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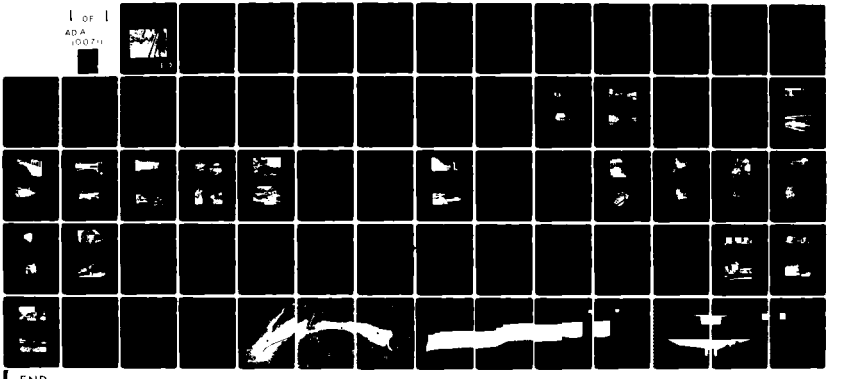

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FLOOD PLAIN INFORMATION

LEY CREEK

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SALINA AND DEWITT TOWNSHIPS ONONDAGA COUNTY NEW YORK

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EASTERN OSWEGO BASIN - REGIONAL WATER RESOURCES PLANNING BOARD

BY

CORPS OF ENGINEERS, U.S. ARMY
BUFFALO DISTRICT

JUNE 1971

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This flood plain information study covers an area along Ley Creek from the New York State Thruway to Onondaga Lake. Within the study area, Ley Creek flows a distance of 4.4 miles. The purpose of this report is to aid in the understanding of local Flood problems and to provide guidance in selecting the best uses for land, subject to overflow. This report is based on hydrological facts, historical and recent flood heights, and technical data having a bearing on the occurrence and magnitude of floods within the study area.

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INTRODUCTION

In recent years there has been a definite trend toward increased development of the nation's flood plains. Without costly flood protection measures, damages are inevitable within these areas. However, in many areas of the country the prospect of using corrective works to alleviate possible flood damages effectively has reached the point of diminishing return. The Executive Branch of the Federal Government, concerned with rising flood damages throughout the nation, transmitted to Congress in August 1966 a report, by the Task Forces on Federal Flood Control Policy, which was titled, "A Unified National Program for Managing Flood Losses." As a result of the recommendation of this report the Flood Plain Management Services Program was developed, within the Corps of Engineers, to provide local governments with a better understanding of their flood problems and their effect on further growth and development within flood plain areas.

This flood plain information report on Ley Creek, Onondaga County, New York, has been prepared at the request of the Eastern Oswego Basin Regional Water Resources Planning Board. Its purposes are to aid in the understanding of local flood problems and to provide guidance in selecting the best uses for land subject to overflow. This report will be distributed to local interests through the New York State Department of Environmental Conservation.

The important phases of the Ley Creek flood problem are covered by this report. First, a record of the largest known floods of the past has been compiled. Secondly, information is presented on possible future floods, namely, the Intermediate Regional and Standard Project Floods.

The Intermediate Regional Flood has a frequency of occurrence in the order of once in 100 years. This means that over a long period of time, say 500 years, the magnitude of this flood would be equalled or exceeded about five times, or on the average of once in 100 years. In other words, each year there is a one percent chance that a discharge of at least that magnitude will occur. Its determination is generally based on statistical analysis of past flood occurrences.

The Standard Project Flood is a flood of rare occurrence and on most streams in New York State it is considerably larger than any flood which has occurred in the past. However, it should be considered when planning for use of the flood plain. In this report, the area referred to as a flood plain is defined as the area which would be inundated by the Standard Project Flood.

This report is based on hydrological facts, historical and recent flood heights, and technical data having a bearing on the occurrence and magnitude of floods within the study area.

Included in this report are maps, profiles, photographs, and cross sections which indicate the extent of flooding that has been experienced and that which might occur in the future. These data, if properly used, can be very beneficial in wise flood plain management. From the maps, profiles and cross sections in this report the depth of probable flooding may be determined, at any location, for either the Intermediate Regional or the Standard Project Floods. Based on this information, future construction may be planned high enough to avoid flood damages or, if at a lower elevation, with recognition of the chances and hazards of flooding. In either case, the risks involved and the alternatives available should be considered.

This report does not include plans for the solution of existing flood problems. Rather, it is intended to provide the basis for further study and planning on the part of local governments, within the study area, in arriving at solutions to minimize possible future flood damages. This might involve local planning programs to guide developments by controlling the flood plain through zoning and subdivision regulations, the construction of flood protection works, or a combination of the two approaches.

Pamphlets and guides pertaining to flood regulation, flood proofing, and other related actions have been prepared by the Corps of Engineers. They are available for use by State agencies, local governments and citizens in planning who are taking action to reduce the flood damage potential.

The Buffalo District of the Corps of Engineers will, upon request, provide technical assistance to Federal, State and local agencies in the interpretation and use of the information contained within this report and will provide other available flood data related thereto. Information available includes high water mark elevations, bench marks and sample flood plain regulations.

SUMMARY OF FLOOD SITUATION

This flood plain information study covers an area along Ley Creek from the New York State Thruway to Onondaga Lake. Within the study area, shown on plate 1, Ley Creek flows a distance of 4.4 miles.

There are no stream gages within the Ley Creek drainage basin, therefore, continuous records of stream flow are not available. Periodic discharge measurements were made by the United States Geological Survey during the period from June 1956 to May 1968 and on 26 September 1963 and 9 September 1965. These were random measurements and not intended as an indication of high flows.

RECENT FLOODS - In recent years, two floods occurred which caused considerable damage within the study area. The first occurred in March 1964 and the second occurred in May 1969. Discharges from these floods were estimated to have approximately the same magnitude. The frequency of occurrence of these floods was estimated to be in the order of once in three years.

OTHER LARGE FLOODS - Flooding within the Ley Creek basin has been at least an annual event although parts of the study area have been flooded as often as five times in a single year. Recently flooding has increased in intensity and frequency because of increased development in the basin and because the channel has been neglected. Unrestricted vegetation and deposition of silt and debris has seriously reduced the channel capacity.

INTERMEDIATE REGIONAL FLOOD - The Intermediate Regional Flood has an average frequency of occurrence in the order of once in 100 years. This flood is determined from an analysis of streams in the general area when there are no records for the stream in question.

STANDARD PROJECT FLOOD - The Standard Project Flood is produced

by the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the drainage basin under study. The peak elevation obtained from a flood of this magnitude is considered by the Corps of Engineers to be the upper limit of the flood plain. This flood has a very rare frequency of occurrence.

FLOOD DAMAGES - Newspaper accounts and personal interviews indicate that at least minor damages have occurred yearly within the study area. The May 1969 flood resulted in substantial damages. A damage survey of the flooded area was made by a consulting engineering firm. Based on June 1969 conditions and January 1971 price levels, the estimated damages would be $99,000. Detailed damages are not available for the March 1964 flood. However, we do know that the March 1964 flood, on the basis of June 1964 conditions and January 1971 price levels caused damages of $5,400 in Mattydale. Since these floods had comparable discharges, the escalated damages indicate worsened channel conditions and increased building within the flood plain. An occurrence of the Intermediate Regional or Standard Project Floods in the study area would cause extensive damage because of their magnitude and the increase in development within the flood plain in recent years.

MAIN FLOOD SEASON - Flooding can occur in the Ley Creek basin at any time of the year but generally the most severe flooding occurs during late winter and early spring when heavy precipitation is augmented by melting snow. Many times, during this period, conditions are made worse by frozen soil or previously saturated soil.

VELOCITIES OF WATER - During an Intermediate Regional Flood, average channel velocities would vary from about 1.13 to 11.36 feet per second throughout the study area. During a Standard Project Flood, velocities would be somewhat greater. Velocities greater than three feet per second combined with depths of three feet or greater

are generally considered hazardous and dangerous to life and property.

HAZARDOUS CONDITIONS - The larger floods have caused hazards to local residents in many ways. Since almost all of the floods occur in the late winter and/or early spring, residents can suffer illness and discomfort from lack of heat if basement flooding extinguishes furnace fires for a number of days. The duration and extent of flooding can cause health problems if septic tanks are inundated and flow in sewer lines backs up into basements. If municipal sewage treatment plants are taxed beyond capacity, untreated discharge into floodways must be made with consequent deposition of waste materials on stream banks and surrounding grounds. Flood waters which overtop roads can also cause hazardous conditions. The danger from underestimating of the velocity and depth of flood waters by unsuspecting children is an age old problem confronting residents within flood areas.

PRIOR REPORTS - During July 1970, the United States Department of Agriculture, Soil Conservation Service prepared a report for Onondaga County titled, "Ley Creek Subwatershed Evaluation Report, Tributary of Onondaga Lake - Watershed 463, Western New York Type IV River Basin, Oswego River Basin." This report eliminated the watershed as a potential PL-566 project.

A prior report titled, "Ley Creek Drainage Basin Study Part I - Report on District Formulation," was prepared in July 1969 by Calocerinos and Spino, Consulting Engineers. The report recommended that Ley Creek drainage basin be included in a Drainage District which would facilitate a proposed improvement and maintenance program.

At the request of the Town of Salina, Onondaga County, New York, a reconnaissance study was made by the Corps of Engineers to determine

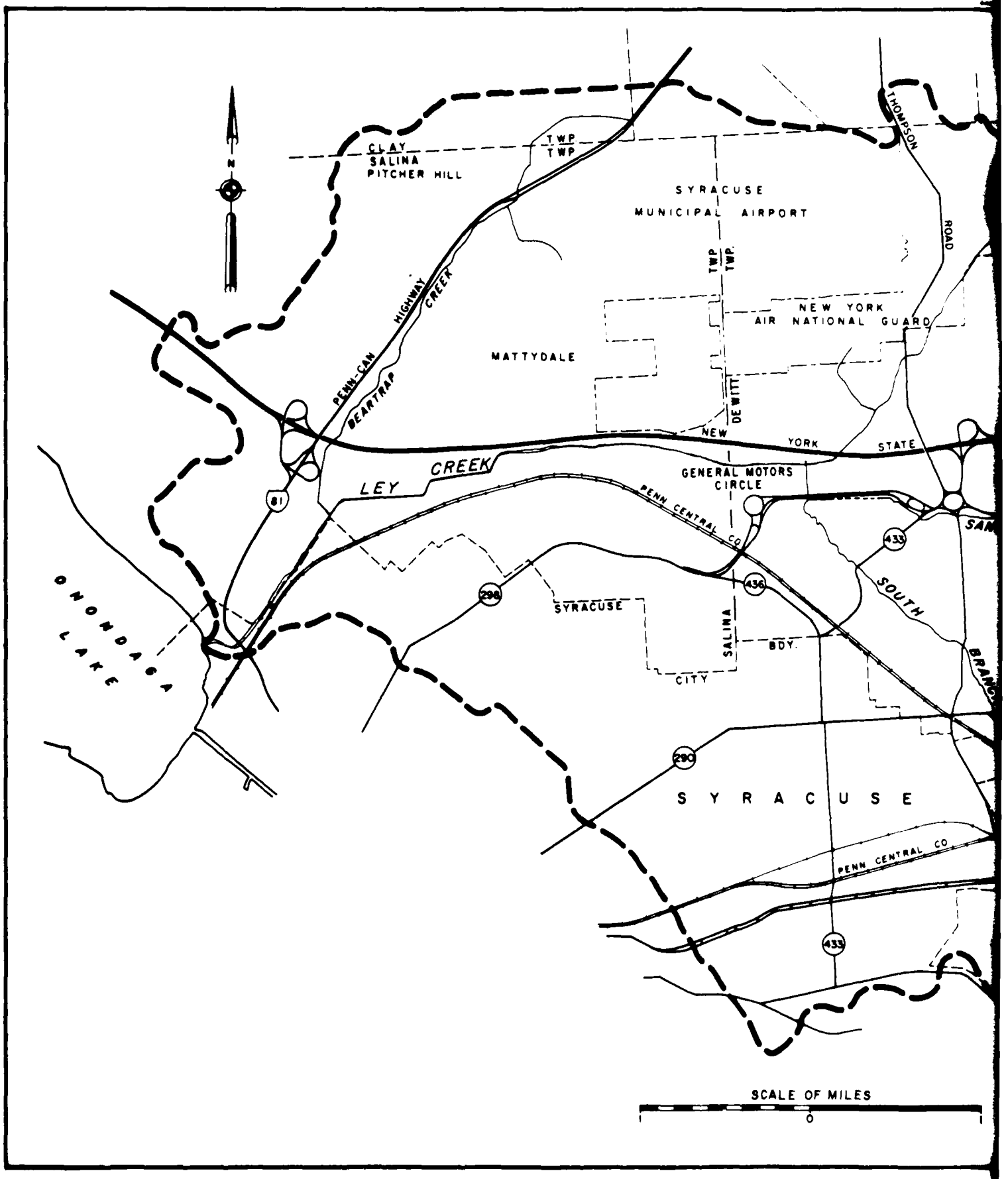
the feasibility of improving Ley Creek for flood control under Section 205 of the 1962 Flood Control Act. The culmination of this study was a report which concluded that a justifiable project could not be developed. The report is dated January 1965.

In November 1960 O'Brien and Gere, Consulting Engineers, inished a study of the Ley Creek Drainage Basin with a report titled, "Report on the Ley Creek Drainage Basin." The primary purpose of the study was to determine deficiencies within the existing Sanders Creek channel and to make recommendations for correcting these deficiencies.

FLOOD DAMAGE PREVENTION MEASURES - The Bear Trap-Ley Creek Drainage District was established by Onondaga County for the purpose of implementing a program of construction and maintenance to remedy the flood problem which exists in the Ley Creek drainage basin.

In August 1970, Onondaga County Department of Public Works, Division of Drainage and Sanitation, initiated Stage I of the construction and maintenance programs which included the enlargement of the Ley Creek channel, from the U. S. Route 11 bridge downstream to Onondaga Lake, and the construction of riprapped channel walls from U. S. Route 11 bridge to Lemoyne Avenue. Also included was the clearing of trees and vegetation and the acquisition of rights-of-way from Onondaga Lake to Town Line Road. This work is expected to be completed mid 1971.

