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# FLOODPLAIN MANAGEMENT STUDY

## LAKE CREEK AND TRIBUTARIES

### WILLIAMSON COUNTY, ILLINOIS



DECEMBER 1986

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FLOODPLAIN MANAGEMENT STUDY  
LAKE CREEK AND TRIBUTARIES  
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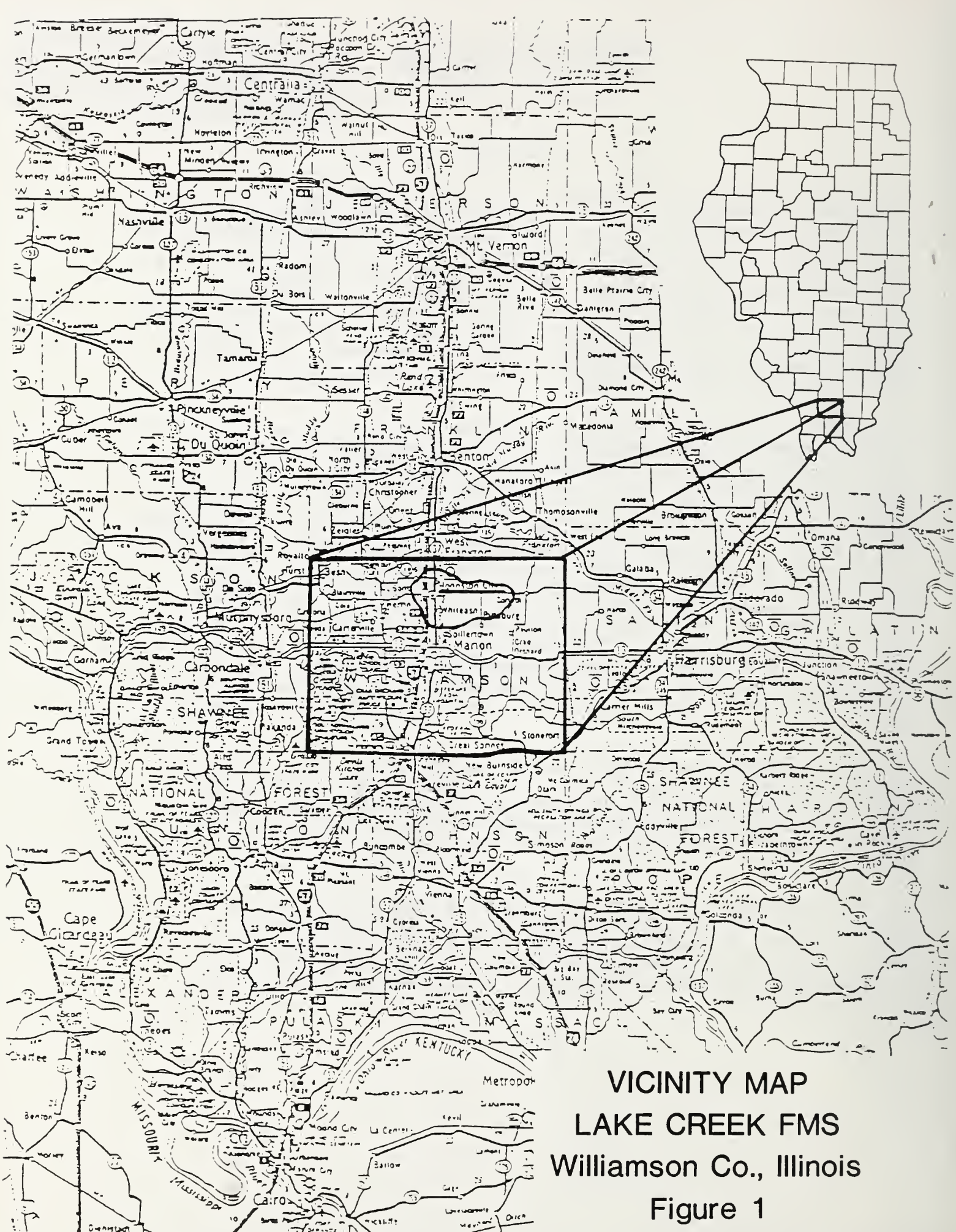
INTRODUCTION

This report defines the flood characteristics of Lake Creek and its tributaries in Johnston City and Williamson County. The tributaries studied are Shakerag Tributary, Tributary A, and Tributary B. This report defines the flood hazard of existing buildings located along or near these streams. This existing flood hazard is the basis used for the planning of measures to eliminate or reduce flood damages. Listed in Appendix F (as furnished to city officials) are existing building elevations and floodwater elevations for the 10 percent, 1 percent, and 0.2 percent chance recurrent floods for present runoff conditions. This report should stimulate development of flood damage reduction measures and provide data for proper regulation of any new development in the floodplain areas.

Floodprone areas in many locations are a severe problem in Illinois. Watershed urbanization and development within and upstream of the floodplain areas intensify this problem. Currently there are about 800 Illinois communities identified as having flood problems. As of March 1, 1986, 727 communities within Illinois are participating in the National Flood Insurance Program (NFIP). The Illinois Department of Transportation, Division of Water Resources (DWR) is the responsible state agency for urban flood problems and for setting priorities for flood studies within the urban areas. A joint coordination agreement was executed between DWR and the Soil Conservation Service (SCS) on April 30, 1976 and was revised in December 1978 to furnish technical assistance in carrying out these flood hazard studies. The studies are carried out in accordance with Federal Level Recommendation 3 of "A Unified National Program for Floodplain Management," and Section 6 of Public Law 83-566. A Plan of Work was executed by DWR and SCS in October 1983, for the Lake Creek and Tributaries Study. The cost of this study was shared by DWR and SCS.

The State of Illinois was asked to provide assistance in solving the flood problems associated with Lake Creek. Prior to committing funds for flood control, the state requires completion of a floodplain management study identifying existing hazards and alternative solutions. The state requests that the study display the beneficial and adverse impacts of all alternatives considered.

A detailed hydrologic and hydraulic analysis was made of the Lake Creek Watershed. In addition a damage analysis was made for the identified floodprone areas. The maps and profiles in this report are adequate for floodplain regulation of the streams studied in detail. The floodway was delineated in accordance with Chapter 19, Illinois Revised Statutes of 1973, 65F (Reference 6).



VICINITY MAP  
 LAKE CREEK FMS  
 Williamson Co., Illinois  
 Figure 1



## DESCRIPTION OF STUDY AREA

The Lake Creek Watershed is located in Williamson County in southern Illinois. Johnston City is located on the lower end of the watershed approximately ten miles north of Marion. Population has remained stable over the past twenty years. The 1980 population was 3,873. Approximately 90 new housing units were constructed in the community between 1970 and 1980.

Lake Creek is a tributary of Pond Creek which is a tributary of the Big Muddy River. Pond Creek junctions with the Big Muddy approximately seven miles west of Johnston City. The Lake Creek drainage area at the west limit of the study area is 25.4 square miles (see Figure 4). The hydrologic sub-watershed number is 07140106-050.

The Lake Creek Floodplain Management Study is concerned with Lake Creek in the urban area of Johnston City, from 2 miles east of I-57 to approximately one mile west of Interstate Route 57, and its tributaries, Shakerag Tributary, Tributary A, Tributary B and the floodplain along these streams. All of these tributaries flow through residential areas of Johnston City. Lake Creek is located south of the city and all tributaries flow into this larger outlet stream.

While residential flooding is occurring at various locations along the floodplains of the tributaries, the major damages occur along Lake Creek at Illinois State Route 37, to a motel, a garage, and a steak house.

The topography varies from flat at the lower end to fairly steep irregular slopes at the upper end of the watershed. The parent materials are loess or alluvium deposits.

Drainage characteristics of the soils vary across the drainage spectrum, moderately well drained, poorly drained, and imperfectly drained. Water is removed from the moderately well drained soils but is available to plants throughout the growing season. Drainage in these soils is not a limiting factor in most non-agricultural uses. At the other end of the scale, poorly drained and somewhat poorly drained soils have severe limitations on both agricultural and non-agricultural uses. Water is removed from the soil so slowly that free water remains at or on the surface during most of the year. Subsurface drainage seldom functions satisfactorily for soils in this area.

Soils that move toward increasingly poor drainage have more limitations for both agricultural and non-agricultural uses. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage or a combination of these.

The moderately well drained soil series is Ava. The poorly drained soil is Bonnie. The somewhat poorly drained soils are Blair, Bluford, and Belknap.

The watershed has the continental climate typical of southern Illinois. There is a wide annual temperature range. Minimums are below zero (0° F) during six out of ten winters and maximums are 100° or higher during eight out of ten summers. Weather fronts associated with low pressure areas bring frequent changes in temperature, humidity, cloudiness, and wind direction during much of the year. Such changes are considerably less frequent during summer months. (Reference 4).

Annual precipitation averages 44.7 inches and varies from 30.8 to 74.5 inches. About one year in seven will have less than 34 inches, and more than 54 inches occurs about equally as often. Precipitation is rather uniformly distributed throughout the year. An average of slightly less than 3 inches occurs during the three driest months and more than 4 inches falls during the three wettest months. More than half the average annual precipitation falls during the April through September growing season, which is approximately 193 days.

Based upon the 1980 Census, the population of Williamson County was 56,538. From the period 1970 to 1980 Williamson County registered a 15.3 percent increase in growth. The unemployment rate within the study area has been well above state and national averages. According to the Illinois State Employment Security Office, the 1985 unemployment rate for Williamson County was 17.6 percent versus a 7.2 and 9.0 for the United States and the State of Illinois respectively.

The per capita income for Williamson County was lower than the State of Illinois and national averages for April 1983 according to the Bureau of Economic Analysis. Williamson County registered per capita personal income of \$8,394 as compared to \$11,687 and \$12,401 for the United States and State of Illinois respectively.

The City of Johnston City had 1,705 occupied housing units of which 72.8% were owner occupied according to the 1980 census of housing (Reference 12).

## NATURAL VALUES

Agricultural land is located throughout the watershed, but the largest area of cropland is east of Johnston City. Bluford, Bonnie and Belknap are on the state list of prime farmlands. Blair, Ava, and several minor soils are classified as important farmland. A large portion of the Bonnie soil is located south of Johnston City, which is in woodland and not available as cropland. Future land use, except for additional mining, will probably remain fairly close to the present uses.

Watershed Land Use							
Type -	Cropland	Grassland	Woodland	Urban	Mined Land	Water	Total
Acres -	3210	5370	5990	870	645	185	16270

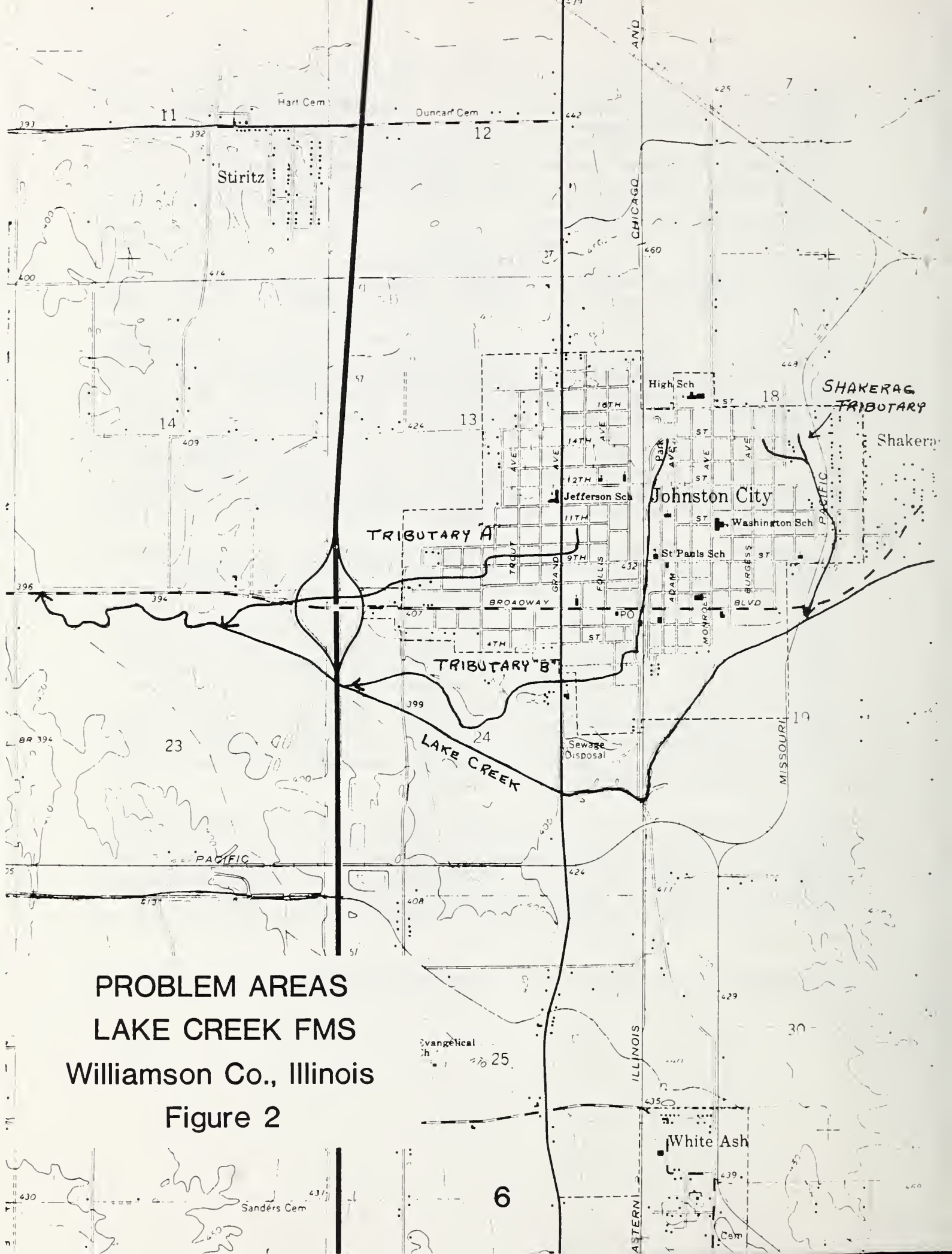
The significant wildlife habitat in the Lake Creek Watershed exists throughout the watershed. Isolated wetland areas are located along the natural drainage paths. The Lake Creek channel upstream of Johnston City is in natural condition. It is a small perennial meandering stream downstream of Johnston City Lake that in places is well shaded.

