

Mr. Valdas Adamkus
Regional Administrator
USEPA, Region V
230 South Dearborn Street
Chicago, IL 60604

Mr. Robert J. Garvey
Executive Director
Advisory Council on Historic
Preservation
1522 K Street, NW
Washington, DC 20005

Mr. John Seyffert
Administrator
Federal Emergency Management
Administration
Room 713
500 C Street, SW
Washington, DC 20472

Mr. Bruce Blanchard
Director
Office of Environmental Project
Review
Department of the Interior
18th and C Streets, NW
Room 424-1
Washington, DC 20240

Mr. Leonard E. Roberts
Deputy Director
Office of Budget and Management
State Clearinghouse
30 East Broad Street
Columbus, OH 43215

Mr. Edward R. Osann
Director
Water Resources & Coastal Construction
Program
National Wildlife Federation
1412 Sixteenth Street, NW
Washington, DC 20036

Mr. Larry D. Henson
Regional Forester
Forest Service
Eastern Region, USDA
Henry S. Reuss Federal Plaza
Suite 500
310 W. Wisconsin Avenue
Milwaukee, WI 53203

Mr. John M. Stackhouse
State Executive Director
USDA, Agricultural Conservancy
and Stabilization Service
Ohio State ACSC Office
200 North High Street
Federal Building, Room 540
Columbus, OH 43215

Mr. Charles H. Pope
Regional Director
Midwest Region
National Park Service
1709 Jackson Street
Omaha, NB 68102

Mr. John O. Hibbs
Regional Administrator
Federal Highway Administration
Region V
18209 Dixie Highway
Homewood, IL 60430

Mr. Allan Hirsch
Director
Office of Federal Activities, A-104
Environmental Protection Agency
401 M Street, SW
Washington, DC 20472

Mr. Myrl H. Shoemaker
Ohio Department of
Natural Resources
Fountain Square
Building D .
Columbus, OH 43224

(w/copy furnished to:)

Mr. Robert Lucas
Corps of Engineers
Liaison
ODNR
Fountain Square
Building D-2
Columbus, OH 43224

Mr. Michael Colvin
ODNR
Office of Outdoor
Recreation Svc.
Fountain Square
Building A-3
Columbus, OH 43224

Mr. Vincent J. Niese
Chairman
Board of County Commissioners
Putnam County Court House
Ottawa, OH 45875

Mr. W. Ray Luce
The Ohio Historical Society
Ohio Historical Center
Interstate 71 & 17th Avenue
Columbus, OH 43216

Mr. Dwight Adams
Environmental Clearance Officer
U.S. Department of Housing and
Urban Development
200 North High Street
7th Floor
Columbus, OH 43215

Defiance Crescent News, Defiance, Ohio, April 19, 1985

Army engineers to re-evaluate Blanchard River flood study

WASHINGTON — U.S. Rep. Delbert Latta said today that the U.S. Army Corps of Engineers has initiated a re-evaluation study of an authorized flood control project for the Blanchard River in Ottawa.

"I am very pleased with the progress being made on a more comprehensive study," Latta (R-Bowling Green) stated.

"The objective of this study is to identify the best plan that will reduce over-bank flood damage on the Blanchard."

The Fifth District congressman said selection of a plan will be based on engineering feasibility, economic justification, environmental soundness and social acceptance.

Funds have been provided for the study, he said, and "it will take 23 months to complete." Detailed design plans and specifications and initiation of construction will occur within two years after completion of the re-evaluation study report, "assuming funds for this purpose are available."

NCBPD-PF 19 APR 1985

SUBJECT: Ottawa, Ohio - Reevaluation Study

This is to inform you that I have initiated a Reevaluation Study of the authorized flood control project at Ottawa, Ohio.

The objective of this study is to identify the best plan that will reduce overbank flood damage of the Blanchard River at Ottawa, Ohio. Selection of a plan will be based on the criteria that the plan must be engineeringly feasible, economically justified, environmentally sound, and socially acceptable.

Funds have recently been provided to Buffalo District to initiate the Reevaluation Study, which will take 23 months to complete. Detailed design, plans and specifications, and initiation of construction will occur within 2 years after completion of the Reevaluation Study Report, assuming funds for these purposes are available. Public involvement and interagency coordination will be an integral part of the study process.

If I may be of further assistance on this matter, please contact me at (716) 876-5464.

Sincerely,

SIGNED

ROBERT R. HARDIMAN
Colonel, Corps of Engineers
District Commander

The attached letter was sent to the following:

Honorable Howard M. Metzenbaum
United States Senate
Washington, DC 20510

Honorable John Glenn
United States Senate
Washington, DC 20510

Honorable Delbert L. Latta
House of Representatives
Washington, DC 20515

Honorable M. Ben Gaeth
1st State Senatorial District
Senate House
Columbus, OH 43216

Representative Charles Earl
State Representative
80th House District
823 Defiance Street
Ottawa, OH 45875

Mayor Louis M. Macke
Village of Ottawa
136 North Oak Street
Ottawa, OH 45875

A copy of the attached letter was sent to the following:

Honorable Howard M. Metzenbaum
United States Senator
2915 Federal Building
1240 East Ninth Street
Cleveland, OH 44114

Honorable John Glenn
United States Senator
200 North High Street
Suite 600
Columbus, OH 43215

Honorable Delbert L. Latta
Representative in Congress
100 Federal Building
280 South Main Street
Bowling Green, OH 43402

US Army Corps of Engineers
Office of the Chief of Engineers

News Release

Release No. 7
For Release: 3/26/85

Contact: Richard Broussard
Phone: 716-876-5454

CORPS CONDUCTS SURVEY ON FLOODING IN OTTAWA

BUFFALO -- Personnel from the Buffalo District of the U.S. Army Corps of Engineers will be conducting a "Flood Damage Survey and Evaluation" in Ottawa, Ohio for a one week period beginning April 1,1985.

They will be going door to door to obtain some additional first floor elevations of private residences and to interview commercial and business interests to develop total estimated damages that have occurred in the past under varying levels of flooding of the Blanchard River so as to project future damages for both commerical and residential properties.

The information obtained will be used in the reevaluation study of overbank flooding of the Blanchard River and supplement the information obtained during October and November 1984.

\# \# \#

News Release

US Army Corps
of Engineers
Buffalo District

Release No. 49
Contact: Jean Palka
For Release: 10/30/84
Phone: 716-876-5454

CORPS CONDUCTS SURVEY ON FLOODING IN OTTAWA

BUFFALO -- Personnel from the Buffalo District office of the U.S. Army Corps of Engineers will be conducting a "Flood Damage Survey and Evaluation" in Ottawa, Ohio for a two week period beginning October 29.

They will be going door to door to obtain first floor elevations of private residences and to interview commercial and business interests to develop total estimated damages that have occurred in the past under varying levels of flooding of the Blanchard River so as to project future damages for both commercial and residential properties.

The information obtained will be used in the reevaluation study of overbank flooding of the Blanchard River.

# # #

MAUMEE RIVER BASIN, INDIANA AND OHIO
REEVALUATION STUDY ON FLOOD CONTROL
OF THE BLANCHARD RIVER AT
OTTAWA, OHIO

APPENDIX F

ENVIRONMENTAL COORDINATION

U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, New York 14207

August 1986

~~88 12 1 124~~

United States Department of the Interior

FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

Columbus Field Office
Post Office Box 3990
Columbus, Ohio 43216-5000

OFC. MGMT. OAS 7 AUG 86 11 29

August 6, 1986

Colonel Daniel R. Clark
District Engineer
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Attention: Bill Butler

Dear Colonel Clark:

This is our Draft Fish and Wildlife Coordination Act Report for the Ottawa Flood Protection Study in the Village of Ottawa, Putnam County, Ohio. Our report is in response to your request in the March 31, 1986 letter. Your staff provided additional information since our receipt of the above letter. This report has been reviewed by the Ohio Department of Natural Resources, Division of Wildlife and a letter of concurrence dated August 1, 1986 is attached.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and are consistent with the intent of the National Environmental Policy Act of 1969 and the U. S. Fish and Wildlife Service's Mitigation Policy.

PROJECT DESCRIPTION

In your March 31 letter, you indicate that a consulting firm has developed seven structural plans for reducing flood damages in the Village of Ottawa (Figures 1-7). Non-structural and no-action plans were also considered.

Alternative I includes selective snagging and clearing of large debris from the river channel.

Alternative II includes construction of a levee/floodwall from the Grand Trunk Western Railroad (DT&I) to Tawa Run. An elevation increase of one foot increments on the levee/floodwall would provide 10, 25, 60, and 100 year flood protection. Closure structures would be located at Oak, Main, and Perry Streets. Flap gates would be placed on all outfall pipes discharging into the river.

Alternative III includes all the features of Alternative II and selective snagging and clearing of the Blanchard River throughout the village.

Alternative IV includes the features of Alternative III and excavation and removal of the Perry Street embankment and an old railroad embankment west of Fourth Street.

Alternative V includes all the features of Alternative IV and snagging and clearing of the river throughout the village.

Alternative VI includes all the features of Alternative V and provision of a 115-acre floodway between Elm Street and Tawa Run. This would require the removal of all trees and shrubs along the right bank of the river.

Alternative VII includes snagging and clearing, removal of the old embankment, and provision of the 115-acre floodway as in Alternative VI.

No reference is made regarding ponding areas on the village side of the levee/floodwall for any of the plans which include levee/floodwall features. A non-structural plan was also considered which called for placement of an automated stream gauge at the Oak Street bridge. The existing gauge at Findlay, Ohio would be modified and automated. Local officials and residents would be notified to take appropriate actions when flooding becomes imminent. The no-action plan was also considered in your study.

We understand that as a result of a March 19, 1986 meeting with local officials and residents, the only plan which has local support is Alternative VII. Alternatives with levee/floodwall features were strongly opposed by the attendees, and Alternative I "would solve very little of the flooding problem and could require continual and expensive maintenance by the village."

Specific information regarding the length of the proposed levee/floodwall is not given in the attached information to your March 31, 1986 letter. Also, dimensions of the structures are not known at this time; therefore, we cannot calculate the area which would be distrubed and/or covered by construction of the levee/floodwall. In general, we are pleased to note that the alignment of the levee/floodwall follows the maximum distance away from the river and Tawa Run, except for a portion downstream from the DT&I Railroad. By locating it as such, the amount of wildlife habitat lost would be kept at a minimum. The amount of woody riparian habitat impacted by the levee/floodwall would be similar to that addressed in our June 27, 1985 Planning Aid Letter.

RESOURCE DESCRIPTION

The proposed project lies within the range of the Indiana bat, a Federally listed endangered species. On June 15 - 16, 1986, an Indiana bat survey was conducted by Mr. Denis Case of the Ohio Department of Natural Resources, Division of Wildlife and your staff members to determine the extent of favorable breeding habitat along the Blanchard River in the project area. A copy of the report on the findings of the survey by Mr. Case is attached to our report. We fully support his recommendations to minimize the adverse impacts upon Indiana bat habitat in the project area.

Except for very short reaches between Oak Street and State Route 65, the entire reach of the Blanchard River within the project area has a continuous stand of trees on both banks, and adjacent wooded areas in some locations. For example, the right bank of the 2,000-foot reach downstream from the DT&I Railroad has trees limited to the top of the bank; whereas, the 1,000-foot reach downstream from the U. S. Route 224 bridge has a wider corridor of riparian vegetation on and beyond the right bank. Species diversity of vegetation is improved over what was identified in the Oak Street to State Route 65 stream reach for the emergency clearing and snagging which we reported in our September 25, 1984 letter. Table 1 lists species of trees, shrubs, vines, and herbaceous plants found along the Blanchard River in the project area.

While conducting our field review, we observed the species of birds listed in Table 2. Again, the diversity of birds identified indicates a high quality wildlife habitat along the river. A number of bird species were added to the list after our canoe float through the project area on May 29, 1986. Of particular interest were two broods of wood ducks (six ducklings in one brood and 2 in another), two great horned owls and one red-tailed hawk, and three great blue herons. Wood ducks and great blue herons are listed as National Species of Special Emphasis by the U. S. Fish and Wildlife Service. As such, strategies are developed to reduce the rate of habitat destruction, improve the management of bottomland habitat, and improve water quality for both species.

With regard to mammals, we observed many woodchuck dens and saw several woodchucks. We also noted evidence of numerous raccoons. During our canoe float, we observed eight muskrats in the river and three fox squirrels and two red squirrels in the woods along the river.

Appendix I includes fishery data from the Ohio Department of Natural Resources, Division of Wildlife for the Blanchard River in Putnam County. A total of eight families of fish representing 33 species were collected between 1974 and 1981. Such diversity represents a healthy warmwater fish population in the Blanchard River.

DISCUSSION

Making an impact assessment of each alternative is difficult, since specific information is not available regarding the extent of snagging and clearing of the river, and the specific alignment and size of the levee/floodwall. The impact of other project measures, such as the embankment removal and the floodway provision, can more clearly be determined because those specific areas have been determined. We have considered the above four features incorporated into various alternatives to be the most significant in terms of resulting impacts to fish and wildlife resources. With this consideration we have listed the alternatives by priority, with the lowest number having the least damage to the fish and wildlife habitat.

Priority No.	Structural Plan	Major Features
1	Alternative I	clearing/snagging
2	Alternative II	levee/floodwall
3	Alternative IV	clearing/snagging, embankment removal
4	Alternative III	clearing/snagging, levee/floodwall
5	Alternative V	clearing/snagging, levee/floodwall, embankment removal
6	Alternative VII	clearing/snagging, embankment removal, floodway provisions
7	Alternative VI	clearing/snagging, embankment removal, floodway provision, levee/floodwall

We have no objections to, or concerns with the non-structural plan and the no-action plan, since these plans would not alter the existing habitat conditions. We understand that the local community is not supportive of alternatives which include the levee/floodwall. Clearing and snagging by itself is thought to be relatively ineffective in solving the flooding problems. With regard to expensive maintenance, we believe the clearing and snagging alternatives would be less costly than other alternatives which include features such as the floodway provision and/or levee/floodwalls. During our canoe float this spring, we observed several locations in need of maintenance. The needed maintenance would consist of removing downed trees and debris which are the precusor to the formation of significant logjams. None would require costly maintenance now but without this yearly maintenance, logjams will form which would restrict the flow of floodwaters.

Another concern is with the ongoing filling of low land along the river, namely the floodplain. Significant filling is occurring riverward of 2nd Street by the street and road maintenance garage. Floodplain filling was sanctioned by your staff last year for the spoiling of material from the "emergency" channel improvement measures in the Oak Street vicinity. While the placement of that spoil material may not have been significant, there is an accumulative impact of many floodplain filling projects in the area.

We are also concerned with the degree of riverbank clearing of trees and clearing of vegetation associated with the floodway provision. Removal of vegetation to facilitate flows upstream from the U. S. Route 224 bridge is not warranted, since the opening under the bridge is the bottleneck. We understand the floodway functions as primarily a floodwater holding area as well as a conveyance for flood waters. Also, the use of material from the embankments could be used to raise some developed areas and more clearly define areas to be protected from flooding, versus areas which can accommodate flooding (the traditional floodplain). The floodway provision could be a good opportunity to develop wetlands within the 115-acre area. Wetlands may not be acceptable to local residents near their domiciles; however, ample area exists along the river meanders downsteam from the U. S. Route 224 bridge. We are opposed to the wholesale clearing of all trees and shrubs within the floodway area, since not all this vegetation would significantly obstruct the flow of floodwaters.

Regarding the removal of the two embankments, wildlife habitat would be lost due to the removal of woody vegetation which has grown on the embankments. However, such losses can be mitigated by planting native trees and shrubs of value to wildlife in appropriate areas of the "floodway." Detailed mitigation measures will be included in our final FWCA report.

Our major concern regarding the construction of levee/floodwalls was addressed in our June 27, 1985 letter. Based upon the illustrated alignment shown on your attached figures for the levee/floodwall alternatives, we believe those concerns expressed in our letter have been alleviated.

In accordance with our Mitigation Policy, published in the Federal Register on January 23, 1981, the fish and wildlife habitat in the project area is designated as Resource Category 3. The mitigation goal for habitats in this category is no net loss of habitat value while minimizing loss of in-kind habitat value. The fish and wildlife habitat impacted by plans proposed for this project is abundant on a national and state basis, but has a high value to the local area. The loss of this habitat can be mitigated by limiting to an absolute minimum the amount of woody vegetation removed for construction of project features. Seeding and mulching disturbed areas with a wildlife meadow seed mixture, planting of trees and shrubs, and the creation of wetlands where possible should adequately mitigate the habitat losses. Biologists from the State and Federal fish and wildlife agencies should participate in the selection of vegetation and materials to be removed in the clearing/snagging and floodway provisions.

In summary, we make the following recommendations to adequately mitigate the loss of fish and wildlife resources within the project area.

1. We recommend the selection of an alternative which would result in the least damage to the fish and wildlife resources. If a more damaging alternative is selected, it must be adequately justified and mitigated.

2. We support and endorse the recommendation made in Mr. Case's July 21, 1986 letter regarding efforts to minimize the adverse impacts to Indiana bat habitat.

3. Spec'fic plans for the clearing and snagging feature in the project area should be reviewed and approved by the State and Federal fish and wildlife agencies.

4. Proposals to incorporate wetland developments in the floodway area should be pursued and reviewed by State and Federal fish and wildlife agencies.

5. Vegetation lost due to removal of embankments or construction of levees should be mitigated with seeding a wildlife seed mixture on disturbed areas and planting of native trees and shrubs of value to wildlife in acceptable areas within the project perimeter.

We appreciate your continued coordination on this project in our effort to adequately mitigate the project-caused loss of fish and wildlife resources.

Sincerely yours,

Kent E. Kroonemeyer

Kent E. Kroonemeyer
Supervisor

cc: Chief, Ohio Division of Wildlife, Columbus, OH
ODNR, Outdoor Recreation Service, Attn: M. Colvin, Columbus, OH
Ohio EPA, Attn: A. Lynch, Columbus, OH
U.S.EPA, Office of Environmental Review, Chicago, IL

Table 1. September 14-15, 1984 and May 28-29, 1985 vegetative survey along the Blanchard River within the City of Ottawa, Ohio.

Trees and Shrubs	Vines and wildflowers
Silver maple	Virginia knotwood
Red maple	Small white aster
Sugar maple	Ironweed
Box elder	Swamp milkweed
Green ash	Stinging nettle
Eastern cottonwood	False stinging nettle
American sycamore	Cocklebur
Black willow	Smartweed (*Polygonum* sp.)
Sandbar willow	Pigweed
Hackberry	Riverbank grape
Honey locust	Avens (*Geum* sp.)
Black walnut	Pokeweed
Slippery elm	Poison ivy
Red mulberry	Bur-cucumber
Ailanthus	Morning glory
Ohio buckeye	False dragonhead
American basswood	Yellow cress
Dogwood (*Cornus* sp.)	Broad-leaved arrowhead
Catalpa	Velvet-leaf
Red oak	Yellow sorrel
White oak	Curled dock
Pignut hickory	Giant ragweed
Shagbark hickory	Common ragweed
Elderberry	Green-headed coneflower
Hawthorn (*Crataegus* sp.)	Foxtail
Crabapple (*Malus* sp.)	Solomon's-seal
Multiflora rose	Lily-of-the-valley
Coralberry	Raspberry
	Goldenrod (*Solidago* sp.)
	Common burdock
	Virginia creeper
	Periwinkle
	Bittersweet nightshade
	Common nightshade
	Queen Anne's lace
	Evening-primrose
	Red clover
	White sweet clover
	Lamb's-quarters
	Tall meadow-rue
	Chickory
	White snakeroot
	Bedstraw (*Galium* sp.)
	Unidentified grasses

Table 2. Birds observed during review of Ottawa LPP project site on September 14-15, 1984, May 28-29, 1985 and May 28-29, 1986. Riparian habitat along the Blanchard River, Putnam County, Ohio.

Canada goose*
Mallard
Wood duck**
Red-tailed hawk
Great blue heron
Killdeer
Solitary sandpiper
Belted kingfisher
Hairy woodpecker
Common flicker
Mourning dove
Rock dove
Great horned owl
Chimney swift
Eastern wood peewee
Bluejay
White-breasted nuthatch
American crow
Black-capped chickadee
House wren
Northern mockingbird
Gray catbird
American robin
Cedar waxwing
European starling
Yellowthroat
Warbler (sp. unknown)
House sparrow
Red-winged blackbird
Common grackle
Northern oriole
Northern cardinal
Indigo bunting
American goldfinch
Song sparrow

* Pair of geese with five goslings
** Several adults and two broods

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCBPD-PF	OTTAWA, OHIO - FLOOD PROTECTION PROJECT MEETING RE/ ITEMS OF LOCAL COOPERATION

TO FILES FROM HASSEY DATE 16 July 1986 CMT 1

1. On 15 July 1986, I met with: Mayor Louis H. Macke; Dewey Williams, Director of Municipal services; Jack Williams, Assistant Director; and Melvin Wachtman, Executive Officer of the Maumee Watershed Conservancy District, to discuss the items of local cooperation for subject project. Mr. Wachtman is the contact for the Conservancy District, the "local sponsor of the project."