FUTURE FLOOD HEIGHTS - Estimated flood crests that would be reached if either the Intermediate Regional Flood or the Standard Project Flood occurred in the study area are shown in table 1. These data are prepared for the various locations indicated so that future floods can more easily be compared with the Standard Project and Intermediate Regional Floods.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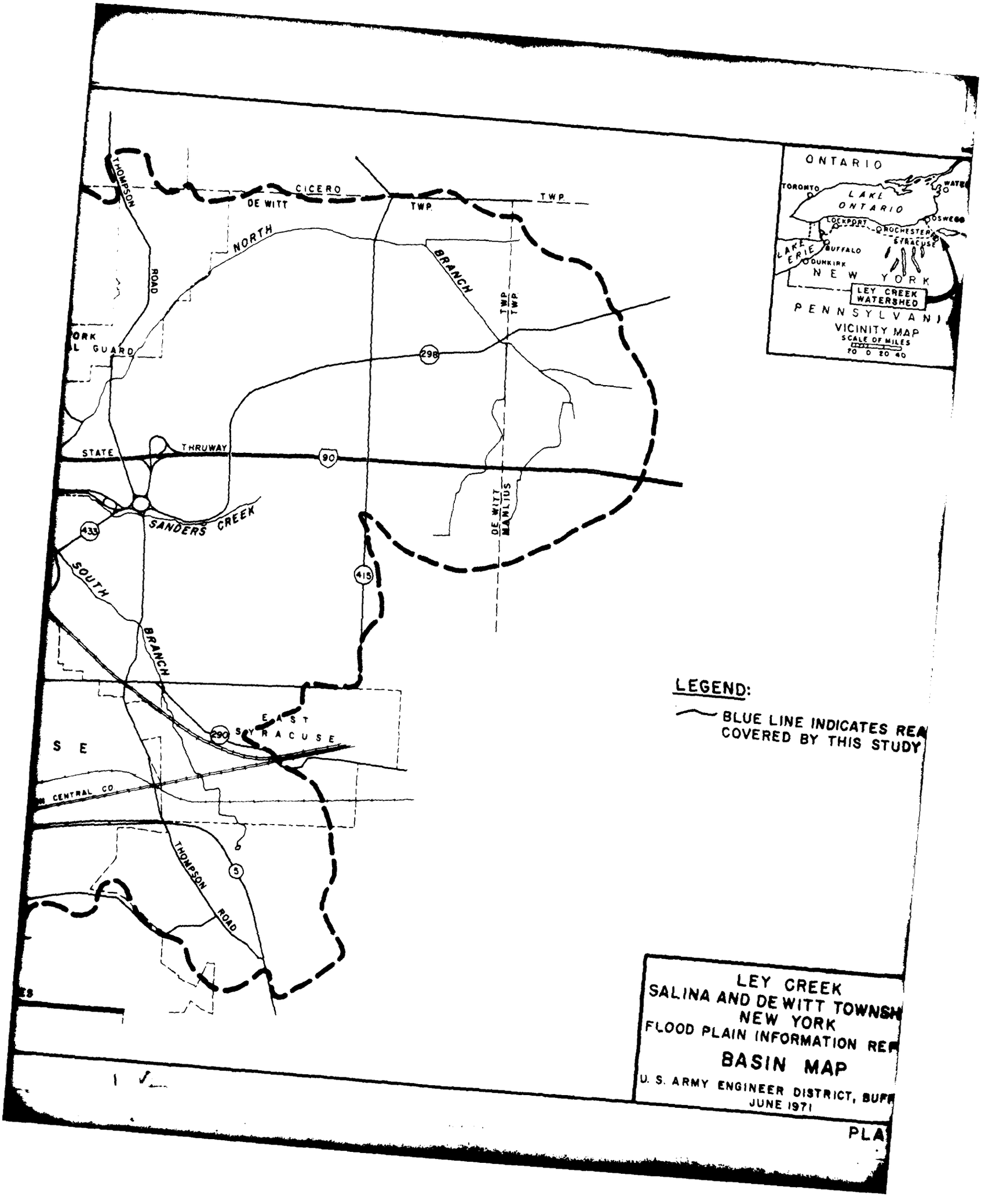
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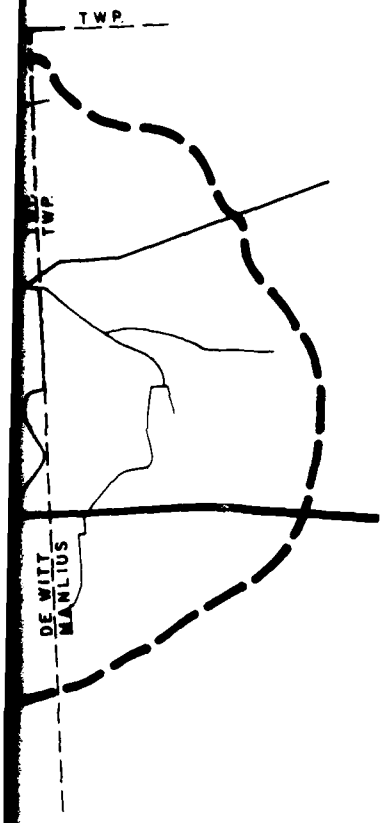


LEGEND:

BLUE LINE INDICATES REACH COVERED BY THIS STUDY

LEY CREEK
SALINA AND DE WITT TOWNSHIPS
NEW YORK
FLOOD PLAIN INFORMATION REPORT
BASIN MAP

U. S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

PLATE 1

TABLE I

RELATIVE FLOOD HEIGHTS

Location	Mile Above Mouth	Flood	Estimated Peak Discharge (c.f.s.)	Above Top of Bank (feet)
Penn Central Trans. Co.	0.05	Intermediate Regional	2,000	0.4
		Standard Project	5,880	7.1
7th North St.	1.17	Intermediate Regional	2,000	1.1
		Standard Project	5,880	4.1
Lemoyne Ave.	2.17	Intermediate Regional	2,000	0.6
		Standard Project	5,880	6.2
Town Line Rd.	3.73	Intermediate Regional	2,000	4.0
		Standard Project	5,880	9.6
New York State Thruway	4.40	Intermediate Regional	2,000	3.9
		Standard Project	5,880	8.2

GENERAL CONDITIONS AND PAST FLOODS

GENERAL

This section of the report is a history of past flooding in the Ley Creek basin, in Onondaga County, New York. Beginning at the mouth of the Creek, the area under study extends upstream 4.4 miles to the New York State Thruway. The total Ley Creek drainage area consists of 30 square miles.

Ley Creek flows in a westerly direction from the junction of North Branch and South Branch to its mouth at Onondaga Lake.

Flooding occurs along the entire length of the study area with the most severe damages at Mattydale and General Motors Circle. Flood damages have increased in recent years because idle land has been converted to commercial and residential properties and because of sanitary fill operations in the swampland of the flood plain. This points out the need for proper legislation to be enacted rapidly to keep flood damageable development out of the flood plain.

Flooding can be expected yearly in the basin with spring floods generally producing the greatest flows. Flood damages have been serious in the past but if the increasing development within the flood plain is not controlled by proper flood plain legislation, flood losses will become more and more severe.

Since stream flow records are not available, much of the flood data given in this report are based on surveys conducted by personnel of the U. S. Army Corps of Engineers. During these surveys, local residents were interviewed and information was gathered pertaining to water elevation for various floods and accompanying damages. A search of newspaper files, historical documents and other miscellaneous sources enabled a history of known floods to be developed for the study area.

SETTLEMENT - Onondaga County was the seat of the Indian nation from which it takes its name, the word meaning "Men of the Mountains." According to their tradition, the union of tribes was founded on the shore of Onondaga Lake where the village of Liverpool now stands.

At the close of the Revolution, the study area was wilderness covered with heavy forest except for small areas which the Indians had cleared. After a treaty with the Onondagas in 1788, lands known as the Military Tract were acquired by the United States Government. The early land grants provided that the territory be laid off in townships of 60,000 acres, subdivided into 100 lots of 600 acres each. The twenty-six townships of the military tract were designated by names of distinguished men.

In 1794 Onondaga County was erected from the western part of Herkimer and included the military tract which now forms all of Cayuga, Seneca, Cortland, Onondaga and parts of Tompkins and Oswego Counties. It was finally reduced to its present territorial limits in 1816 by detachment of Cayuga, Cortland and Oswego.

POPULATION - The U. S. Bureau of Census indicated that, between 1960 and 1970, the population of the city of Syracuse decreased from 216,038 to 192,529, a drop of 11 percent in 10 years. During the same period, the population of Onondaga County increased from 423,028 to 466,334, an increase of 10 percent. Figure 1 shows graphically the population trends of Syracuse and Onondaga County.

These data reflect the trend of development within the flood plain. Unless proper Flood Plain Management is instituted and enforced as soon as possible, this progressive increase in development, if allowed to continue at the rate it has in the past without regard for flooding, will lead to more frequent and greater depths of flooding and will considerably increase the amount of damage which inhabitants must bear.

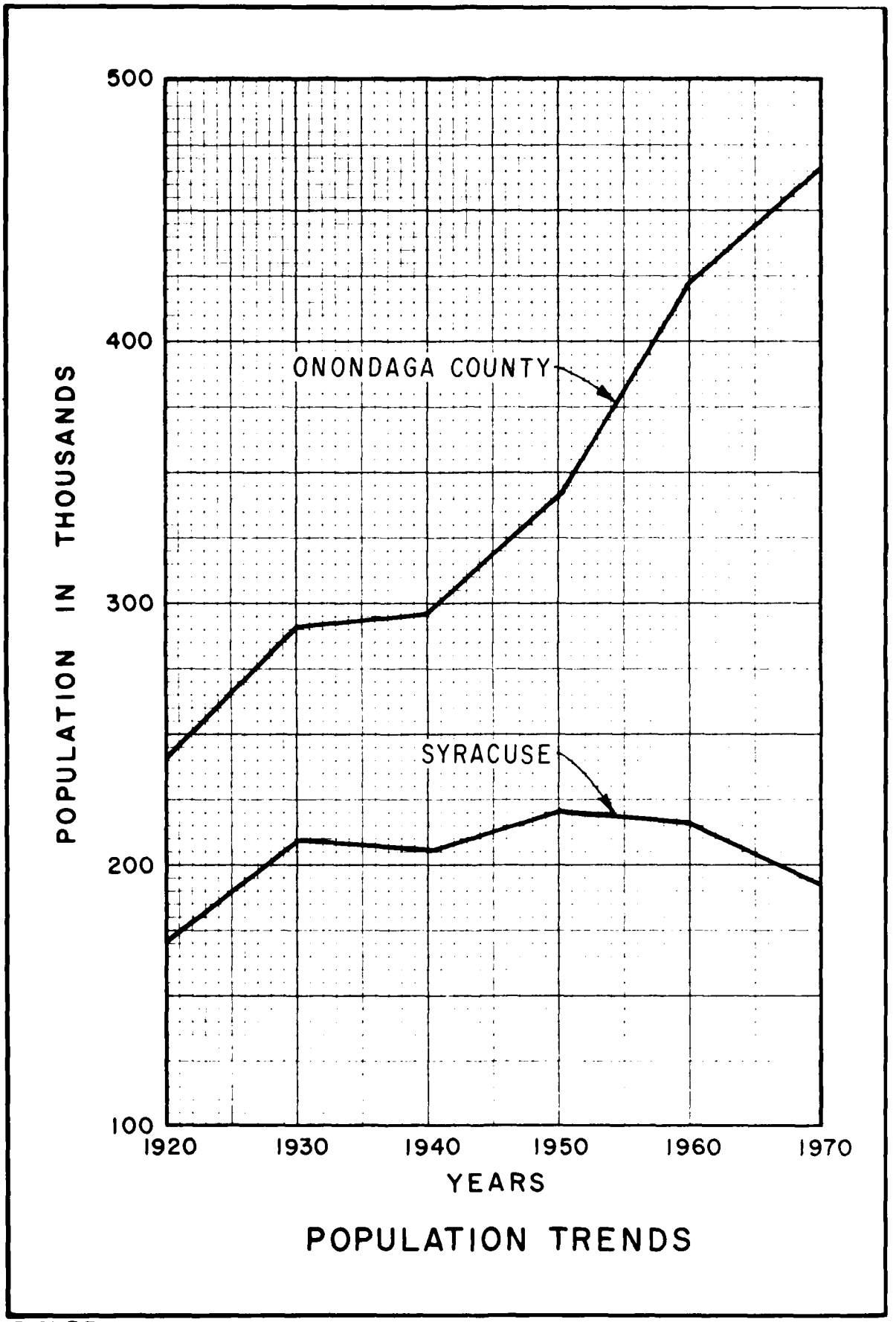

500
400
300
200
100
POPULATION IN THOUSANDS
ONONDAGA COUNTY
SYRACUSE
1920
1930
1940
1950
1960
1970
YEARS
POPULATION TRENDS

FIGURE 1

EXISTING REGULATIONS - Presently there are no regulations in the study area regarding building or the use of land with respect to flood risk.

The State of New York enabling statutes which permit city zoning, specifying chapter 21, Article 2-A, Section 24, that such regulations shall be designed to secure safety from fire, flood and other dangers, and to promote the public health and welfare... The State of New York Town Law, Section 263, states "such regulations shall be made in accordance with comprehensive plan and design to promote health and general welfare..." Also Section 277 concerning planning boards and official maps, states that "land shown on plats shall be of such character that it can be used safely for the building proposed without danger to health or from fire, flood or other menace."

The 1965 Legislature of New York State passed amendments adding Part IIIA, Use and Protection of Waters, to Article 5 of the Conservation Law. Although Part IIIA is not meant to regulate the flood plain, it does help prevent encroachment of streams, thereby helping to reduce future flood damages. Part IIIA states, in part, that no person or public corporation shall change, modify or disturb the course, channel or bed of any stream or shall erect, reconstruct or repair any dam or impoundment structure without a permit from the Water Resources Commission. The amendments became effective on 1 January 1966. The full text of the Act can be found in chapter 955 Sections 429 a-g of the Laws of New York State-1965.

FLOOD WARNING AND FORECASTING SERVICES - The Ley Creek area does not receive specific flood warnings or forecasting services from the National Oceanic and Atmospheric Administration, National Weather Services. The Genesee River basin west of the Ley Creek basin, receives these services from the Rochester Weather Bureau.

Flood forecasting for the Genesee River basin has no bearing on when floods will occur in the Ley Creek basin except that, in general, similar conditions could cause flooding in both areas.

The Weather Bureau at the Syracuse Airport forecasts daily climatological data and could warn the surrounding area about any severe or excessive weather conditions which might develop.

THE STREAM AND ITS VALLEY - The Ley Creek drainage basin forms part of the larger Oswego River watershed in Central New York. Parts of the towns of Cicero, Clay, DeWitt, Manlius and Salina; the villages of East Syracuse, and North Syracuse, and the city of Syracuse are included in the basin. Ley Creek with its five major tributaries, Bear Trap Creek, North Branch, South Branch, Sanders Creek and Teall Brook drain an area of 30 square miles.

The topography of the basin is generally flat with some gently rolling hills. Surface elevations vary from about 410 feet at the headwaters of the basin to about 365 feet at Onondaga Lake. Ley Creek is considered a mature stream but the gross features of the area were largely formed by glaciers and past glacial lakes and streams. Streambed gradients are very mild, varying from about 5 feet per mile to about 1 foot per mile. Soils in the basin consist of silt, sand, gravel and clay which overlap glacial till.