The channel along the south side of Johnston City has been straightened in the past. Currently large trees grow along the channel and shade most of the channel. The wide floodplain along Lake Creek, near Johnston City, provides significant floodwater storage during large runoff events.

The Shakerag Tributary and the upper (eastern) portion of Lake Creek occur on Belknap silt loam. The lower portion of Lake Creek below the Shakerag Tributary (to the west) and Tributaries A and B occur on Bonnie silt loam (see Figure 2). Both soils are poorly to very poorly drained with seasonal high water tables very near or above the surface. Bonnie is the wetter of the two, but both have poor potential for urban uses because of the wetness problems. Bonnie is strongly acid while Belknap is moderately strongly acid and both soils are low in available phosphorus, potash and organic matter. Native vegetation on these soils is dominated by green ash, elm, silver maple, sycamore, cottonwood, river birch, and willows. The riparian border of Lake Creek is in bottomland hardwoods and provides very valuable wildlife habitat. All three tributaries (A, B, and the Shakerag) have urban development rather than bottomland hardwoods along their extent.

There are 10 species of plants and animals that occur on the Endangered and Threatened Species of Illinois (1981) list that do occur in Williamson County. Of those the climbing milkwood (endangered), green trillium (threatened), brown creeper (endangered), and rice rat (threatened) occur in forested bottomlands, floodplains or wetlands and may possibly occur within the floodplain study area. The floodplain woodlands along Lake Creek provide excellent habitat for many species.

No archeological or historical sites have been identified in the detailed study area.



**PROBLEM AREAS**  
**LAKE CREEK FMS**  
**Williamson Co., Illinois**  
**Figure 2**

## FLOOD PROBLEMS

The primary damage areas evaluated as part of this study are shown on Figure 2. The following table summarizes the number of buildings flooded by the 100 year flood and the calculated average annual damage for each area.

### PROPERTIES FLOODED - PRESENT RUNOFF CONDITION WITHOUT PROJECT - 100 YEAR

LOCATION	NUMBER OF BUILDINGS	AVERAGE ANNUAL DAMAGES
(1) Tributary A	15	2,330
(2) Tributary B	6	740
(3) Shakerag Tributary	2	560
(4) Lake Creek	9	40,240
TOTAL	<u>32</u>	<u>\$43,870</u>

Most of the Lake Creek damages (\$40,000) occur to the restaurant, motel and service station located along Highway 37. On the other tributaries, most of the damage is to residential and associated structures.

### TOTAL DAMAGES BY FREQUENCY PRESENT WITHOUT PROJECT

Frequency % Chance Year	Total Buildings (Number)	Total Damage (1000 Dollars)
0.2 500	37	334.2
1.0 100	32	156.1
2.0 50	30	143.4
10.0 10	19	89.0
50.0 2	13	48.5

Average Annual damages = \$ 43,870

The future runoff condition will be the same as present conditions assuming that the existing Johnston City Lake will be retained in its present condition. The major transportation routes affected by flood waters are Illinois State Route 37, and Broadway Boulevard. In addition, several residential streets are covered by flood water during the larger storm events.

During the April 1983 rainfall, State Route 37 was closed for 6 hours while flood water was running over the highway. An area approximately 500 feet in length was affected by the water overtopping the highway and washed out 18 inches of material on the west side of the road in three different locations. Water from Lake Creek at the intersection of Newton and Broadway was 16 to 20 inches deep and Broadway was water covered for approximately 3 blocks.

The dam for the Johnston City Lake breached in 1981 during a storm. Also during 1980 a tornado and wind storm damaged many trees, which fell into the channels, restricting the flow. This problem of blocked channels still exists. The April 1983 storm happened before the Johnston City reservoir was rebuilt in 1984, probably resulting in more damages than normal because of the lack of control on approximately 4 square miles of watershed. According to local citizens, the re-construction of this dam has helped the flooding problems of the community associated with Lake Creek.

Another area of concern is the area on Tributary B at Ninth Street. The water flows underground for approximately 300 feet from a large railroad fill with a narrow opening through pipes that are not large enough to handle the flow properly. Water ponds on the upstream side of the railroad, covering streets and private property. Very little damage is done to existing buildings.



## EXISTING FLOODPLAIN MANAGEMENT

Currently the City of Johnston City is participating in the Regular Phase of the National Flood Insurance Program (NFIP). The unincorporated areas of Williamson County have had hazard areas identified, but at present are not enrolled in the National Flood Insurance Program. This program provides data to the local government so that they can adopt floodplain management measures. Each flood insurance study includes a flood boundary map with a floodway designated to assist the community in establishing the rules it will use to regulate land use.

In order to provide a national standard without discrimination, the 100 year flood (1% chance) has been adopted by State and Federal agencies as the base flood for purposes of floodplain management measures. The 500 year (0.2% chance) flood is employed to indicate areas of additional flood risk because certain critical facilities such as hospitals, schools, nursing homes, utilities, and facilities for producing or storing volatile, toxic or water-reactive materials should be located above the 500 year flood profile. For all the streams studied in detail, the boundaries of the 100 year and 500 year flood for present runoff conditions have been delineated. These flood boundaries have been determined by using the flood elevations calculated for each valley cross section. Between the surveyed cross sections, the floodplain boundaries were interpolated using topographic maps prepared at a scale 1 inch = 200 feet (contour interval of 2 feet). In cases where the 100 year and 500 year flood boundaries are close together, only the 100 year boundary has been shown. The boundaries of the floodplains are shown on the floodplain maps.

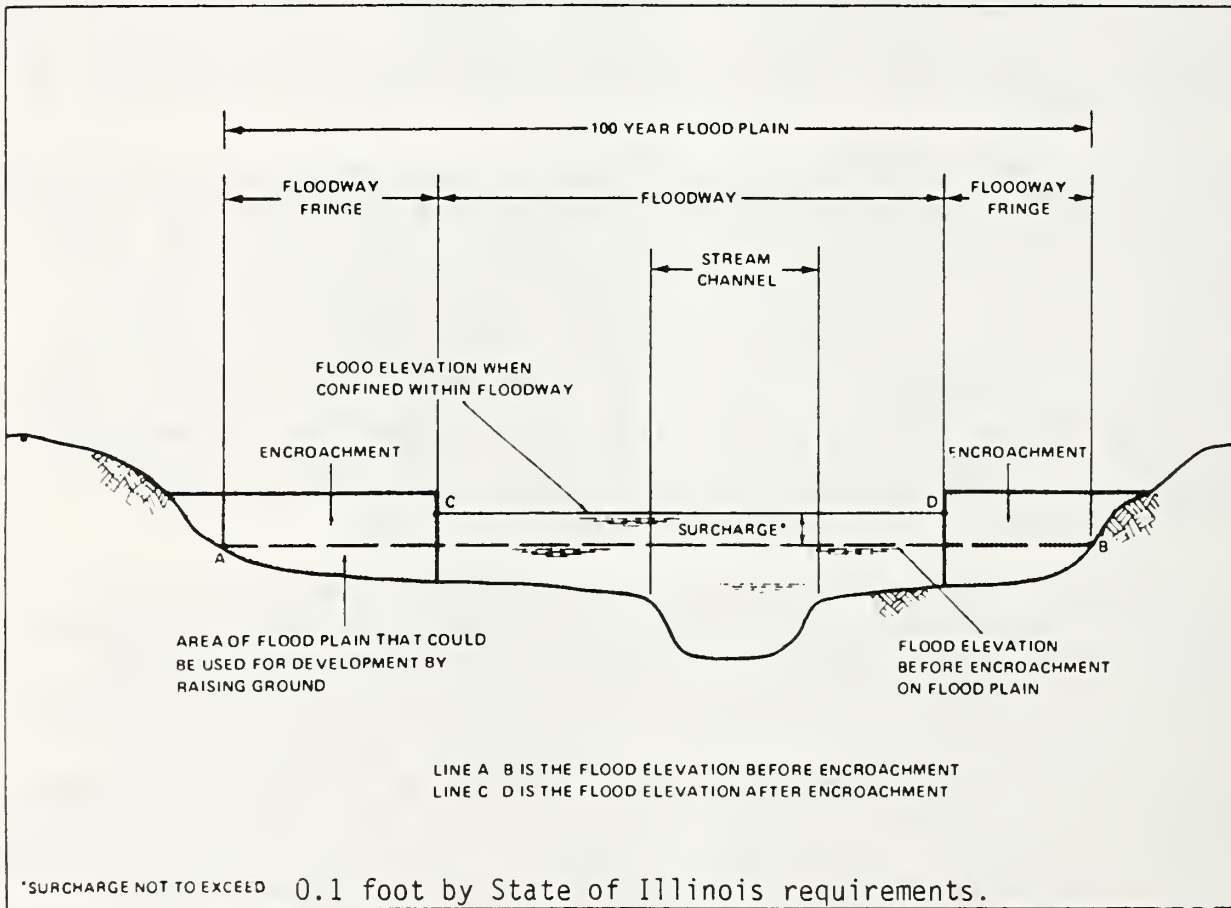
Small areas within the flood boundaries may lie above the flood elevations and are therefore not subject to flooding. However, due to the limiting scale of the topographic maps used to prepare the floodplain maps, such areas are not shown. The profile sheets in Appendix A should be used to ascertain flood elevations for any specific point along Lake Creek for present or future runoff conditions. In addition, Appendix F lists the 10 year, 100 year and 500 year flood elevations at the location of all buildings surveyed in the floodplain. Encroachment on floodplains, such as artificial barriers, reduces the water carrying capacity and increases flood heights thus increasing flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from the floodplain development against the resulting increased flood hazard.

For purposes of the NFIP, the concept of a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the 100 year floodplain is divided into floodway and a floodway fringe. The floodway is the channel of the stream plus any adjacent floodplain areas that must be kept free of encroachment in order that the 100-year flood discharge can be carried without a substantial increase in flood heights. In this case, blockage of the floodplain areas within the floodway adjacent to the channel without blocking the channel will result in increasing the flood elevations. The floodway fringe area (ie: all the floodplain except floodway) is not required to convey the flows but does act as a storage area on flat streams. The typical relationship between the floodway fringe and the floodway are shown in the floodway schematic (Figure 3).

In Illinois, the minimum standard used to define the 100 year floodway is described in the Illinois Revised Statutes of 1973 under 65F, Chapter 19 (Reference 6). In this standard, the encroachment in the floodplain is limited to that which will cause only an insignificant increase in flood heights. The Illinois Division of Water Resources has recommended that the floodway be determined using no more than a 0.1 foot surcharge (Reference 2). The 0.1 foot surcharge floodway proposed for this study was computed by equal conveyance reduction from each side of the floodplain.

As shown on the flood boundary and floodway maps, the floodway boundaries were determined at individual cross sections. Between the cross sections the boundaries are interpolated.

The area between the floodway and boundary of 100 year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the floodplain that could be completely obstructed without increasing the water surface elevations of the 100 year flood more than 0.1 of a foot at any point.



FLOODWAY SCHEMATIC

FIGURE 3



## ALTERNATIVES FOR FLOODPLAIN MANAGEMENT

Several floodplain management strategies including no action, nonstructural measures, and structural alternatives were evaluated. A brief description of each alternative follows: (See Appendix C for sketches of the different structural measures and Appendix D for cost estimates.) The Benefit/Cost ratios for each element are shown in the summary table following this section of the report.

### Alternative A - Present Conditions (No Action)

Components: This alternative assumes no additional action beyond what is currently being done in the watershed. The existing Johnston City Reservoir will remain intact. All new development will be regulated according to Flood Insurance requirements so no new buildings will be built subject to flood damage. Existing building owners in the community will continue to be able to purchase flood insurance to reduce the financial impact of flooding. Areas currently experiencing flood damages will continue to be flooded.

Costs: None.

Effects: The average annual damages will remain the same or increase slightly over the next 20 years. Peak discharges are not expected to increase but unless existing channels are maintained in Johnston City, flood elevations can be expected to increase slightly. The existing businesses located along Highway 37 may not remain open because of the estimated \$40,000+ annual damage done to these buildings by floodwater.

### Alternative B - Non Structural Measures

Components: A channel maintenance program is needed on the upstream urban portions of Tributary A, Tributary B, and Shakerag Tributary. By keeping the existing channels and culverts free of obstructions, existing damages can be kept from increasing. It is estimated that 2 to 2.5 miles of channel need to be kept clear of debris. Annual damages to the contents of 19 sheds and garages presently subject to floodwater damage could be reduced from \$1600 to \$380 by raising the contents 1 foot off the floor.

Costs: It is estimated that annual cost of channel maintenance will be approximately \$1,000.

Effects: Prevents damage from increasing due to channel obstructions and reduces content damages in 19 garages and sheds.

Alternative C - Structural Measures

Components: (Lake Creek) This alternative includes installing ring dikes around the existing motel, restaurant, and garage along Highway 37. In addition, Highway 37 will be elevated past the businesses to elevation 405.2 (2 feet above the 100-year flood level) and an additional 5' x 5' box culvert will be installed under Highway 37 where Tributary B flows under the Highway. A flood easement will be purchased on the 57 acres of floodplain between Highway 37 and Water Street that will have increased flood depths of up to 0.5 feet. (See Appendices C and D for additional details).

Costs: The costs of this alternative are as follows:

Location	Construction	Engr & PA	Land Rts	Total	Total Annual Cost <sup>1/</sup>
Lake Creek	\$217,400	\$43,500	\$8,600	\$269,500	\$24,480

<sup>1/</sup> Includes Operation, Maintenance and Replacement costs. The above annual costs are based on a 100 year life of project and using an amortization rate of 8 5/8%.

Effects: The net result of these structural measures will be to reduce the number of buildings flooded by the 100 year storm from 32 to 25 and reducing the average annual damages in the watershed from \$43,870 to \$3,700. All of these benefits are to the businesses along Highway 37.

The raising of Highway 37 will result in increasing the water elevation on the open space between Illinois 37 and Water Street. Depths of flooding over Highway 37 will be increased for all frequencies. (See Appendix G). At Highway 37, the increase will be approximately 0.5 feet for the 100-year flood and at Water Street it will be raised by about 0.1 feet. The cost estimate includes the purchase of a flood easement for the approximately 57 acres between the two roads at an estimated cost of \$100/acre.