2. The meeting was held in the city hall in the Village of Ottawa, Ohio and began at 2:00 P.M. and ended at 4:30 P.M. I gave the Mayor, Dewey and Melvin excerpts from the draft reevaluation report related to cost, benefits, selected plan description and the specific items of local cooperation. All items were discussed in detail and the selected plan was described in detail.

3. I requested Melvin to send a letter from the Maumee Watershed Conservancy District expressing their position regarding the items of local cooperation. The Mayor stated that the Ottawa Village Council meets on 28 July 1986 and he will also provide a letter stating the position of the Village.

4 The meeting was positive and all concurred that the Selected Plan represents the "Peoples Plan" and saw no problem in providing letters of concurrence.

5. I told Melvin that I would have Larry Dunfee - NCDPE - assigned to NCB to call him and further discuss the items of local cooperation. Larry called on 7/16/86.

DA FORM AUG 80 2496 PREVIOUS EDITIONS WILL BE USED

U.S. Government Printing Office: 1983-490-062

Village of Ottawa

136 NORTH OAK STREET
OTTAWA, OHIO 45875

April 3, 1986

Army Corp of Engineers
Buffalo District
Attn: Joseph Hassey
1776 Niagara Street
Buffalo, New York 14207

Dear Mr. Hassey:

The attached are the clippings on the Flood Program from our local newspaper, which you requested. If in the future there are any more releases, I will be happy to forward them to you.

Cordially,

Alice E. Heitmeyer

Alice E. Heitmeyer
Deputy Clerk-Treasurer

MAYOR (419) 523-6929 • CLERK-TREASURER 523-5020 • DIRECTOR OF MUNICIPAL SERVICE 523-5020

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCB PD-PF	OTTAWA, OH PUBLIC WORKSHOP MEETING 3/19/86 COUNCIL CHAMBERS - 7:30 P.M.

TO FILES FROM JOE HASSEY DATE 3/21/86 CMT 1

1. Subject meeting held and attended by about 50-75 people -- 38 of whom chose to register. Some of these indicated their interest and who they represented.

2. Mayor Macke opened the meeting and introduced me. I presented an overview of the project since it was first studied in 1964 to the present. I then introduced John Lesnik and Kerry Frech from GAI who presented the attached 7 alternative plans. I then presented a non-structural (EARLY WARNING) Plan and a no-Action plan.

3. During the presentation of the 7 plans by GAI, various details were discussed in response to questions raised by various individuals. It was difficult to convince the people that snagging and clearing would only be a temporary measure and require continual and expensive maintenance that would be a non-Federal responsibility. It was difficult also to convince them that snagging and clearing would only reduce flood levels in bank and that the overbanks are a major part of the floodway. The AE displayed and discussed a typical cross section that clearly illustrated that the River Channel only represented a very small part of the floodway and that most of the floodway was on the overbanks.

4. The people wanted to know the details of levees and floodwalls as related to the June 1981 flood and with particular reference to heights of the levees and floodwall and associated land required. The AE provided the information in detail starting at Tawa Run and continuing upstream to the Grand Trunk Western R.R Bridge (DT & I.). It became apparent that the people did not want levees or flood walls because of: aesthetics, social, damages induced on South bank of River, and risk involved with water that could be trapped behind the levee if inadequate interior drainage were not totally provided for. Cost and benefits were not discussed nor did the people ask about them.

5. After almost 3 hours of discussion, a lady stated that Alternatives 1-6 should not be studied any further but we should only finalize alternative 7 that consists of: Removing a R.R. and bridge embankment, Snag and clear the river channel, clear and control a floodway in vicinity of the removed R.R. embankment and do some selective filling on the overbanks. I asked the others to voice their opinions on the lady's suggestion and all agreed with her. The public mandate was to pursue Alternative VII only. I then closed the meeting.

Joe Hassey.

DA FORM AUG 80 2496 PREVIOUS EDITIONS WILL BE USED

Residents oppose river dikes at flood meet

By Dennis Beidle
Associate Editor

Representatives of the U.S. Army Corps of Engineers and an engineering consulting firm out of Pittsburgh, PA, learned last Wednesday that Ottawa village residents did not favor placement of levees along the Blanchard River to control some low-level river flooding.

Retired engineer Joseph Hassey, recently recalled to service by the Buffalo district office of the U.S. Army Corps, along with Karey L. Frech and John R. Lesnik of G.E.I. Associates of Pittsburgh, learned that Ottawa residents were more likely to favor creation of a floodway along the village's southwestern side.

The engineers and consultants also learned that Ottawa village residents thought more highly of the idea of damming the Blanchard River upstream from Ottawa in order to slow the water flow and control damages.

The study indicated that the river's fall for its four mile stretch within the village limits between the Grand Trunk Western railroad bridge and Tawa Run was only three feet.

"The river is practically a pond," Lesnik told nearly 50 local residents last Wednesday.

However, attempts to deepen the bottom of the river in order to induce greater fall and to better contain the flow during a flood would be self-defeating. "If you get into a fight with nature, you'll lose every time," Lesnik added.

G.E.I. Associates engineers created seven possible flood plans, some of which called for among other things, creation of a dike system along the river's northern and eastern banks.

Several other alternatives, including the snagging of the Blanchard, plus construction of the dike system, plus removal of abandoned bridge abutments on South Perry Street and leading to the former Findlay and Fort Wayne Railroad bridge west of West Fourth Street, were also explained.

Yet, some of the proposals would, during a flood of equal or greater severity than the June 1981 flood, cause yet more damage to the village's south side than had been experienced in the past, engineers admitted.

The seventh proposal, in which the river would be snagged and the floodway created from the Blanchard River flood plain between South Elm Street (Route 65) and Tawa Run.

It was considered by the consulting firm as most feasible one economically.

Had that proposal for a 50-year flood control project been in place when the 1981 flood occurred, the river level would have dropped by nearly 1½ feet at the South Oak Street bridge.

While portions of the village would still have been indunated, flooding would not have been as widespread.

Engineers, however, were unable to specifically say how much less flooding would have been in June 1981 if the floodway was in place, if bridge abutments were removed and if the river had already been snagged.

Creation of a floodway would be a "substantial improvement" over other possible plans, and would drop the river level on the village's south side by almost 1½ feet during severe flooding, Lesnik said.

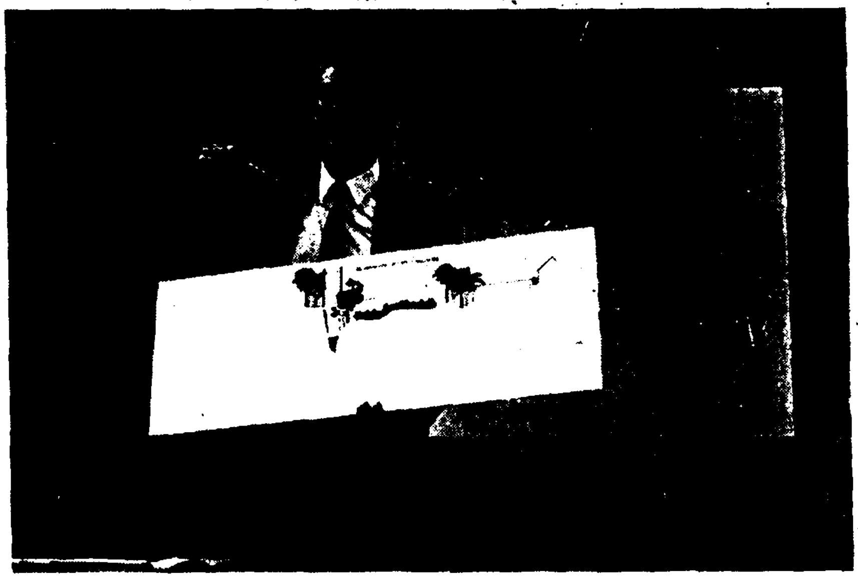
Engineers said that the 'benefit to cost' ratio of the recommended alternative would allow funding of the construction phase of the project.

The other recommendations would carry lessor ratios because the cost expended would not provide any greater benefit for village residents, engineers added.

Low agriculture crops and grasses would be planted in the floodway area. Brush, trees and undergrowth would be cleared from the floodway, as well as from the eastern and northern banks of the Blanchard. The southern and western banks would remain almost completely untouched.

In addition, usage of the floodway would also be limited. Some of the area could be turned into parking facilities or into a village park, the engineers and Army Corps representatives suggested last Wednesday.

However, cost estimates would remain incomplete, as no figures were available for the relocation of an Ohio Power high voltage transmission line



(Photo by Dennis Beidle)

This cross-section of the Blanchard River basin in Ottawa was shown by John R. Lesnik of G.E.I. Associates of Pittsburgh, PA during a meeting of local residents held in Ottawa Village Council chambers last Wednesday by the U.S. Army Corps of Engineers.

County Sentinel/ Ottawa, OH/ March 12, 86

Hearing set on river dike proposal on Blanchard River

By Dennis Beidle
Associate Editor

Possible solutions to Blanchard River flooding within the Ottawa corporation limits will be discussed during a workshop and public meeting scheduled for 7:30 p.m. next Wednesday, March 19, at Ottawa Village Hall.

Ottawa Mayor Louis Macke announced on Monday that the workshop, called by the Army Corps of Engineers and G.E.I. Consultants, a Pittsburgh, PA-based engineering firm, will explain proposals for flood control inside the village.

Public comments on G.E.I. Consultants' proposals will be solicited at that meeting, Macke said.

Joe Hassey, an engineer with the Army Corps of Engineer's Buffalo, NY office, and John Lesnik of G.E.I. Consultants, will discuss flood control proposals along the Blanchard River.

A proposal for installation of a river dike along a portion of the Blanchard River between South Oak Street and the right-of-way of the former Findlay and Fort Wayne Railroad was proposed to village council last year by Melvin Wachtmann, executive officer of the Maumee Watershed Conservancy District.

The $876,000 project under consideration would result in the installation of a 25-year frequency flood dike, consisting of earthen levees, on both banks of the Blanchard River on the village's west side.

Installation of storm sewer check valves, plus snagging and clearing of the river channel between the Grand Trunk Western Railroad bridge east of the village and the West Main Street bridge, and channel work north and west of the Main Street bridge, was also included in the proposal presented before council last year.

An explanation of the study results will be presented during next Wednesday night's public meeting.

Ottawa Village Council last October 7 authorized the Army Corps of Engineers' study of the effects of the dike proposal only after Mayor Macke broke 3-3 tie vote.

Council president Charlie Bruskotter and councilmen Dave Laudick and William Roberts voted in favor of the measure, while councilmen Dick Edelbrock, Tom Doepker and Ken Fortman voted against.

The dike proposed at that time would contain only a 25-year flood, and would apparently not contain floods which occurred in 1959 and 1981, Wachtmann commented.

Concern was expressed during that meeting that money would be spent on a study without any follow-through action.

Wachtmann reminded councilmen at the time that the plan as presented during that meeting was only in the preliminary stages.

Photo by Dennis Beidle

A flood control proposal for the Blanchard River, like this portion looking west towards Glandorf from the Route 65 bridge, will be the topic of discussion at a "workshop" scheduled by the United States Army Corps of Engineers and G. E. I. Consultants of Pittsburgh, PA next Wednesday, March 19, in Ottawa's Village Council chambers. One proposal, discussed before council last year, called for the diking of this portion of the river in order to protect Ottawa's near-west end.

3 HASSEY

Putnam County Sentinel/ Ottawa, OH/ March 12, 86

Speak out on flood control

It's a rare opportunity for Ottawa village residents to speak out on their ideas for control of the Blanchard River.

With memories of the 1981 flood in the back of one's mind, the nagging question still remains: what can be done?

The almost prehistoric idea of diking the river banks, first explored in depth in the aftermath of the 1959 flood, has been resurrected again by the U.S. Army Corps of Engineers.

That's an expensive idea, which may or may not work, and if it does, probably not to the benefit of all.

So next Wednesday's meeting on possible flood control plans for the Blanchard River inside the village is important on two fronts.

First, the U.S. Army Corps and its engineering consultant firm will present their ideas for flood control in Ottawa. If theirs is the same one presented before council last year, flood control inside Ottawa will not be a certainty.

Second, the meeting is an important opportunity for the public — and that especially includes both west side residents and downtown merchants, who almost always are the hardest hit when the Blanchard spills over — to tell the U.S. Army Corps its own ideas on flood control.

While citizen's ideas presented on flood control may not become reality because of environmental concerns, the expression of such may provide some basis for new and creative ideas previously not considered by others.

And such ideas may prove better in the long run than the half-a-dike plan to protect the west side of Ottawa as proposed last year by the U.S. Army Corps.

Next Wednesday's meeting, scheduled for 7:30 p.m. in village council chambers, should be one attended by all concerned with even the remote possibility of flooding inside Ottawa.

We urge public participation. The stakes are too great not to do so.

Toledo Blade/ Toledo, OH/ March 17, 86

J. Hassey

Area River Flooding To Be Meeting Topic

By Blade Staff Writer

OTTAWA, O. — The U.S. Army Corps of Engineers will hold a meeting at 7:30 p.m. Wednesday on controlling flooding of the Blanchard River.

The purpose of the meeting, to be in the village hall here, will be to explain the various plans for controlling flooding within the Ottawa village limits.

Among proposals to be discussed will be installation of a dike along a portion of the Blanchard River between South Oak Street and the former Findlay & Fort Wayne Railroad right-of-way.

Corps consultants will discuss the results of a study of the dike proposal ordered last year.

3 Kelly

DISPOSITION FORM

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCBPL-PF	Meeting with GAI (Consultants) on 27 FEB 86 in CPL's DIST. OFFICE TO CRITIQUE PLANS Developed By GAI TO REDUCE OVERBANK FLOODING AT OTTAWA, OH.

TO STUDY FILES FROM J.C. HASSEY DATE 3/8/86 CMT 1

1. Subject meeting was held in accordance with attached agenda.

2. John Lesnik, Project Manager for GAI, presented plans. He began with an overlay of a 1-200 scale photogrammetric map composite that illustrated 10, 25, 50, 100-year levels of flooding and a levee-flood wall-closure structure configuration on the north bank of the Blanchard River at Ottawa. The general location and extent was similar to that developed for the Corps Preliminary Assessment Report. No structures were shown or planned for the South bank but John implied that conditions on the south bank would not change with minimal clearing on the north overbank and the levees-flood-wall closure structures in place on the north bank. Buildings on the south bank include a Honda Shop, pay storage facility and a warehouse all of which can be floodproofed by raising contents or moving the "Hondas" from the building. John presented 4 plans (10, 25, 50, 100) but all with the same configuration shown on the map. The costs for each w/o lands and $435,000 AED cost would be: 10 YR-$700,000, 25 YR. $780,000, 50 YR. $840,000 and 100 YR. $920,000. He stated that the Perry St. embankment and abandoned RR embankment would provide some of the material needed for the levees and that he made some preliminary tests of the material. John stated that the unit costs he used were considerably less than the Corps but he would send data for our review. The power lines in the abandoned R.R. embankment would have to be relocated. In passing John mentioned that the "Gross" effect of removing the embankments and some extensive snagging and clearing would only reduce the water surface profile at the index point by about 1.3 feet.

3. John stated that he found about 4 or 5 storm sewer outfalls that would probably require flap-gates and some conduits would be required for internal drainage. John stated that Dewey Williams has repeatedly

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DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCB PD-PF	Meeting with GAI 27 Feb.'86 contd.

TO	FROM	DATE	CMT 1

said that basement flooding is due to overland flow and not storm sewer back-up. John has not included storm sewer check valves in the plans.

4. Larry Slerman asked John about internal drainage and ponding areas. Larry suggested if space is a problem, move the levees but this of course would increase levee heights and costs. The reason for the suggestion resulted from John's statement that space was tight and he was experiencing difficulty in keeping levees on the higher elevations. Larry also commented on closure structures and mentioned that the AE might consider the types used at Point Place rather than sand bags. I sent John data on closure structures on 28 Feb.'86 as promised. John then asked about freeboard and I sent him data on 28 Feb'86 as promised. John stated that the following range of levee heights w/freeboard would obtain for the 10-yr plan: Tawa Run Area 0-12' (3' F.B.), 5' (1.8' F.B.), 8' (3' F.B.) and 3-4' (3' F.B. AT UPSTREAM END. The levee heights would increase by 1' increments from 10-25-50-100.

5. Roger Haberly asked John if flooded areas were the same as those used in the Preliminary Assessment Report and both John and Fred Boglione agreed that the area is about the same. John asked Fred Boglione about stage-damage curves and Fred stated that they could still be used as presented in the Preliminary Assessment Report. John mentioned F.I. and suggested that if a 100-yr. plan were selected there could be possible benefits on insurance cost savings.

6. Larry reminded John of his responsibilities to address (in effect) NCDPD-PF comments dated 22 July 1985. Fred Boglione met with GAI before the meeting to discuss flood profiles and cross sections and the need to re-run them. GAI understood and suggested they will. Kerry

DA FORM 2496 AUG 80 PREVIOUS EDITIONS WILL BE USED

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCBPD-PF	Meeting with GAI 27 FEB'86

TO	FROM	DATE	CMT 1

Frech told me - he would send a copy of drawing used to present plans. Bill Butler had no comments. No one from Design or General Engineering were present. Tom Wilkinson seemed to interact very favorably with Sam Mazella and discussed materials, material sources and inspection trench details. GAI spent some time after meeting with Ambrose Andre discussing flood-walls. I again emphasized that GAI should investigate land costs and non-structural alternative (Advance warning system and individual floodproofing preparedness). I also emphasized the need to present a no-Action plan.

7. I summarized and told all the type of study we are involved in - the "last stage" before final design and plans and specs. Furthermore we must advise local interests of our plans since their share of cost has increased. I told GAI of things to do: Final drawings, plans, public workshop meeting, write ups and work provided for in items 7-10 inclusive. GAI work must be completed by 1 April 1986. No one seemed to misunderstand what I said. I have been assured that GAI will develop some slides for a workshop meeting in Mid March (small public) with local interests from Ottawa. This is required before GAI finalizes his findings.

Joseph C Hassey

DA FORM AUG 80 2496 PREVIOUS EDITIONS WILL BE USED

27 FEBRUARY 1986

AGENDA

FOR

MEETING WITH GAI CONSULTANTS, MONROEVILLE, PA

IN BUFFALO DISTRICT OFFICE 1300 HOURS

TO

PRESENT PLANS FOR REDUCING OVERBANK

FLOODING OF BLANCHARD RIVER AT OTTAWA, OHIO

1. INTRODUCTIONS: (HASSEY)

   GAI - JOHN LESNIK, KERRY FRECH, JAMES NIECE, SAM MAZELLA

   CORPS - DAN KELLY, ROGER HABERLY, LARRY SHERMAN, FRED BOGLIONE, BILL BUTLER, TOM WILKINSON

2. PROJECT OVERVIEW (HASSEY)

3. PLAN PRESENTATIONS (GAI)

4. DETAILED COMMENTS (HASSEY)

   1. ECONOMICS (HABERLY MUST LEAVE FIRST)
   2. HYDROLOGY
   3. HYDRAULICS
   4. ENVIRO
   5. DESIGN
   6. GEOTECH
   7. ESTIMATES

5. SUMMARY

6. COMPLETION SCHEDULE

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT PRESENTATION OF PRELIMINARY PLANS. MEETING W/ MAYOR MAKE & STAFF – MEL WATCHMAN, GAI & STAFF

TO STUDY FILE FROM DATE 2/13/86. CMT 1

1. Subject meeting was held in Ottawa Council Chambers and was attended by those listed on attachment. GAI (John Lesnik) presented what I consider to be a plan with a few variations. He first showed new mapping with 10 yr. – 25 yr. flood contours and the location of cross sections across the River.

2. John then focused on a second drawing with "the plan" – 25 year, and in effect, the same configuration and location, as that presented in the Preliminary Assessment report for the north bank levee. No levee on South bank – no snag or clear, no channel work, – possibly remove R.R. embankment & relocate power poles –, remove Perry St. bridge embankment, flap gates in levee. – damage continues on south bank (10-12 structures). John stated with a large flood water might be trapped behind levee because flap gates would not have capacity to handle the water.