DEVELOPMENT IN THE AREA - Because of the outward push of urban expansion from Syracuse, about seventy percent of the watershed has been developed for industrial, commercial and residential uses. This growth will probably continue until most of the area is developed. Pictures of this growth are shown on figures 2 through 5. Five percent of the basin is wooded and five percent is being used for agricultural purposes. Twenty percent of the land area is idle with the largest portion of this type along the North Branch.

The area is serviced by five major transportation routes with the sixth under construction. Air transportation is available in the

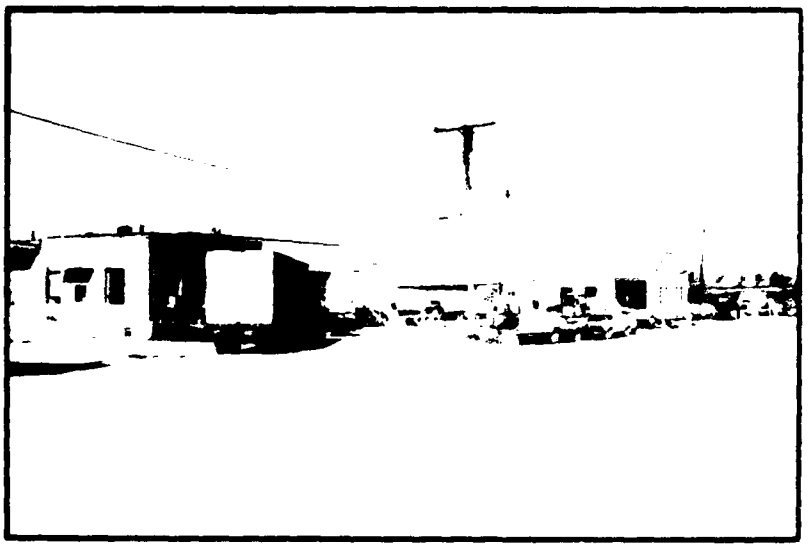


Figure 2 - Photo shows general development on 6th North Street, stream mile 0.99. Photo was taken in April 1971.

Figure 3 - Photo was taken in May 1969 at the Cambridge Avenue - Anderson Street area, stream mile 2.50. Photo courtesy of Calocerinos and Spino Consultants.

Development in the flood plain.

Figure 4 - Photo was taken in the Cambridge Avenue area, stream mile 2.40.

Figure 5 - Photo was taken at Cambridge and Mitchell Avenues, stream mile 2.45.

Development in the flood plain
Photos were taken in April 1971.

northern part of the basin at the Syracuse Municipal Airport. An east-west access is provided by the New York State Thruway. Access to the area from the north and south is provided by Interstate Route 81. Interstate 690 which is under construction will be a direct route from Syracuse to the Ley Creek basin. Large bulk cargo can be handled by the Penn Central Transportation Company and the New York State Barge Canal.

Existing adequate water and sewer facilities will also help insure a continued rise in population within the area.

BRIDGES ACROSS THE STREAM - There are seven highway bridges and two railroad bridges which cross Ley Creek within the study area. Table 2 lists pertinent data for these structures and shows their relationship with the Standard Project and Intermediate Regional Floods. Inspection of the flood profiles on plate 4 shows that several of the structures are constrictive and cause large head losses (defined in Glossary). The high level bridge at Interstate Route 81 has very little hydraulic effect on the stream profile; therefore, it was not shown on plate 4 or table 2. The profiles on plate 4 should be used as a guide for all future construction of new bridges or alterations to existing bridges which cross the Creek in the study area. Views of some of the bridges are shown in figures 6 through 11.

OBSTRUCTION TO FLOOD FLOWS - Debris that builds up at the upstream side of a bridge can severely retard the flow of water. Bridges with insufficient underclearance such as the railroad spur bridge just upstream of Park Street, and bridges with a small cross sectional area, such as the 7th North Street Bridge, are a hindrance to stream flow.

The problem of channels choked with overhanging trees, vegetation and debris, which is so prevalent in other basins of the area, also plague the channels in the Ley Creek basin. The construction and maintenance program now in progress by the County will relieve the problem in the lower reach but the problem will continue in the upper reaches. Figures 12 through 17 are pictures of examples of flood flow obstruction.

TABLE 2

BRIDGES ACROSS LEY CREEK

Mile above Mouth	Identification	Stream Bed Elev.	Floor Elev. (2)	Standard Project Flood Crest Elev. (1)	Intermediate Regional Flood Crest Elev. (1)	Low Steel Elev.
.05	Penn Central Trans. Co.	359.0	375.8 (3)	372.0	365.4	370.7
.28	Park Street	360.3	371.9	373.7	367.0	369.2
.44	Penn Central Trans. Co. (Spur)	360.6	372.0 (3)	374.7	371.9	367.2
1.17	7th North Street	361.0	370.3	375.1	372.1	366.6
1.95	Brewerton Road (N.Y.S. Rt. 11)	362.5	377.2	377.7	372.9	373.0
2.17	Lemoyne Avenue	364.9	378.7	380.2	374.6	374.5
3.73	Town Line Road	368.0	380.5	382.6	377.0	375.7
4.40	New York State Thruway	371.3	384.1	383.4	379.1	381.4

(1) All elevations referred to upstream side of respective bridge with the exception of the N.Y.S. Thruway bridge.
(2) All floor elevations are referred to centerline of street except where the top of rail is given.
(3) Top of rail elevation.

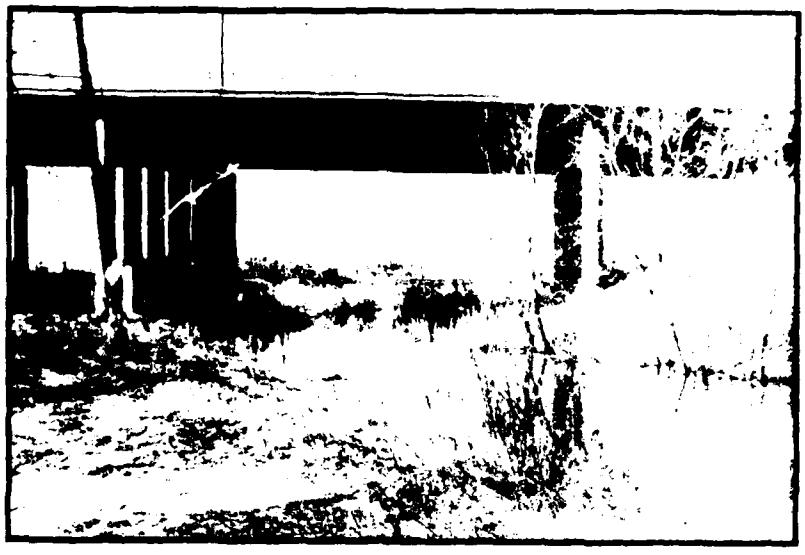


Figure 6 - View of upstream side of Interstate Route 81 bridge, stream mile 0.23. There is little hydraulic effect on stream flow.

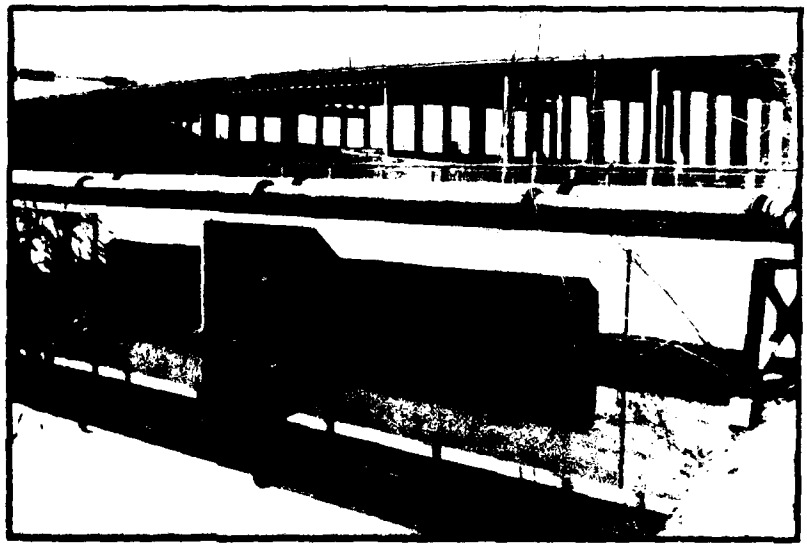


Figure 7 - View of upstream side of Park Street bridge, stream mile 0.25.

Bridges across Lev Creek
Photos were taken in April 1971.

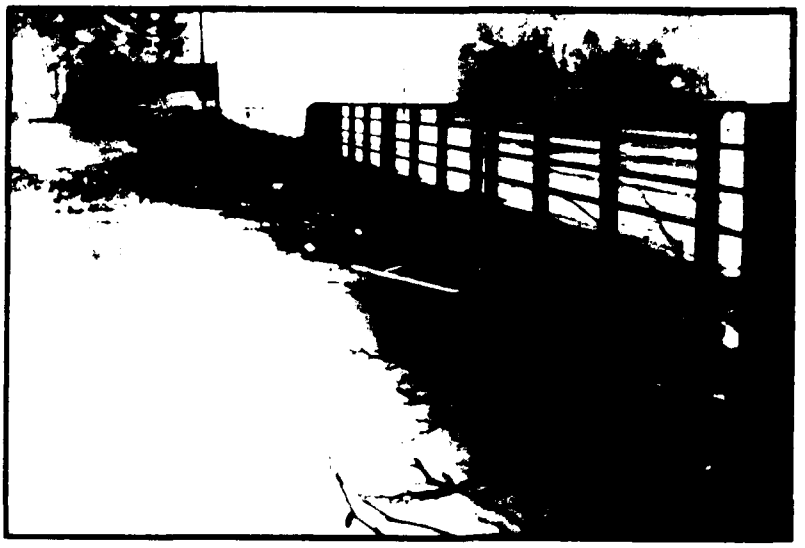


Figure 8 - Looking at the upstream side of Brewerton Road bridge (U.S. Route 11), stream mile 1.45. Note accumulation of debris that occurs when a bridge is not built high enough to clear high water.

Figure 9 - View of Lemoyne Avenue bridge, stream mile 2.17. Debris cannot pass under the bridge during high flows.

Bridges across Ley Creek
Photos were taken in May 1[illegible]

Photos courtesy of [illegible]

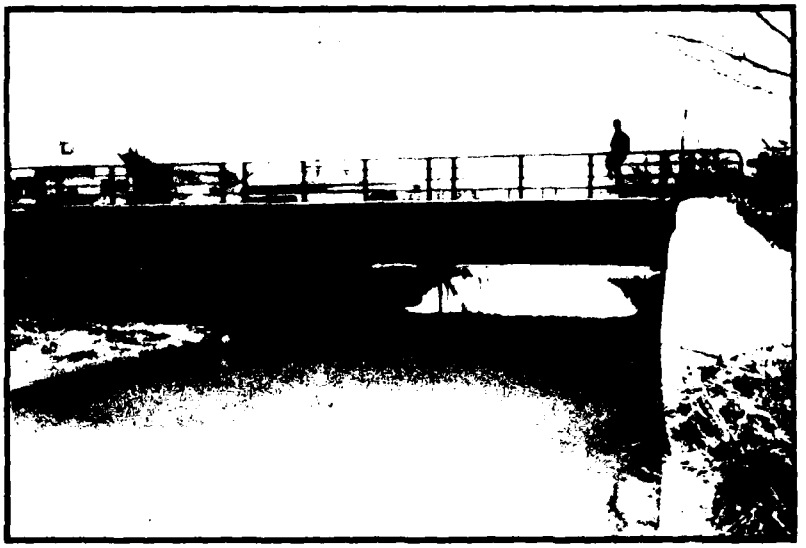


Figure 10 - Looking at the upstream side of Lemoyne Avenue bridge, stream mile 2.17. Note shoaling along left side of channel.

Figure 11 - View of upstream side of Town Line Road bridge, stream mile 3.73.

Bridges across Ley Creek
Photos were taken in April 1971.

Figure 12 - Photo showing upstream side of Penn Central Transportation Co. bridge, stream mile 0.44. Profiles on plate 4 show bridge is constrictive. Note high line tower footing built well within the channel.

Figure 13 - Looking at the upstream side of 7th North Street bridge, where the channel has become choked with debris, stream mile 1.17.

Obstructions to flood flows
Photos were taken in April 1971.

Figure 14 - Photo of pipeline across the creek just upstream from Lemoyne Avenue, stream mile 2.18.

Figure 15 - Photo shows where channel banks have become overgrown with trees and brush near Factory Avenue, stream mile 2.30.

Obstructions to flood flows
Photos were taken in April 1971.

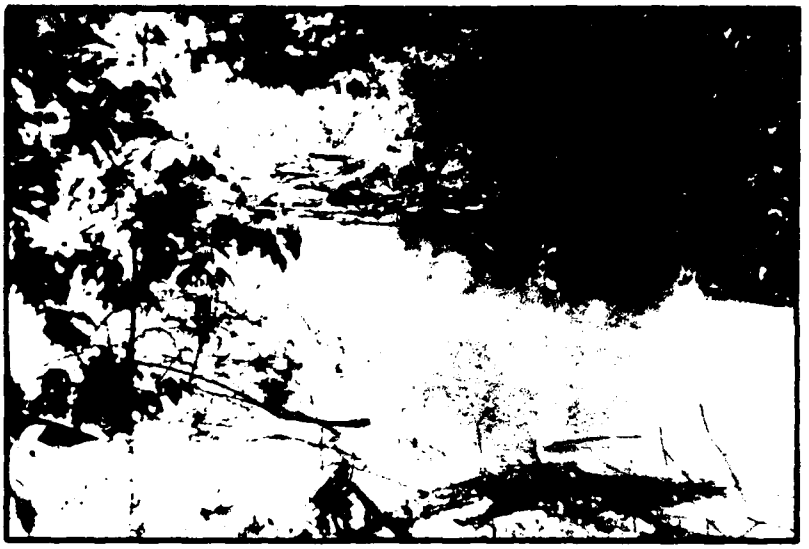


Figure 16 - Debris and heavy vegetation shown in this photo reduce flows in South Branch near the Warren Construction Company.