Alternative D - Structural Measures

Components: (Lake Creek) This alternative includes installing ring dikes around the existing motel, restaurant, and garage along Highway 37 to provide 100 year protection with 2 feet of freeboard. Highway 37 will be raised past the businesses to elevation 405.2 and an additional 5' x 5' box culvert will be installed under Highway 37 where Tributary B flows under the highway. To limit the impact of raising Highway 37, a 400 foot length of the highway south of the businesses will be lowered to elevation 402.0.

Costs: The costs of this alternative are as follows:

Location	Construction	Eng & PA	Land Rts	Total	Total Annual Cost
Lake Creek	\$258,150	\$51,650	\$2,900	\$312,700	\$28,480

1/ Includes Operation, Maintenance and Replacement costs. The above annual costs are based on a 100 year life of project and using an amortization rate of 8 5/8%.

Effects: The installation of these structural measures will result in reducing the number of buildings flooded by the 100 year storm from 32 to 25 and will reduce average annual damages in the watershed from \$43,870 to \$3,700. All of these benefits are to the businesses along Highway 37.

By lowering 400 feet of Highway 37 to elevation 402 the maximum increase in water surface profile upstream of Highway 37 is 0.1 feet. THEREFORE NO FLOOD EASEMENT IS REQUIRED WITH THIS ALTERNATIVE. The length of road flooded is reduced for all frequencies and the depth of water over the road is reduced for all except the 100 year frequency (See Appendix G).

Alternative E - Structural Measures

Components: (Lake Creek) This alternative consists of clearing and snagging and removing the existing log jams, associated with the present channel. Construction between stations 21250 and 33120 will leave the Lake Creek channel and side slopes at the same dimensions as now exist. The logs and brush that are removed will be placed on a disposal site located outside the floodplain.

Costs: The costs of this alternative are as follows:

Location	Construction	Eng & PA	Land Rts	Total	Total Annual Cost
Lake Creek	\$88,700	\$17,740	\$3,260	\$109,700	\$18,110

1/ Includes Operation, Maintenance and Replacement costs. The above annual costs are based on a 100 year life of project and using an amortization rate of 8 5/8%.

Effects: The net results of these structural measures will not reduce the number of buildings flooded (32), by the 100-year flood storm. However, a more efficient "cleaned out" channel will convey the runoff water with less flood depth, especially during the smaller storms. The average annual damages in the watershed will be reduced from \$43,870 to \$29,100.

NOTE: A quick evaluation was made of constructing a 60 foot wide channel from sta 24000 to Water Street along with the clearing and snagging described in Alternative E. This enlargement had minimal impact on further reducing flood damages. The average annual damages would be reduced from \$43,870 to \$27,400. Or the enlarged channel would reduce damages by an additional \$1,700 annually. Costs for the channel work were never determined because of the minimal impact.

Alternative F - Structural Measures

Components: (Tributary A) A new channel will be constructed between cross section 4780A and Davis Avenue, a distance of 1025 feet. This channel will have a 6 foot bottom with 2:1 side slopes. The existing culvert at West Ninth Street will be replaced by a 5 foot diameter CMP and a new 4' x 5.5' box culvert will be installed under Noah Avenue.

(Tributary B) A new channel will be constructed from Highway 37 to Third Street, a distance of 1050 feet. This channel will have a 10 foot bottom with 2:1 side slopes. An additional 5' x 5' box culvert will be installed under Benton Avenue.

Costs: The costs of this alternative are as follows:

Location	Construction	Eng & PA	Land Rts	Total	Total Annual Cost
Tributary A	\$72,000	\$14,400	\$1,100	\$87,500	\$8,865
Tributary B	62,000	12,400	1,300	75,700	7,460
Total	\$134,000	\$26,800	\$2,400	\$163,200	\$16,325

1/ Includes Operation, Maintenance and Replacement costs. The above annual Costs are based on a 100 year life of project and using an amortization rate of 8 5/8%.

Effects: The net result of these structural measures will be to reduce the number of buildings flooded by the 100-year storm from 32 to 25 and reducing the average annual damages in the watershed from \$43,870 to \$42,800.

Alternative G - Structural Measures

Components: (Tributary A) A new channel with a 6 foot bottom and 2:1 side slopes will be constructed between Johnson Avenue and Trout Avenue, a distance of 845 feet. The existing culvert at West Ninth Street will be replaced with a 5 foot diameter CMP and the Noah Avenue culvert will be replaced with a 52" x 77" CMP Arch.

(Tributary B) A new channel with a 10 foot bottom and 2:1 side slopes will be constructed from Highway 37 to Third Street, a distance of 1050 feet. An additional 5 foot diameter CMP will be installed under Benton Avenue.

Costs: The costs of this alternative are as follows:

Location	Construction	Eng & PA	Land Rts	Total	Total Annual Cost
Tributary A	\$55,800	\$11,200	\$900	\$67,900	\$7,130
Tributary B	40,100	8,000	1,300	49,400	5,150
Total	\$95,900	\$19,200	\$2,200	\$117,300	\$12,280

1/ Includes Operation, Maintenance and Replacement costs. The above annual costs are based on a 100 year life of project and using an amortization rate of 8 5/8%.

Effects: The installation of these structural measures will result in reducing the number of buildings flooded by the 100-year storm from 32 to 25 and will reduce average annual damages in the watershed from \$43,870 to \$42,850.

LAKE CREEK & TRIBUTARIES  
SUMMARY & COMPARISON OF ALTERNATIVES

Alternative and Location	Components	Installation Cost	Annual Cost	Annual Benefits	Net Benefit	B:C Ratio	Remaining Damages	Notes:
Alternative A	Ongoing Program						\$43,870+	Damages may increase as existing channels and culverts plug with debris. Buildings flooded by 100yr = 32
Alternative B	Channel Maintenance Program (on tributaries) raising contents of 19 sheds and garages 1 ft. off floor		\$ 1,000+	\$ 1,220+			\$42,650	Damages will not increase from culvert obstructions. Buildings flooded by 100yr = 32
Alternative C	Ring dikes, new 5ft x 5ft box culvert under Hwy 37 at Trib B. Raise Hwy 37 past businesses	\$269,500	\$24,480	\$40,170	\$15,690	1.6:1	\$3700	Dikes constructed to protect from 100yr flood with 2ft freeboard. Water raised 0.5 feet on upstream side up hwy 37 Flood easement required on approximately 57 ac. Bldgs flooded by 100 yr = 25. Increases depth of flooding over Hwy 37 for all frequencies.

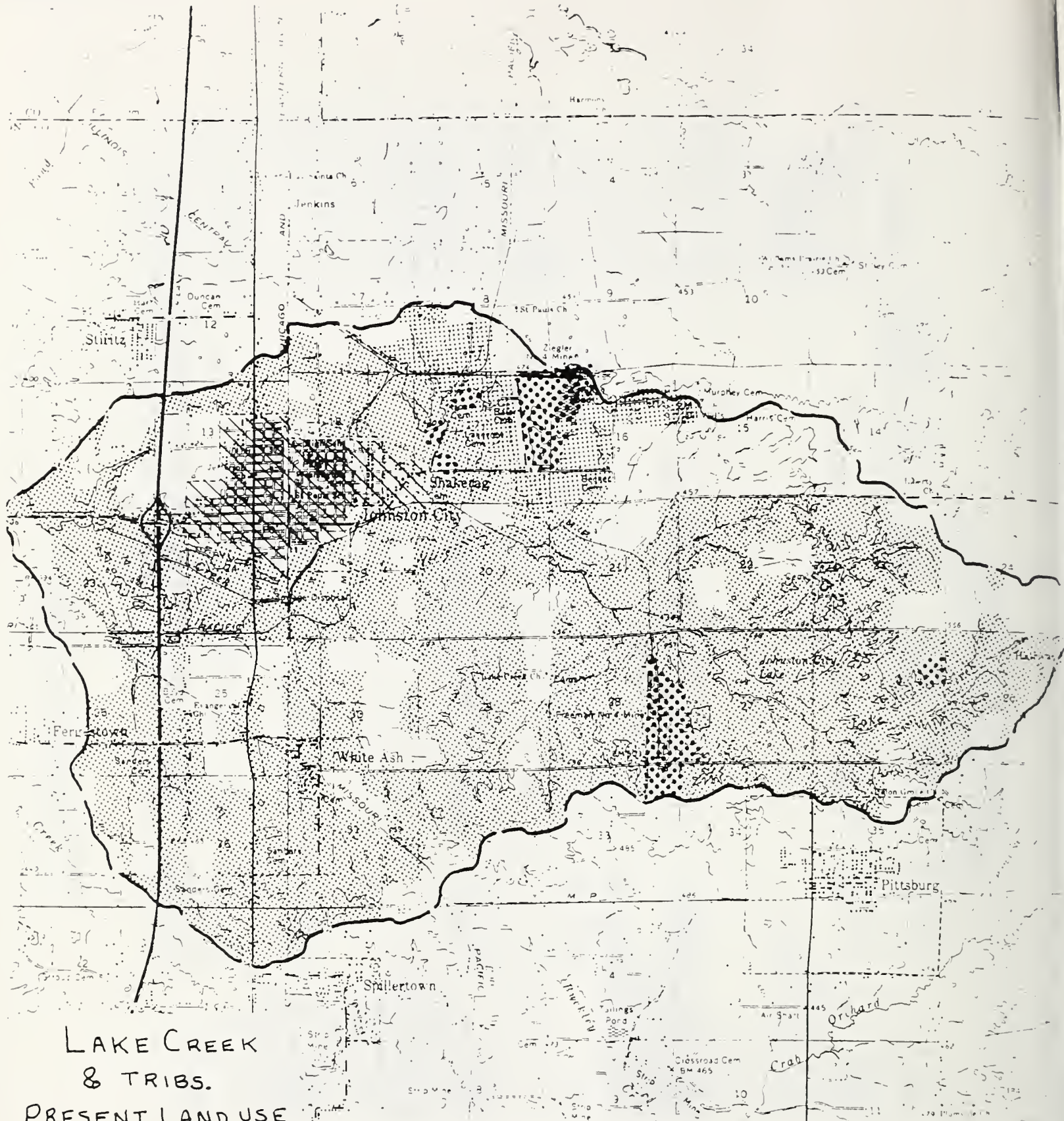
LAKE CREEK & TRIBUTARIES  
SUMMARY & COMPARISON OF ALTERNATIVES

Alternative and Location	Components	Installation Cost	Annual Cost	Annual Benefits	Net Benefit	B:C Ratio	Remaining Damages	Notes:
Alternative D	Ring dikes, new 5' x 5' box culvert under Hwy 37 on 2' freeboard. Trib B. Raise Hwy 37 past businesses. Lower 400' of Hwy 37.	\$312,700	\$28,480	\$40,170	\$11,690	1.4:1	\$3,700	Dike constructed to protect from 100 yr flood with  Water raised 0.1' on upstream side of Hwy 37. No flood easement is required. Bldgs flooded by 100yr = 25. Depth of flooding over road and length of road flooded reduced for most frequencies.
Alternative E	Remove brush, trees, logs & debris in Lake Creek channel from Sta.21250 to 33120 (11870')	\$109,700	\$18,100	\$14,770	(\$-3,330)	0.8:1	\$29,100	Channel bottom width & side slopes will remain same size as present ditch. Material removed from ditch will not be placed in the existing floodplain. Bldgs flooded by 100 yr = 32



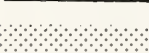



LAKE CREEK & TRIBUTARIES  
SUMMARY & COMPARISON OF ALTERNATIVES

Alternative and Location	Components	Installation Cost	Annual Cost	Annual Benefits	Net Benefit	B:C Ratio	Remaining Damages	Notes:
Alternative F	TRIB A							
	1025' of new channel. New 5' CMP @ W 9th St; 4'x5.5' box culvert @ Noah Av	\$87,500	\$8,865	\$790	(\$-8,075)	0.09:1		This Alternative doesn't reduce damages along Lake Creek.
	TRIB B							
	1050' of new channel. Additional 5'x5' box culvert @ Benton Av	\$75,700	\$7,460	\$310	(\$-7,150)	0.04:1		
	TOTAL	\$163,200	\$16,325	\$1,070	(\$-15,225)	.07:1	\$42,800	Bldgs flooded by 100 yr = 25
Alternative G	TRIB A							
	845' of new ditch. New 5' CMP @ W 9th St; New 52"x77" CMP Arch at Noah Av	\$67,900	\$7,130	\$720	(\$-6,410)	0.10:1		This alternative doesn't reduce damages along Lake Creek
	TRIB B							
	1050' of new channel New 5' CMP @ Benton Av	\$49,400	\$5,150	\$300	(\$-4,850)	0:06:1		
	TOTAL	\$117,300	\$12,280	\$1,020	(\$-11,260)	0.08:1	\$42,850	Bldgs flooded by 100 yr = 25



LAKE CREEK  
& TRIBS.  
PRESENT LAND USE

-  URBAN
-  CROPLAND
-  GRASSLAND  
+  
WOODLAND
-  MINEDLAND

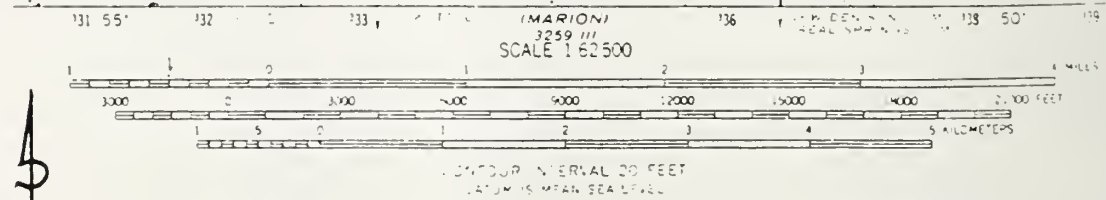


FIGURE 4

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, WASHINGTON, D.C. 20242  
AND BY THE STATE GEOLOGICAL SURVEY, URBANA, ILLINOIS 61801  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