3. I told the Mayor and Mel Watchman to consider the plan and let me know their reaction. I again told them their cost would probably be 3-400 thousand 75/25 split. (includes design cost). A surveyor was present who was concerned about the The F.P.I. report and the 100 year area. Suggested he contact John Koller.

4. On 2/14/86 told John Z. about meeting and also Koller and Fred Bogliano.

5. Called John Lesnik on 2/18/86 and told him of our concerns of having plans to present to public. He said he would like to come to our office and discuss them.

DA FORM AUG 80 2496 PREVIOUS EDITIONS WILL BE USED

☆U.S. Government Printing Office: 1983—400-082

Meeting Council Chambers 1:00 PM (3/13/86)

Proposed Flood Control Mtg.

[illegible] M. Williams — Village of Ottawa

Mayor Macke — Village of Ottawa

John T. Williams — Village of Ottawa

Kerry Frech — GAI Consultants

JOHN R. LESNIK — " "

James E. Niece — " "

MEL WACHTMANN — MWCD, DEFIANCE, OH

JOE HASSEY — NCBPD-PF (CORPS OF ENGRS. - BFLO. N.Y.

John K. [illegible]

David W. [illegible]

[illegible] E. [illegible]

[illegible] Macke

[illegible]

MAUMEE WATERSHED CONSERVANCY DISTRICT
FIRST FEDERAL BUILDING. ROOM 309
601 CLINTON STREET
DEFIANCE, OHIO 43512
PHONE (419) 782-8746

October 9, 1985

Colonel Daniel R. Clark
District Commander
U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, NY 14207

Dear Colonel Clark:

Reference is made to your letter of 13 September 1985, and to our discussions regarding initiation of Advanced Engineering and Design (AE&D) that may lead to construction of the Blanchard River-Ottawa, OH flood protection project held on 25 September 1985. This letter constitutes an expression of intent by the Maumee Watershed Conservancy District to cooperate with the Federal Government in initiating construction of the Blanchard River-Ottawa, OH flood protection project as soon as possible.

I have reviewed the current Preliminary Assessment Report, dated July 1985, and the project cost sharing arrangements that you now believe will be applicable at the time of construction. Based on my analysis of this information, I would be required to do the following:

a. Provide, without cost to the United States, all lands, easements, and rights-of-way necessary for the construction and subsequent maintenance of the project, as required;

b. Hold and save the United States free from damages due to construction of the project except for damages due to the fault or negligence of the United States or its Contractors;

c. Maintain and operate the project, or integral parts, after completion in accordance with regulations prescribed by the Secretary of the Army;

d. Provide, without cost to the United States, all alterations and relocations of existing improvements including bridges, highways, buildings, utilities, sewers, and other facilities;

e. Comply with the applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," Public Law 91-646, approved 2 January 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent maintenance of the project and inform affected persons of pertinent benefits, policies, and procedures in connection with the said Act; and

f. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (PL 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 and operation of the project.

Since the Maumee Watershed Conservancy District is the agency empowered by law to provide the non-Federal cooperation required for the Blanchard River-Ottawa, OH flood protection project, I thereby inform you that it is our intent to enter into a binding written agreement with appropriate representatives of the Corps of Engineers which addresses project construction and satisfies the requirements of Section 221 of Public Law 91-611 prior to construction. Attached as Exhibit A is an assessment of the Maumee Watershed Conservancy District's ability to pay the non-Federal portion of costs for the project. Attached also is Exhibit B, which is a financial report for September 1985, for the Village of Ottawa, Ohio.

The present plan consists of earth levees on both banks of the Blanchard River near the west side of the village, channel improvement work downstream of the Main Street Bridge, snagging and clearing between the Grand Truck Western bridge and Main Street bridge, and the installation of storm sewer check valves. The estimated project cost (1985 price level) for the present plan is $876,000, of which the non-Federal local cost share is 25% or $219,000, which includes $12,000 credit for lands, easements and rights-of-way. It is the intent of the local sponsor to provide this amount of funds up front, provided the final completed plans meet the approval of the Village of Ottawa and/or the local sponsor.

It is further understood that if this letter of assurance is acceptable to the ASA(CW), he will recommend to the Office of Management and Budget that an appropriate request for funds to initiate study for (AE&D) be included in the PResident's budget for Fiscal Year 1987. Subject to the Conservancy Court approval of Amendment #1 to Section IV of the Official Plan, and subject to the Village of Ottawa, Ohio concurrence in the proposed COE plan of construction and costs, or modification by future legislation or administrative action, I reserve the right to reconsider my position.

Sincerely,

Melvin H. Wachtmann

Melvin H. Wachtmann
Executive Officer and
Secretary-Treasurer
Maumee Watershed
Conservancy District

MHW/keg
Enclosure
cc: Village of Ottawa

EXHIBIT A

Maumee Watershed Conservancy District's ability to Pay the Non-Federal Portion of Costs for Blanchard River-Ottawa, OH Flood Protection Project

When the final plan for the project is completed and accepted by the Village of Ottawa, the Maumee Watershed Conservancy District, operating under Section 6101 ORC, will proceed as follows:

1. Board of Directors approve a resolution adopting the plan as Amendment No. 1 to Section IV of the District's Official Plan.

2. Seek approval of the Conservancy Court of Amendment No. 1 to Section IV of the District's Official Plan.

3. Prepare an Appraisal of Benefits and Damages to the Plan.

4. Hold hearings on the objections to the Appraisal.

5. Seek approval of the Conservancy Court of the Appraisal of Benefits and Damages.

6. Board of Directors levy an assessment against the appraisal to pay the non-Federal share of the cost of the Plan.

7. Seek confirmation fo the Conservancy Court of the assessment.

When the assessment has been confirmed by the Court the Maumee Watershed Conservancy District will be in position to pay the non-Federal cost of the project.

If the benefits are appraised solely to the Village of Ottawa they will be the only persons assessed. Attached hereto as Exhibit B is a statement of financial capabilities of the Village of Ottawa for the project.

NCBIM-S

23 APR 87 10 32

Village of Ottawa

136 NORTH OAK STREET
OTTAWA, OHIO 45875

April 16, 1987

Mr. Joe Riamond
Army Corp of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Mr. Riamond,

Please be advised the Ottawa Village Council, at their meeting of April 13, 1987, agreed to study the various proposals for flood control as presented by the Army Corp of Engineers and expect to reach a decision at their regular meeting on April 27, 1987 and will so advise the Corp.

Thank you for your past and present assistance.

For the Mayor and Council:

Respectfully,

Dewey M. Williams

Dewey M. Williams
Dir. of Municipal Services
City Bldg.
Ottawa, Ohio 45875

cc: Mayor & Council
Mr. M. Watchman

EXHIBIT B

VILLAGE OF OTTAWA, OHIO

FINANCIAL REPORT FOR MONTH OF SEPTEMBER 1985

	Balance 8/31/85	Receipts	Expenditures	Balance 9/30/85
GENERAL FUND	$ 740,918.71	34,882.32	31,059.38	$ 744,703.65
INCOME TAX FUND	$ 1,450,528.70	73,303.46	98,600.77	$ 1,425,229.39
REVENUE SHARING	$ 13,672.48	56.10	4,655.77	$ 9,072.82
WATER REVENUE FUND	$ 237,193.54	14,593.90	19,983.42	$ 232,104.02
SEWER REVENUE FUND	$ 75,786.68	7,207.85	10,666.41	$ 72,328.12
SEWER EXPANSION FUND	$ 39,578.76	-	100.00	$ 39,478.76
PERMISSIVE TAX FUND	$ 6,608.75	-	2,837.84	$ 3770.91
STREET C.M.R. FUND	$ 291,545.25	6657.23	2615.55	$ 295,526.93
STATE HIGHWAY FUND	$ 2,708.41	539.77	-	$ 3,248.18
SPECIAL ASSESSMENTS BOND RETIREMENT	$ 23,362.67	—	—	$ 23,362.67
WATER REPLACEMENT	$ 75,000.00	—	—	$ 75,000.00
S. S. E. S. GRANT	$ -0-	—	—	$ -0-
WASTEWATER CONSTRUCTION	$ 955,492.52	774.46	96,589.06	$ 859,677.92
Ledger Totals	$ 3,912,392.48	138,279.07	267,108.00	$ 3,783,563.37
INVESTMENTS	$ 3,~~818~~ 668,000.00			$ 3,668,000.00
Cash on Hand	$ 94,392.48			$ 115,563.37

Investments

Due	Int. Rate	Amount	Place
10/12/85	8.00 %	300,000.	First National
11/10/85	7.50 %	200,000.	Ohio Bank
11/12/85	9.25 %	125,000.	State Home
11/15/85	7.50 %	200,000.	Ohio Bank
12/9/85	7.30 %	350,000.	AmeriTrust
12/12/85	7.55 %	125,000.	Ohio Bank
12/15/85	7.55 %	125,000.	Ohio Bank
12/18/85	7.90 %	150,000.	Ohio Bank
12/28/85	7.80 %	200,000.	Ohio Bank
1/8/86	7.25 %	300,000.	AmeriTrust
1/8/86	7.25 %	425,000.	AmeriTrust
2/11/86	7.60 %	400,000.	Ohio Bank
4/14/86	8.25 %	750,000.	State Home
Total CD's		3,650,000.	
12/1/90	9.0 %	18,000.	Village Bond
Total Investments		3,668,000.	

Bank Balance from Statement		$
Outstanding Checks		$
Balance Checking Acct.		$
Income Tax Change Fund	+	$ 100.00
Water Dept. Change Fund	+	$ 100.00
Police Dept. Change Fund	+	$ 10.00
CASH ON HAND		$ 115,563.37

Ohio Citizens Trust

	Bal. 7/31/85	Receipts	8/31/85
Water Debt Service 7-5270-1	$ 62,738.37	277.45	63,015.82
Water Reserve 7-5270-2	$ 591,968.02	3,478.11	595,446.13
Sewer Debt Service 7-5111-1	$ 149,533.71	108.14	149,641.85

INDEBTEDNESS Outstanding. Principal only

Sewer System MR Bonds	$ 52,000.
Waterworks MR Bonds	$ 1,170,000.
Special Assessment Bond	$ 18,000.
Sewer Plant Notes	$ 600,000.

Village of Ottawa

136 NORTH OAK STREET
OTTAWA, OHIO 45875

October 9, 1985

Melvin H. Wachtman
Maumee Watershed Conservancy District
601 Clinton Street, Room 311
Defiance, Ohio 43512

Dear Mr. Wachtman:

Village council met in special session Monday evening, October 7th and authorized the Corp of Engineers to proceed with the proposed study for flood control in the Village of Ottawa,Ohio.

A copy of our letter to Colonel Daniel R. Clark is enclosed for your file.

Yours very truly,

VILLAGE OF OTTAWA

Louis H. Macke

Louis H. Macke
Mayor

Village of Ottawa
136 NORTH OAK STREET
OTTAWA, OHIO 45875

October 9, 1985

Daniel R. Clark
Colonel, Corps of Engineers
District Commander
Buffalo, New York

Village council met in special session Monday evening, October 7th, and authorized the Corp of Engineers to proceed with the proposed study for flood control in the Village of Ottawa, Ohio. It is our understanding that by authorizing the study by your department, we incur no financial obligation and will not do so until the survey is completed and approved by Council and construction contracts are signed by us.

Mr. Zorich assured us that the Village of Ottawa officials would be consulted in the study as we fel we are in position to offer suggestions for the betterment of the project. Our interest is in seeing that the project when completed will provide reasonal assurance of flood water damage to the residents of our community. We want to participate and are most willing to co-operate in every way possible.

As per instructions from Mr. John Zorich, P. E. we are enclosing information concerning the financial ability to participate in the anticipated flood control project in the event the final project is approved by the Village.

Very truly yours,

VILLAGE OF OTTAWA, OHIO

Louis H. Macke
Mayor

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCBPD-PF	MEETING IN Council Chambers OTTAWA OHIO on 25 SEPTEMBER 1985 TO DISCUSS LCA, COST SHARING, AND REEVALUATION STUDY

TO PD-P ~~John Zorich~~ FROM JOE HASSEY DATE 9/26/85 CMT 1

1. Subject meeting was held at 1:00 PM → 3:10 PM and was attended by those shown on the attached list. John Zorich chaired the meeting, Rao provided technical assistance and I assisted John in plan presentations and other matters related to the planning process.

2. John Zorich gave some opening remarks and explained the general purpose of the meeting. He went into detail about the letter sent to Mr. Watchman and briefly discussed the authorized project plan, initial appraisal plan, 208 project, Section 14 work, and the Preliminary Assessment (PA) Report and Plan. John emphasized that the PA plan and cost are not final and that other plans will be investigated but it is probable that a similar type and size plan will result. A great deal of emphasis was made on the relationship between the 1981 flood and the type of flood the PA plan would protect against. The PA plan would not protect against large floods like the 1981 since the size of a project is constrained by the total average annual benefits and at Ottawa a large project would be difficult to justify.

3 John Zorich introduced me and I also presented an overview and history of plan developments for Ottawa. - The '64 plan, '84 plan, PA plan and additionally I told them of a preliminary plan to re-route all RR traffic over the Grand Trunk bridge to allow removal of the Chessie bridge that is obstructive and costly to modify. The plan was not acceptable to RR officials. I discussed the B/C ratios, annual costs, annual benefits and levels of protection for the various plans. I also mentioned the $250K received in March 1985 to do a reevaluation study. I mentioned that the

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DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCBPD-PF	Meeting in Council Chambers in Ottawa, Ohio on 25 September 1985 to discuss LCA, Cost Sharing and Reevaluation Study.

TO ~~John Zorich~~ PD Files FROM Joe Hassey DATE 9/26/85 CMT 1

3. (Cont'd) - '64 plan was much larger than the initial appraisal plan and the initial appraisal plan (84) was larger than the PA plan. The reason for the smaller plans was economic justification. The average annual cost of a plan must be less than the average annual benefits. The PA plan is based upon a flood damage survey completed in the early part of this year and the resulting average annual benefit analysis was used in the preliminary assessment report. The '64 plan and initial appraisal report plan (84) are not economically justified based upon the recent flood damage evaluation. I stated that the Corps had received $50K in March 1985 to start a reevaluation study and the preliminary assessment report represents the first step and results.

4. John Zorich emphasized that other plans will be investigated and the selected plan that meets Corps standards will be studied in more detail and finalized in a general design memorandum report that will begin after the reevaluation study is completed. Plans and Specs will then be developed and it is during that time that local financial support must be forthcoming before a construction contract can be advertized. John emphasized that the final plan and cost is not known at this time but will probably be similar to the preliminary assessment plan.

5. I asked various people about their views on the preliminary plan and any other comments or questions they might have.

6. Mayor Macke said he believes snagging and clearing would be the best solution to solving many of the flood problems at Ottawa and stated that the improvements at Defiance (downstream) have [illegible]

DA FORM AUG 80 2496 PREVIOUS EDITIONS WILL BE USED

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCBPD- PF	Meeting in Council Chambers in Ottawa, Ohio on 25 September 1985 to discuss LCA, Cost sharing and Reevaluation Study.

TO PD files FROM Joe Hassey DATE 9/26/85 CMT 1

6 (contd.) the duration of flooding at Ottawa from ≅ 20 Hours to about 16 hours during some past floods. In response to the Mayor, Rao stated that once the river flows go on the overbanks, snagging and clearing is not effective in lowering flood levels. I told the mayor that the Corps must coordinate with USFWS who generally do not favor snagging and clearing. John Zorich stated that if the Corps snagged and cleared it would be a one time event and the locals would be required to maintain the project. Mr. Hatchman verified this and said the Conservancy District is experiencing costly maintenance. I asked the Mayor what the people of Ottawa thought about the '64 plan and he said it was much too big, costly, and would segregate the community. I then asked about the Preliminary Assessment Plan and received an answer with a weak 'maybe'. It seemed as though many of the people want snagging and clearing only. Vincent Niese seemed to agree with the mayor about snagging and clearing. Calvin R. Kirracofe (MWCD) asked about the impact of future changes in land use on flood control plans. John stated that we had not investigated this and it would be very costly and time consuming but because the Ottawa area is relatively small the impact would probably not be too significant. I asked Dewey Williams if he would provide John Lesnik (GAI) with info on sewer systems and road elevations and he said he would. According to Dewey, Ottawa does not have a combined sewer system - Sanitary only.

7. John Zorich explained the proposed Cost Sharing and made it clear that everything is subject to change and approval by ASA. Money is not needed now but in the future. John explained how 75/25

DA FORM AUG 80 2496 PREVIOUS EDITIONS WILL BE USED

U.S. Government Printing Office: 1983—400-862

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCBPD- PF	Meeting in Council Chambers in Ottawa, Ohio on 25 September 1985 to discuss LCA, Cost sharing, and Reevaluation Study.

TO John Zorich FROM Joe Massey DATE 9/26/85 CMT 1

7 (cont'd) and 65/35 would be implemented and used a $1,000,000 Project (similar to PA plan cost) as an example. MAYOR HACKE STATED HE WANTS VILLAGE COUNCIL TO ACT ON LOA & DON'T MEET AGAIN TILL 16 OCT SO CAN'T GIVE RESPONSE ON LOA TILL 17 OCT. J. ZORICH STATED THE SOONER THE BETTER & HE WILL INFORM NCD/DCE OF THE 16 OCT DATE TO FORWARD NCD/DCE OF THE DELAY.

8 The following was furnished to all:

1. Ltr to Watchman w/ Sample letter of Assurance.
2. Fact sheet (cost sharing & schedule of actions for letter of assurance) Encl 2.
3. S 366 cost sharing proposal
4. Plan of improvement (PA) w/ cost / benefits for 25 year plan.
5. Major steps - planning design and implementation.

Mayor Hacke, Mr. Niese, and Calvin Kiracofe was given a complete Preliminary Assess. FFT.

9 Calvin Kiracofe asked "What would happen if the levees were overtopped. John explained that we would have to provide for equal pressures on each side of the levee to prevent a sudden collapse. We explained that the PA plan would not protect against a flood the one of the magnitude of that occurred in 1981 but would protect against smaller floods. If I understood Dewey correctly, he stated that flood water enter the sanitary system (vents) and cause backup in the basements. Mr Niese stated the SCS plans would not impact on Corps plans. The Mayor told me that the Corps could use Council chambers to hold meetings in the future. Dewey agreed with me that the PA levees would hardly be noticed because of size and proposed location.

10. Conclusion: Ottawa residents apparently do not want a large project and would prefer snagging and clearing. The Chessie Bridge is very obstructive during ice flows but no changes are apparent. The Mayor and Council meet on 16 Oct '85 to consider cost sharing. The Mayor has invited Mr. Watchman to attend to expedite the [illegible] process.

DA FORM AUG 80 2496 PREVIOUS EDITIONS WILL BE USED

U.S. Government Printing Office: 1983—406-082

2 ENCL
ENCL 1 - ATTENDEES
ENCL 2 - FACT SHEET ON OTTAWA.

25 SEPT. 85

MEETING IN OTTAWA, OHIO RE/ OTTAWA FC PROJECT

THOSE PRESENT

Joseph C. Haasly — CORPS OF ENGINEERS — 1776 NIAGARA ST. BUFFALO, N.Y. 14207

Vincent J. Niese Putnam County Commissioner 419-3656-7640 R&X Leipsic D.