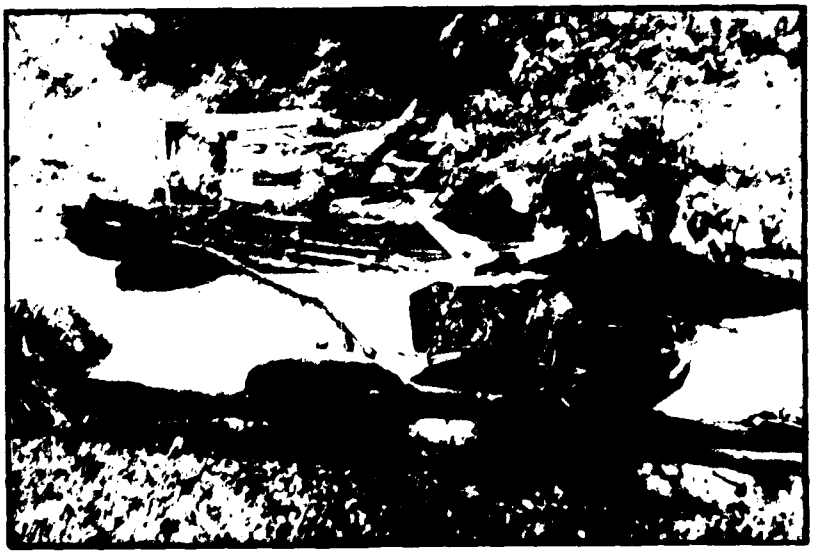


Figure 17 - Photo shows heavy build-up of debris in South Branch near Manlius Street bridge.

Obstructions to flood flows
Photos were taken in May 1989
Photos courtesy of Calocerinos and Spina Consultants

FLOOD SITUATION

FLOOD RECORDS - Since there are no stream flow gages in the Ley Creek basin, continuous records of stream discharges are not available. The United States Geological Survey made periodic but random measurements which were not intended as an indication of high flows.

To reinforce the lack of records, local residents were interviewed for information on past floods. Newspaper files were searched along with historical documents and records. Valuable data were obtained from reports of field investigations made after floods.

FLOODED AREAS, FLOOD PROFILES AND CROSS SECTIONS - Plate 3 shows the approximate areas along Ley Creek that would be inundated by the Intermediate Regional and the Standard Project Floods. The actual limits of these overflow areas on the ground may vary from those shown on the map because the 10-foot contour interval and the scale of the map do not permit precise plotting of the flooded area boundaries. These plates are designed to show the approximate areas subject to flooding so that individuals and governments realize the areas where a flood hazard must be considered before development.

Plate 4 shows the high water profiles for the Intermediate Regional and the Standard Project Floods which are discussed in the "Future Floods" section of this report.

These flood profiles provide the information needed to be able to build above the flood elevations and to develop an effective regulation plan. The profiles are based on the improved channel conditions as they will be when the County completes improvements this summer.

Plate 5 shows valley cross sections which are representative of the flood plain within the area investigated. The approximate elevations of the Intermediate Regional and Standard Project Floods are indicated on the sections.

By using the flooded area maps, flood profiles and cross sections contained in this report as a guide, local governments can pass regulations which limit urban and industrial development that will be allowed in the flood plain. Use of the flood plain for recreational development should be encouraged. In the future, additional recreational facilities of all types will be needed as the population increases. The placement of these additional parks, athletic fields, possible golf courses, drive-in theaters and similar developments in those areas which are susceptible to frequent flooding is recommended because of their important value and relatively small flood damage potential. If future high value development is considered in areas subject to frequent flooding it should be raised above the 100-year flood level. If it is found uneconomical to elevate the land in these areas, means of flood proofing the structure should be incorporated. Figures 18 and 19 are pictures of examples of wise flood plain use.

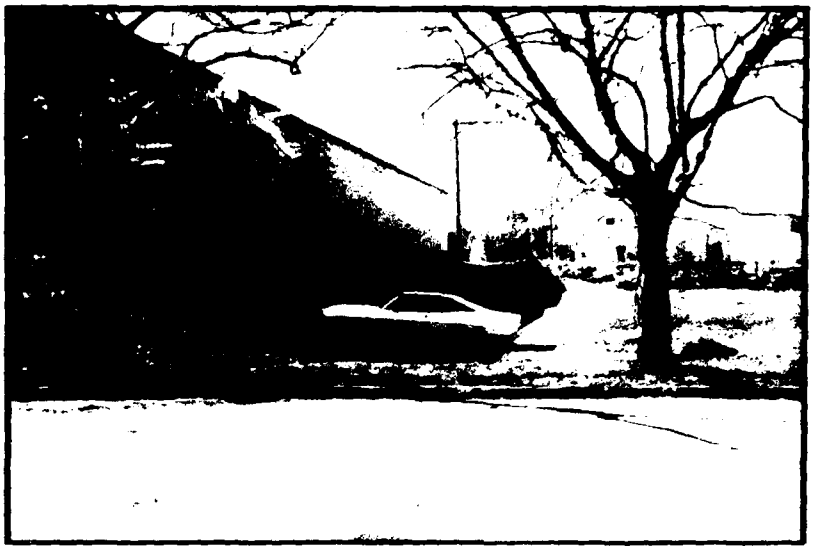


Figure 18 - Building at 2nd North Street and Hiawatha Boulevard which has been built at an elevation well above the Standard Project flood, stream mile 0.5.

Figure 19 - View of MacArthur Stadium is an example of limited flood plain use, stream mile 0.7.

Good flood plain practice
Photos were taken in April 1971.

FLOOD DESCRIPTIONS

Descriptions of known large floods that have occurred in the study area are based upon field investigations, historical records and newspaper accounts.

Past floods in the area were usually caused by one of three types of storms which may be classified as:

1. Those caused by intense rainfall, usually of short duration and rarely covering a large area. These storms are often called "cloudbursts."

2. Those caused by less intense, but heavy rainfall of greater duration and covering the whole drainage basin. These storms may continue for several days.

3. Those caused by the rapid melting of an accumulated blanket of snow, particularly when accelerated by spring rainfall.

A condensation of available information on flood occurrences is given in the following paragraphs. This information is presented as an example of the type and extent of flood problems which have already occurred and an indication of possible flood problems.

Past flooding has occurred both in the summer, from excessive rainfall, and in winter from a combination of snowmelt and rainfall.

MARCH 1950 - On the 2nd and 3rd of the month, a cold air mass, advancing behind an easterly moving low pressure system, brought high winds and blizzard-like conditions to Onondaga County. Many secondary roads were closed by drifts 10 to 15 feet in depth. Then followed a period of cold weather which lasted until the 21st with only an occasional day when the average temperature was above normal. A low pressure system, crossing the Great Lakes and southeastern Canada on the 8th and 9th produced one of the heaviest precipitation periods in the State for the month. Again on the 27th another low pressure system advancing from the interior of

the Country to the Great Lakes region brought heavy rains to most of the State. Temperature rose so that from rain and melting snow, flood conditions developed. Low lands and highways were inundated within the study area.

MARCH 1960 - March was a very cold month caused by the persistence of high pressure systems. The cold air was made colder by the presence of snow cover. This cold front, lasting until the 27th, resulted in a new record low for March in Syracuse, New York. The snow cover that had been building up was suddenly exposed to warm temperatures in the last days of March. The melting snow was accompanied by rains and together with ice jamming caused a great deal of flooding in the study area.

MARCH 1964 - Heavy rains, falling on saturated ground caused overbank flooding in the Town of Salina at the Village of Mattydale.

MAY 1969 - The storm began about 2 p.m. on 19 March when 1.10 inches of rain fell during the first hour. The initial downpour, followed by an additional 2.00 inches of rain resulted in the most severe flooding of recent years. Flooding began along the South Branch on 19 March and spread to the main branch of Ley Creek by the morning of the 20th. The Mattydale area in the vicinity of Young Avenue and Cambridge Avenue was the most severely flooded. Figures 20 through 31 show flooding conditions within the study area.

This concludes the "General Conditions and Past Floods" section of this report. However, what can and should be done to prevent and/or reduce future flood damages? Under the New York State "home rule" type of government, it is the prerogative and responsibility of local governments to develop and enforce, as soon as possible, flood plain regulations based on the information contained in this report. This report will provide them with the necessary tools to control the extent and assure the proper type of development which would be allowed within the flood plain. Regulation of the flood

Figure 20 - Flood scene of Young Avenue taken from Toas Avenue, stream mile 2.35.

Figure 21 - Aerial photo looking east along the New York State Thruway at the Young Avenue area, stream mile 2.40.

Ley Creek flood scenes
May 1969 flood
Photos courtesy of Calocerinos and Spino Consultants

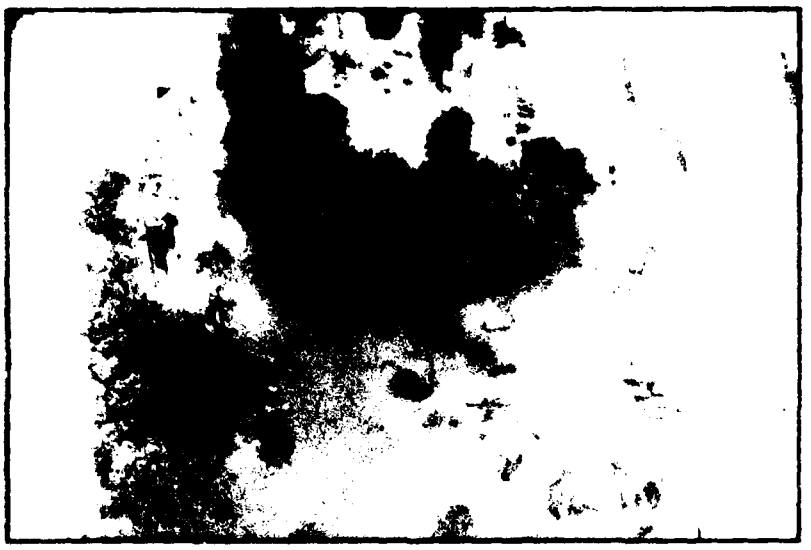


Figure 23 - Aerial photo looking east along the New York State Thruway in the Garrison Avenue area, stream mile 2.4.

Figure 24 - Photo of flooded home at Mitchell and Young areas, stream mile 2.4b.

Jay Creek flood scenes
The 1975 flood

Figure 24 - Aerial photo of flooding along the New York State Thruway near Cambridge Avenue, stream mile 2.40.

Figure 25 - Photo of flooded home at Cambridge and Mitchell Avenues, stream mile 2.45.

Ley Creek flood scenes
May 1969 flood
Photos courtesy of Calocerinos and Spina Consultants

Figure 26 - Flood scene at Cambridge and Mitchell Avenues, stream mile 2.45.

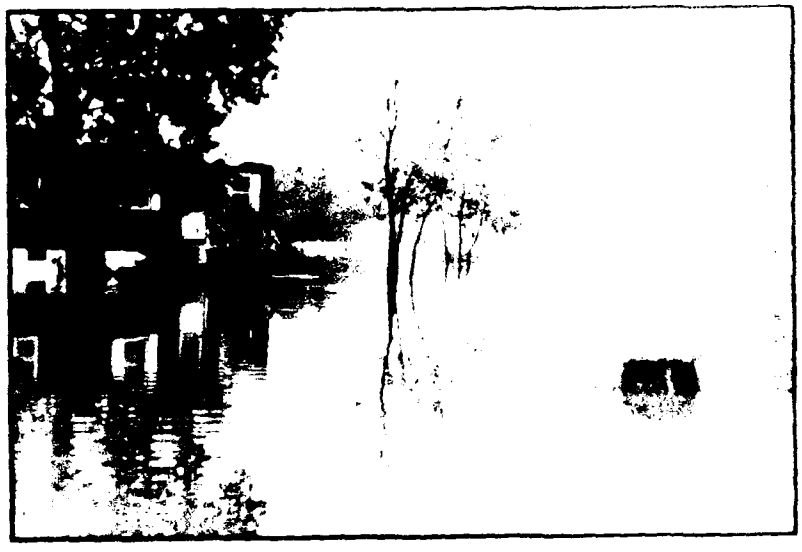


Figure 27 - Photo showing flooding at Mitchell and Young Avenues, stream mile 2.45.

Ley Creek flood scenes
May 1969 flood
Photos courtesy of Calocerinos and Spina Consultants

Figure 28 - Photo of flooded home at McKenny and Young Avenues, stream mile 2.50.

Figure 29 - Flood scene at Cambridge and Anderson Avenues, stream mile 2.50.

Ley Creek flood scenes
May 1969 flood
Photos courtesy of Calocerinos and Spino Consultants

Figure 30 - Photo of flooding at Cambridge and Gordon Avenues, stream mile 2.55.

Figure 31 - Aerial photo of flooding at General Motors Circle, stream mile 4.00.

Ley Creek flood scenes
May 1969 flood
Photos courtesy of Calocerinos and Spina Consultants

plain can usually be carried out most effectively by a combination of several regulatory methods, such as zoning ordinances, subdivision regulations and building codes. The regulations can also establish a floodway so as to insure against encroachment by fills and developments and the accumulation of brush, weeds, debris and large trees which obstruct flood flows, since all these factors result in increased creek stages. In order to assist local governments, the U. S. Army Corps of Engineers has prepared and is distributing to State, County and local governments copies of pamphlets entitled, "Guidelines for Reducing Flood Damages," and for those presently in the flood plain or planning to build in areas subject to possible flooding, "Introduction to Flood Proofing." The use of data presented in this report along with the above mentioned pamphlets will provide general guidelines for flood damage reduction to existing and future development within the flood plain of Ley Creek. The U. S. Army Corps of Engineers will distribute to State, County and local governments other helpful pamphlets as well as additions to existing pamphlets as they are developed. Figure 32 lists the corrective and preventive measures used in flood damage prevention.