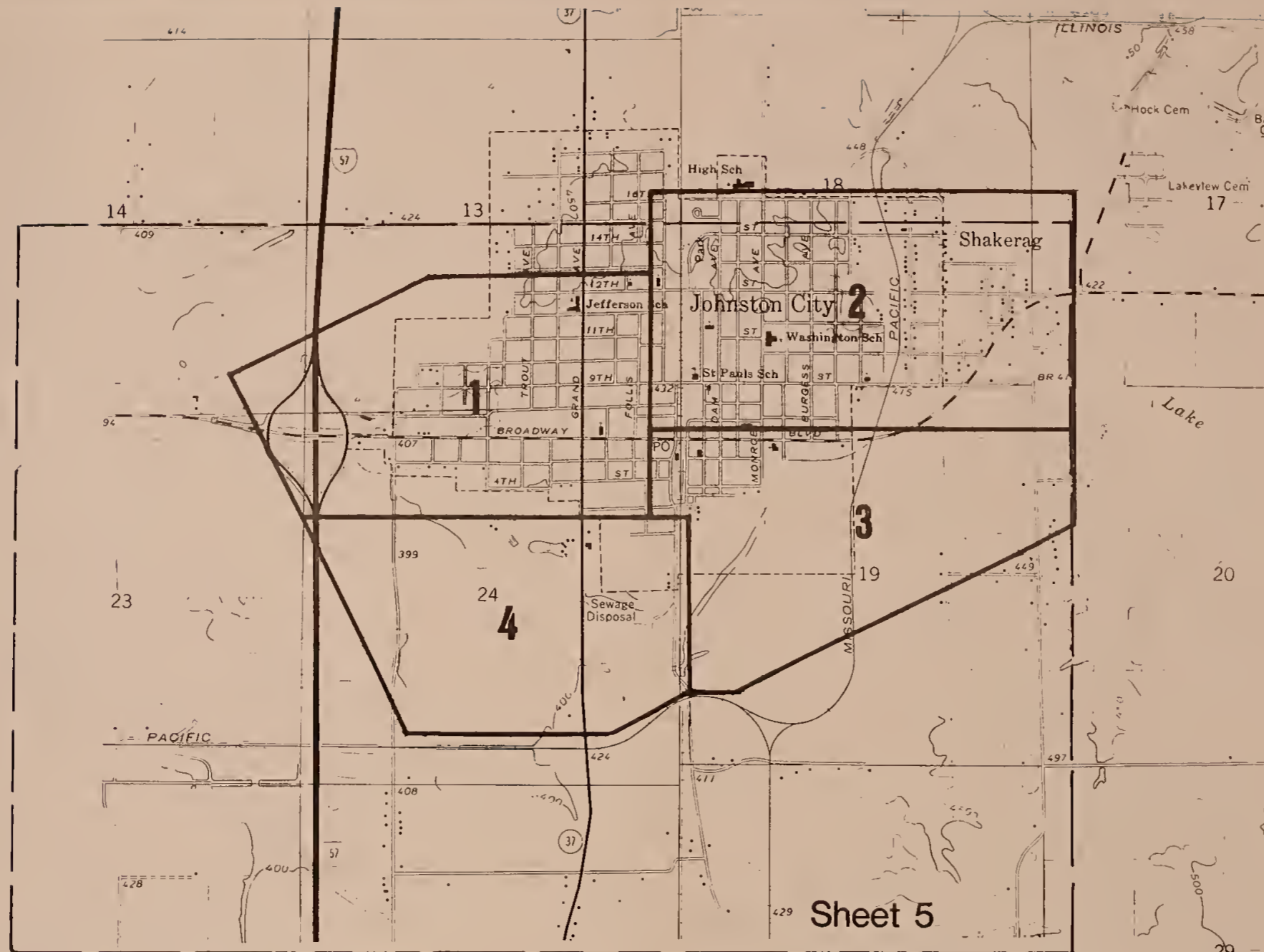
## GLOSSARY AND REFERENCES

### Glossary

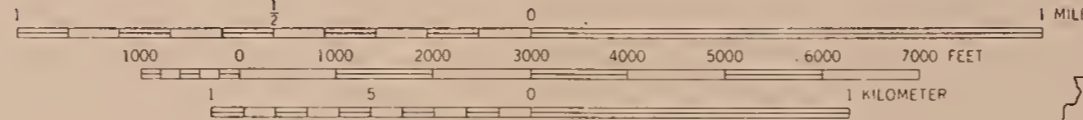
- Avg. Annual Damage- The estimated average yearly damage expected to occur during the project evaluation periods.
- Encroachment- Obstruction in part of a floodplain which reduces floodwater carrying capacity, therefore increasing flood stages.
- Floodway- The portion of a floodplain required to convey floodwaters without causing significant increases in flood heights or velocities.
- Floodway Fringe Area- Portions of the floodplain outside of the floodway subject to shallow inundation and low velocity flow.
- Flood- An overflow of water onto land not normally covered by water. This inundation of land is temporary, and the land is normally adjacent to a river or stream, lake, or other body of water. Normally, a "flood" is considered as any temporary rise of stream flow or stage that causes a significant adverse effect. Adverse effects would be damage to property, sewer backup, creation of unsanitary conditions, erosion, sedimentation, accumulation of debris, or other problems.
- Flood Crest- The maximum stage or elevation reached by the waters of flood at a given location. It may be referred to as flood stage or high water elevation.
- Flood Peak- The maximum instantaneous discharge at a given location. It usually occurs at or near the time of the flood crest.
- Floodplain- The relatively flat area or low lands adjoining the stream channel, or water course, lake, or other body of water, which has or may experience flood inundation.
- Head Loss- The effect of natural or man-made obstructions such as small bridge openings, buildings, fill, or accumulation of debris which limits the conveyance of water, causing a rise in upstream water surface elevation.
- Profile- A graph showing the relationship of water surface elevation and natural ground elevations to location along the water course. A profile is normally drawn for a specific flood. Also referred to as water surface profile.
- 100 Year Flood- A flood having a 1% chance of being equalled or exceeded in any one year. It may occur in any year. It is based on a statistical analysis of precipitation and gage records. Also referred to as a flood with a 100 year recurrence interval.

## References

1. U.S. Dept. of Housing and Urban Development, Federal Insurance Administration, Johnston City, Illinois Flood Insurance Study, November 1981.
2. Governor's Task Force on Flood Control, State of Illinois Guidelines for Floodplain Studies, Illinois State Water Survey Divison and Illinois Division of Water Resources, March 1975.
3. Sheviak, C.J. and R.H. Thorn, Illinois Department of Conservation, Endangered and Threatened Species of Illinois, 1981.
4. Illinois Department of Registration and Education, Division of Industrial Planning and Development, Water Resources and Climate, 1958.
5. State of Illinois, Department of Transportation, Division of Water Resources, Protect Your Home From Flood Damage, Local Assistance Series 3B, March, 1982.
6. State of Illinois, Department of Transportation, Division of Water Resources, Rules and Regulations, Regulation of Construction Within Floodplains Established Pursuant to Section 65f, Chapter 19, Illinois Revised Statutes, Springfield, 1973.
7. USDA, Soil Conservation Service, Computer Program for Project Formulation, Hydrology Technical Release No. 20, Washington, DC, May 1983 (draft).
8. USDA, Soil Conservation Service, WSP-2 Computer Program, Technical Release No. 61. May 1976.
9. USDA, Soil Conservation Service, Floodway Determination Computer Program, Technical Release 64, June 1978.
10. U.S. Department of Agriculture, Soil Conservation Service, Guide for Selecting Roughness Coefficient "n" Values for Channels, Lincoln, Nebraska, December 1963.
11. USDA, Soil Conservation Service, Soil Survey of Williamson County, Illinois, May, 1959.
12. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, August 1982.
13. USDA, Soil Conservation Service, Urban Floodwater Damage Economic Evaluation Program (URBI), Fort Worth, Texas, January 1982.



SCALE 1:24 000



CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

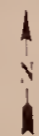
**FLOODPLAIN MAPS**

**23**

INDEX MAP

**ORTHOPHOTOGRAMMETRIC MAPPING**

DATE OF PHOTOGRAPH: 3-10-80  
DATE OF MAPPING: APRIL, 1981  
CONTOUR INTERVAL 2  
DATUM N.G.V.D. 1929 ADJ.



PREPARED FOR  
**ILLINOIS DEPARTMENT OF TRANSPORTATION  
DIVISION OF WATER RESOURCES**

PREPARED BY  
**AERIAL SURVEYS  
DIVISION OF HIGHWAYS**

PROJECT NO.  
**WL-1039**

**FLOODPLAIN MANAGEMENT STUDY  
LAKE CREEK AND TRIBUTARIES  
JOHNSTON CITY  
WILLIAMSON COUNTY, ILLINOIS**



E 322,000

E 323,000

F 324,000

E 325,000

E 326,000

E 327,000

N 421,000

N 420,000

N 419,000

MATCH TO

N 421,000

SHEET 2

N 420,000





N 419,000

MATCH TO

SHEET 3



LEGEND

-  Floodway
-  100yr Floodplain
-  500yr Floodplain
-  Cross Section I.D. 5815A

E 322,000

E 323,000

E 324,000

MATCH TO E 325,000

SHEET 4

E 326,000

Lake Creek 4390B

E 327,000

5570B

21250

22150

22700

LEGEND

ORTHOPHOTOGRAMMETRIC MAPPING  
 DATE OF PHOTOGRAPHY: 3-10-80  
 DATE OF MAPPING: APRIL, 1981  
 CONTOUR INTERVAL: 2'  
 DATUM: N.G.V.O., 1929 ADJ.



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PROJECT NO.  
 WL-1039

FLOODPLAIN MANAGEMENT STUDY  
 LAKE CREEK AND TRIBUTARIES  
**JOHNSTON CITY**  
 WILLIAMSON COUNTY, ILLINOIS

24





SHEET 1 OF 5







**LEGEND**

-  Floodway
-  100yr Floodplain
-  500yr Floodplain
-  Cross Section I.D. 3360S

**LEGEND**  
 CONTOUR INTERVAL 2'  
 HORIZONTAL CONTROL STATION  
 VERTICAL CONTROL STATION  
 ELEVATION POINT  
 PHOTO METRIC POINT

**ORTHOPHOTOGAMMETRIC MAPPING**

DATE OF PHOTOGRAPHY: 3-10-80      CONTOUR INTERVAL 2'  
 DATE OF MAPPING: APRIL, 1981      DATUM N.G.V.D. 1929 ADJ

SCALE IN FEET

200   0   200   400   600   800   1000

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PROJECT NO.  
**WL-1039**

**FLOODPLAIN MANAGEMENT STUDY  
 LAKE CREEK AND TRIBUTARIES  
 JOHNSTON CITY  
 WILLIAMSON COUNTY, ILLINOIS**





**25**

**SHEET 2 OF 5**





LEGEND

-  Floodway
-  100yr Floodplain
-  500yr Floodplain
-  31270 Cross Section I.D.

LEGEND  
 HORIZONTAL CONTROL SYSTEM (STANDARD)  
 DATUM POINT  
 FROM VERTICAL POINT

DATE OF PHOTOGRAPHY: 3-10-80  
 DATE OF MAPPING: APRIL, 1981

**ORTHOPHOTOGAMMETRIC MAPPING**

DATE OF PHOTOGRAPHY: 3-10-80      CONTOUR INTERVAL 2  
 DATE OF MAPPING: APRIL, 1981      DATUM N G V D 1929 ADJ

SCALE IN FEET  
 200   0   200   400   600   800   1000

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 DIVISION OF WATER RESOURCES**

PREPARED BY  
**AERIAL SURVEYS  
 DIVISION OF HIGHWAYS**

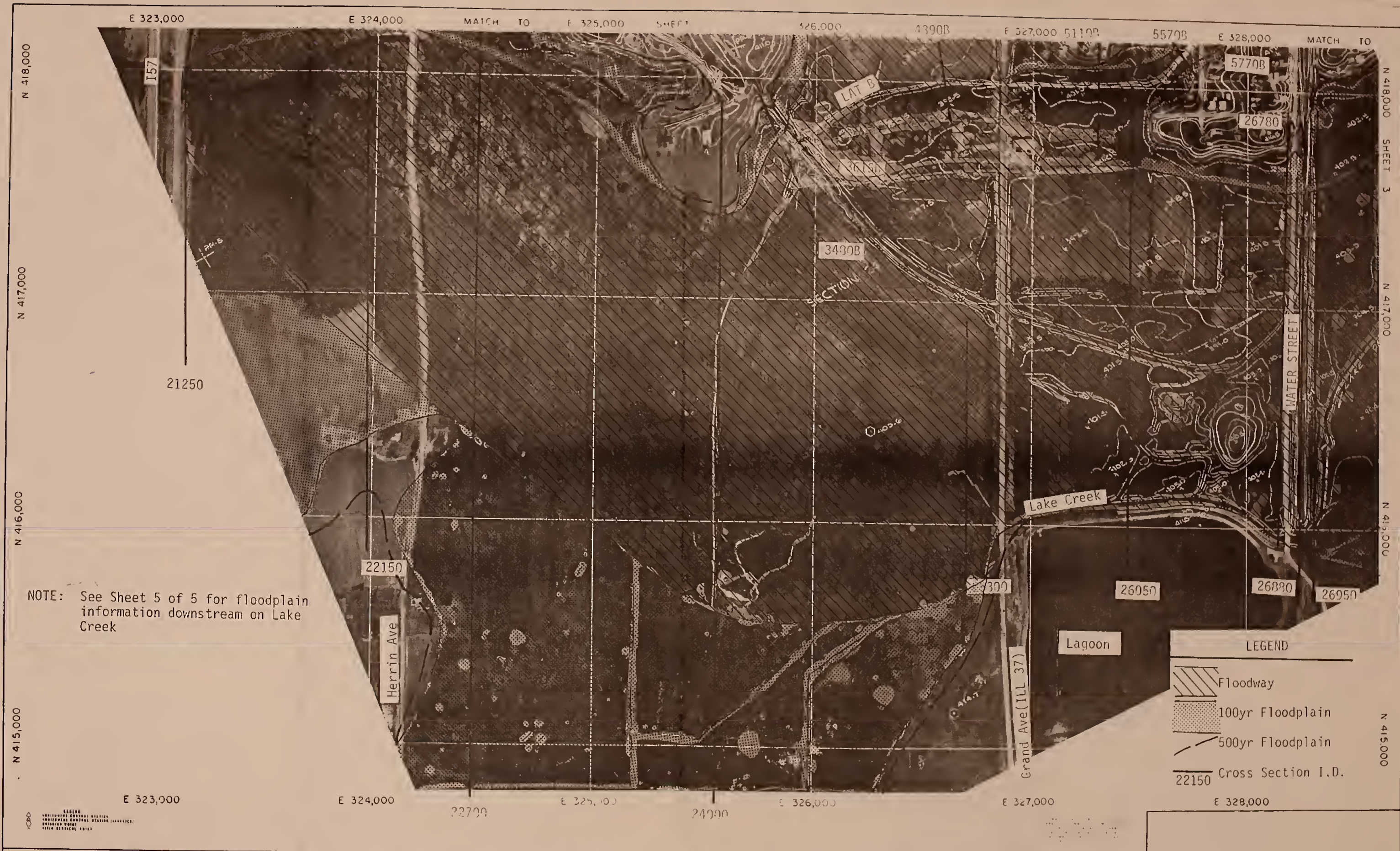
PROJECT NO.  
**WL-1039**

**FLOODPLAIN MANAGEMENT STUDY  
 LAKE CREEK AND TRIBUTARIES  
 JOHNSTON CITY  
 WILLIAMSON COUNTY, ILLINOIS**

**26**




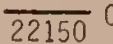
**SHEET 3 OF 5**





NOTE: See Sheet 5 of 5 for floodplain information downstream on Lake Creek

**LEGEND**

-  Floodway
-  100yr Floodplain
-  500yr Floodplain
-  Cross Section I.D. 22150

**ORTHOPHOTOGRAMMETRIC MAPPING**

DATE OF PHOTOGRAPHY: 3-10-80      CONTOUR INTERVAL: 2'

DATE OF MAPPING: APRIL, 1981      DATUM: N.G.V.D. 1929 ADJ

SCALE IN FEET

200   0   200   400   600   800   1000

PREPARED FOR

**ILLINOIS DEPARTMENT OF TRANSPORTATION**  
DIVISION OF WATER RESOURCES

PREPARED BY

**AERIAL SURVEYS**  
DIVISION OF HIGHWAYS

PROJECT NO.