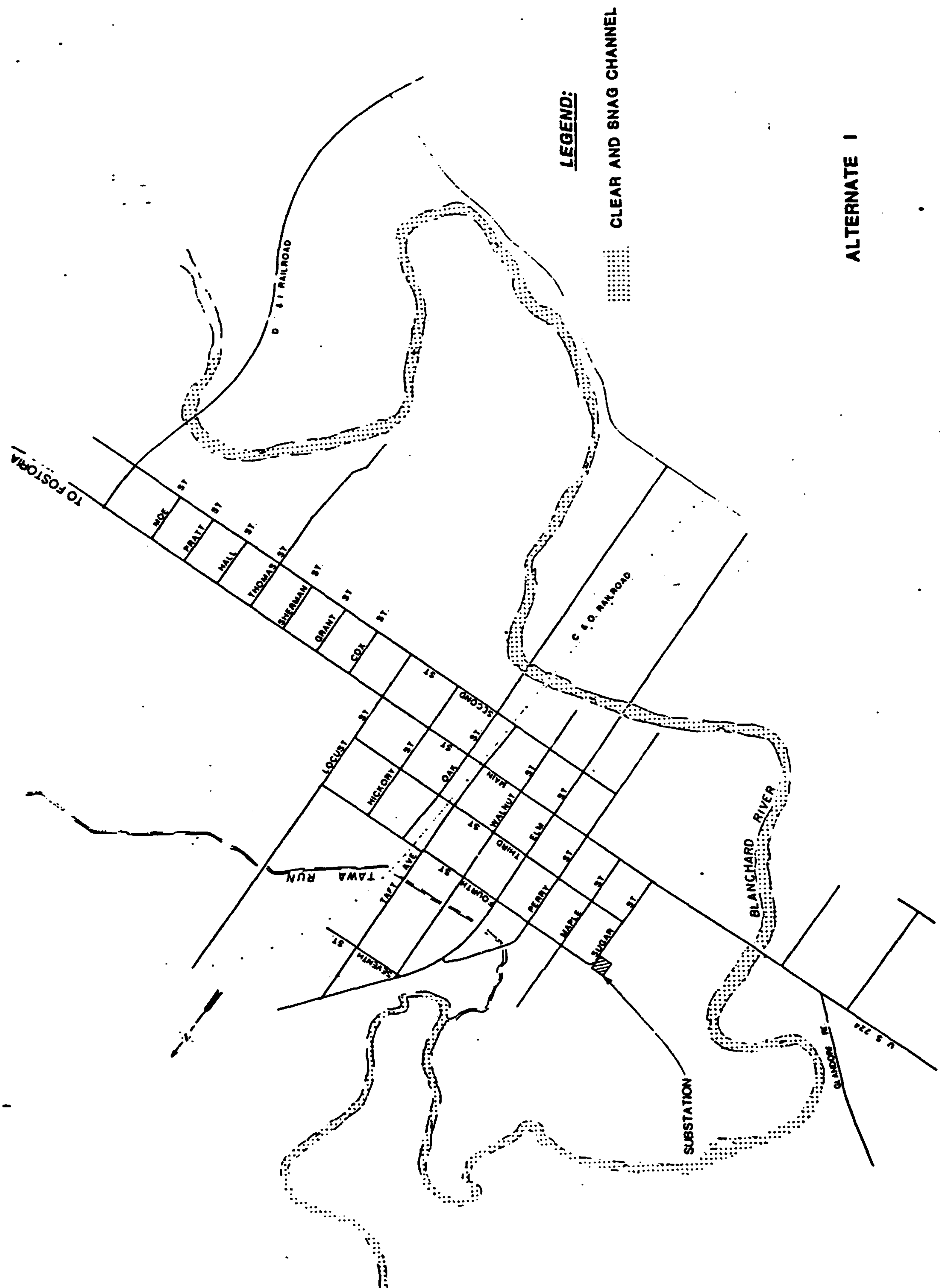
Ruth A. Coonrod, Director M.W.C.D.

Melvin H. Wachtmann, Exec Off MWCD (419) 782-8746

Calvin R. Kiracofe Director Maumee Con. Dist. (419) 2279854

DEWEY WILLIAMS	OTTAWA DIR	419-523-3206	OTTAWA
John T. Williams	Village of Ottawa	419-523-5020	OTTAWA
Louis J. Mecke	"	"	"
Bill Roberts	"	"	"
K. Yalamanchili	U.S. Army C.E.	(716)-876-5454	Buffalo.
John Zorich	"	"	"

Encl 1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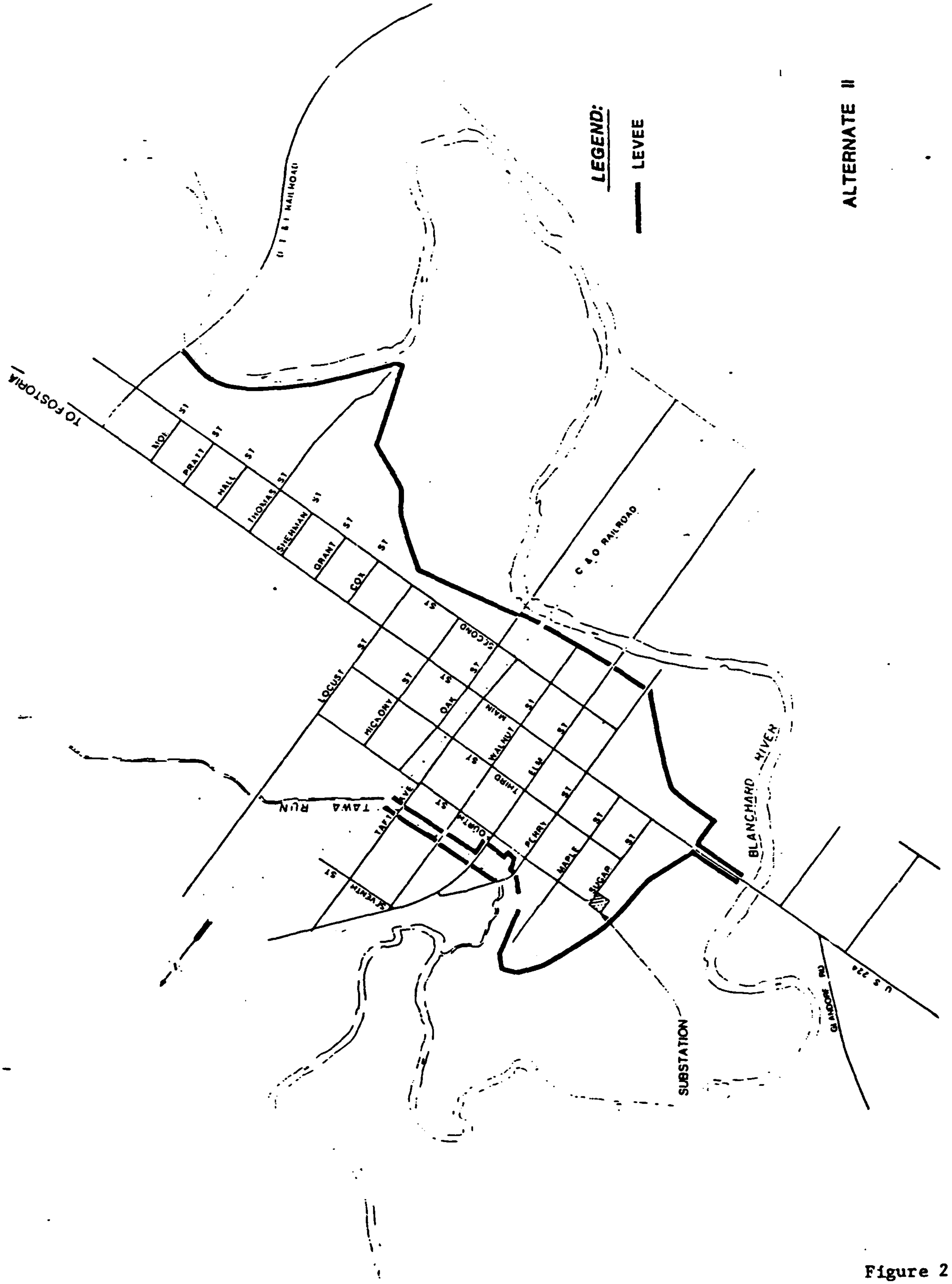
CLEAR AND SNAG CHANNEL
ALTERNATE I
TO FOSTORIA
D & I RAILROAD
C & O RAILROAD
NOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
SECOND ST
LOCUST ST
HICKORY ST
OAK ST
MAIN ST
WALNUT ST
ELM ST
THIRD ST
TAFT AVE
FOURTH ST
PERRY ST
MAPLE ST
SUGAR ST
SEVENTH ST
TAWA RUN
BLANCHARD RIVER
SUBSTATION
U S 224

Figure 1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LEGEND:
LEVEE
TO FOSTORIA
C & O RAILROAD
BLANCHARD RIVER
TAWA RUN
SUBSTATION
PRATT ST
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THOMAS ST
SHERMAN ST
GRANT ST
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PERRY ST
MAPLE ST
SUGAR ST
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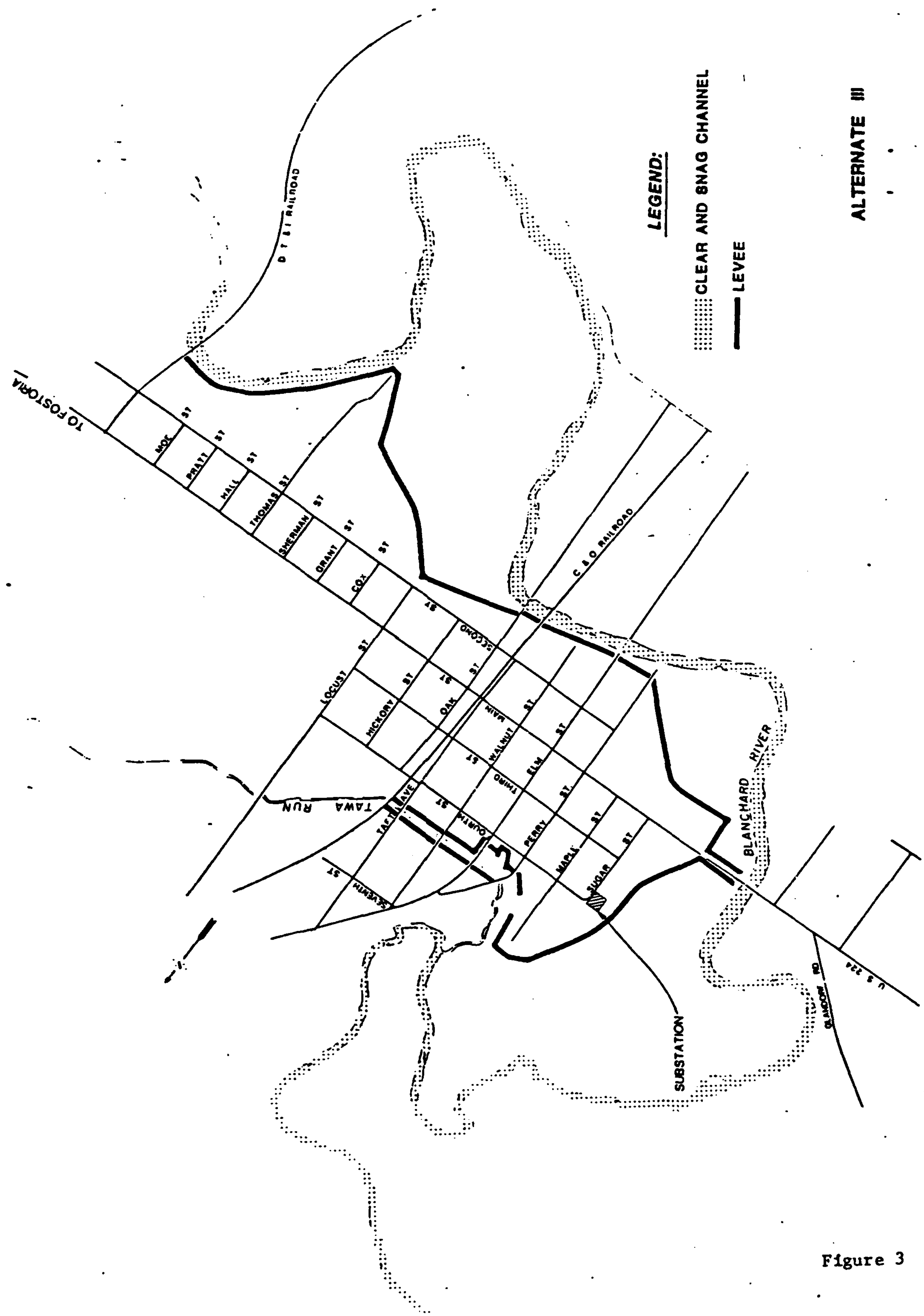
TAFT AVE
SEVENTH ST

Figure 2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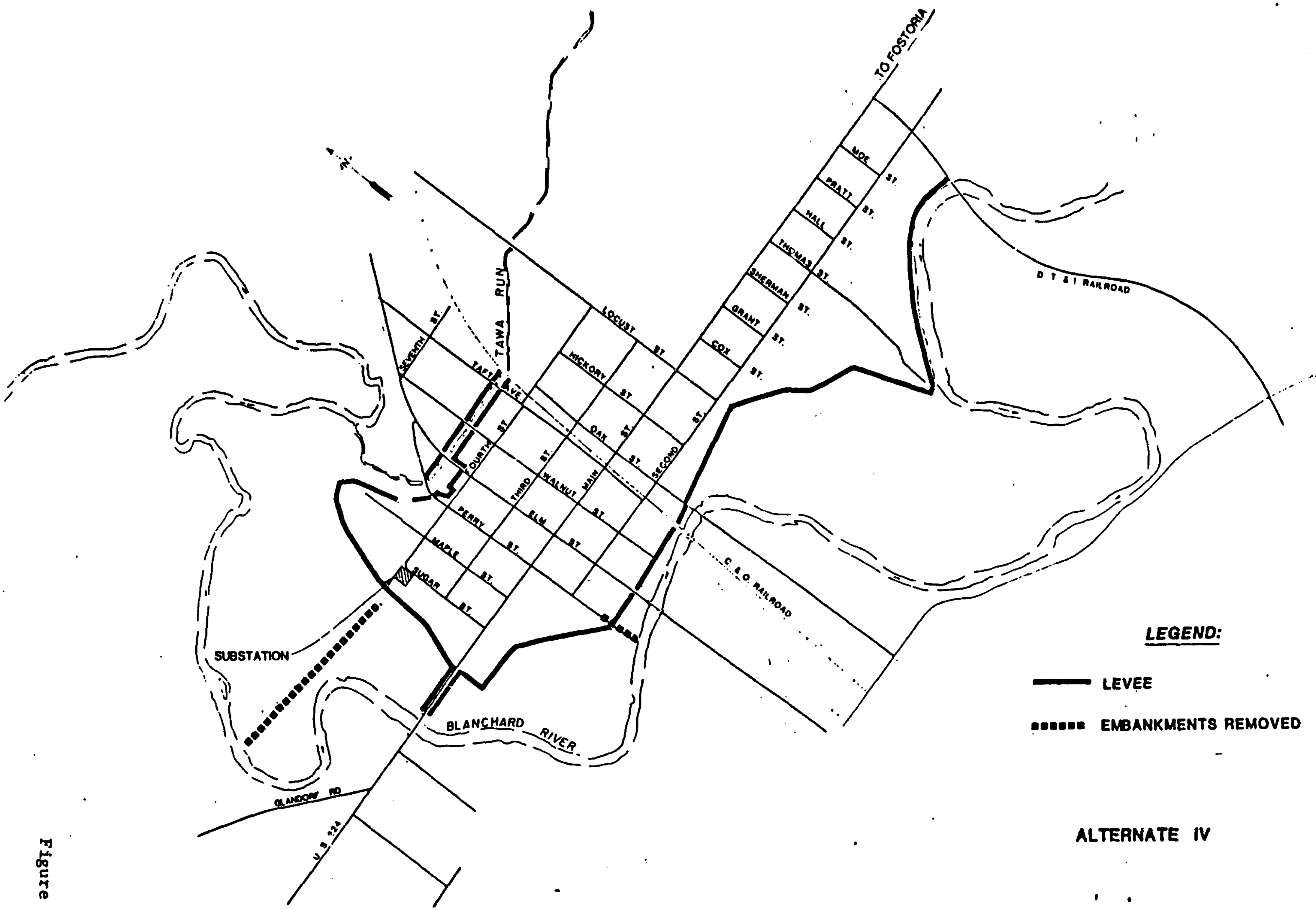
LEGEND:
CLEAR AND SNAG CHANNEL
LEVEE
TO FOSTORIA
D T & I RAILROAD
C & O RAILROAD
BLANCHARD RIVER
TAWA RUN
SUBSTATION
U S 224
GLANMORE RD
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
SECOND ST
LOCUST ST
HICKORY ST
OAK ST
MAIN ST
WALNUT ST
ELM ST
THIRD ST
FOURTH ST
PERRY ST
MAPLE ST
SUGAR ST
SEVENTH ST
TAFT AVE

Figure 3


TO FOSTORIA
MOE ST.
PRATT ST.
HALL ST.
THOMAS ST.
SHERMAN ST.
GRANT ST.
COX ST.
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PERRY ST.
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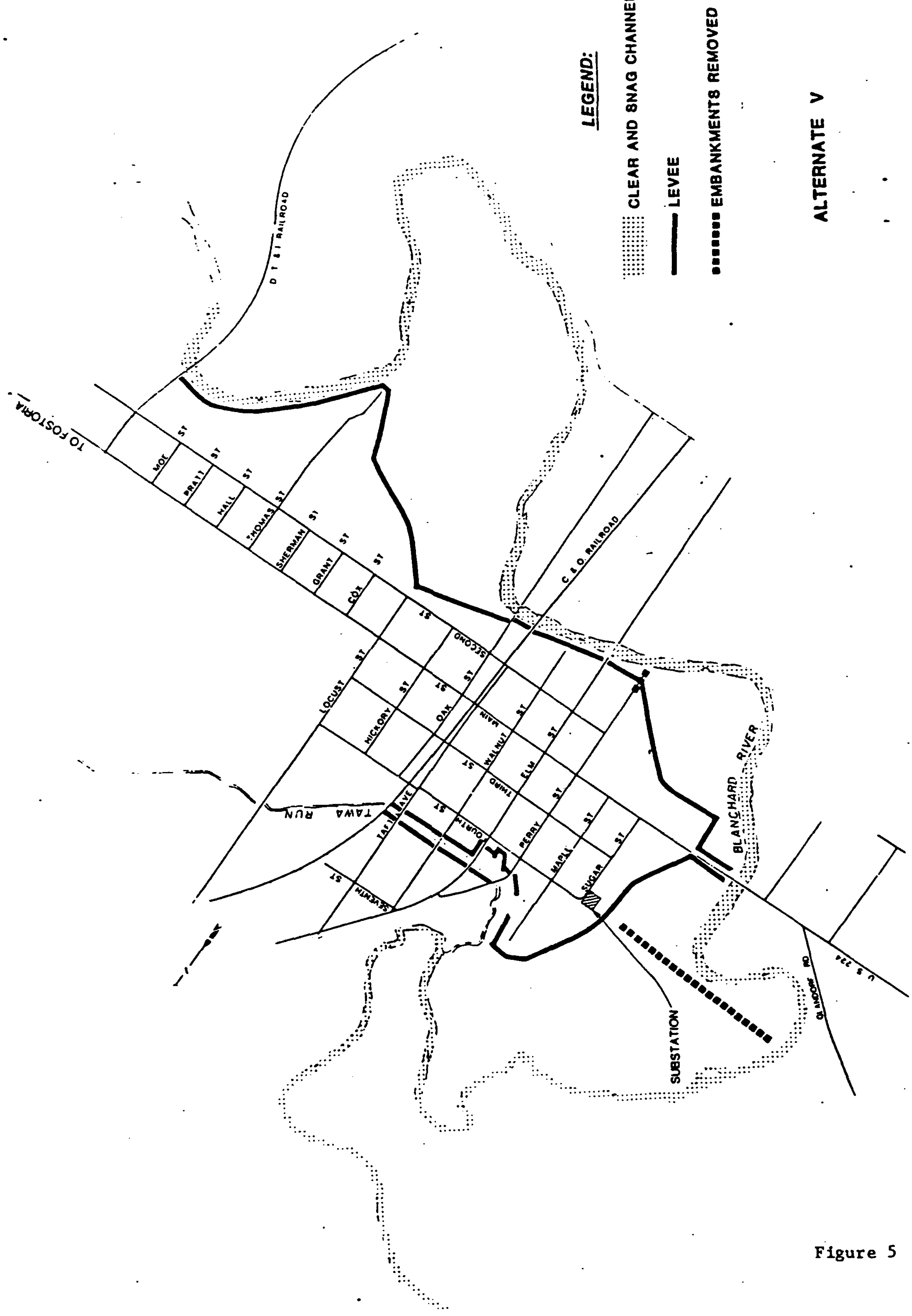
SUGAR ST.
TAWA RUN
D T & I RAILROAD
C & O RAILROAD
SUBSTATION
BLANCHARD RIVER
GLANDORF RD
U S 224
N
LEGEND:
LEVEE
EMBANKMENTS REMOVED
ALTERNATE IV