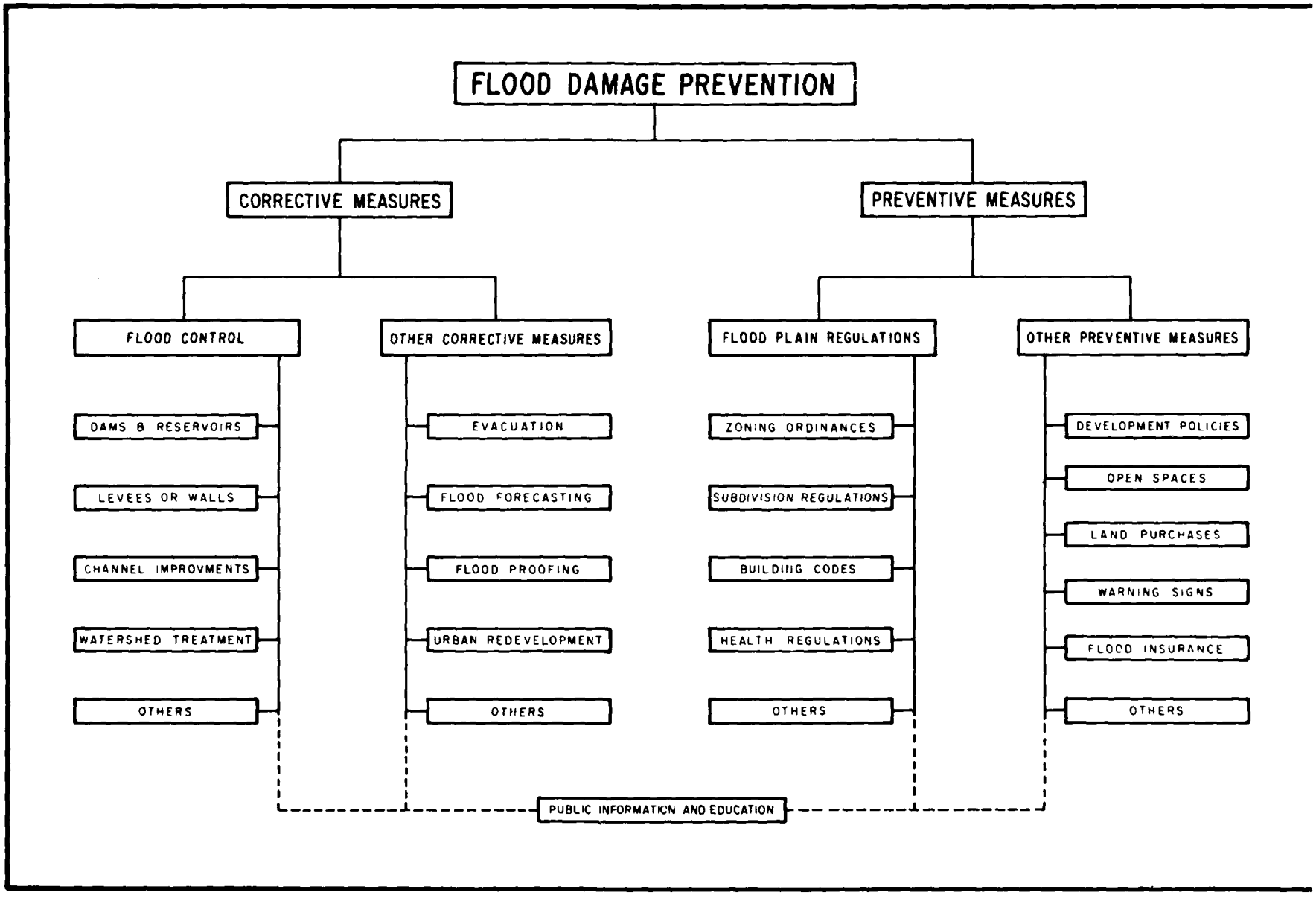

FLOOD DAMAGE PREVENTION
CORRECTIVE MEASURES
PREVENTIVE MEASURES
FLOOD CONTROL
OTHER CORRECTIVE MEASURES
FLOOD PLAIN REGULATIONS
OTHER PREVENTIVE MEASURES
DAMS & RESERVOIRS
LEVEES OR WALLS
CHANNEL IMPROVMENTS
WATERSHED TREATMENT
OTHERS
EVACUATION
FLOOD FORECASTING
FLOOD PROOFING
URBAN REDEVELOPMENT
OTHERS
ZONING ORDINANCES
SUBDIVISION REGULATIONS
BUILDING CODES
HEALTH REGULATIONS
OTHERS
DEVELOPMENT POLICIES
OPEN SPACES
LAND PURCHASES
WARNING SIGNS
FLOOD INSURANCE
OTHERS
PUBLIC INFORMATION AND EDUCATION

FIGURE 32

FUTURE FLOODS

This section of the report discusses the Standard Project and the Intermediate Regional Floods which are possible future floods that could occur on Ley Creek. The Standard Project Flood represents the upper limit of the expected flooding. The Intermediate Regional Flood represents a flood that may reasonably be expected to occur more frequently and would not be as high as the Standard Project Flood.

Large floods have been experienced in the past on Ley Creek and on other streams in the general geographical and physiographical region of this study. Heavy storms similar to those causing these floods could occur again over the watershed of Ley Creek. In this event, floods would result on Ley Creek comparable in size with those already experienced on Ley Creek and neighboring streams. It is therefore desirable, in connection with any determination of future floods which may occur on Ley Creek, to consider storms and floods that have occurred in the region on watersheds whose topography, watershed cover, and physical characteristics are similar to Ley Creek.

Table 3 lists the maximum known floods, their date, peak discharge, discharge per square mile and recurrence interval that have occurred at various U.S.G.S. gaging stations in the region of this study area. Inspection of table 3 shows that floods of the magnitude of the Intermediate Regional Flood and larger have occurred in the vicinity of Ley Creek.

TABLE 3

MAXIMUM KNOWN FLOOD DISCHARGES AT U.S.G.S. GAGING STATIONS IN THE REGION OF LEY CREEK, NEW YORK

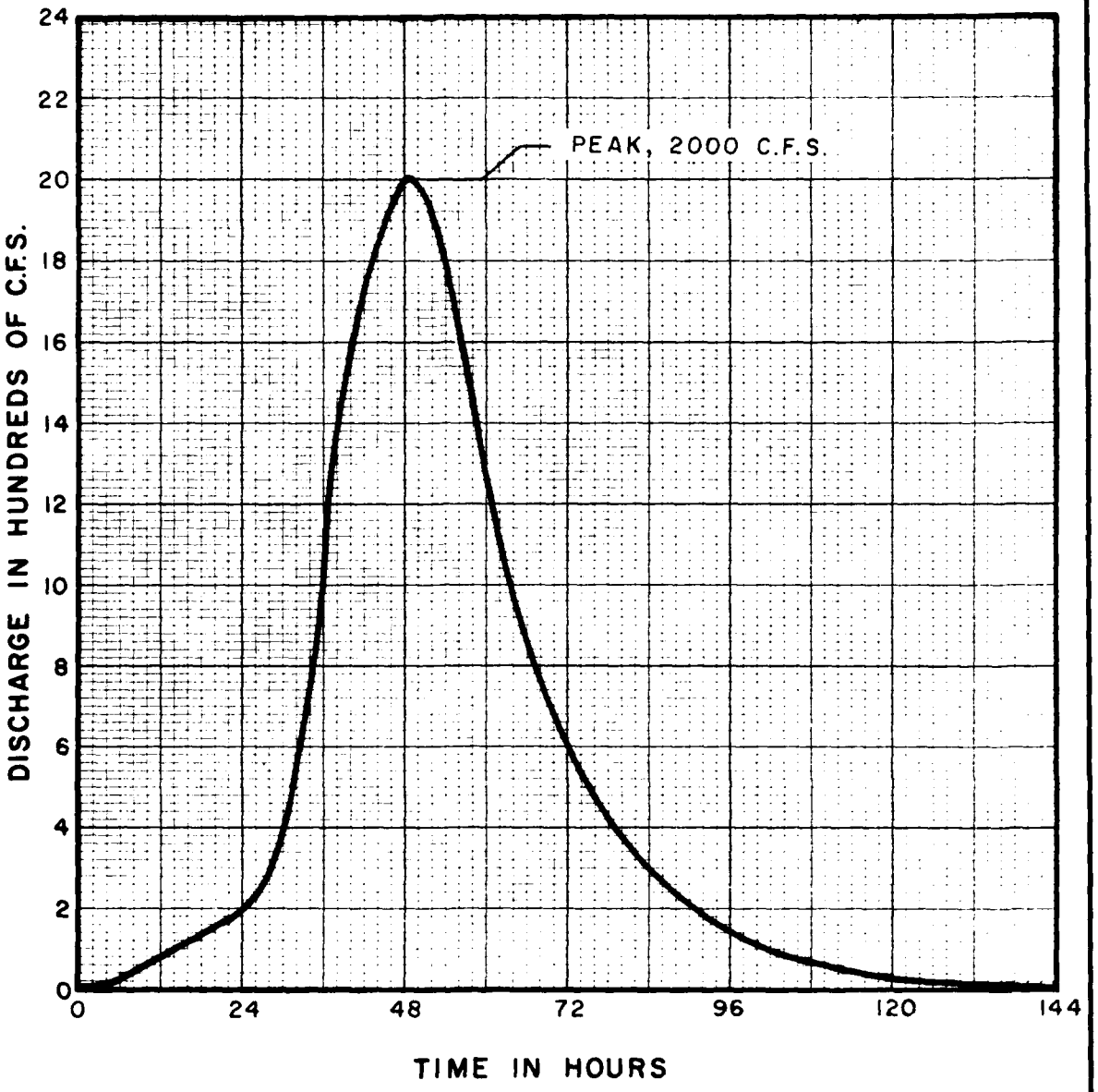
Stream	Gage Location	Period of Record (years)	Drainage Area (sq. mi.)	Peak discharge of record (cfs)			Estimate Recurrence Interval (years)(3)
				Date	Amount	Sq. Mi.	
Limestone Creek	Fayetteville	30	85.5	28 March 1950	7,010	84.5	25
Butternut Creek	Jamesville	11	32.2	5 March 1964	1,260	39.1	4 (4)
Chittenango Creek	Chittenango	19	66.3	11 Feb 1960	2,690 (2)	40.6	4 (4)
Canandaigua Outlet	Lyons	44	441	31 March 1960	13,000 (1)	20.5	200
Flint Creek	Phelps	10	102	30 March 1960	2,940	28.8	9
Cayuga Inlet	Ithaca	31	145.5	8 July 1935	22,000 (1)	151.2	200
Fall Creek	Ithaca	44	126	8 July 1935	15,500	123	greater than 200
Seneca River	Baldwinsville	19	3136	4 April 1960	17,200 (2)	5.5	33

(1) Corps of Engineers estimate.
(2) Regulated flow.
(3) Based on conditions of development at time of flood.
(4) More than one flood of this approximate magnitude.

DETERMINATION OF INTERMEDIATE REGIONAL FLOOD - The Intermediate Regional Flood is defined as a flood having an average frequency of occurrence in the order of once in 100 years, at a designated location, although the flood may occur in any year. Some probability estimates are based on statistical analysis of streamflow records available for the watershed under study but limitations in such records usually require analysis of rainfall and runoff characteristics in the "general region" of the area under study. Results of the hydrologic study showed that the Intermediate Regional Flood on Ley Creek at the study area would have a peak discharge of 2,000 cfs.

An Intermediate Regional Flood on Ley Creek would be more damaging than the May 1969 flood. The Intermediate Regional Flood represents a major flood, although it is much less severe than the Standard Project Flood. Shown on plate 2 is the stage hydrograph for the Intermediate Regional Flood estimated by the Corps of Engineers.

DETERMINATION OF STANDARD PROJECT FLOOD - Only in rare instances has a specific stream experienced the largest flood that is likely to occur. Severe as the maximum known flood may have been on a given stream, it is a commonly accepted fact that, in practically all cases, a larger flood can and probably will occur. The Corps of Engineers, in cooperation with the Weather Bureau, had made broad and comprehensive studies and investigations based on the vast records of experienced storms and floods and has evolved a generalized procedure for estimating the flood potential of streams. These procedures have been used in determining the Standard Project Flood. It is defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical region involved, excluding extremely rare combinations.



NOTES:

Hydrograph estimated by the Corps of Engineers.

Drainage Area 30 Sq. Mi.

LEY CREEK
SALINA AND DE WITT TOWNSHIPS
NEW YORK
FLOOD PLAIN INFORMATION REPORT
100 YEAR STORM HYDROGRAPH
U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

PLATE 2

A Standard Project Flood estimate was made for Ley Creek Basin in the study area. The theoretical storm contained rainfall amounts of 5.87 inches in 3 hours, 8.76 inches in 6 hours, 10.80 inches in 24 hours and 13.13 inches in 96 hours. The peak discharge within the study area would be 5,880 cfs. Although the rainfall of a Standard Project Storm is severe, its magnitudes have been approached in several areas in New York State and Northern Pennsylvania. In July 1942, rainfall of 8.48 inches in a 24-hour period was recorded at Coudersport, Pennsylvania, and unofficial precipitation stations reported rainfall in excess of 20 inches over a 200-square mile area in Northern Pennsylvania and Southern New York. In July 1935, 10.5 inches of precipitation was recorded at Burdett, New York, in a 48-hour period.

Unfortunately, when data are given pertaining to future floods such as the Intermediate Regional and Standard Project Floods, people have the opinion that this will probably not happen during their lifetime and have a tendency to ignore the potential problems. Although it is true that the Intermediate Regional Flood has a recurrence interval in the order of once in 100 years and the Standard Project Flood is even less frequent, it must be kept in mind that either or both floods can happen in any given year.

FREQUENCY - It is not practical to assign a frequency to the Standard Project Flood. The occurrence of such a flood would be a very rare event; however, it could occur in any year and it is not the most severe flood that could occur. The Standard Project Flood is presented in this report to show the reasonable upper limit of the flood plain.

POSSIBLE LARGER FLOODS - Floods larger than the Standard Project Flood are possible; however, the combination of factors that would be necessary to produce such floods would seldom occur. The consideration of floods of this magnitude should be considered dependent on the type of development of the risk of utilizing the flood plain.

HAZARDS OF GREAT FLOODS

The amount and extent of damage caused by any flood depends in general upon how much area is flooded, the height of flooding, the velocity of flow, the rate of rise and the duration of flooding.

AREAS FLOODED AND HEIGHTS OF FLOODING - The areas along Ley Creek flooded by the Standard Project Flood and the Intermediate Regional Flood are shown on plate 3. Depths of flooding can be estimated from the cross sections which are shown on plate 5.

The Intermediate Regional and Standard Project Floods were computed by using stream characteristics for selected reaches as determined from observed flood profiles, topographic maps and valley cross sections. The overflow areas shown on plate 3 and the water surface profiles shown on plate 4 have been determined with an accuracy consistent with the purpose of this study and the accuracy of the available basic data. This Standard Project Flood overflow in the urban areas should be considered to be indicative only, because of the effects of the buildings and other large obstructions. The water surface profiles of the Standard Project and Intermediate Regional Floods depend to a great extent upon the degree of destruction or clogging of various bridges during the flood occurrence. Because it is impossible to forecast these events it was assumed that all bridge structures would stand and that no clogging would occur.

Elevations of the Intermediate Regional and Standard Project Floods should be given careful consideration in all future planning because of the large difference between past flood elevations and possible future flood heights.

Figures 33 through 38 are photographs which show the heights that would be reached by the Standard Project and the Intermediate Regional Flood on structures presently existing within the flood plain in the study area.

VELOCITIES, RATES OF RISE AND DURATION OF FLOODING - Average channel velocities during floods depend largely upon the size and shape of the channel section, the composition of the stream and the slope of the channel bottom, all of which vary on different streams and at different locations on the same stream.

Frequently rates of rise may not give adequate warning that a flood is coming. Debris clogging and ice jamming can act as a dam and cause water to form pond. When sufficient head accumulates in the pond to break the dam, a surge of water would flow downstream causing an almost instantaneous rate of rise.

High channel and overbank velocities in combination with deep, fairly long duration flooding would create a hazardous situation in the flood plain. Table 4 lists the average velocities that would occur in the channel and overbank areas for a discharge of Intermediate Regional and Standard Project Flood magnitudes.