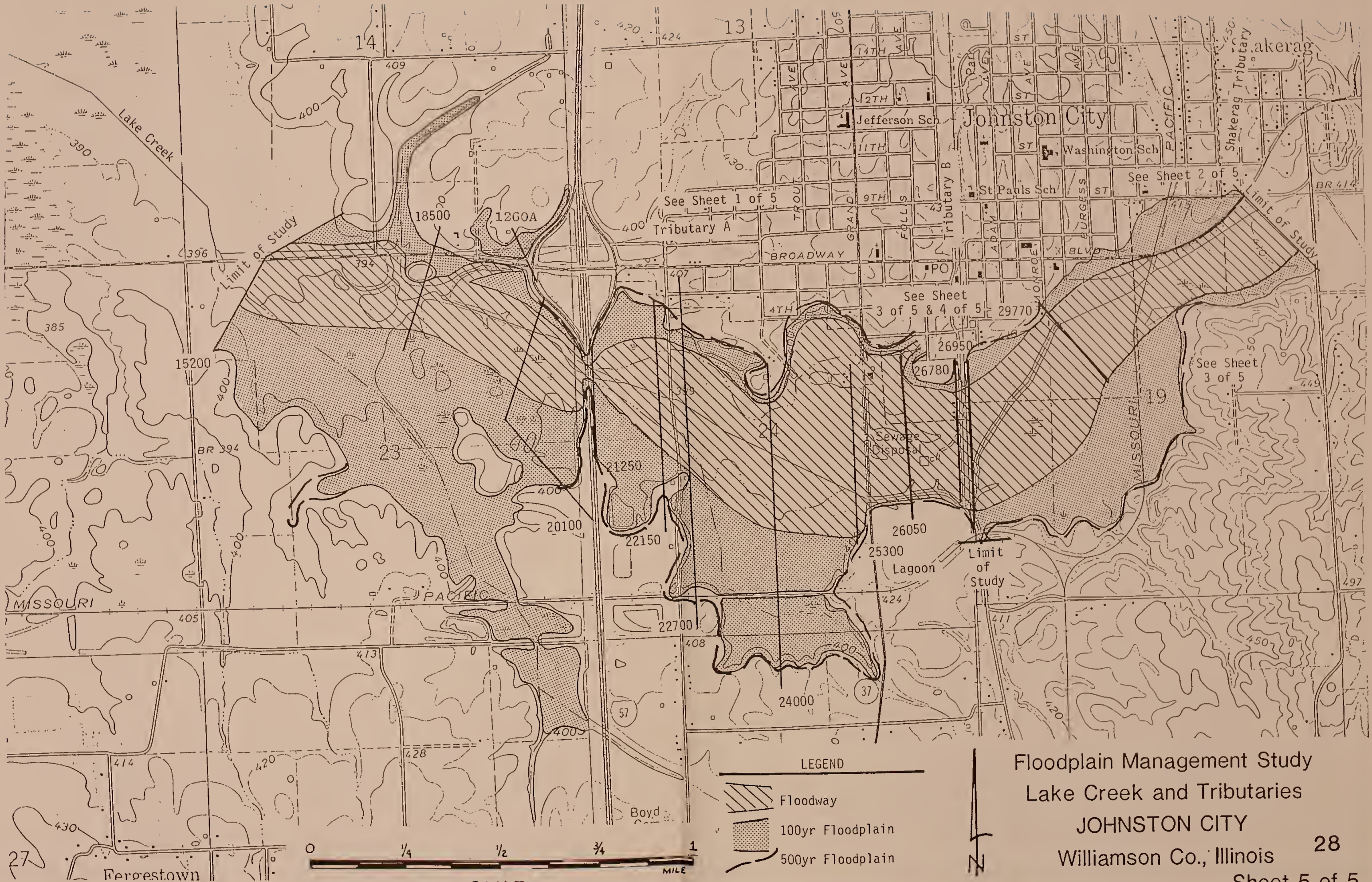
**WL-1039**

**FLOODPLAIN MANAGEMENT STUDY**  
LAKE CREEK AND TRIBUTARIES  
**JOHNSTON CITY**  
WILLIAMSON COUNTY, ILLINOIS

**27**





**SHEET 4 OF 5**

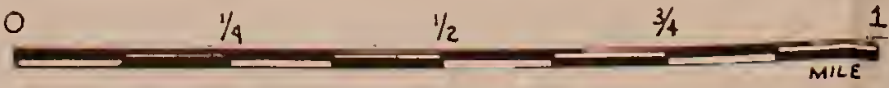




Floodplain Management Study  
 Lake Creek and Tributaries  
**JOHNSTON CITY**  
 Williamson Co., Illinois  
 28  
 Sheet 5 of 5

LEGEND

-  Floodway
-  100yr Floodplain
-  500yr Floodplain
-  Cross Section I.D.



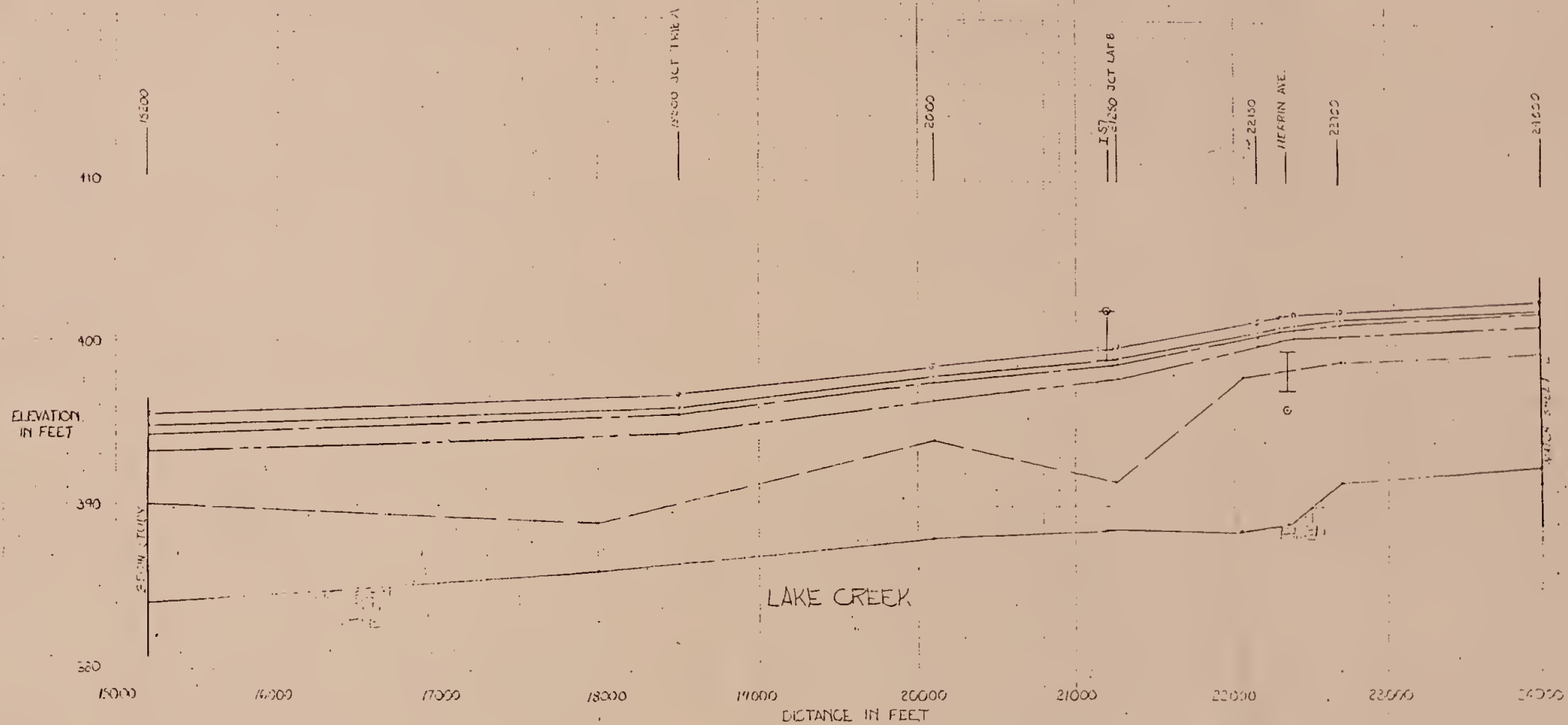
SCALE





# APPENDICES





LEGEND

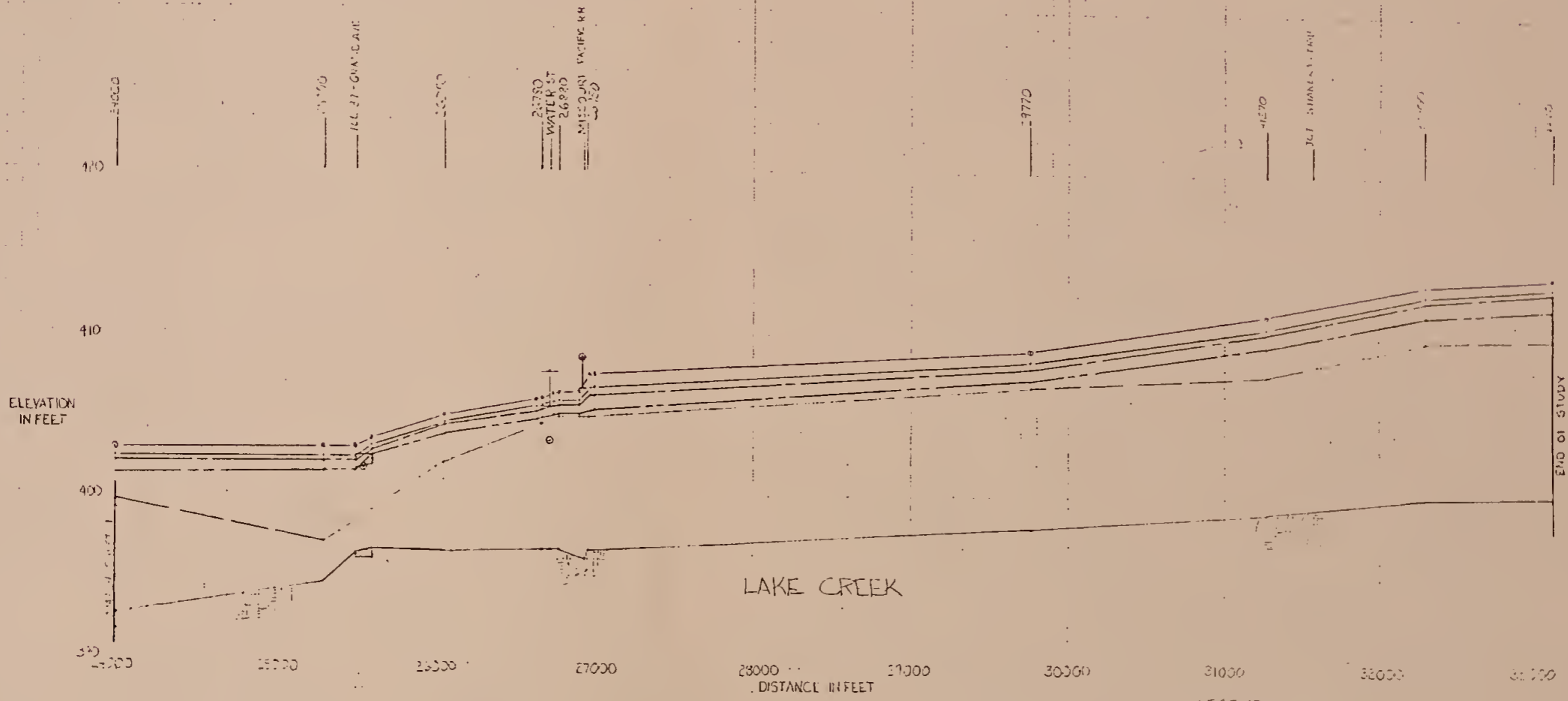
	CHANNEL BOTTOM
	LOW BANK
	BRIDGE
	500 YR
	100 YR
	50 YR
	10 YR
	SECTION ID
	LOW POINT ROAD

LAKE CREEK-  
JOHNSTON CITY  
PRESENT CONDITIONS  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Prepared by: *J. P. ...*  
Checked by: *R. ...*  
Date: *...*