Figure 4


LEGEND:
CLEAR AND SNAG CHANNEL
LEVEE
EMBANKMENTS REMOVED
ALTERNATE V
TO FOSTORIA
D T & I RAILROAD
C & O RAILROAD
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
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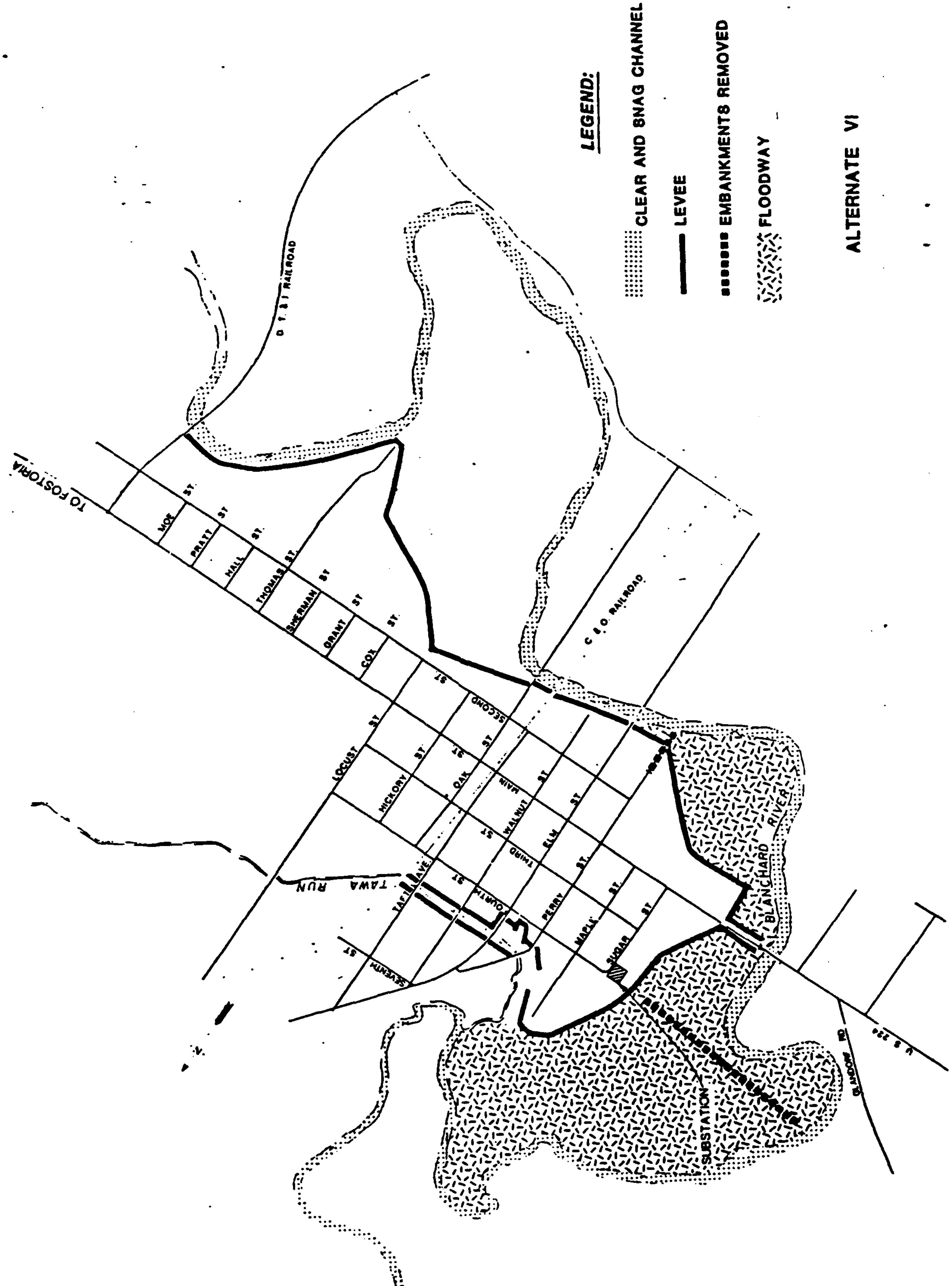
ELM ST
FOURTH ST
PERRY ST
MAPLE ST
SUGAR ST
TAFT AVE
SEVENTH ST
TAWA RUN
BLANCHARD RIVER
SUBSTATION
U S 224
GLANDORF RD

Figure 5


LEGEND:
CLEAR AND SNAG CHANNEL
LEVEE
EMBANKMENTS REMOVED
FLOODWAY
ALTERNATE VI
TO FOSTORIA
D T & I RAILROAD
C & O RAILROAD
MOE ST
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
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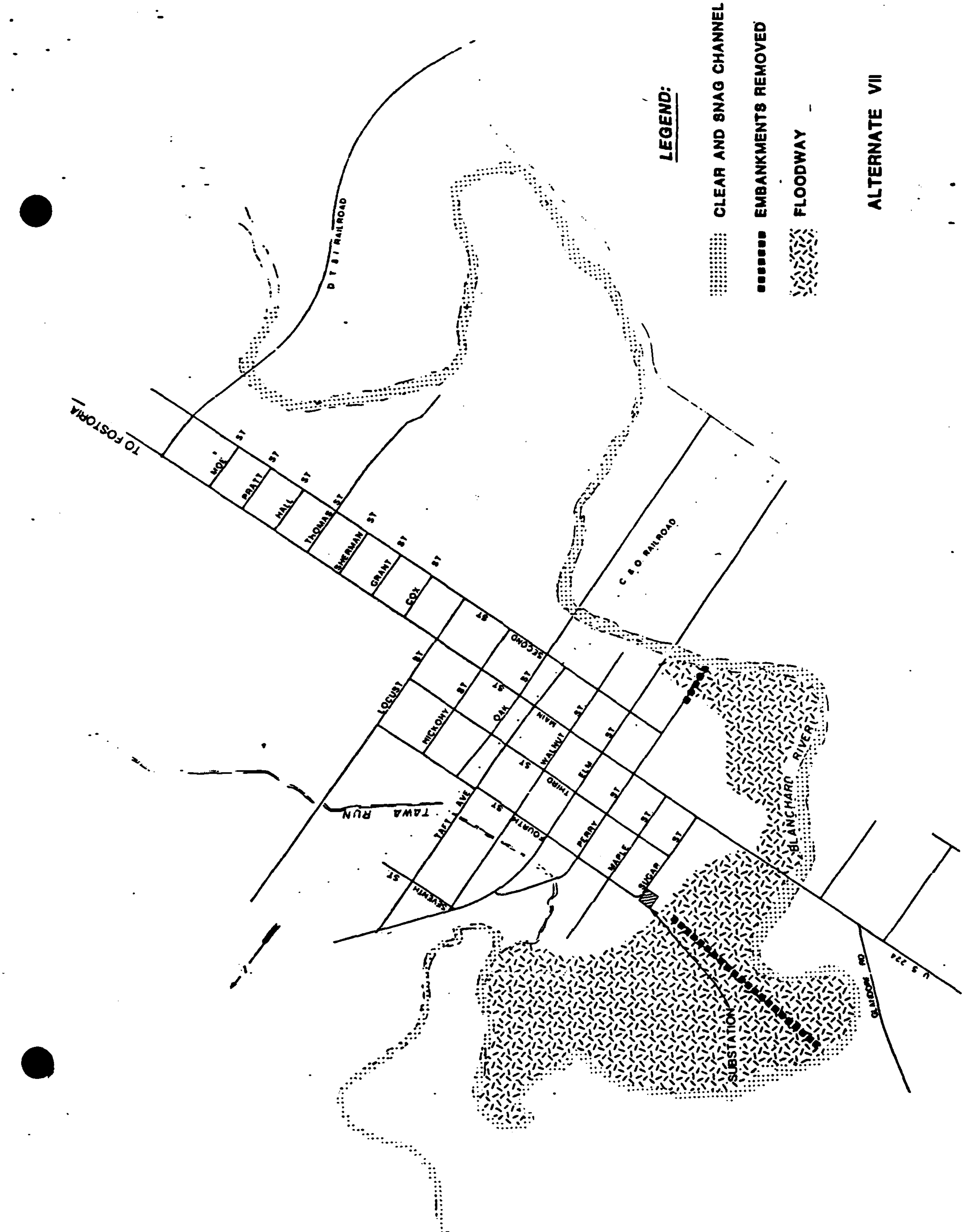
PERRY ST
MAPLE ST
SUGAR ST
FOURTH ST
TAFT AVE
SEVENTH ST
TAWA RUN
BLANCHARD RIVER
SUBSTATION
U S 224

Figure 6



LEGEND:
CLEAR AND SNAG CHANNEL
EMBANKMENTS REMOVED
FLOODWAY
ALTERNATE VII
TO FOSTORIA
D T & I RAILROAD
C & O RAILROAD
PRATT ST
HALL ST
THOMAS ST
SHERMAN ST
GRANT ST
COX ST
SECOND ST
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THIRD ST
FOURTH ST
PERRY ST
MAPLE ST
SUGAR ST
SEVENTH ST
TAFT AVE
TAWA RUN
BLANCHARD RIVER
SUBSTATION
U S 224

Figure 7

ODNR
OHIO DEPARTMENT OF NATURAL RESOURCES
Division of Wildlife
Fountain Square
Columbus, Ohio 43224
614-265-6330

OFC. MGMT. OAS
23 JUL 86 09 38

July 21, 1986

William E. Butler, Geographer
Environmental Resources Unit
U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207

Dear Mr. Butler:

This is in response to your request for an opinion on the potential for an Indiana bat (Myotis sodalis) nursery colony to occur in the flood protection project area for Ottawa, Ohio. The riparian woodland along the Blanchard River, from the old Perry Street bridge, downstream to the abandoned railroad, appears to be suitable habitat for a nursery colony. This opinion is based on an examination of aerial photography, and a field observation of the woodland between Perry Street and Main Street.

Summer habitat requirements for the species are not well defined, but the following are thought to be important, and are present in the project area.

1. Older age riparian woodland bordering both sides of a waterway for a reach of about ½ mile. The age structure should allow for cavity formation.

2. Dead trees and snags, especially with exfoliating bark should be present. The woodland should be of a large enough extent to allow for recruitment of new nursery sites, as bark falls from existing sites.

3. The riparian woodland should be essentially continuous along the stream banks themselves, but it need not extend for any more than a tree or two inland.

The high degree of subjectivity in the above description is recognized, but quantitative data do not exist. The occurrence of a nursery roost within 20 miles of the Ottawa project site, also influences my opinion.

There are two basic options at this point. A survey can be attempted for the bat and/or a roost, or their presence can be assumed and the project designed accordingly. The latter is recommended in that it would be extremely difficult to develop a defensible position that the bat does not occur in the project area. The trapping conditions are poor, an actual roost could occur at a considerable distance from the riparian zone itself, and roost location is at least partially a result of good fortune as opposed to systematic technique. Techniques other than trapping may be possible to determine the presence of the species, but such techniques are unproven and would require a substantial amount of development.

The best biological approach in terms of project design would be to leave the riparian zone untouched, although clearing of ground debris would not be expected to affect any bats. It may also be acceptable to thin the woodland, but no data exist for guidance. My guess is that removal of trees and brush (excluding dead trees and snags) up to 10" dbh would not be likely to affect the suitability of the habitat for Indiana bats.

I hope the above helps, and I would be glad to try to clarify any of it, or answer any further questions.

Sincerely,

Denis S. Case
Assistant Administrator
Wildlife Management & Research

DSC:gh
cc: Ann Davies
Bill Roshak

APPENDIX I

FISHERIES REVIEW OF THE BLANCHARD RIVER IN PUTNAM COUNTY, OHIO. 1974-81

The following information was collected during routine stream surveys conducted by fisheries personnel of the Ohio Department of Natural Resources, Division of Wildlife. Fish populations have been sampled with various types of seines, fyke nets and electroshockers.

The data presented was collected during the years 1974 through 1981 and is considered reflective of the stream if such surveys were conducted at the present time as no significant environmental changes have occurred that did not already exist at the time of these surveys.

The following species of fish have been recorded from general stream surveys and are not the total species considered to be present in this area of the Blanchard River. The relative abundance terms used are comparable to those used by Trautman and Gartman (1974) and Allison and Hothem (1975).

A - Abundant
VC- Very common
C - Common
U - Uncommon
R - Rare

	SPECIES	RELATIVE ABUNDANCE
Catastomidae		
White sucker	*Catostomus commersoni*	C
Golden redhorse	*Moxostoma erythrurum*	VC
Quillback	*Caprodes cyprinus*	U
Hog sucker	*Hypentelium nigricans*	U
Centrarchidae		
Smallmouth bass	*Micropterus dolomieu*	U
Largemouth bass	*Micropterus salmoides*	C
Rock bass	*Ambloplites rupestris*	C
Bluegill	*Lepomis macrochirus*	U
Green sunfish	*Lepomis cyanellus*	A
Longear sunfish	*Lepomis megalotis*	U
White crappie	*Pomoxis annularis*	C
Clupeidae		
Gizzard shad	*Dorosoma cepedianum*	C
Cyprinidae		
Common shiner	*Notropis cornutus*	C
Stoneroller	*Campostoma anomalum*	C
N. creek chub	*Semotilus atromaculatus*	C
Golden shiner	*Notemigonus crysoleucas*	C
Redfin shiner	*Notropis umbratilis*	A
Fathead minnow	*Pimephales promelas*	C
Bluntnose minnow	*Pimephales notatus*	A
Spotfin shiner	*Notropis spilopterus*	VC
Sand shiner	*Sand shiner*	C
Silverjaw minnow	*Ericymba buccata*	U
Carp	*Cyprinus carpio*	C
Roseyface shiner	*Notropis rubellus*	U

SPECIES		RELATIVE ABUNDANCE
Cyprinodontidae		
Blackstripe topminnow	*Fundulus notatus*	U
Ictaluridae		
Channel catfish	*Ictalurus punctatus*	U
Tadpole madtom	*Noturus gyrinus*	U
Black bullhead	*Ictalurus melas*	C
Yellow bullhead	*Ictalurus natalis*	U
Percidae		
Johnny darter	*Etheostoma nigrum*	C
Logperch darter	*Percina caprodes*	U
Greenside darter	*Etheostoma blennioides*	C
Atherinidae		
Brook silverside	*Labidesthes sicculus*	U

Bibliography

Allison, D. and H. Hothem, 1975. An evaluation of the status of the fisheries and the status of other selected wild animals in the Maumee River Basin, Ohio. ODNR, Division of Wildlife leaflet. June, 1975.

Trautman, M. B. and D. K. Gartman, 1974. Re-evaluation of the effects of man-made modifications of Gordon Creek between 1887 and 1973 and especially as regards its fish fauna, Ohio Journal of Science, 74(3):162-173.

Prepared by:

Darrell Allison

Darrell Allison
Fish Management & Research Supervisor
Wildlife District Two

October 2, 1984

ODNR
OHIO DEPARTMENT OF
NATURAL RESOURCES

Fountain Square
Columbus, Ohio 43224
Division of Wildlife
614/265-6305

August 1, 1986

Mr. Kent Kroonemeyer, Supervisor
Columbus Field Office
U.S. Fish and Wildlife
P.O. Box 3990
Columbus, OH 43216-5000

Dear Mr. Kroonemeyer:

We have completed our review of your Draft Fish and Wildlife Coordination Act Report for the Local Flood Protection Project for the Village of Ottawa, Putnam County, Ohio.

This letter will serve as our concurrence in the findings and recommendations of your report. We feel that incorporation of the five recommendations included in your report will adequately mitigate the loss of fish and wildlife habitat resulting from project implementation.

We appreciate the opportunity to review this document. If additional assistance or clarification is required, do not hesitate to contact us.

Sincerely,

Clayton H. Lakes

CLAYTON H. LAKES
Chief

CHL:jaa

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
NCBPD-ER	Ottawa, Ohio - Flood Protection Project - Wetlands Determination

TO Files FROM William F. MacDonald DATE 28 Jul 86 CMT 1
MacDonald/ls/2175

1. Purpose: The purpose of this report is to determine Department of the Army jurisdictional responsibility under Section 404 of the Clean Water Act for freshwater wetland areas within the Flood Protection Project for Ottawa, Ohio.

2. Background and Location:

2.1 A detailed report describing the subject project is provided in the General Reevaluation Report and Environmental Impact Statement for the Ottawa, Ohio Flood Protection Project, August 1986.

2.2 A field investigation was conducted on 15 July 1986 by Bill Butler and Bill MacDonald to determine the extent of wetlands on the project site. The information attained on site was used in conjunction with aerial photographs taken on April 29,1985 to develop a wetlands flora cover type map and to determine the extent of Section 404 of the Clean Water Act authority. No attempt to determine wildlife or other associated values was made due to the limited nature of this investigation.

2.3 Two areas were preliminarily identified as possible wetland areas from aerial photography and are subject to this review. Areas "A" and "B" as indicated on Enclosure One attached are aquatic areas resulting from old channel isolation (oxbows). Area "A" was apparently formed when an old oxbow channel was separated from the Blanchard River by the construction of a railroad embankment.

3. Environmental Setting:

3.1 Reference is made to Section 3, Affected Environment, of the Environmental Impact Statement for the Flood Protection Project for Ottawa, Ohio.

3.2 The Blanchard River flows north from the Main Street bridge and then meanders west before returning to a northeast flow beyond an old abandoned railroad embankment. The left edge of the river is dominated by mature deciduous trees in a narrow (approximately 100 ft) band. A wider wooded area is found on the right side of the river. This treed area generally follows old river channels which have silted in and exist as low lying flood plain areas which are frequently flooded.

The dominant overstory in these wooded areas consist of maple (Acer spp.), ash (Fraxinus spp.), Locust (Gleditsia triacanthos), cottonwood (Populus deltoides), willow (Salix spp.), and hackberry (Celtis occidentalis). Understory cover is dense on the edges which receive direct sun light and sparse under the shaded canopy.

3.3 A railroad embankment running east and west is located immediately adjacent and south of area "A" (See Enclosure one). Agricultural land which was planted to soy beans was found on the north.

3.4 Area "A" is an old oxbow which was isolated from the river system by the construction of a railroad embankment which runs east and west and is located to the south. The inundated area is approximately 540 feet long and 150 feet wide. A small island is located approximately in the center of the flooded area and was vegetated with willow (Salix spp.) and maple (Acer spp.). The remainder of the inundated area was dominated by smartweeds (Polygonum spp.) and buttonbush (Cephalanthus occedentalis) with the exception of one open-water area (See Enclosure One). Approximately 5 or 6 large dead flooded trees existed and at least one was being used by redheaded woodpeckers as a nesting site. Water levels apparently fluctuate widely as indicated by the species and growing characteristics of the dominant plants. This wetland pocket drained to the west along the railroad embankment and into the Blanchard River. It appears to be "perched" in elevation and relatively isolated from the influence of river water. Apparently, this area receives surface flow from an agricultural field to the north.

3.5 Area "B" is an open water area which remains at the downstream end of an old river channel. Its hydrolic position in regard to the main river flow and the railroad embankment appears to be maintaining its depth and longevity. No aquatic vegetation is visible in the April 29, 1985 aerial photography nor was it apparent during the 15 July 1986 field visit. Water levels were, however, elevated during the field trip and the photograph was taken early in the growing season.

4. Conclusion and Recommendations:

4.1 Area "A" is a freshwater wetland as defined by Section 404 of the Clean Water Act (33 CFR 323.2(c)), and is considered a Special Aquatic Site as defined by U.S. Environmental Protection Agency regulation 40 CFR 230.41.

4.2 Area "B" is not a freshwater wetland as defined by the Clean Water Act but is regulated by this authority a part of the waters of Blanchard River.