TABLE 4

INTERMEDIATE REGIONAL AND STANDARD PROJECT FLOOD VELOCITIES

Creek Mile	Average Velocities			
	Intermediate Regional		Standard Project	
	Channel ft. per sec.	Overbank ft. per sec.	Channel ft. per sec.	Overbank ft. per sec.
.27	3.72	.37	3.78	1.17
1.95	1.98	.27	3.66	.80
2.75	2.11	.52	2.08	.92
4.36	1.85	.87	2.31	1.14

NOTE: Since Table 4 indicates only average velocities, maximum velocities would be somewhat greater in both channel and overbank areas.

Rates of rise are dependent upon the slope of the basin, intensity of the storm, development within the basin and loss of rainfall. It can also depend upon the condition and amount of debris in the channel at the time of the storm. The duration of a flood above bankfull stage is dependent upon the duration of the storm and on the assumption that the storm was caused by rainfall and does not include prolonged runoff from snowmelt and high stages caused by ice jams, etc. Table 5 lists the total rise from low water to the crest, the average rate of rise and the duration above bankfull stage of the Intermediate Regional and Standard Project Floods for Ley Creek.

TABLE 5

RATE OF RISE AND DURATION

LEY CREEK AT MILE 2.0

Flood	Height of rise (ft.)	Time of rise (hr.)	Rate of rise (ft. per hr.)	Duration above bankfull (hrs.)
Intermediate Regional	7.8	24	.32	19
Standard Project	12.7	37	.34	44

Figure 33 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at Central New York Freightways Garage on 6th Street, stream mile 0.99.

Figure 34 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at the Tuffy Trucking Garage on 6th North Street, stream mile 0.99.

Possible future flood heights
Photos were taken in April 1971

Figure 35 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods on Cambridge Avenue, stream mile 2.50.

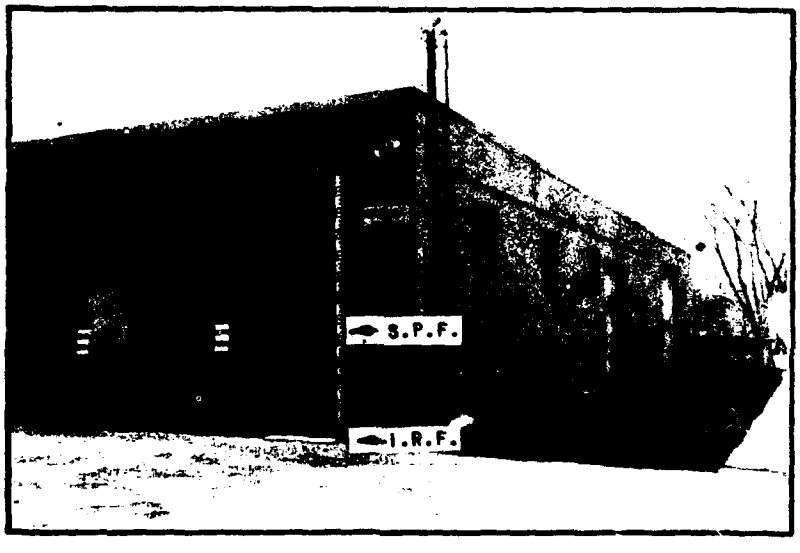


Figure 36 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at Bomac Inc. on Cambridge Avenue, stream mile 2.40.

Possible future flood heights
Photos were taken in April 1971

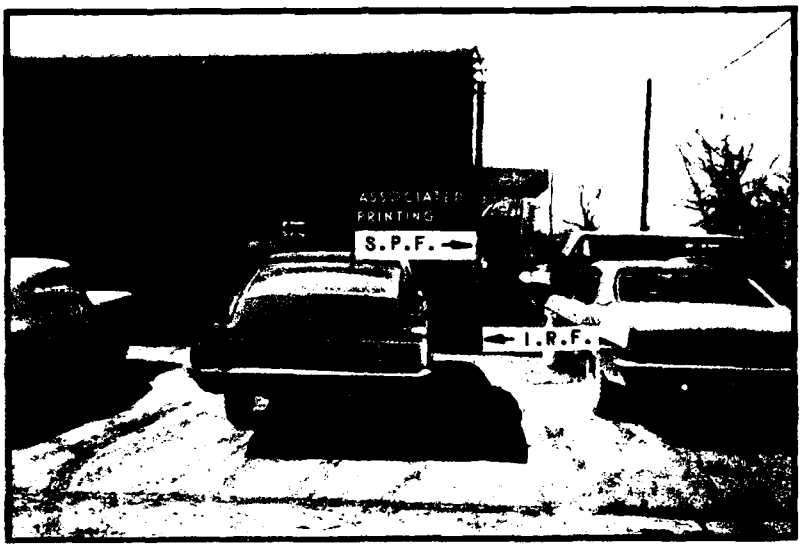


Figure 37 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at Associated Printing Service on Cambridge and Mitchell Avenues, stream mile 2.45.

Figure 38 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at the intersection of Mitchell and Cambridge Avenues, stream mile 2.45.

Possible future flood heights
Photos were taken in April 1971

GLOSSARY OF TERMS

Discharge. The quantity of flow in a stream at any given time, usually measured in cubic feet per second (cfs).

Flood. An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

Normally a "flood" is considered as any temporary rise in stream flow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased stream flow, and other problems.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

Flood Plain. The relatively flat area or low lands adjoining the channel of a river, stream or watercourse or ocean, lake or other body of standing water, which has been or may be covered by flood water.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Head Loss. The effect of obstructions, such as narrow bridge openings or buildings that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.

Hydrograph. A curve denoting the discharge or stage of flow over a period of time.

Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and run-off characteristics in the "general region of the watershed."

Left Bank. The bank on the left side of a river, stream or a watercourse, looking downstream.

Low Steel (or Underclearance). See "underclearance."

Right Bank. The bank on the right side of a river, stream or watercourse, looking downstream.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40% to 60% of the Probable Maximum Floods for the same basins. Such floods, as used by the Corps of Engineers, are intended as practical expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Underclearance. The lowest point of a bridge or other structure over or across a river, stream, or watercourse that limits the opening through which water flows. This is referred to as "low steel" in some regions.

AUTHORITY, ACKNOWLEDGMENTS AND INTERPRETATION OF DATA

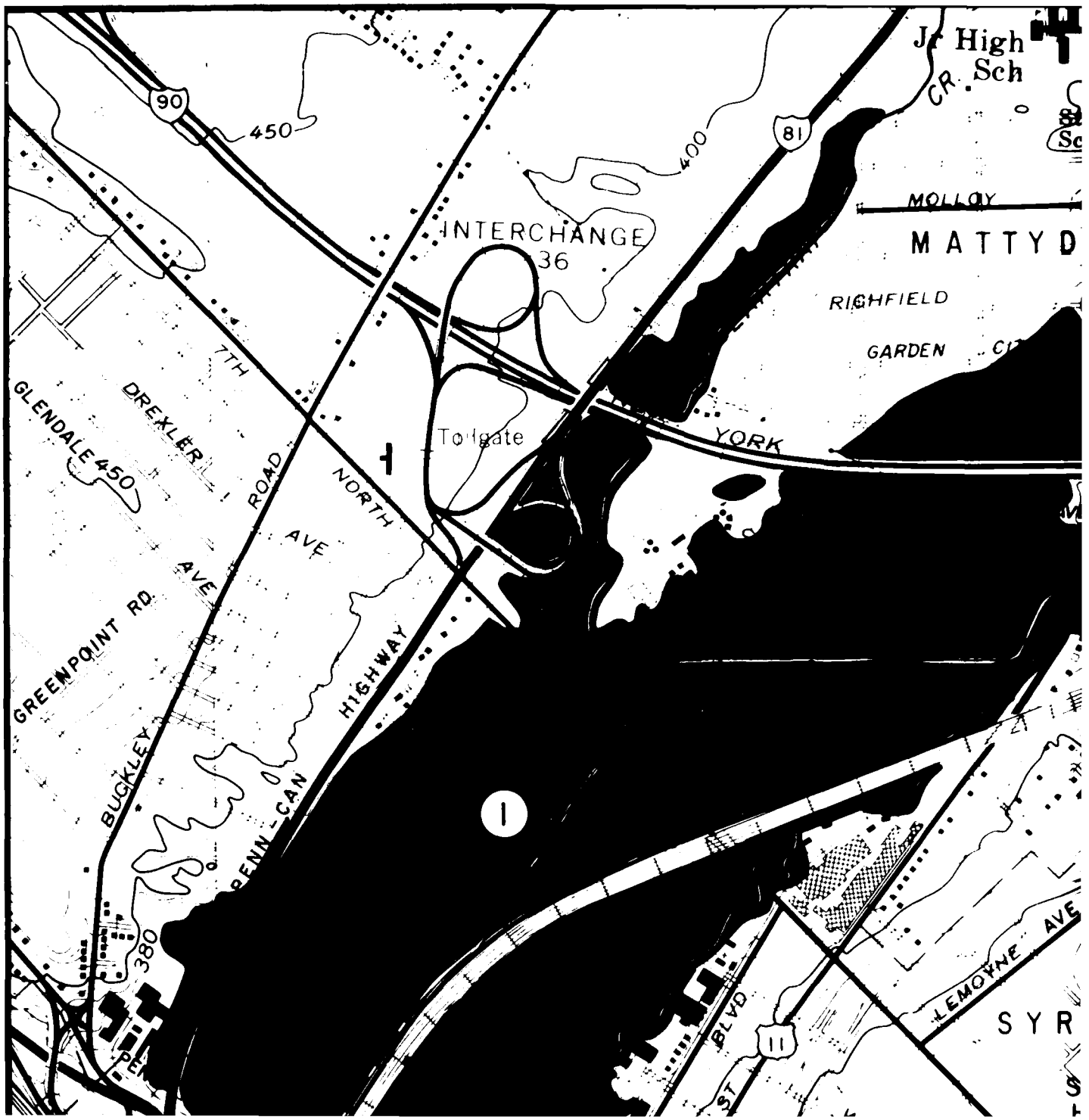
This report has been prepared in accordance with the authority granted by Section 206 of the Flood Control Act of 1960 (PL 86-465), as amended.

* * *

The assistance and cooperation of Federal, State and local agencies and individual citizens in supplying useful information are appreciated.

* * *

This report presents the local flood situation caused by Ley Creek in the townships of Salina and DeWitt, and the City of Syracuse, New York. The U. S. Army Engineer District, Buffalo, will provide, upon request, interpretation and limited technical assistance in the application of the data contained in this report, particularly as to its use in developing effective flood plain regulations. After local authorities have selected the flood magnitude or frequency to be used as the basis for regulation, the Corps of Engineers can assist in the selection of floodway limits by providing information on the effects of various widths of floodway on the profile of the selected flood.