APPENDIX A



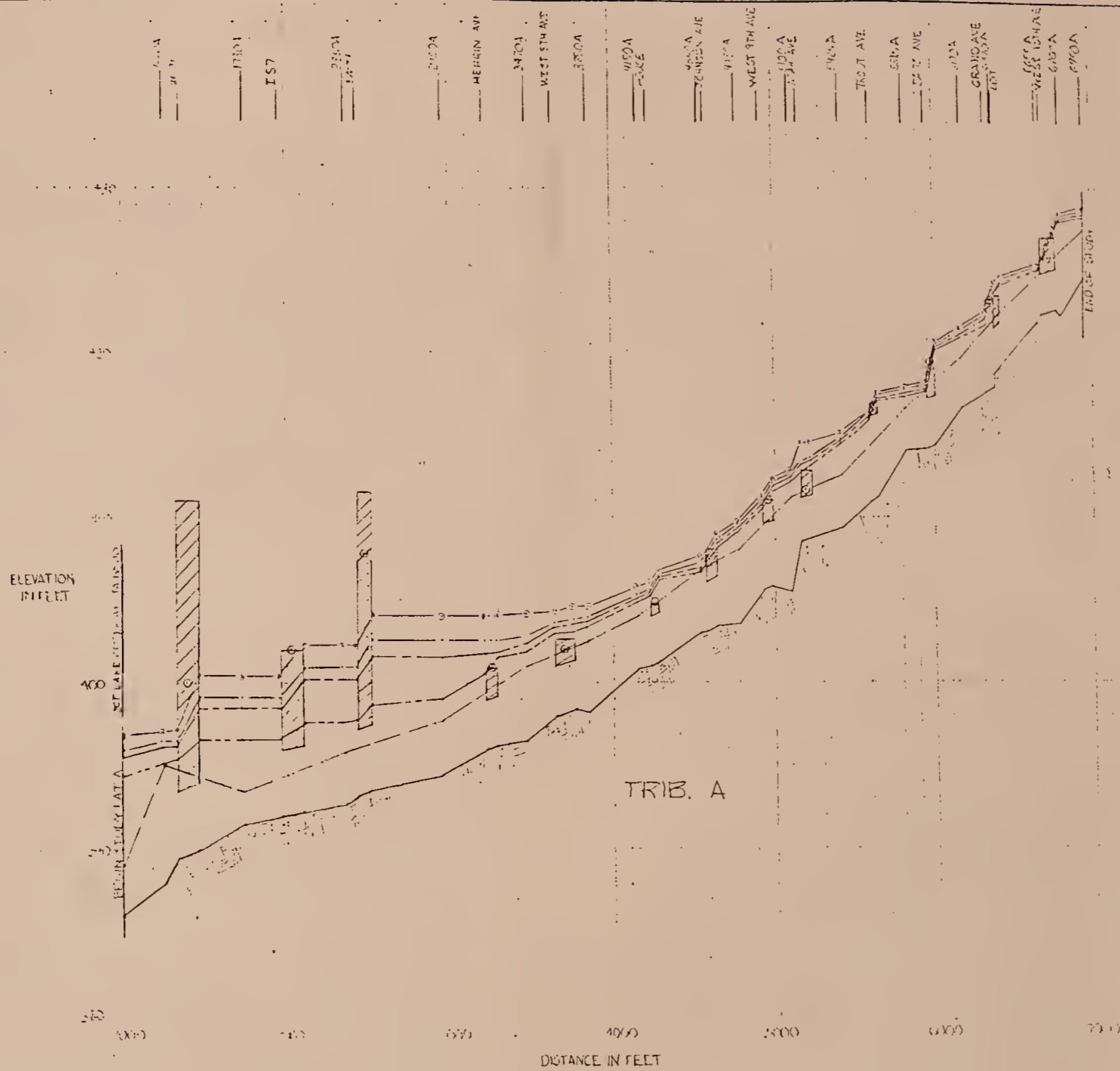


- LEGEND
- CHANNEL BOTTOM
  - LOW BANK
  - BRIDGE
  - CULVERT
  - 500 YEAR
  - 100 YEAR
  - 50 YEAR
  - 10 YEAR
  - SECTION ID
  - LOW POINT ROAD

LAKE CREEK -  
JOHNSTON CITY  
PRESENT CONDITIONS  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

APPENDIX A





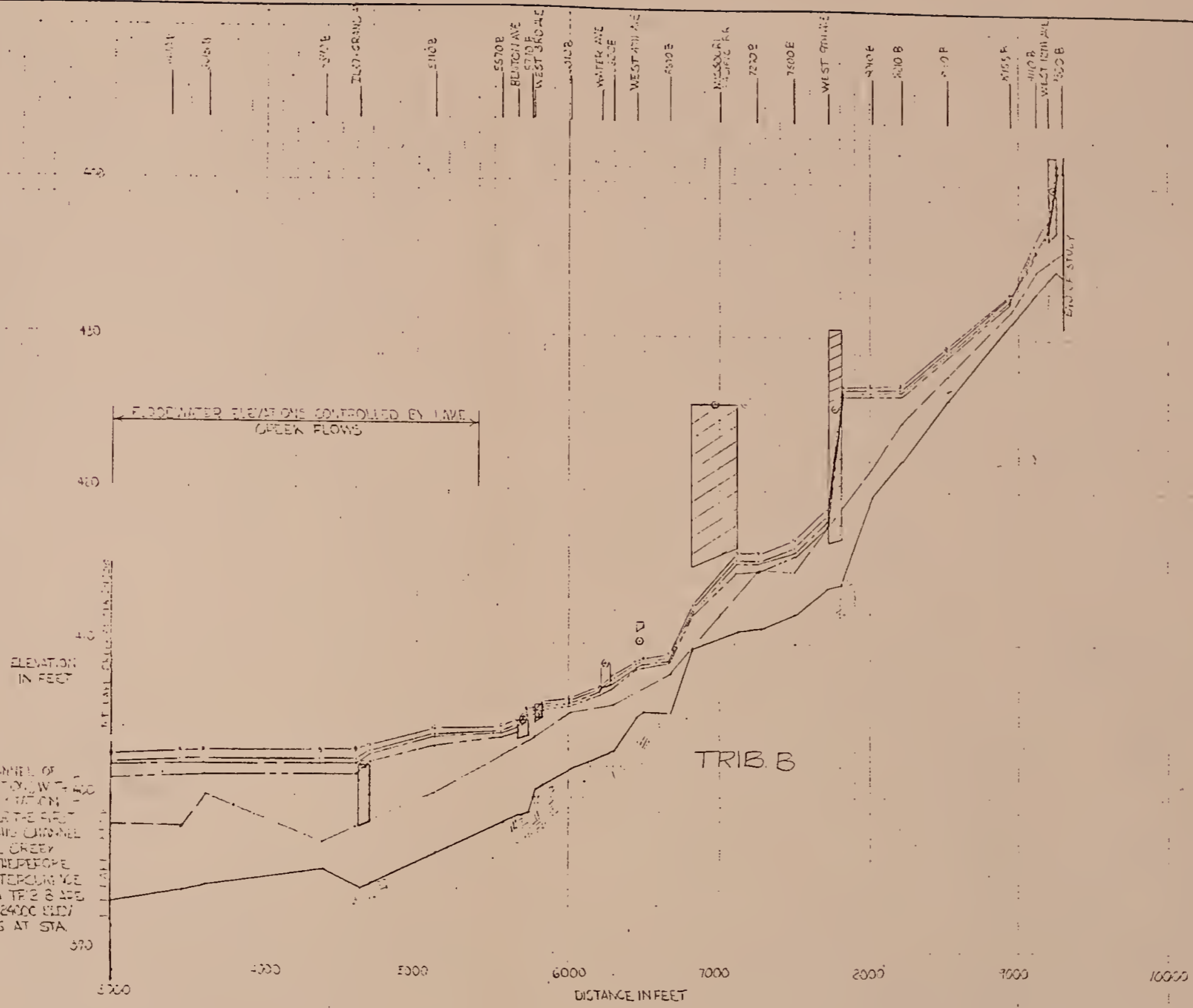
- LEGEND
- CHANNEL BOTTOM
  - LOW BANK
  - CULVERT
  - 500 YR
  - 100 YR
  - 25 YR
  - 10 YR
  - SECTION ID
  - LOW POINT ROAD

LAKE CREEK - TRIB. A.  
 JOHNSTON CITY  
 PRESENT CONDITIONS  
 U.S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

APPENDIX A







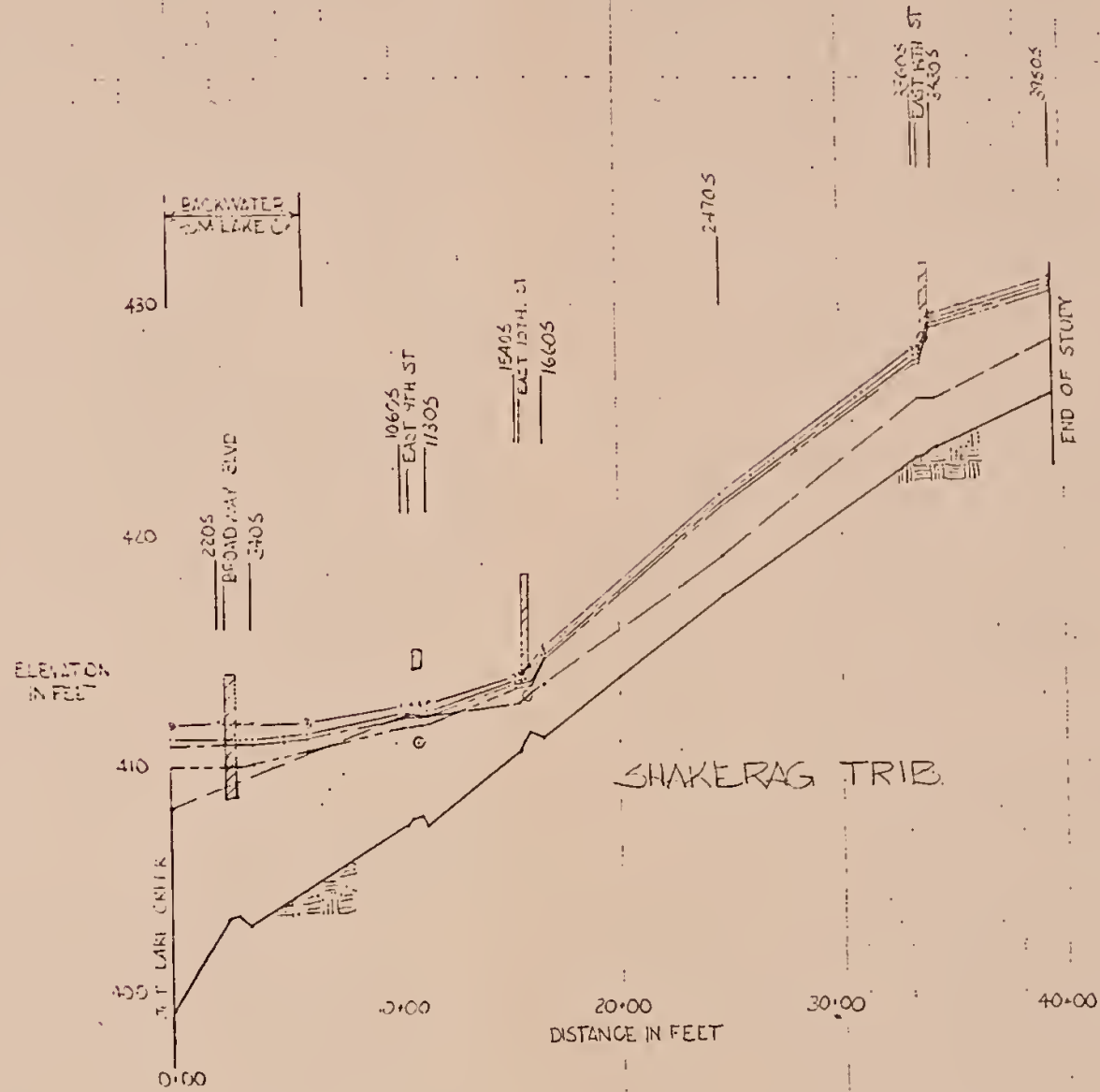
NOTE: THE CHANNEL OF TRIB. B CONTOUR WITH FLOOD WAVE CENTER AT STATION 21250. HOWEVER THE FIRST 2000 FT OF THIS CHANNEL IS IN THE LAKE CREEK FLOODPLAIN. THEREFORE STARTING WATERCOURSE ELEVATIONS ON TRIB B ARE BASED ON STA 24000 (S12) NOT THE ELEV. AT STA. 21250.

- LEGEND
- CHANNEL BOTTOM
  - LOW BANK
  - CULVERT
  - 500 YR
  - 100 YR
  - 50 YR
  - 10 YR
  - SECTION I D
  - LOW POINT ROAD

LAKE CREEK- TRIB B  
 JOHNSTON CITY  
 PRESENT CONDITIONS  
 U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Project No. \_\_\_\_\_  
 Date \_\_\_\_\_  
 Drawn by \_\_\_\_\_  
 Checked by \_\_\_\_\_  
 Approved by \_\_\_\_\_  
 APPENDIX A