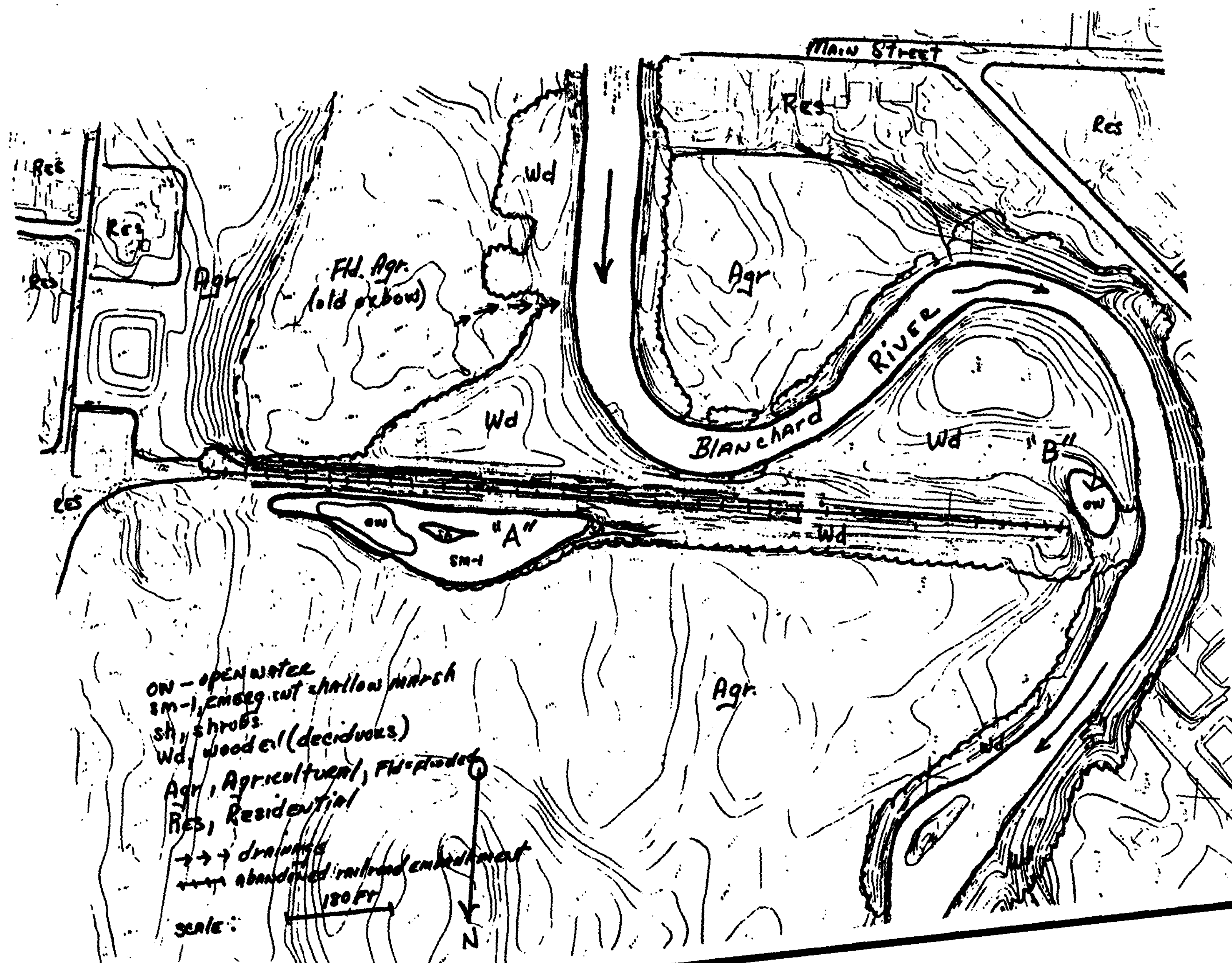
4.3 Removal of the railroad embankment as a project feature will not require a Section 401(b)(1) evaluation or Water Quality Certification in regard to Section 401 of the Clean Water Act.

4.4 Removal of the railroad embankment will, however, significantly impact the wetland area by changing its water source and regime. Total removal would again subject this area to river overbank flooding and siltation. Within a relatively short period of time (5-10 years) this area would resemble the flood plain on the south side of the railroad embankment which was once part of the same oxbow channel (see Enclosure 1).

4.5 The discharge of fill material into wetland area A and river channel section B would require a Section 404(b)(1) evaluation and Section 401 Water Quality Certification. A finding of compliance would have to demonstrate that there are no practicable alternatives to the proposed discharge that would have less adverse effect on the aquatic ecosystem.

Bill MacDonald

WILLIAM F. MacDONALD
Wildlife Biologist
Environmental Branch, Planning Division


Main Street
Res
Res
Res
Res
Res
Wd
Fld. Agr.
(old oxbow)
Agr
Agr
Wd
Blanchard River
Wd
"B"
OW
OW
sh
"A"
sm-1
Wd
Agr.
Wd
ON - open water
sm-1, emergent shallow marsh
sh, shrubs
Wd, wooded (deciduous)
Agr, Agricultural, Fld=flooded
Res, Residential
drainage
abandoned railroad embankment
scale:
180 Ft
N

NCBFD-ER/W. Butler 28 July 1986

MEMORANDUM FOR RECORD

SUBJECT: Ottawa, OH, Flood Protection Study

1. On 15 July 1986, Messrs. Denis Case (ODNR - Division of Wildlife), Bill MacDonald (COE), and Bill Butler (COE) surveyed a portion of the study area to determine the potential presence of summer nursery roosts for the Federally endangered Indiana bat (*Myotis sodalis*) along the Blanchard River. This on-site inspection is required under Section 7(c) of the Endangered Species Act to determine if this species is present and whether suitable habitat exists for either expanding the existing population or potential reintroduction of populations. The survey participants traversed the riparian corridor of the right streambank from Main Street upstream to the Ferry Street bridge abutment. Portions of this cooridor segment were inaccessible due to high river levels and large pools of standing water.

2. The surveyed streambank contains a narrow, yet dense growth of trees with an associated understory along the periphery. Three potential roost sites (i.e., dead trees with exfoliated bark) were identified along this stream segment.

3. Mr. Case concluded that the project area may provide suitable summer nursery habitat for the Indiana bat. However, Mr. Case stated that a Section 7(c) biological assessment may prove to be inconclusive for several reasons. Due to the width and discotinuity of the tree canopy, trapping bats with the use of mist nets may be ineffective. The bats could fly over and around the nets. An intensive search of the project area for roost sites could result in a negative finding yet bat nurseries could be secreted in overlooked portions of the study area. Also, nurseries sites could be located as far as 0.5 mile away from the river and the bats could use the corridor as a foraging area. Echolocation techniques could identify the presence of *Myotis* in the study area but would not be able to differentiate between the Indiana bat and more common *Myotis* species.

4. Mr. Case recommended that any project-induced impacts to the Indiana bat could be adequately mitigated by restricting floodway tree removal to those smaller than 10 inches in diameter (dbh). Implementation of this plan would preserve any existing nursery roost sites in the study area and ensure an adequate stock of sites to benefit future recruitment. These recommendations will be submitted to the Buffalo District by letter (rec'd 23 July 1986).

William E. Butler

WILLIAM E. BUTLER
Community Planner
Environmental Analysis Branch

CF:
NCBPD
NCBPD-PF

ODNR
OHIO DEPARTMENT OF
NATURAL RESOURCES
Division of Wildlife
Fountain Square
Columbus, Ohio 43224
614-265-6330

July 21, 1986

William E. Butler, Geographer
Environmental Resources Unit
U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207

Dear Mr. Butler:

This is in response to your request for an opinion on the potential for an Indiana bat (Myotis sodalis) nursery colony to occur in the flood protection project area for Ottawa, Ohio. The riparian woodland along the Blanchard River, from the old Perry Street bridge, downstream to the abandoned railroad, appears to be suitable habitat for a nursery colony. This opinion is based on an examination of aerial photography, and a field observation of the woodland between Perry Street and Main Street.

Summer habitat requirements for the species are not well defined, but the following are thought to be important, and are present in the project area.

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2. Dead trees and snags, especially with exfoliating bark should be present. The woodland should be of a large enough extent to allow for recruitment of new nursery sites, as bark falls from existing sites.

3. The riparian woodland should be essentially continuous along the stream banks themselves, but it need not extend for any more than a tree or two inland.

The high degree of subjectivity in the above description is recognized, but quantitative data do not exist. The occurrence of a nursery roost within 20 miles of the Ottawa project site, also influences my opinion.

There are two basic options at this point. A survey can be attempted for the bat and/or a roost, or their presence can be assumed and the project designed accordingly. The latter is recommended in that it would be extremely difficult to develop a defensible position that the bat does not occur in the project area. The trapping conditions are poor, an actual roost could occur at a considerable distance from the riparian zone itself, and roost location is at least partially a result of good fortune as opposed to systematic technique. Techniques other than trapping may be possible to determine the presence of the species, but such techniques are unproven and would require a substantial amount of development.

The best biological approach in terms of project design would be to leave the riparian zone untouched, although clearing of ground debris would not be expected to affect any bats. It may also be acceptable to thin the woodland, but no data exist for guidance. My guess is that removal of trees and brush (excluding dead trees and snags) up to 10" dbh would not be likely to affect the suitability of the habitat for Indiana bats.

I hope the above helps, and I would be glad to try to clarify any of it, or answer any further questions.

Sincerely,

Denis S. Case
Assistant Administrator
Wildlife Management & Research

DSC:gh
cc: Ann Davies
Bill Roshak

VINCENT J. NIESE
MARTIN J. KUHLMAN
ALVIN F. SCHROEDER

EDNA M. MICHEL
CLERK

PUTNAM COUNTY COMMISSIONERS
245 East Main St.
PUTNAM COUNTY COURT HOUSE
OTTAWA, OHIO 45875

PHONE 523-3656

May 21, 1986

District Commander
U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, NY 14207-3199
ATTN: Mr. William E. Butler

Dear Mr. Butler:

I am very sorry for not getting the notice to you on the Ottawa, OH Flood Protection Study-Land Use. I have given this a very close study and reviewed the proposed land use plans and zoning regulations, plans developed in response to the Clean Air and Clean Water Acts of 1977.

We the Commissioners of Putnam County, OH, believe in Alternative VII (Figure 7):

- Selective snagging and clearing.
- Embankment removal/power line relocation. Some excavated material would be used to fill low areas along the proposed floodway.

The Figure #7 is a plan to help with the flooding in the Village of Ottawa, Ohio. We are sorry for the delay.

Yours truly,

Vincent J. Niese

Vincent J. Niese
PUTNAM COUNTY COMMISSIONER
PUTNAM COUNTY, OHIO

VJN/bis

OhioEPA

State Of Ohio Environmental Protection Agency

P.O. Box 1049, 361 East Broad St., Columbus, Ohio 43266-0149
(614) 466-8565

Richard F. Celeste, Governor

Daniel R. Clark
District Commander
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

May 20, 1986

Attention: Mr. William E. Butler

Dear Colonel Clark:

RE: Ottawa, OH, Flood Protection Study - Land Use

We have reviewed the above-mentioned project. Structural alternatives listed for flood protection include one or more of the following measures: selective snagging and clearing of large-scale debris from the Blanchard River channel, levee/floodwall construction, street closure structures, flapgates on all outflows, embankment removal, and provision of a floodway (approximately 115 acres). Nonstructural measures include implementation of a flood warning system or no-action.

Selective clearing and snagging of the channel should not significantly impact the Blanchard River provided vegetal removal from the banks is kept to a minimum and in-stream work does not disrupt spring spawning periods. Levee/floodwall construction as proposed provides ample set-back from the river along the majority of the project reach. However, filling in low areas of the proposed floodway has the potential to decrease the value of the floodway for flood storage. At a minimum, a wetland assessment should be made to determine if the "low-lying areas" identified are currently, or have the potential to, support wetland vegetation. Other methods proposed are of little concern to our Agency.

We appreciate the opportunity to provide these comments. If you have further questions or comments, please contact Ms. Audrey Lynch of my staff at (614) 466-6959.

Warren W. Tyler

AAL:aal

cc: M. Colvin, ODNR, Office of Outdoor Recreation Services
K. Kroonemeyer, U.S. Fish and Wildlife Service
T. Glatzel, U.S. EPA, Region V

0029S/31

ODNR
OHIO DEPARTMENT OF
NATURAL RESOURCES

Fountain Square
Columbus, Ohio 43224

May 16, 1986

Colonel Daniel R. Clark
District Engineer
U.S. Department of the Army
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

ATTN: Mr. William Butler

RE: Ottawa, Ohio, Flood Protection Study

Dear Colonel Clark:

This is in response to your request for comments on the Ottawa, Ohio, Flood Protection Study in accordance with Section 7(c) of the Endangered Species Act of 1973.

Bald eagles have been recorded along the Blanchard River; however, these records are for transient individuals and no nests or significant wintering grounds exist in the project area. Records of pregnant Indiana bats along the Little Auglaize River in Paulding County indicate the presence of a summer nursery roost. We recommend that the Corps complete a survey along the Blanchard River to determine the potential for nursery roosts within the project area. Upon completion of the survey, we will provide more substantive comments on the potential project-induced impacts to the Indiana bat.

We appreciate the opportunity to provide these comments. If you have any questions, please contact Anne Davies (614/265-6414) of the Environmental Review Section of this office.

Sincerely,

Michael D. Craden

Michael D. Craden, Ph.D., Chief
Office of Outdoor Recreation Services

MDC/AD/cab

cc: Bob Lucas, Office of Chief Engineer
Denis Case, Division of Wildlife
Kent Kroonemeyer, USFWS

MID-WESTERN OHIO JOINT PLANNING COUNCIL

310 NORTH MAIN STREET (419) 692-6522 DELPHOS, OHIO 45833

May 7, 1986

Mr. William E. Butler
District Commander
U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, New York 14207-3199

Dear Mr Butler

On May 1, 1986, the Mid-Western Ohio Joint Planning Council Board of Directors reviewed the seven proposed alternatives for a Flood Protection/Land Use Study in Ottawa, Ohio.

Mid-Western Ohio Joint Planning Council recommends that the Corps conduct further discussion with Putnam County residents concerning this project. Also, a more comprehensive perspective concerning the Blanchard River is advised since alteration of the river at Ottawa impacts communities located downriver.

Thank you for your time and attention. If you have any questions, please do not hesitate to call our office at 419-692-6522.

Sincerely

Christopher Burnham

Christopher Burnham
Executive Director

bjb

"Serving Five Counties"

United States Department of Agriculture

Soil Conservation Service

200 North High Street
Room 522
Columbus, Ohio 43215

May 6, 1986

Colonel Daniel R. Clark
District Commander
US Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Dear Colonel Clark:

I am writing in response to your letter of April 7, 1986, regarding the Ottawa, Ohio, flood protection study. Our involvement in this watershed dates back to 1963 when applications for planning assistance under Public Law 83-566 were made to the State of Ohio for both the Upper and Lower Blanchard River Watersheds. The Lower Blanchard extends from the junction with the Auglaize River upstream to the vicinity of the Putnam-Hancock County line, with the Upper Blanchard extending upstream from this point. The applications have remained on file, but unserviced, since that time. The severe flooding of June 1981 has sparked a renewed interest in reducing flood damages throughout the watershed.

As a means of gathering basic watershed data on hydrology, engineering, economics, geology, and environmental issues, we suggested that a flood plain management study be conducted under existing authorities of the Soil Conservation Service. The county commissioners of Hancock, Hardin and Putnam Counties submitted an application to the Ohio Department of Natural Resources and the study was initiated in 1984. Completion is scheduled for early in FY 87. It is hoped that this study will give the sponsors possible alternatives for flood reduction and provide a sound basis for a request for PL-566 planning authorization. The study includes both the Upper and Lower Blanchard Watersheds, excluding the village of Ottawa which is currently being studied by your district.

Specific objectives of the study are:

1. To compile factual information on the frequency, extent, depth, duration and the economic damages of flooding in the watershed and conduct a preliminary evaluation of alternatives for solving the identified problems. This information will be used as a basis for requesting planning authorization under the existing PL-566 applications (if feasible alternatives are identified).

2. To provide a complete delineation of flood plain areas in the watershed to serve as a basis for a comprehensive flood plain management program.

3. To assess the existing natural values of the flood plain and identify opportunities for their preservation and/or enhancement.

Alternatives proposed to be investigated are:

Structural

1. Channel modification of the Blanchard River.
2. Channel modification of Eagle Creek.
3. Dike construction for urban flood protection in Findlay.
4. Dike construction for agricultural protection in rural areas.
5. Diversion of flood flows around Findlay.
6. Floodwater retarding dams in upstream areas of the watershed.
7. Evaluations of bridge obstructions in Findlay.

Nonstructural

1. Flood warning system.
2. Conservation land treatment measures.

Our respective staffs have already communicated on this project and shared data of mutual interest. I would suggest that the Corps of Engineers and Soil Conservation Service continue to work together to hopefully find solutions to the flooding problems in the Blanchard River Watershed. Mr. Robert Burris of my office is available to coordinate our planning efforts with your district. His phone number is 614-469-6932.

Sincerely,

Harry W. Oneth

Harry W. Oneth
State Conservationist

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

JAN 27 1986

Mr. William E. Butler
Environmental Analysis Branch
U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, NY 14207

Dear Mr. Butler:

On December 30, 1985, the Council received your draft report and request for comments on the cultural resources survey for the proposed flood control project along the Blanchard River, Ottawa, Ohio. We agree with your conclusions and recommendations, that the site in Area C and the site in Area D be further investigated to determine if they are eligible for the National Register of Historic Places.

The Council appreciates your solicitation of comments, and looks forward to working with you on this project. If you have further questions at this stage, please contact Tom McCulloch at 202-786-0505 (an FTS number).

Sincerely,

Michael C. [illegible]

for Don L. Klima
Chief, Eastern Division
of Project Review

Ohio Historic Preservation Office

1985 Velma Avenue
Columbus. Ohio 43211
614/466-1500

OHIO HISTORICAL SOCIETY
SINCE 1885

January 13, 1986

District Commander
U.S. Army Engineer District, Buffalo
1776 Niagara Street
Buffalo, NY 14207
ATTN: Mr. William E. Butler

Dear Sir:

Re: Archaeological Investigations
Proposed Flood Control Project
Blanchard River, Ottawa, Ohio

I have received the report "A Phase I Cultural Resources Survey of a Proposed Flood Control Project along the Blanchard River, Ottawa, Ohio." prepared by David Stanley. My staff has reviewed this information and on the basis of their evaluation I find that I concur with the evaluation that further investigations will be necessary at the site localities indicated within the report in order to determine if these sites are eligible for the National Register of Historic Places.

If you need any additional information or clarification, please contact Richard Boisvert at (614) 466-1500 ext. 470 or480. Thank you for your cooperation.

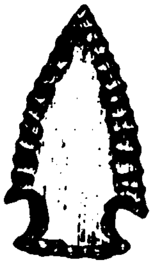
Sincerely,

W. Ray Luce

W. Ray Luce
State Historic Preservation Officer

WRL/RAB:db

US Army Corps
of Engineers
St. Paul District



REPORT OF INVESTIGATIONS

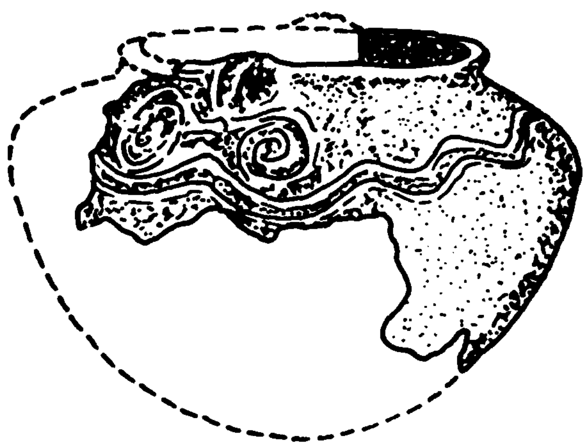
NCSPD-ER-14

DEC 1985

PHASE I CULTURAL RESOURCES SURVEY
OF A PROPOSED FLOOD CONTROL PROJECT
ALONG THE BLANCHARD RIVER, OTTAWA, OHIO

BY

DAVID STANLEY



INTRODUCTION

This report presents the findings of a Phase I cultural resources survey undertaken in association with a proposed flood control project along the Blanchard River at Ottawa, Ohio. The field work was conducted on September 10 through 13, 1985, and was directed by David G. Stanley of the U.S. Army Corps of Engineers, St. Paul District. The survey was conducted by the St. Paul District under Intra-Army Order NCB-IA-71RF with the Buffalo District.

DESCRIPTION OF PROJECT AND PROJECT AREA

The project area is located within the E1/2, SE1/4, SE1/4 of Section 21; the E1/2, NE1/4, NE1/4 and the NE1/4, SE1/4, NE1/4 of Section 28; the N1/2, SW1/4, NW1/4 and the NW1/4, SE1/4, NW1/4 of Section 27; and the NW1/4, SW1/4, SW1/4 of Section 22, T1N, R7E, Ottawa Township, Putnam County, Ohio (Figure 1). The Blanchard River flows east and north around the town of Ottawa. The potential for flooding endangers much of the community.

The proposed project (Figure 3) would include construction of a levee 5,300 feet long on the west end of the town of Ottawa. In addition, 2,500 feet of the nearby Blanchard River channel would be excavated to a 50-foot bottom width; snagging and clearing would also be conducted up to 10-15,000 feet upstream from the channel work.

The project area is situated within the physiographic region of northwestern Ohio known as the Lake Plain. Northeastern Putnam County consists of a glacial till plain; the remainder of the county is covered with glacial lucustrine sediments, water-worked till, and a series of low glacial lake beach ridges (Brock and Urban 1976:102).

Presettlement vegetation in Putnam County consisted primarily of deciduous swamp forest. On poorly drained soils, the most common trees were black ash, white ash, American elm, shagbark hickory, basswood, swamp white oak, burr oak, pin oak, sycamore, silver maple, and cottonwood. Areas of better drained soils, such as the beach ridges, supported black oak, beech, hard maple, and black cherry (Brock and Urban 1976:102).