Jr High
Sch
CR
90
450
400
81
MOLLOY
MATTYD
INTERCHANGE
36
RIGHFIELD
GARDEN
7TH
DREXLER
GLENDALE
450
ROAD
NORTH
AVE
To Igate
YORK
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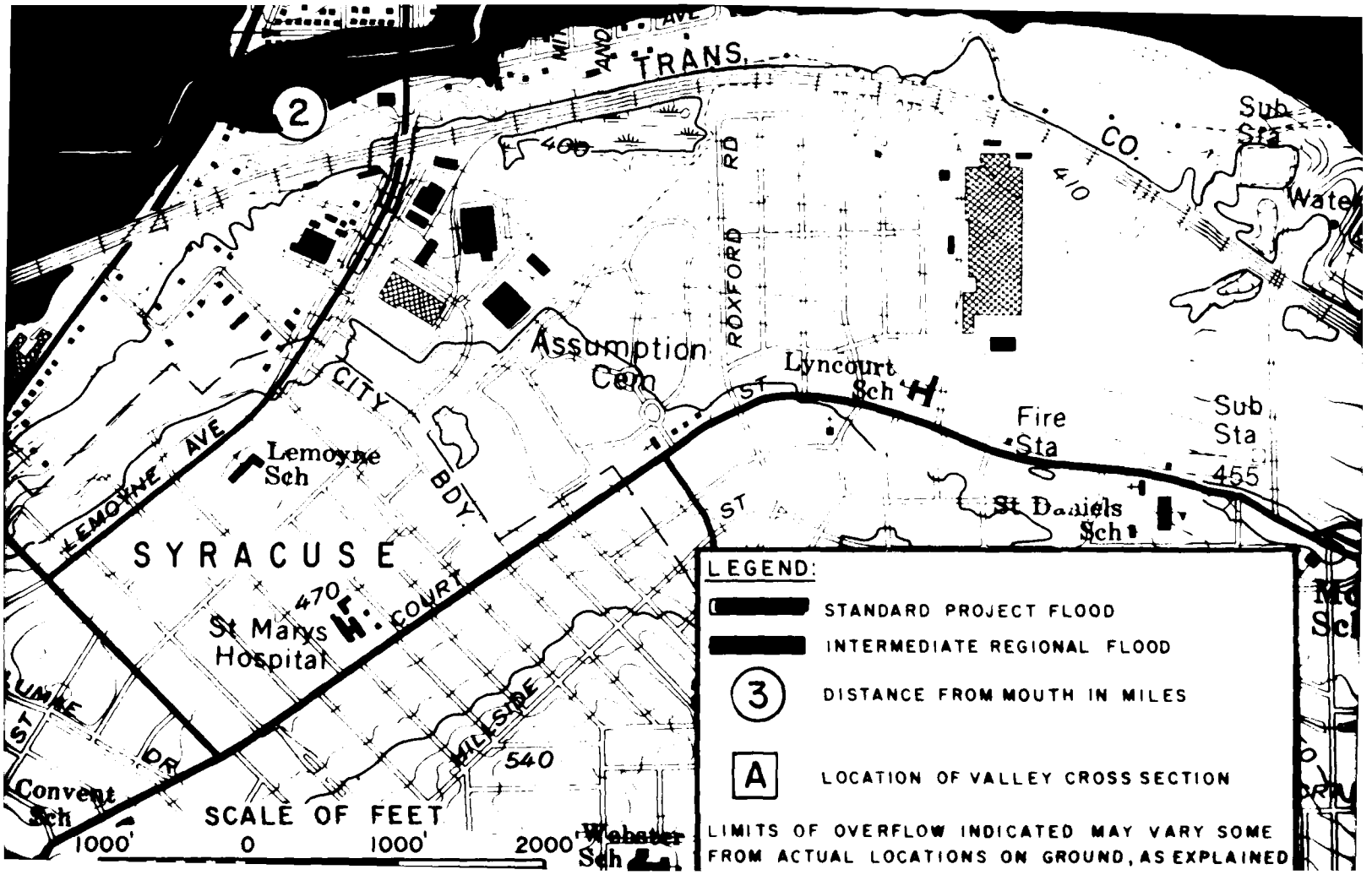
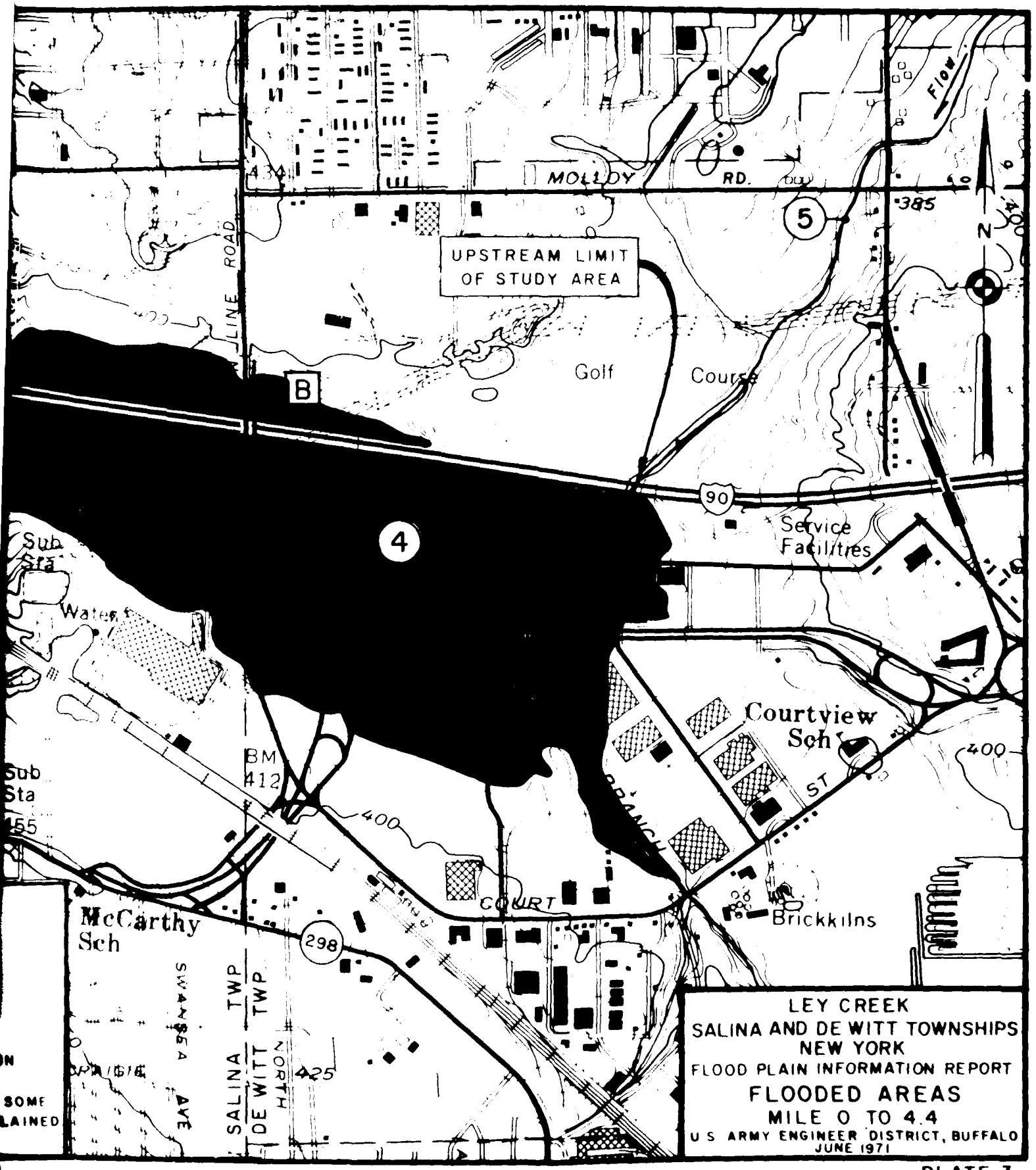
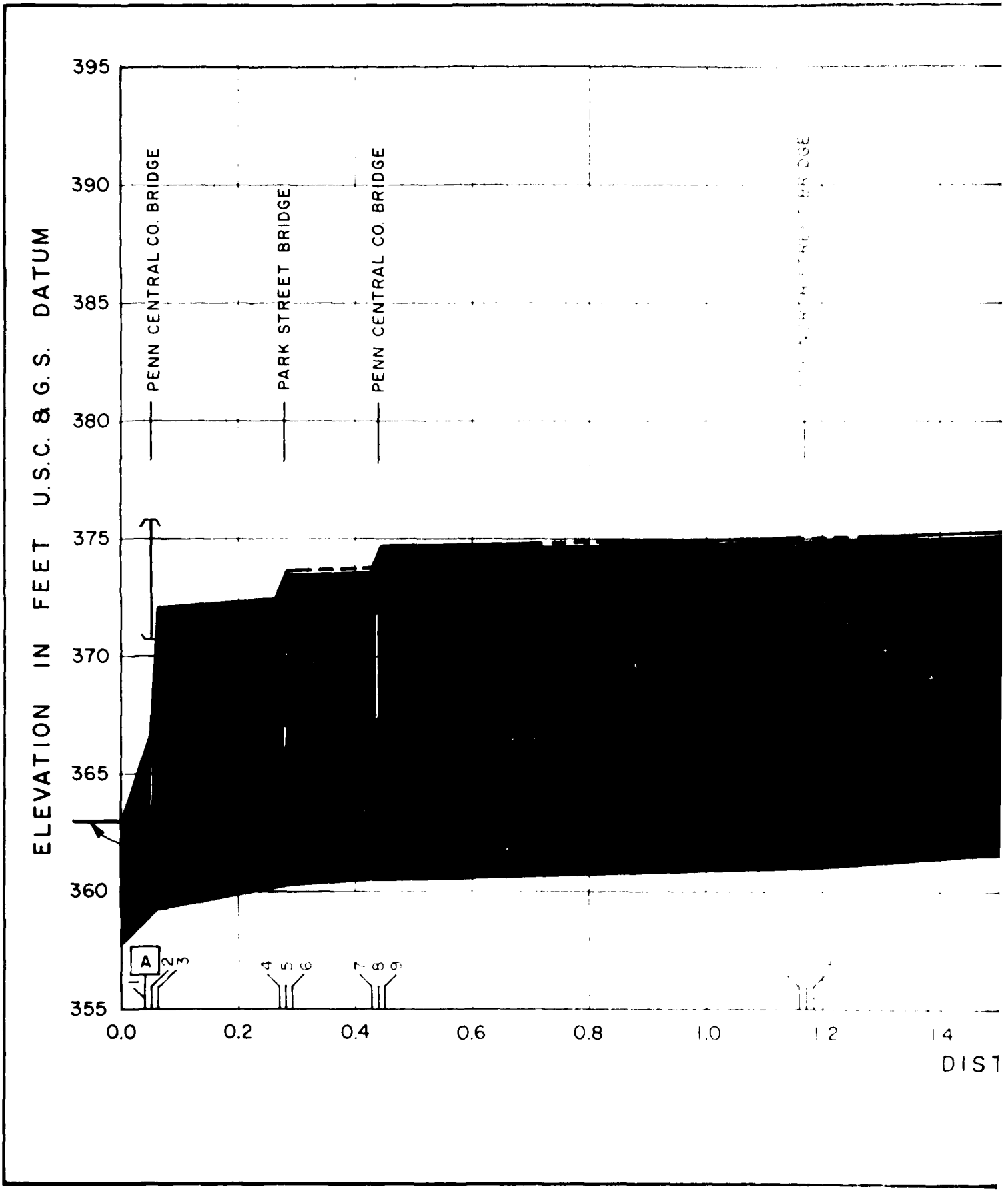
GREENPOINT RD
BUCKLEY
HIGHWAY
1
380
LEMOYNE AVE
BLVD
11
SYR


TRANS.
CO.
Sub Sta
Water
410
400
ROXFORD RD
Assumption Cem
Lyncourt Sch
ST
Fire Sta
Sub Sta
455
CITY
BDY.
LEMOYNE AVE
Lemoyne Sch
SYRACUSE
470
St Marys Hospital
COURT
St Daniels Sch
540
Convent Sch
Webster Sch
SCALE OF FEET
1000' 0 1000' 2000'
LEGEND:
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
3
DISTANCE FROM MOUTH IN MILES
A
LOCATION OF VALLEY CROSS SECTION
LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND, AS EXPLAINED



LEY CREEK
SALINA AND DE WITT TOWNSHIPS
NEW YORK
FLOOD PLAIN INFORMATION REPORT
FLOODED AREAS
MILE 0 TO 4.4
U S ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

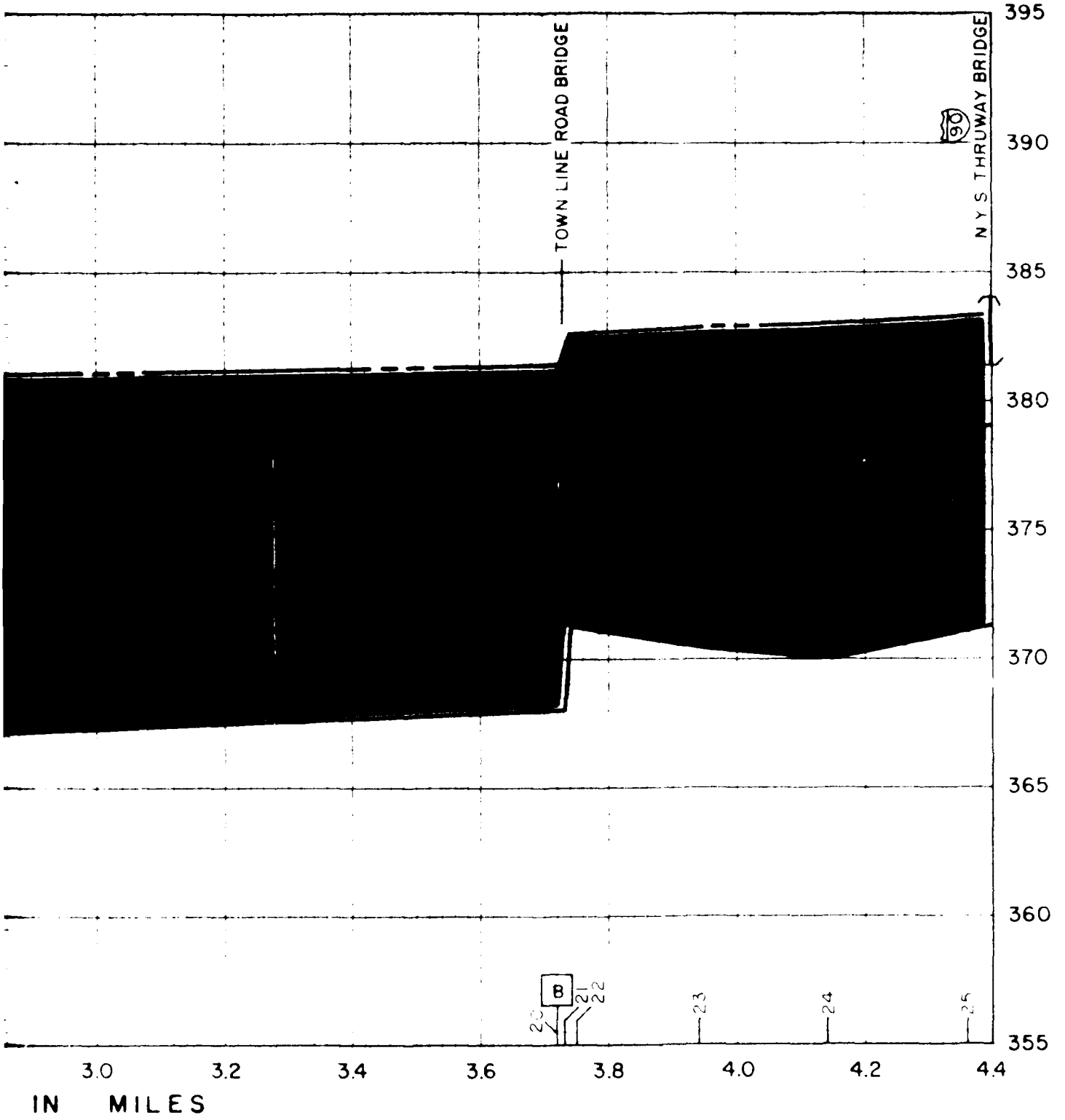
PLATE 3


ELEVATION IN FEET U.S.C. & G.S. DATUM
395
390
385
380
375
370
365
360
355
PENN CENTRAL CO. BRIDGE
PARK STREET BRIDGE
PENN CENTRAL CO. BRIDGE
A
1
2
3
4
5
6
7
8
9
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
DIST

CROSS SECTION LOCATIONS

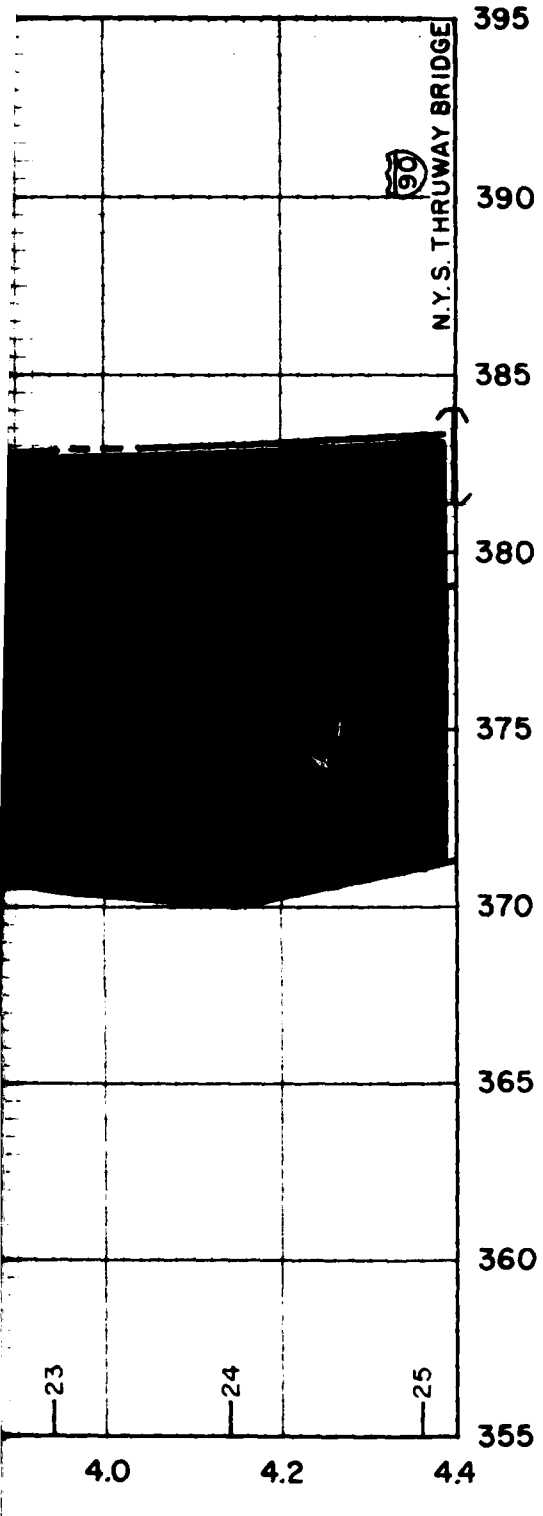
14 16 18 20 22 24 26 28 30

DISTANCE ALONG LEY CREEK FROM MOUTH IN MILES



LEGEND

NOTES:



LEGEND:

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE STREAM BED

B — LOCATION OF VALLEY CROSS SECTION

APPROXIMATE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

NOTES:

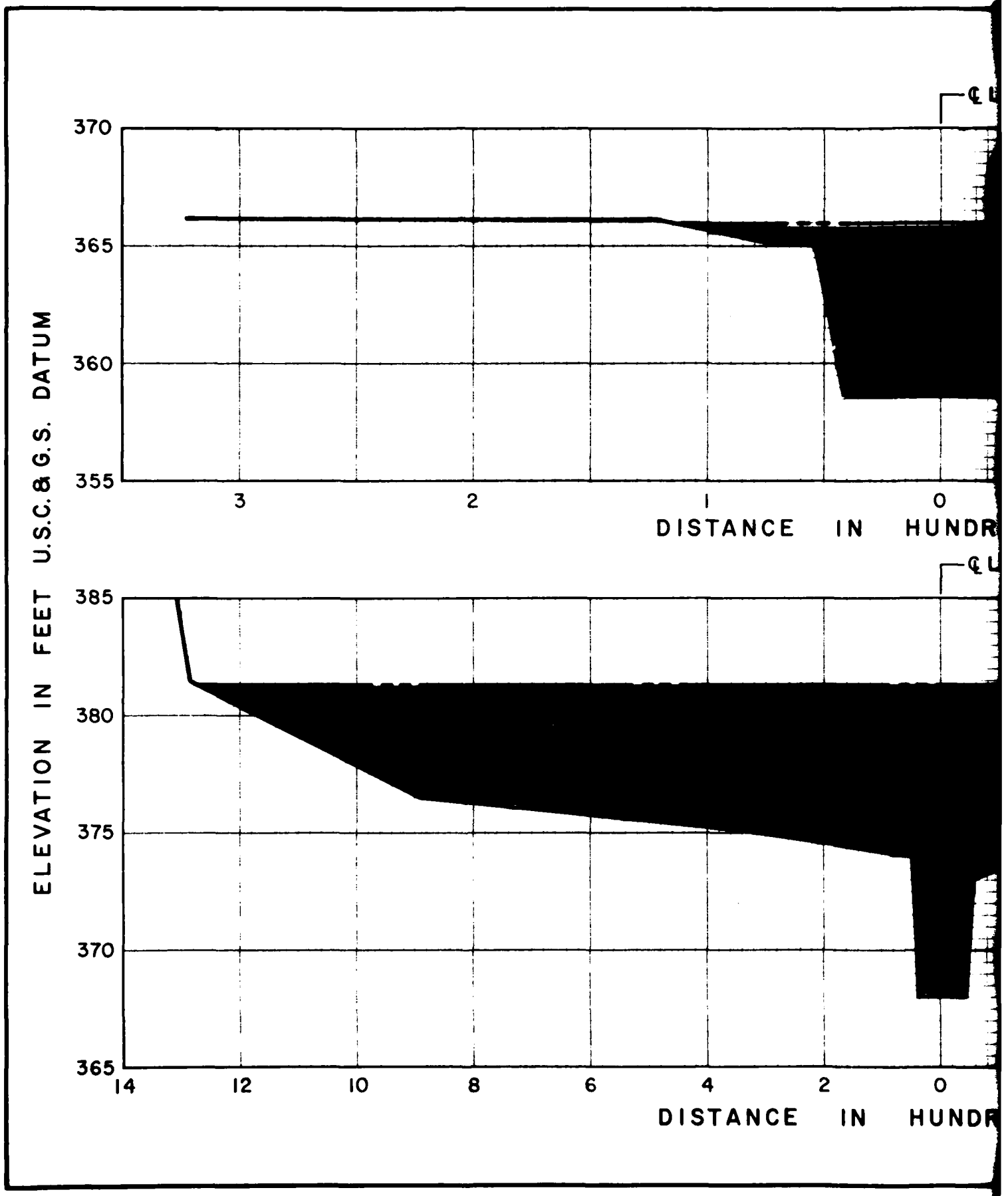
CREST PROFILES ARE BASED ON THE FOLLOWING:

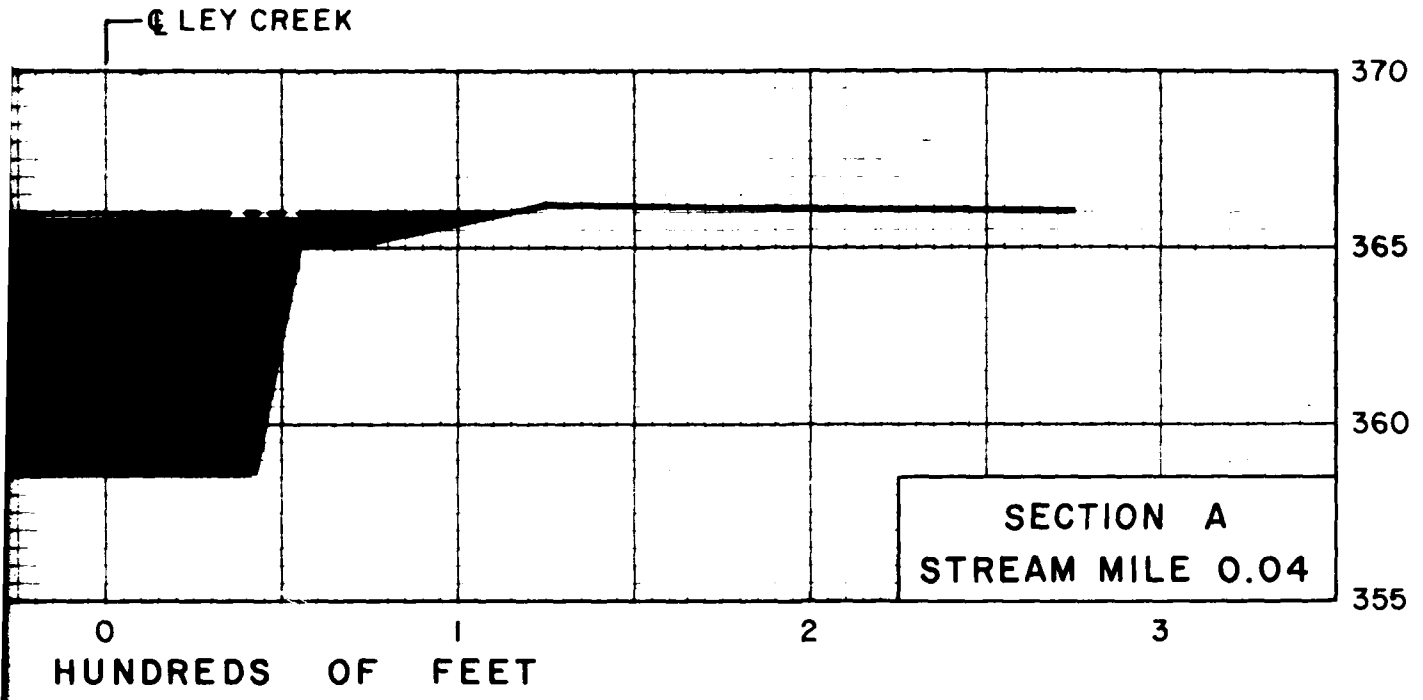
1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

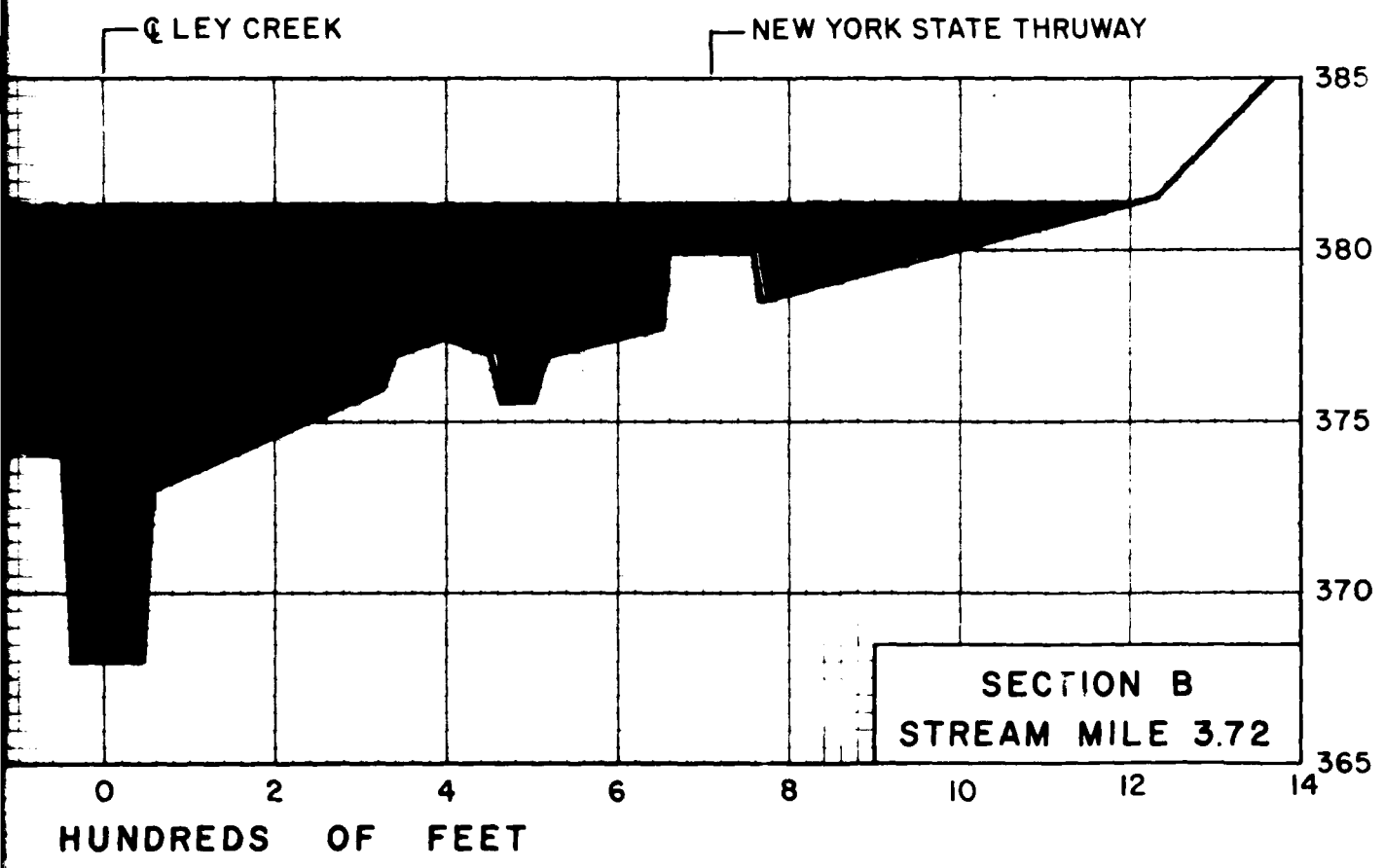
LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

LEY CREEK
SALINA AND DE WITT TOWNSHIPS
NEW YORK
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 0 TO 4.4
U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

PLATE 4


ELEVATION IN FEET U.S.C.& G.S. DATUM
370
365
360
355
3
2
1
0
DISTANCE IN HUNDR
385
380
375
370
365
14
12
10
8
6
4
2
0
DISTANCE IN HUNDR



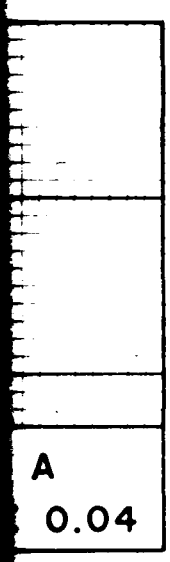


LEGEND

NOTES:

VALLE
BASED O
AND U.S.
MAPS.

VALLE
LOOKING
LOCATED



LEGEND:

STANDARD PROJECT FLOOD

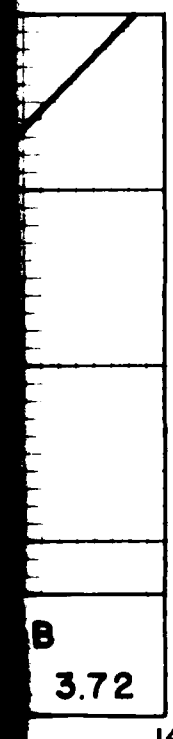
INTERMEDIATE REGIONAL FLOOD

APPROXIMATE GROUND SURFACE

NOTES:

VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATE 3.



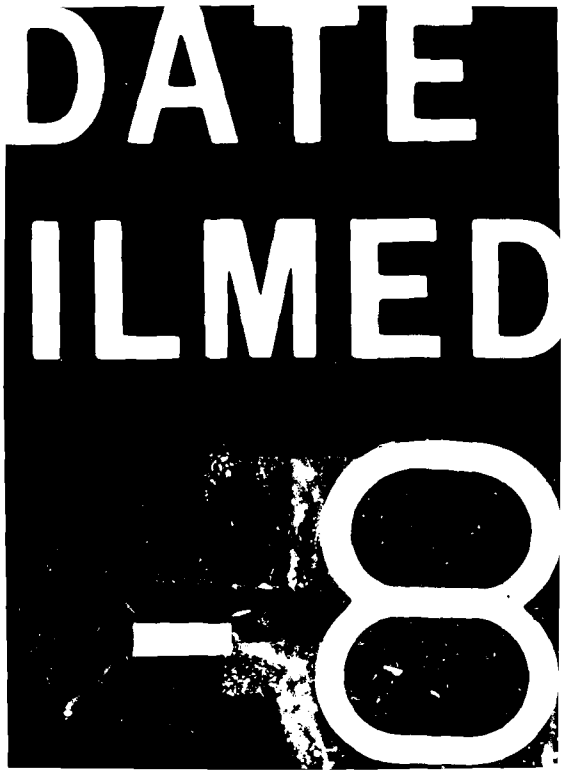
14

LEY CREEK
SALINA AND DE WITT TOWNSHIPS
NEW YORK
FLOOD PLAIN INFORMATION REPORT

VALLEY CROSS SECTIONS A AND B

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

PLATE 5


DATE
ILMED
-8