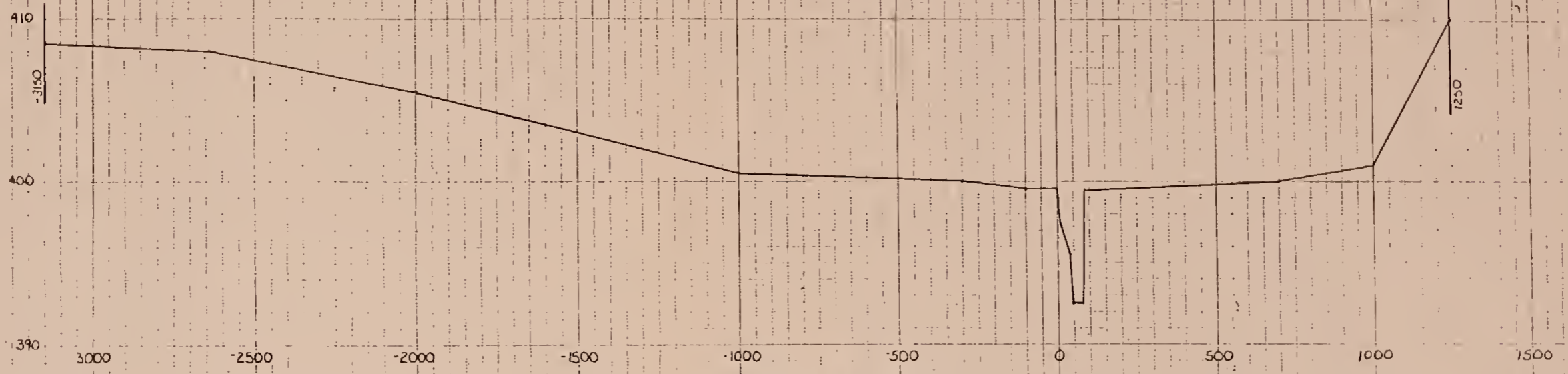


LEGEND	
	CHANNEL BOTTOM
	LOW BANK
	CULVERT
	500 YR
	100 YR
	50 YR
	10 YR
	SECTION TO LOW POINT ROAD

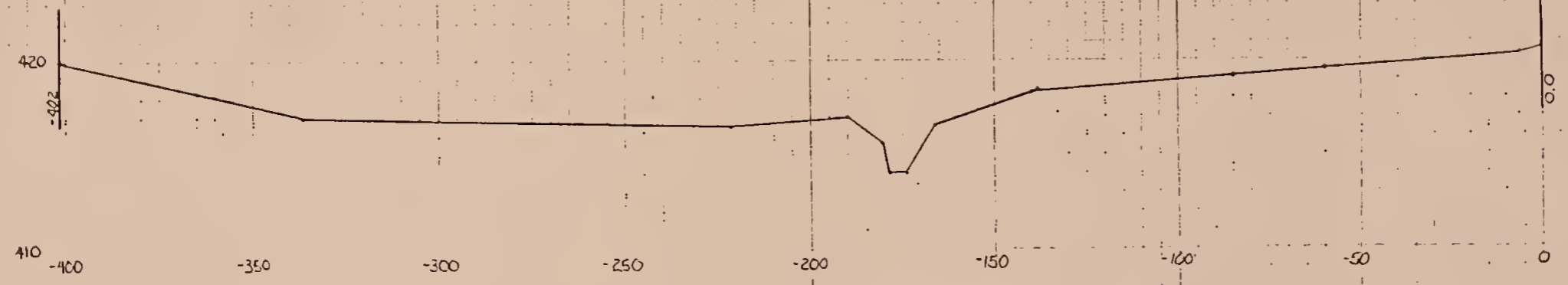
LAKE CREEK-SHAKERAG  
 JOHNSTON CITY  
 PRESENT CONDITIONS  
 U.S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

DATE	APPROVED BY
3/20	
SCALE	
1" = 100'	
APPENDIX A	





SECTION 24000  
 SCALE: HORIZONTAL 1"=200'  
 VERTICAL 1"=4'



SECTION 5815A  
 SCALE: HORIZONTAL 1"=20'  
 VERTICAL 1"=4'

TYPICAL CROSS SECTION  
 LAKE CREEK, JOHNSTON CITY

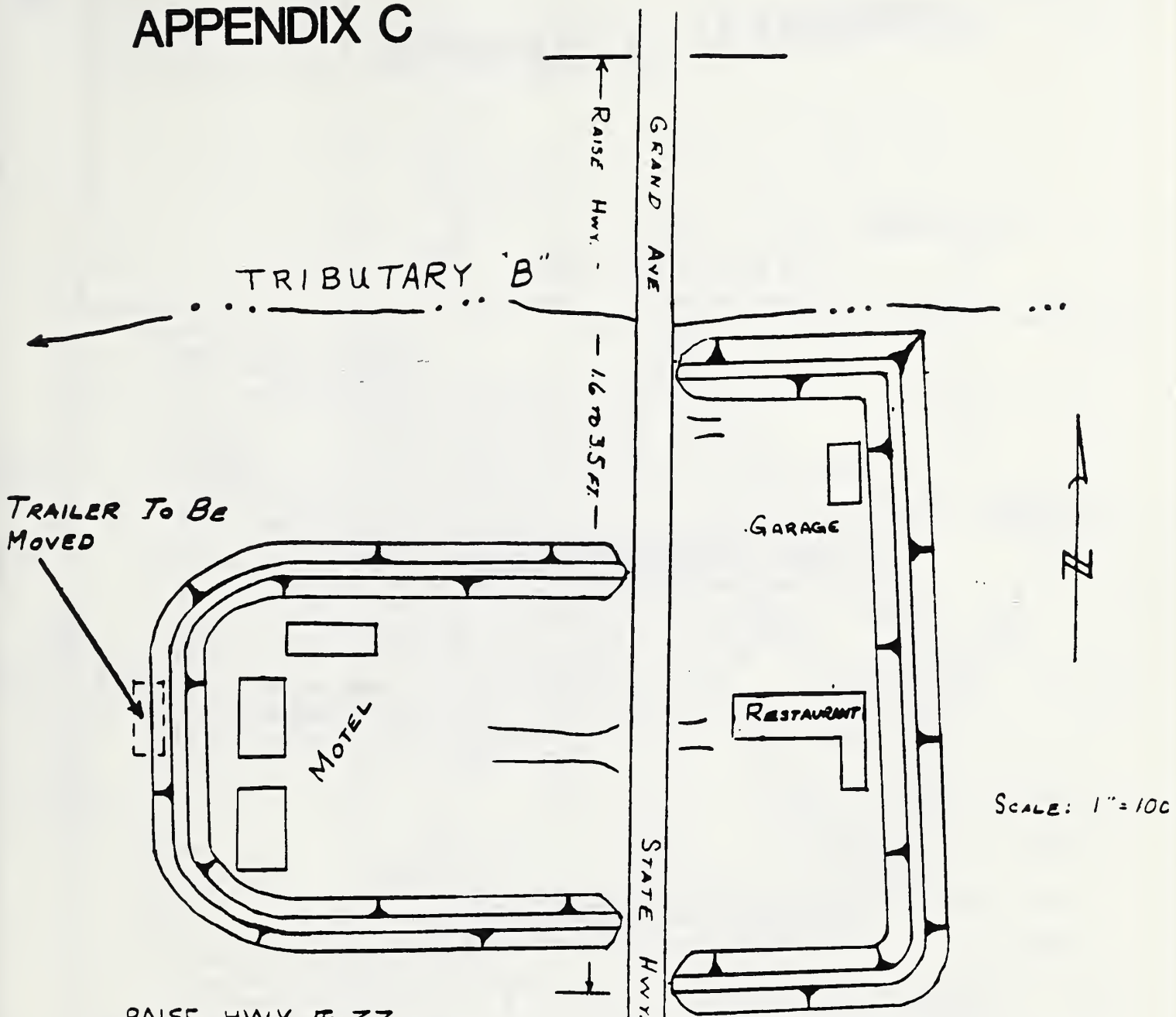
U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE

Drawn by <i>J. Ed. [Signature]</i>	Date 1/80	Approved by [Signature]	Title [Blank]
Traced [Blank]	Checked [Blank]	Drawing No. [Blank]	Scale [Blank]

APPENDIX B



# APPENDIX C



TRAILER To Be Moved

RAISE HWY. # 37

TOP WIDTH:	24 FEET
HEIGHT	1.6-3.5 FEET
LENGTH	770 FEET
SIDE SLOPES	3:1

MOTEL LEVEL

TOP	10 FEET
HEIGHT	4.1 FEET
LENGTH	750 FEET
SIDE SLOPES	3:1

NOTE: PROVIDE INTERNAL DRAINAGE SYSTEM.

HIGHWAY #37 CULVERT  
ADD 5' X 5' RC. BOX CULVERT

RESTAURANT LEVEL

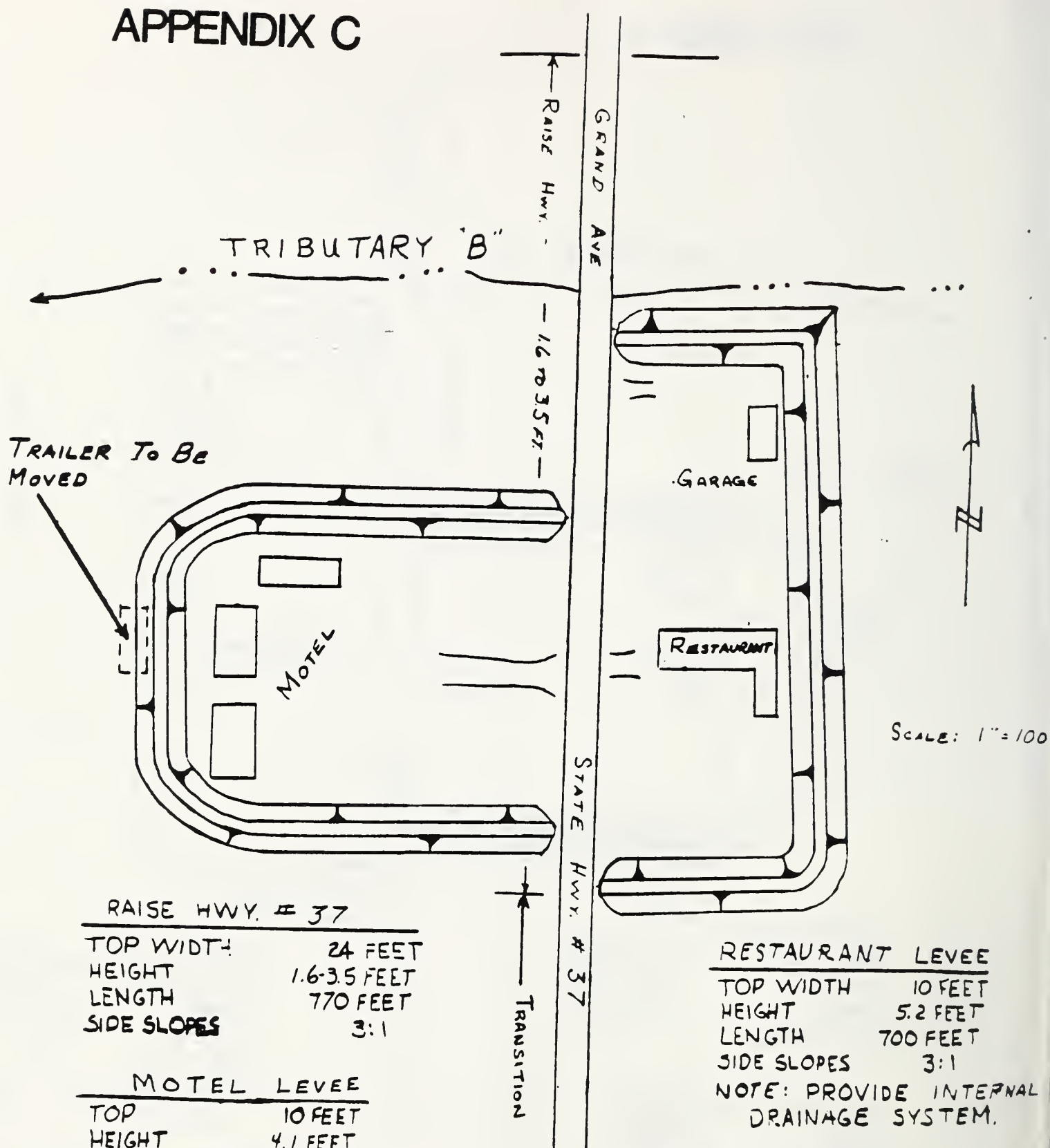
TOP WIDTH	10 FEET
HEIGHT	5.2 FEET
LENGTH	700 FEET
SIDE SLOPES	3:1

NOTE: PROVIDE INTERNAL DRAINAGE SYSTEM.

## ALTERNATIVE-C

RING LEVEE  
LAKE CREEK & TRIBS. WATERSHED  
AT JOHNSTON CITY  
WILLIAMSON CO., ILLINOIS

# APPENDIX C



RAISE HWY. # 37	
TOP WIDTH	24 FEET
HEIGHT	1.6-3.5 FEET
LENGTH	770 FEET
SIDE SLOPES	3:1

MOTEL LEVEL	
TOP	10 FEET
HEIGHT	4.1 FEET
LENGTH	750 FEET
SIDE SLOPES	3:1

NOTE: PROVIDE INTERNAL DRAINAGE SYSTEM.

HIGHWAY #37 CULVERT  
ADD 5' X 5' RC. BOX CULVERT

RESTAURANT LEVEL	
TOP WIDTH	10 FEET
HEIGHT	5.2 FEET
LENGTH	700 FEET
SIDE SLOPES	3:1

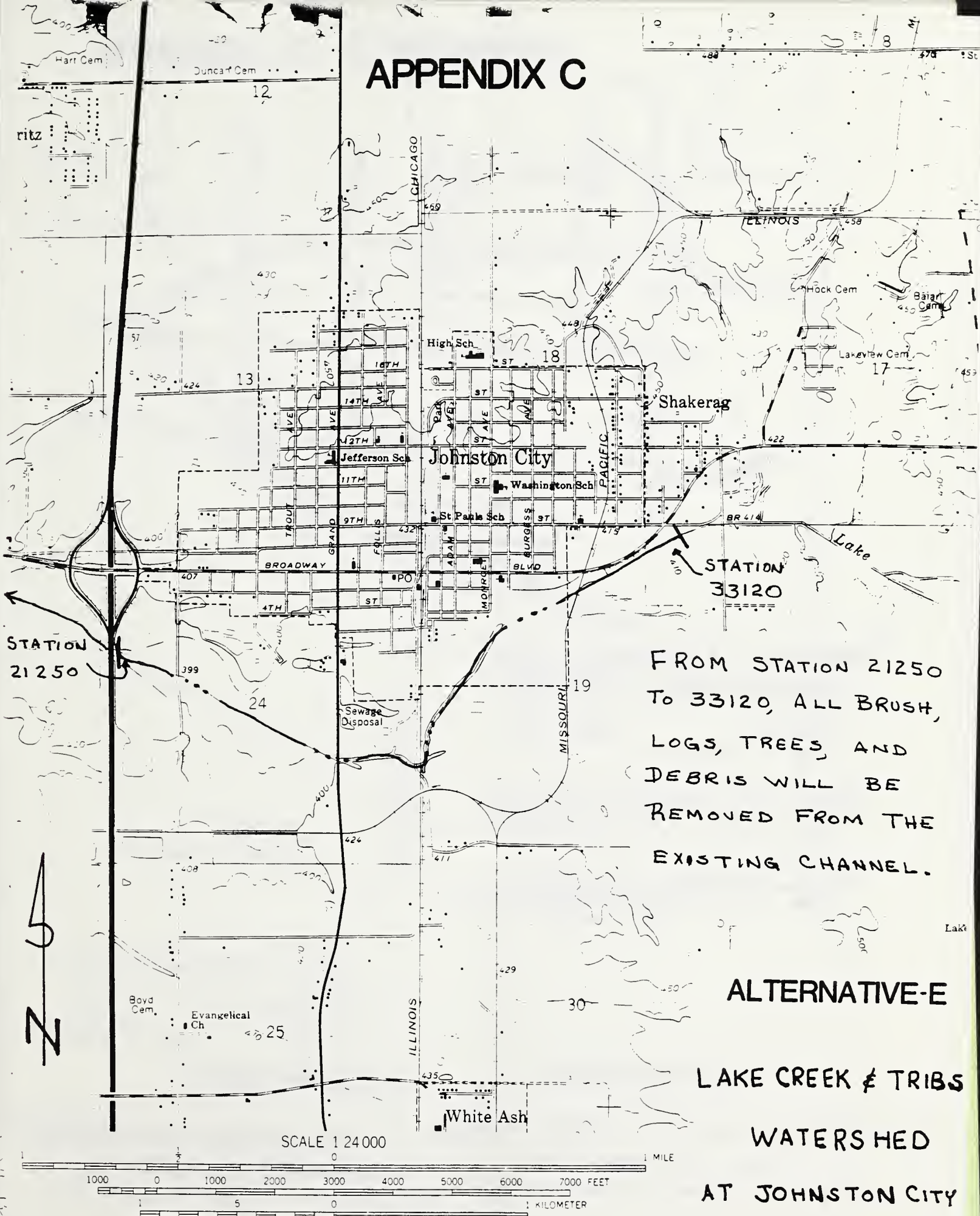
NOTE: PROVIDE INTERNAL DRAINAGE SYSTEM.