The Blanchard River drains about 765 square miles of the extreme southeastern corner of the Maumee Basin. Two types of terraces were identified in the portion of the Blanchard River Valley in and near the project area; these are termed the T1 and T2 terraces. They were identified on the basis of their elevations, soil morphology, and positions on the landscape.

The T1 terrace is lower, and closer to the river; it corresponds to the modern floodplain. The soils on this terrace are mapped as Genessee silt loam, Shoals silt loam, and Sloan silt loam (Brock and Urban 1976). All three are floodplain soils formed in alluvium, with Sloan soils usually occupying the lowest areas, Genesee soils on the higher elevations, and Shoals soils between the other two. These soils are all prone to periodic flooding.

The T2 terrace is higher, farther away from the river, and older. Soils on the T2 terrace are mapped as Haney silt loam, a fairly well drained soil found on stream terraces as well as glacial lake beach ridges and outwash plains (Brock and Urban 1976).

All of the project area, except for portions immediately adjacent to the channel and residences, has been disturbed by plowing. Surface vegetation at the time of the survey included soybeans, alfalfa, and short, mixed grasses and weeds. Areas immediately adjacent to the channel supported mesic forest with a thin understory.

FIELD METHODS

Records and other sources at the Courthouse and local library were consulted, and the Putnam County Historical Society in Kalida was also visited. Field methods included pedestrian survey, examination of cutbanks, and soil coring. These methods will be described in more detail in the discussion of each portion of the project area. For convenience, the general project area was arbitrarily divided into four segments bounded by roadways, an abandoned railroad bed, and other features (Figure 2).

RECORDS AND LITERATURE SEARCH

A letter dated June 5, 1984 from the Ohio State Historic Preservation Officer stated that no comprehensive archeological surveys had ever been conducted near the project area, although two sites (33Pu37 and 33Pu45) were recorded downstream. The letter further mentioned that the proposed project is located in what is considered to be an archeologically sensitive area.

No structures were indicated in the County courthouse records for the area between the town as it is currently platted, and the Blanchard River to the west. Two plat maps, dated 1894 and 1981, also showed no evidence of structures (Figures 4 and 5).

An early historical account (Brown 1880) noted that the town of Ottawa was situated within the last Tawa Reservation in Ohio, on the site of the old Indian town of Lower Tawa. The Tawa Reserve, or Ottawa Reservation, was the result of a treaty signed on September 29, 1777 at "The Foot of the Rapids of the Maumee of the Lakes" (Kinder 1915:88). The treaty stated that the reservation was to contain five square miles, the center of which was to be where the old Indian trace (trail) crossed the Blanchard River at a "point where the river bridge, on the road to Columbus Grove, now stands" (Kinder 1915:90). This location is probably that of the old Oak Street Bridge, which is currently scheduled to be replaced.

According to Kinder (1915), the name of the Indian village located on this reservation was initially spelled "Tauwa," and appeared in this form in the earliest histories of the region. However, the village was called "Tawa" by the early settlers. Its location is now within the town of Ottawa. The village of Tauwa is known to have existed as early as 1750, and was visited by

French missionaries and fur traders until 1832 (Kinder 1915). Kinder further states that the location of this village was supposed to be on the

> trace and the center of the reservation of five square miles. The village, as it existed in 1830, embraced the territory now north of the Findlay, Ft. Wayne, and Western Railroad, west of the Chicago, Hamilton and Dayton railroad, north as far as the Defiance pike and west to the river. The most pretentious cabin at that time was the council house, constructed of logs and located on what is now Walnut Street, on the west side of the street a short distance beyond Tawa Run" (1915:90).

This description would place the 1830 village within the NW1/4, SW1/4, SW1/4 of Section 22, T1N, R7E, Ottawa Township, near the confluence of Tawa Run and the Blanchard River--probably on the east side of Tawa Run and the south side of the Blanchard River. The northern portion of the proposed levee terminates on the west side of Tawa Run.

The Tawa village site appears to be situated outside of the proposed project boundaries; nevertheless, because of its importance, its location was visited during the course of this investigation. The results of this visit are described in the discussion of Area D.

The Putnam County Historical Society was visited on September 10, 1985. The historic artifacts on display consisted primarily of material dating from the 1870s to the early twentieth century. The prehistoric artifacts in the collection consisted of projectile points and ground stone tools. According to Mrs. Norma Sellhorst, a member of the museum's board of directors, these artifacts came from Putnam County, primarily from the Kalida area. The exact locations from which they came are not known.

The projectile points included specimens with shallow side-notches and concave bases, typical of Middle and Late Archaic types (e.g., Cook 1976). The rest of the points spanned the Early, Middle, and Late Woodland periods, and possibly the protohistoric period. They included contracting-stemmed points similar to the Kramer type (White 1968), corner-notched specimens resembling the Snyder type (White 1968) and small isosceles and equilateral triangualar points generally associated with Late Woodland and protohistoric cultures.

The ground stone tool collection included several manos and metates but was dominated by a wide variety of grooved axes. The raw material used for these tools included granite, rhyolite, and andesite as well as unidentifiable igneous and metamorphic rocks.

RESULTS OF FIELD INVESTIGATIONS

Area A. Area A is situated in the southeast portion of the project area (Figures 2, 6). It includes land along both sides of the river, immediately adjacent to the channel. This area is bounded on the west by Route 65 and on the east by the Chessie System Railroad bridge. The north side of the river will be impacted by a portion of the proposed levee and the south side will be used as a disposal area. The soils throughout Area A are mapped as Sloan silt loam (Brock and Urban 1976), a typical soil for a T1 or Low terrace.

Vegetation consists of an immature floodplain forest with a thin understory. The undisturbed portions of this area are dominated by ridge-and-swale topography, including some recent chutes. At the time of the survey, some standing water was present on the south side of the river. Surface visibility was highly variable; overall, it was moderately good.

On the south side of the river most of the proposed disposal area consists of recent fill, including large concrete and asphalt chunks. The portions that were relatively undisturbed were very low and contained standing water. This area has a low potential for archeological sites. No evidence of cultural deposits other than the recent fill was observed.

On the north side, where a portion of the proposed levee will be constructed, the area was criss-crossed by recent chutes and footpaths with excellent surface visibility. This area is littered with modern debris. It has a low potential for archeological sites, and produced no evidence of cultural deposits other than the modern refuse.

Area B. Most of Area B is situated on the north and east side of the river, between Route 65 and U.S. Highway 224 (Figure 2). A small portion is located on the south side, immediately adjacent to the channel and Route 65. This latter area will serve as a disposal site. The soils on the south side are mapped as Sloan silt loam; however, this entire area consists of fill.

The remaining portions of Area B, on the north and east side of the river, include a T1 terrace with Genesee, Shoals, and Sloan silt loam soils, and a T2 terrace with Haney loam (Block and Urban 1976). A trailer park is located in the northwest portion of Area B, near U.S. Highway 224.

At the time of the survey, the sparse vegetation cover consisted of mixed grasses and weeds (Figure 7B). Surface visibility ranged from moderate to excellent. Except for the portion on the south side of the river, immediately adjacent to the channel, the entire area has been disturbed by agriculture, and has a 20-22 cm plow zone. There was no evidence of extensive sedimentation. At one time, Area B was probably dominated by ridge-and-swale topography, which has been smoothed by plowing. For this reason, it was difficult to determine the exact location of the interface between the T1 and T2 terraces.

Survey transects in Area B were oriented in order to take advantage of areas of maximum surface visibility. No evidence of prehistoric cultural deposits was observed, but a limited quanity of historic debris was found scattered over the T2 terrace. This material included brick, metal, and china fragments. They were not concentrated in any apparent pattern, and there was no evidence of any structure in the area. This material may represent refuse associated with the trailer park.

Area C. Area C is bounded by U.S. 224 (Main Street) on the south, the Blanchard River on the west, Sugar Street on the east, and the abandoned railroad embankment on the north (Figure 2). The landforms in this area include both the T1 and T2 terraces.

The dominant soil type on the T1 terrace is Genesee silt loam (Brock and Urban 1976), with Haney loam present on the T2 terrace. The T1 terrace has ridge-and-swale topography, and the vegetation at the time of the survey consisted of a mature mesic forest and pasture with very poor surface visibility. The T2 terrace contained a residence and a electrical power station. The vegetation included a lawn associated with the residence and an alfalfa field (Figure 8A), a portion of which contained fill. Surface visibility on the T2 terrace was also very poor.

The T1 terrace is well outside of the proposed project area and, consequently, was not shovel tested. This area is very poorly drained and has a low potential for archeological sites. Ponding was evident at many locations.

The T2 terrace has a higher site potential because of its higher elevation and better drained soils. The landowner, Donald Clossan, stated that there is a prehistoric site in the alfalfa field that is usually collected several times a year by local residents. The probable location of this site, between Mr. Clossan's residence and the electrical power station, may be impacted by the proposed levee (Figure 2, 3). A portion of the site has probably been covered by fill, evident on the surface from its higher elevation, but undisturbed remnants may still exist to the west. On the basis of the information supplied by the landowner, this site is located within the NE1/4, NE1/4, NE1/4 of Section 28, T1N, R7E, Ottawa Township.

Permission to shovel test the field was denied by the landowner until after the final cutting of the alfalfa, later in the fall.

Area D. Area D is bounded on the south by the abandoned railroad embankment, on the west and north by the Blanchard River, and on the east by Tawa Run (Figure 2). The landforms in Area D include both the T1 and T2 terraces. The soil type on the T1 terrace is Genesee silt loam, and on the T2 terrace, Haney loam. The vegetation cover throughout Area D consists of soybeans.

The proposed levee will probably affect the T2 terrace, and perhaps a small portion of the eastern part of the T1 terrace.

The surface visibility in the beanfield was very poor (Figure 7A). However, informants reported that a prehistoric site exists on the T2 terrace, on a knoll within the beanfield (Figure 2). The site is apparently situated north of the abandoned railroad embankment, just west of the residential area north of Fifth Street and west of Maple Avenue. Based on the information supplied by the informants, the site is probably located within the SW1/4, SW1/4, SW1/4 of Section 22, T1N, R7E, Ottawa Township.

This site has undoubtedly been disturbed by agricultural activities. Given the well-developed B horizon and C horizon of this soil type (Brock and Urban 1976), and the lack of any evidence of extensive sedimentation or deposition, it is unlikely that any deeply buried sites are present. However, this interpretation would need to be confirmed through additional study.

Because of the dense cover of soybeans, surface inspection was impractical, and shovel testing would have been impossible without causing crop damage. Consequently, the field should be reexamined after plowing.

An attempt to relocate the 1830 Tawa village on the east side of Tawa Run was made; [illegible]er, the entire area had been covered with approximately 10m of fill (Figure [illegible]).

River Channel Improvements. The area where the river channel will be excavated was also examined. These improvements will affect approximately 2,500 feet of the river, beginning at the Main Street Bridg(U.S. Highway 224; see Figure 3). The east side of the river is T1 terrace immediately adjacent to the channel, and has low archeological site potential. On the west side of the river, the landforms include a T1 terrace with Shoals silt loam soil, and upland deposits with Digby loam soil developed over glacial till.

The cutbank exposure along the west bank had excellent visibility, and was closely examined for eroding cultural deposits or buried soil horizons. No evidence of cultural material was observed, other than refuse that had been thrown over the embankment.

CONCLUSIONS

Area A has a low potential for containing archeological sites because of previous disturbance, and the nature of the landforms themselves. The area is poorly drained, and would not have been conducive to long-term human occupation.

The portion of Area B on the south side of the river has been heavily disturbed by the deposition of fill The original landform was a T1 terrace that would have had a low potential for containing archeological deposits even prior to disturbance.

The portion of Area B on the north side of the river contained both a T1 and a T2 terrace. The former, as noted earlier, had a low potential for containing archeological deposits. The surface visibility at the time of the survey was fairly good, and no archeological materials were observed.

The T2 terrace in Area B, in contrast, had a high potential for containing cultural deposits. Both the nature of the geomorphic deposits and the soil morphology suggest that the present surface is relatively old. The soil type is Haney loam, which has a shallow A horizon, a well developed B horizon, and a distinctive C horizon. The A horizon is actually a plow zone and, assuming that the surface is relatively old, one would expect to find evidence of cultural deposits on the surface.

Surface visibility on the T2 terrace ranged from fair to good, with some areas completely exposed. No evidence of prehistoric cultural deposits was observed. A small amount of historic material was found, but appeared to be recent refuse. There was no evidence of any structure in Area B.

Area C included sections of both the T1 and T2 terrace. The T1 terrace was outside of the proposed project area. The T2 terrace not only had a high potential for containing cultural deposits but, according to informants, does contain an archeological site. The presence of the site could not be confirmed during the survey because the field was planted in alfalfa. A portion of the site may have been disturbed by filling and by the construction of a electrical power station.

Area D also contained both a T1 and a T2 terrace. Prehistoric cultural deposits are known to be present on the T2 terrace. The T1 terrace has low potential for cultural deposits; nevertheless, the area north of Fifth Avenue and directly west of Tawa Run should be resurveyed when surface visibility improves, since the reported location of the 1830 Tawa village is directly across Tawa Run to the east. Although the probable site of the village itself is covered with about 10 m of fill, additional evidence may be visible on the west side of the creek. The T2 terrace immediately to the west of Tawa Run has been heavily disturbed by residential development on Maple Street and Fifth Avenue.

RECOMMENDATIONS

In view of the results of this reconnaissance survey, it is recommended that the sites in Area C (NE1/4, NE1/4, NE1/4 of Section 28) and Area D (SW1/4, SW1/4, SW1/4 of Section 22) be investigated further, in order to confirm their locations and determine whether they are eligible for listing on the National Register of Historic Places. It is recommended that future investigations be coordinated with agricultural schedules, in order to minimize crop damage and facilitate the study.

REFERENCES CITED

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1968 The Lithic Industries of the Illinois Valley in the Early and

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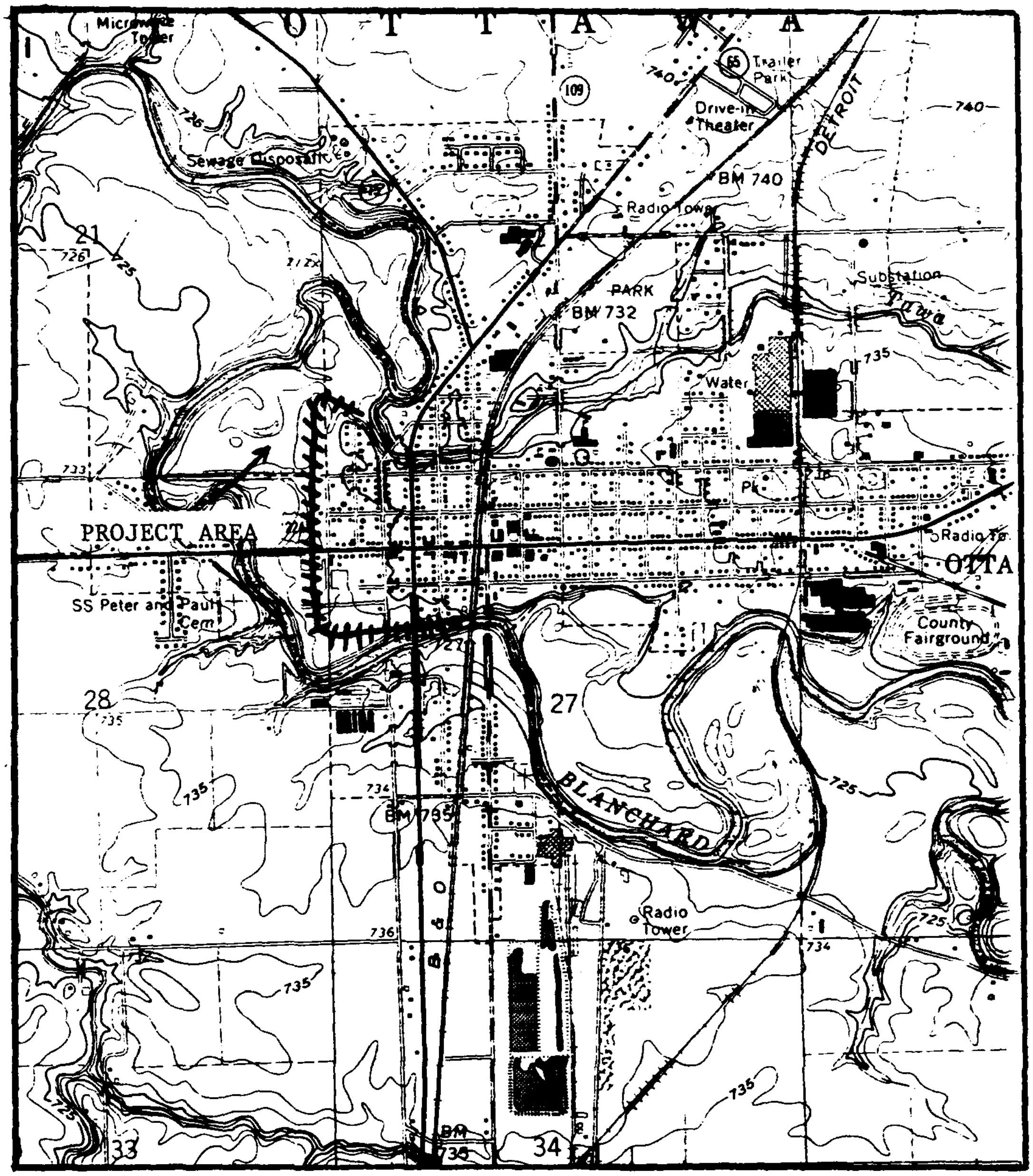


Figure 1. Topographic coverage of proposed project area. USGS 7.5' Quad: Ottawa, Ohio, 1960, 10' contour intervals. Field date 9/10-13/85. Project no. NCSPD-ER-14.

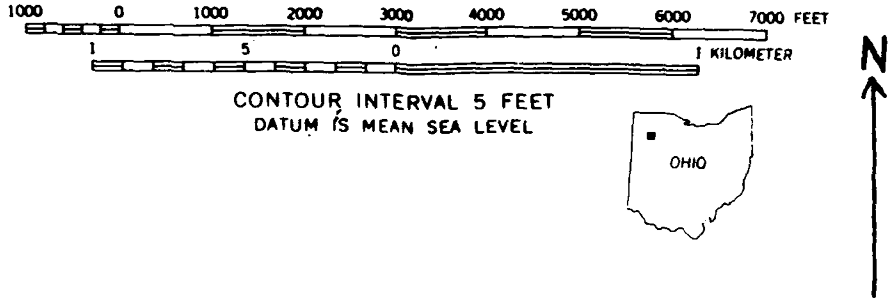
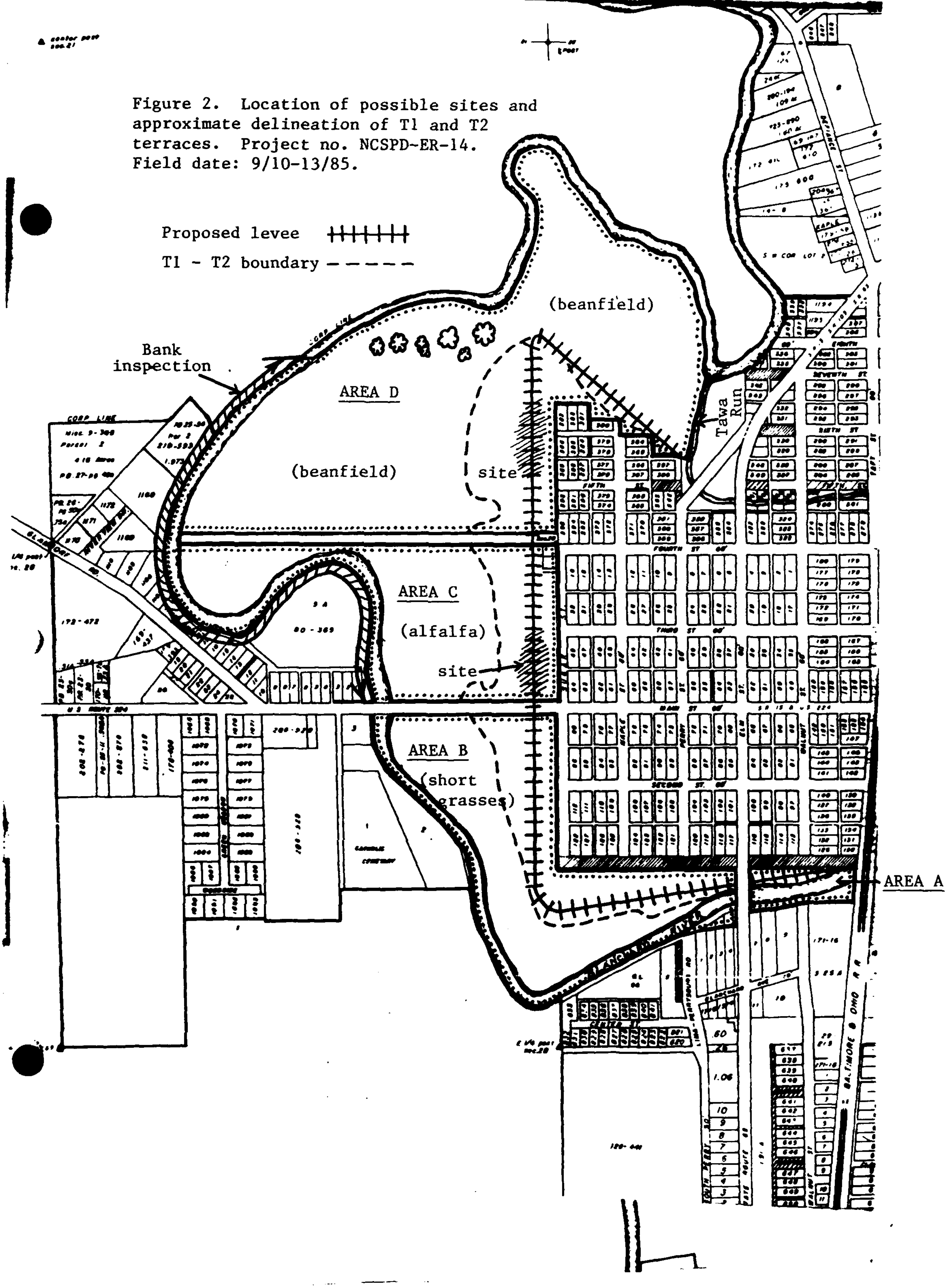
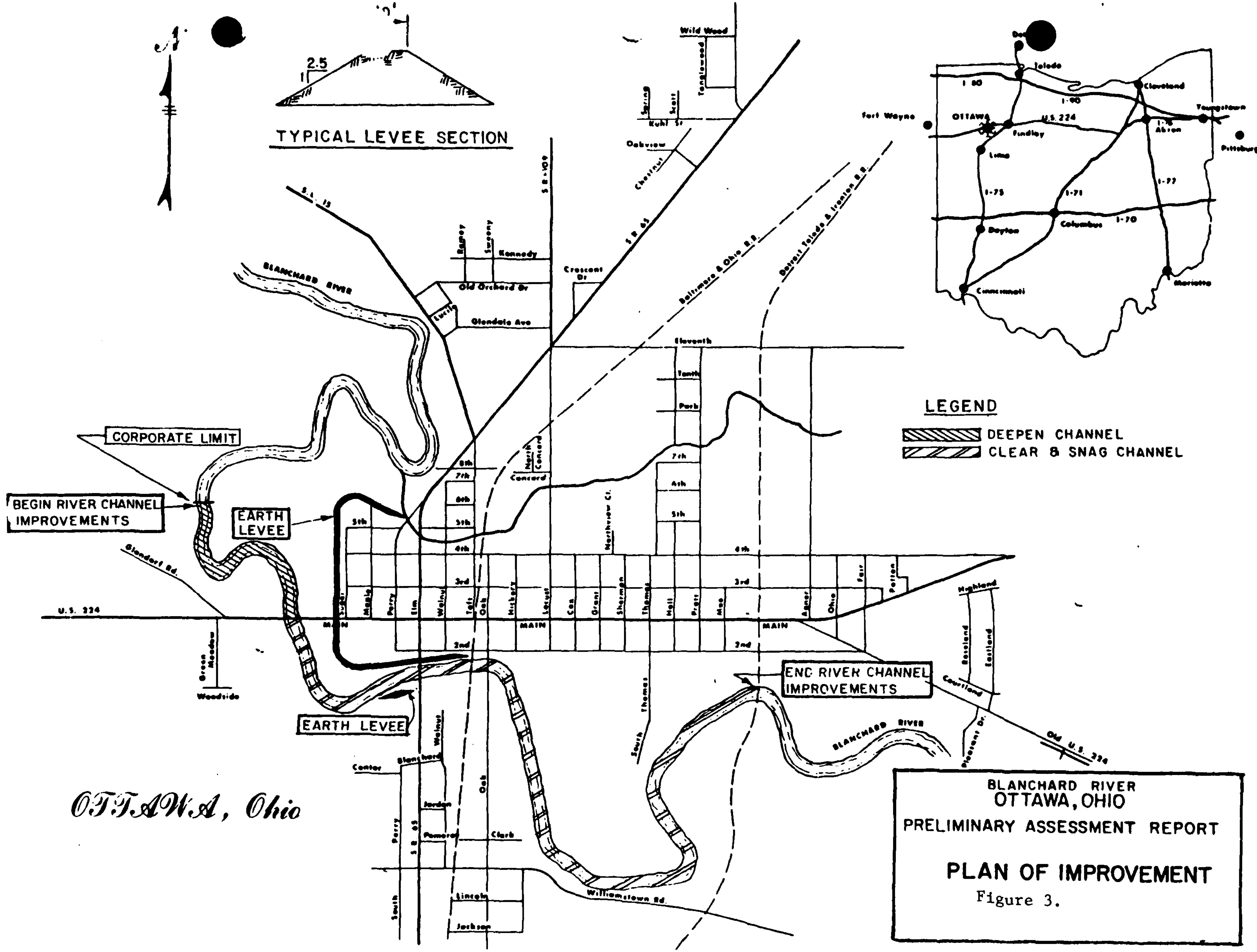


Figure 2. Location of possible sites and approximate delineation of T1 and T2 terraces. Project no. NCSPD-ER-14. Field date: 9/10-13/85.

Proposed levee

T1 - T2 boundary





BLANCHARD RIVER
OTTAWA, OHIO
PRELIMINARY ASSESSMENT REPORT

PLAN OF IMPROVEMENT

Figure 3.

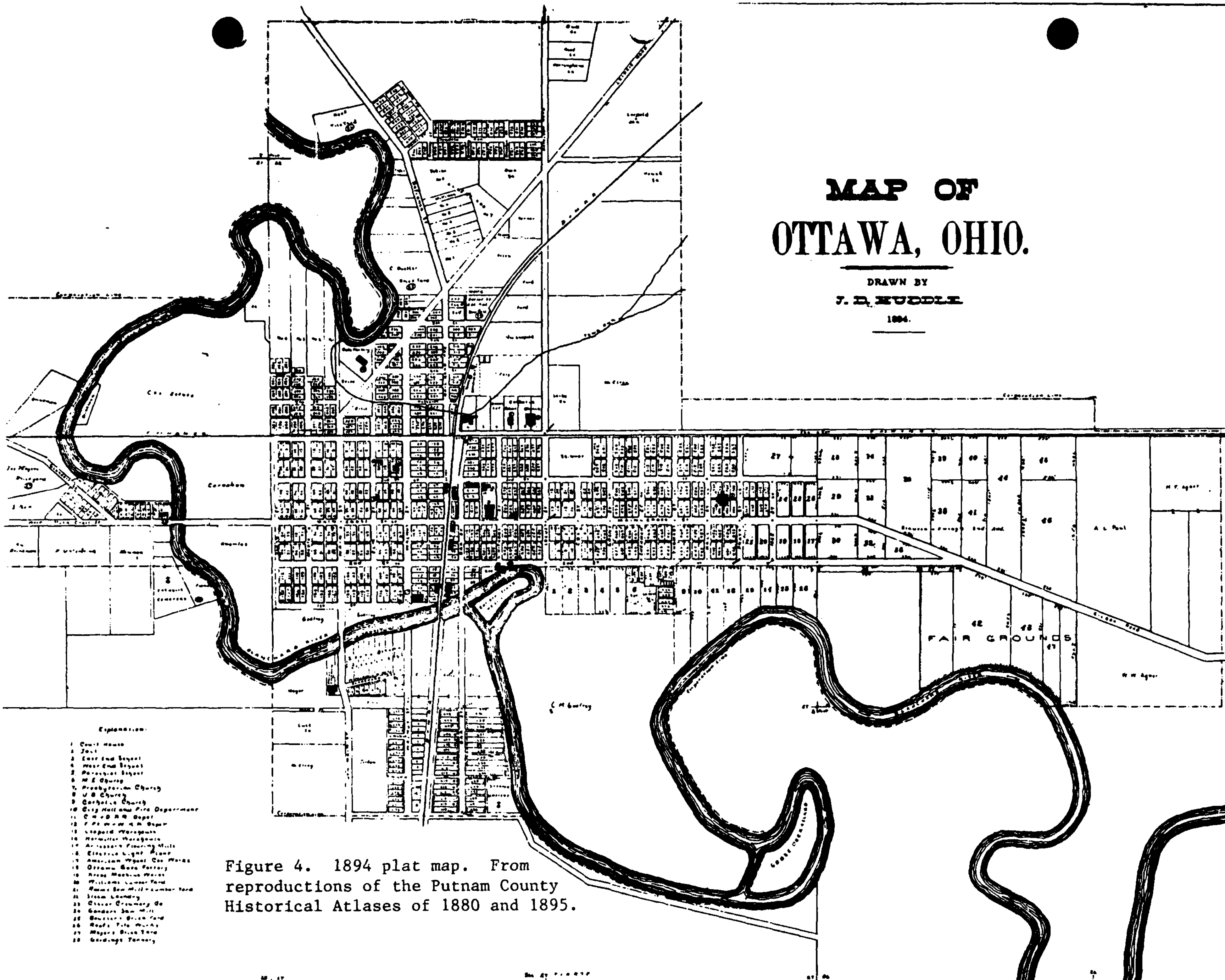


Figure 4. 1894 plat map. From reproductions of the Putnam County Historical Atlases of 1880 and 1895.

Figure 5. 1981 plat map. Courtesy of Putnam County Engineer's Office.

A

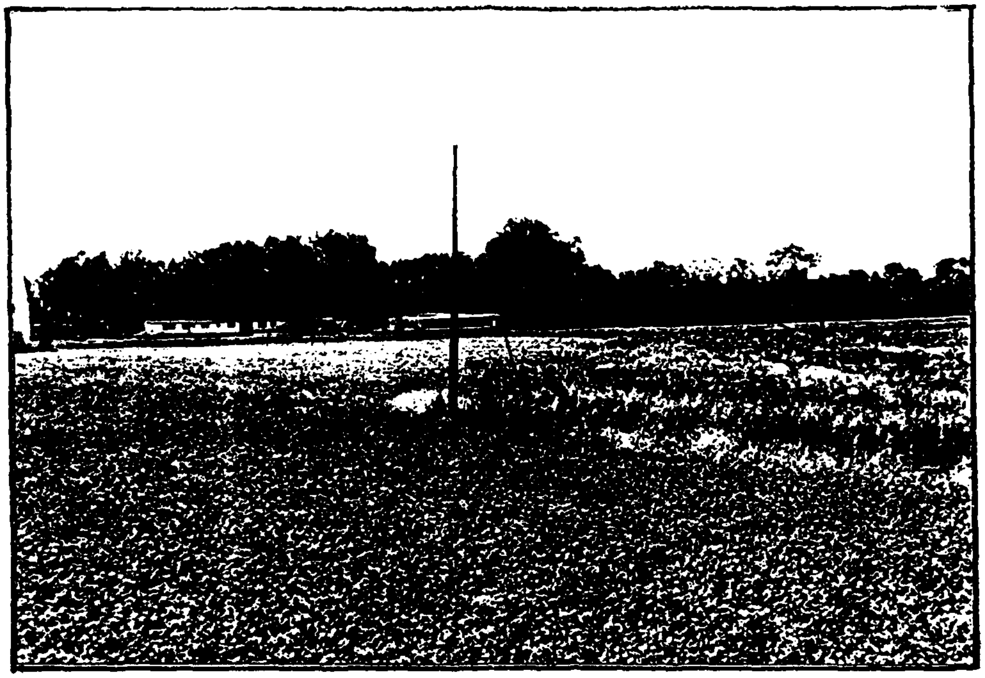
B

Figure 6. Photographic coverage of project area. A - south side of the river, Area A, looking north. B - north side of the river, looking west, Area A.

A

B

Figure 7. Photographic coverage of project area. Surface visibility in beanfield - A - Area D. Surface visibility in Area B - B.



A

B

Figure 8. Photographic coverage of project area. A - view of site in alfalfa field in Area C. B - View of fill material at reported location of 1830 Tawa village, looking southwest.

ODNR

OHIO DEPARTMENT OF NATURAL RESOURCES

November 6, 1985

Mr. Thomas W. Seamans
GAI Consultants, Inc.
570 Beatty Rd., Pittsburgh
Monroeville, Pa. 15146

Dear Mr. Seamans:

Your letter of October 22, 1985 to James Schmenk, Game Protector Supervisor, has been referred to me.

Angler utilization of the Blanchard River in Ottawa is light to moderate with primary species of fish being sought as follows:

Bluegill, sunfish, bullheads, channel catfish, and carp.

Such fishing pressure has been relatively static during the past ten or more years and is not expected to increase or decrease.

We have no records of sightings of bald eagles in this area of the Blanchard River in Ottawa.

No other endangered species have been documented in this area except that the Indiana bat, Myotis sodalis, has been documented nesting during summer in the nearby riparian cover of the Little Auglaize River and are expected to be present where such cover exists on the Blanchard River.

Sincerely,

Darrell Allison

Darrell Allison
Fish Management Supervisor
Wildlife District Two
952 Lima Avenue, Box A
Findlay, Ohio 45840

DA/ds
cc: G. Palmer
J. Schmenk
B. Roshak
File

~~[illegible]~~
~~[illegible]~~
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~~Division Chief~~

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE

Thomas W. Seamans
Gai Consultants Inc.
570 Beatty Rd.
Monroeville Pa. 15146

Dear Mr. Seamans

I must apologize for not answering your letter from October sooner than this. But, I am in my busiest season of the year. Also, I had moved and have been trying to relocate.

In regard to your letter of October 22, 1985. The Blanchard River gets moderate to heavy fishing pressure during the spring and summer months. Though I have only been in the county for two years, I believe the fishing pressure has increased slightly. The river is used for other activities as well though. Several people enjoy the winding river to canoe on. During the hunting seasons, many hunters pursue both squirrels and racconns along the banks. Trappers catch mink, muskrat, and raccoon along the Blanchard. I have had reporets that there is beaver in the Blanchard in Hancock County.

Three people have reported seeing an eagle along the Blanchard. John Agner of Ottawa, Wayne Stechschulte of 20500 Rd. 14 Columbus Grove Ohio, 45830 and along the Blanchard near Kalida a Randy Schroeder 11462 Rd. 16 R.R.4 Ottawa OH. 45875. All three individuals discribed a bird that sounded much like an adult bald eagle. All three individuals were sure that it was an eagle.

If I can be of any more help please contact me at my new address.

Garth D. Goodyear
12745 S.R. 12 West
Columbus Grove Oh. 45830

Fkone (419) 659-2919

Very truly yours
Putnam County Game Protector

Garth D. Goodyear

Garth D. Goodyear

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists
570 Beatty Rd. • Pittsburgh,
Monroeville, Pa. 15146
412-856-6400

OFC. MGMT. OAS
1 Nov 85 10 30z

October 30, 1985

Project 85-109-30

Mr. Joseph Hassey
U.S. Army Engineer District,
Buffalo
Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207-3199

Contract DACW49-85-D-0005
Blanchard River, Ottawa, Ohio

Dear Mr. Hassey:

I am transmitting the following for your review and consideration.

a) An environmental characterization of the Ottawa, Ohio area as produced by our environmental specialist after a 16-17 October field visit. We are not responsible for the environmental assessment under the scope of work, but you have requested our input to your efforts in this area. The attachment is for that purpose.

b) We will shortly request a partial payment based on progress to date. This attachment is adapted from our revised, final proposal and it should help you verify that our estimated percentage-completed is accurate.

I will call in a few days to answer any questions about these materials.

Very truly yours,
GAI Consultants, Inc.

John R. Lesnik
John R. Lesnik
Project Manager

JRL/dae

Enclosures

Vegetation

The banks of the Blanchard River in Ottawa, Putnam County, Ohio have a mature tree canopy with a shrub/sapling understory and herbaceous ground cover. Vegetation is generally limited to the banks, however, north of Route 224 there are some expanded areas of riparian vegetation along the right (downstream) bank.

This vegetation is not unique to the state but does represent a limited local resource. Intensive farming practices and some residential development have removed most woodlots and hedgerows from the surrounding countryside, thus increasing the significance of the river corridor for wildlife. The following trees and shrubs were noted in the work area during a 16 October 1985 field reconnaissance:

Silver maple	Hawthorn
Sycamore	Shagbark hickory
Red maple	Red oak
Sugar maple	White oak
Black locust	Black willow
Honey locust	Mulberry
Slippery elm	Box elder
Cottonwood	Multiflora rose
Green ash	Hackberry

The U.S. Fish and Wildlife Service found the same species plus 9 others.

Herbaceous plants also were not surveyed but the following were noted:

Smartweeds (Polygonum sp.)

Fox tail

Pokeweed

Sticktights (Bidens sp.)

Cocklebur

Grape

Velvet leaf

Solomon's seal

Jimson weed

Nightshade

Raspberry

Goldenrod

Common Burdock

Virginia creeper

False stinging nettle

Poison ivy

Green-headed coneflower

A more complete survey of the area by the Fish and Wildlife service found 29 other species. None of the plants are on the United States or the Ohio endangered and threatened vascular plants list.

Wildlife

A diversity of wildlife use this riparian habitat for nesting, denning, feeding and migration cover. Mature trees provide nesting areas for wood ducks and mast while saplings and shrubs provide travel corridors for deer. Stream corridors also provide natural migration routes for birds. On 16 October 1985, during a field reconnaissance of the area the following animals or sign of them were observed:

Great blue heron

White-throated sparrow

Wood duck

Tufted tit-mouse

Cedar waxwing

Feral pigeon

House sparrow

Blue jay

Hairy woodpecker

Canada goose

Golden-crowned kinglet	Muskrat
White-breasted nuthatch	Raccoon
Common grackle	Woodchuck
Mourning dove	Fox squirrel
Robin	Red squirrel
Red-winged blackbird	White tailed deer

A bald eagle was seen along the river just upstream from the work area during the spring of 1985 by John R. Agner. The Ohio Department of Natural Resources has established a successful eagle hacking program in northern Ohio, therefore, it is reasonable to expect bald eagles to pass through the area.

Putnam County's extensive agricultural land use has removed wildlife habitat from all but a small percentage of the county. Any habitat loss, especially critical riparian habitat, may be significant for Putnam County. Loss of this habitat with little available alternative habitat could negatively affect animal movements through this area.

Aquatic Habitat

A warmwater fishery is supported by the Blanchard River. Important game species which are reportedly fished for and caught in the work area include white crappie, smallmouth bass, largemouth bass, channel catfish, black bullhead, bluegill and green sunfish.

Loss of streamside vegetation, especially large trees, will reduce shading of the water and increase water temperature. Warmer water may negatively affect the fish population as higher water temperatures will decrease the dissolved oxygen in the water, making the area unsuitable for some species of fish.

Removal of large trees along the banks may also increase bank erosion. Tree loss will eventually mean decay of their extensive root systems which will not be replaced by the shallower rooted shrubs and saplings. As root systems are lost, undercut banks and erosion could occur at a higher frequency than before tree loss because the soil holding root systems are missing.

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Ohio Historic Preservation Office

1985 Velma Avenue
Columbus, Ohio 43211
614/466-1500

OHIO HISTORICAL SOCIETY
SINCE 1885

June 5, 1984

Colonel Robert R. Hardiman
District Commander
Department of the Army
Buffalo District Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

Re: Blanchard River Flood Control Study
Ottawa, Ohio

Dear Colonel Hardiman:

I am writing in response to your letter of 17 May 1984 concerning the above project. I have reviewed the information which you provided. The project is located in an archaeologically sensitive area which has never been the site of a comprehensive archaeological survey. Two archaeological sites have been recorded downstream from the project area (33Pu37 and 33Pu45). Prior to my making a recommendation I would like to receive more detailed project plans in order to better evaluate potential impacts. Due to the fact that the project is located in an archaeologically sensitive area I will likely recommend that a Phase I & Phase II archaeological survey be performed in any areas which will be newly disturbed by the project such as areas of levee construction and stream rechannelization.

If you have any questions concerning these matters, please contact Richard Boisvert or Thomas Cinadr at the above number.

Sincerely,

W. Ray Luce

W. Ray Luce
State Historic Preservation Officer

WRL/TJC:tc