## ALTERNATIVE-D

RING LEVEE  
LAKE CREEK & TRIBS. WATERSHED  
AT JOHNSTON CITY  
WILLIAMSON CO., ILLINOIS



# APPENDIX C



FROM STATION 21250  
TO 33120, ALL BRUSH,  
LOGS, TREES, AND  
DEBRIS WILL BE  
REMOVED FROM THE  
EXISTING CHANNEL.

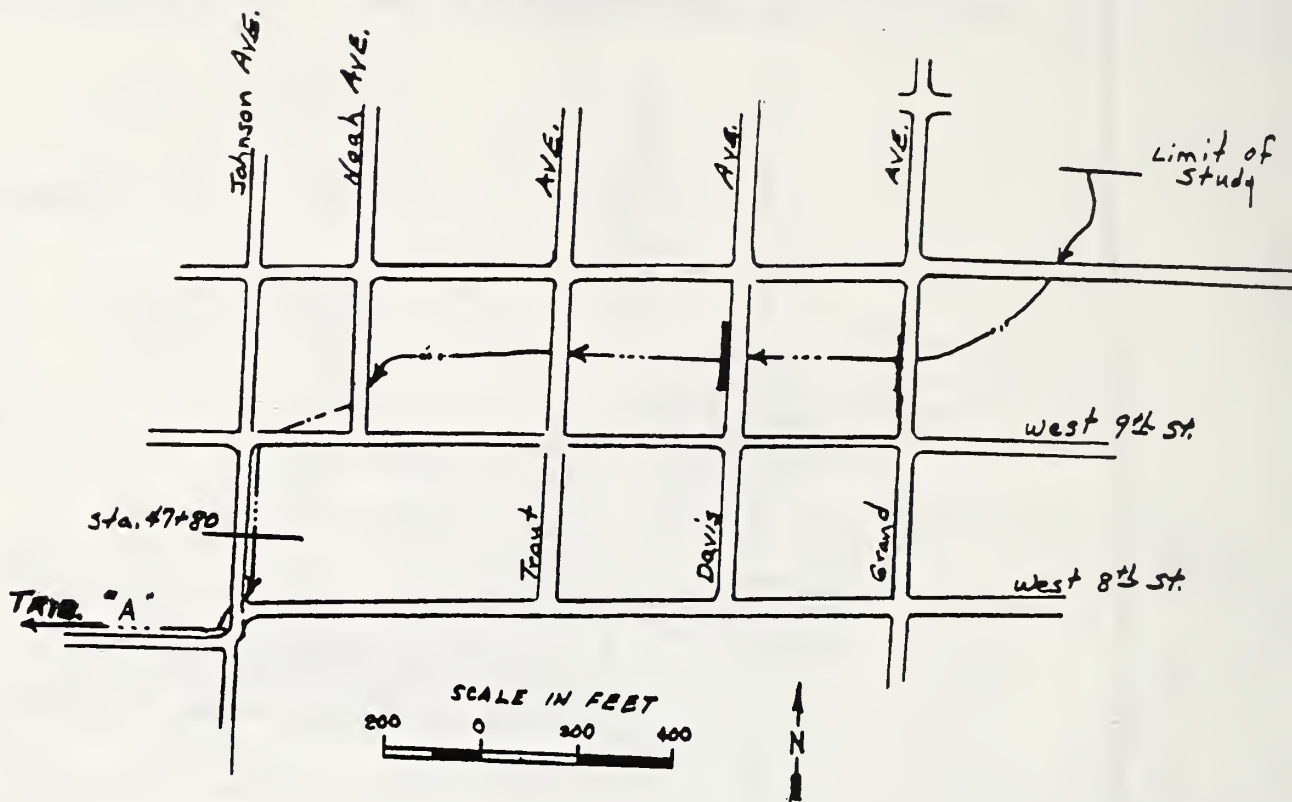
ALTERNATIVE-E

LAKE CREEK & TRIBS  
WATERSHED  
AT JOHNSTON CITY

WILLIAMSON CO, ILL.

SCALE 1:24,000  
CONTOUR INTERVAL 10 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

# APPENDIX C



## TRIBUTARY "A" CHANNEL WORK

FROM STA. 47+80 TO DAVIS AVE.

- BOTTOM WIDTH 6 FT.  
 - DEPTH 4 to 4.5 FT.  
 - LENGTH 1025 FT.  
 - SIDE SLOPES 2:1

## WEST 9<sup>th</sup> STREET CULVERT

NEW 5' DIA. C.M.P. (50' LONG)

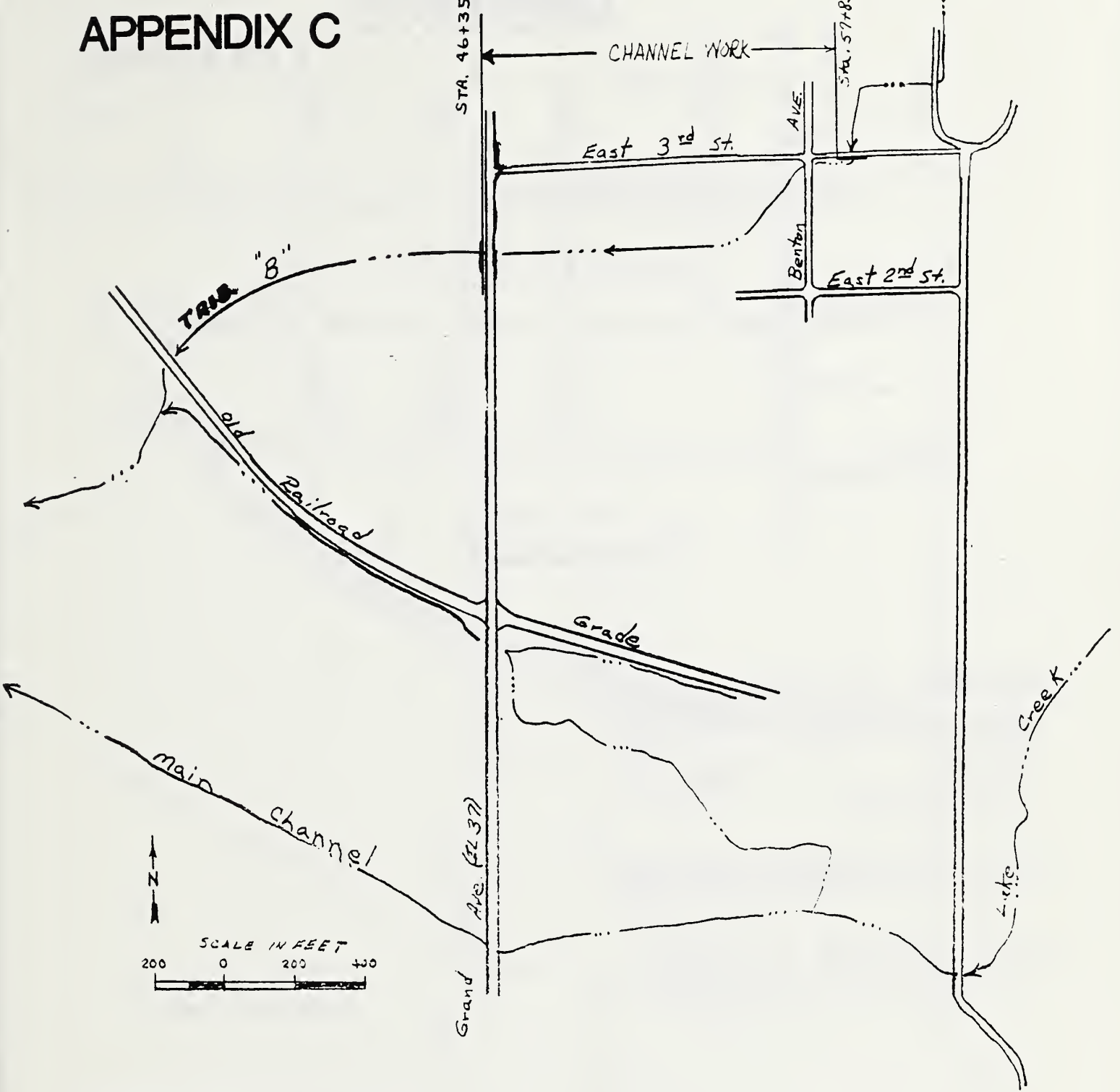
## NOAH AVENUE CULVERT

NEW 4' high x 5.5' wide R.C. BOX CULVERT (65' LONG)

## ALTERNATIVE-F

LAKE CREEK & TRIBS. WATERSHED  
 AT JOHNSTON CITY  
 WILLIAMSON COUNTY, ILLINOIS

# APPENDIX C



TRIBUTARY 'B' CHANNEL WORK

BOTTOM WIDTH      10 FT.  
 DEPTH                4 to 5.5 FT.  
 LENGTH              1,050 FT.  
 SIDE SLOPES        2:1

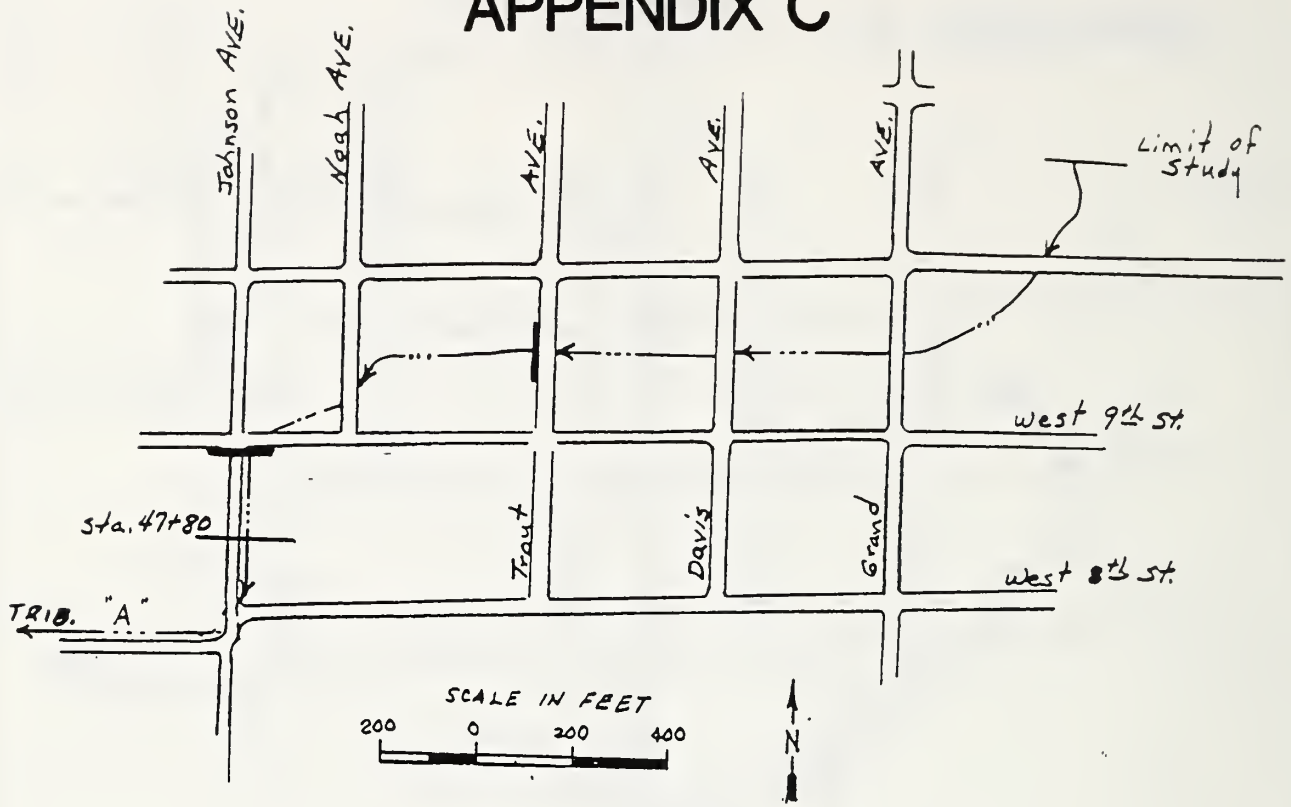
BENTON AVE. CULVERT

ADD 5'x5'x70' R.C. BOX CULVERT

## ALTERNATIVE-F

LAKE CREEK & TRIBS. WATERSHED  
 AT JOHNSTON CITY  
 WILLIAMSON COUNTY, ILLINOIS

# APPENDIX C



## TRIBUTARY "A" CHANNEL WORK

FROM JOHNSON AVE TO TROUT AVE

- BOTTOM WIDTH 6 FT.  
 - DEPTH 4 to 4.5 FT.  
 - LENGTH 845 FT.  
 - SIDE SLOPES 2:1

## WEST 9th STREET CULVERT

NEW 5' DIA. C.M.P. (50' LONG)

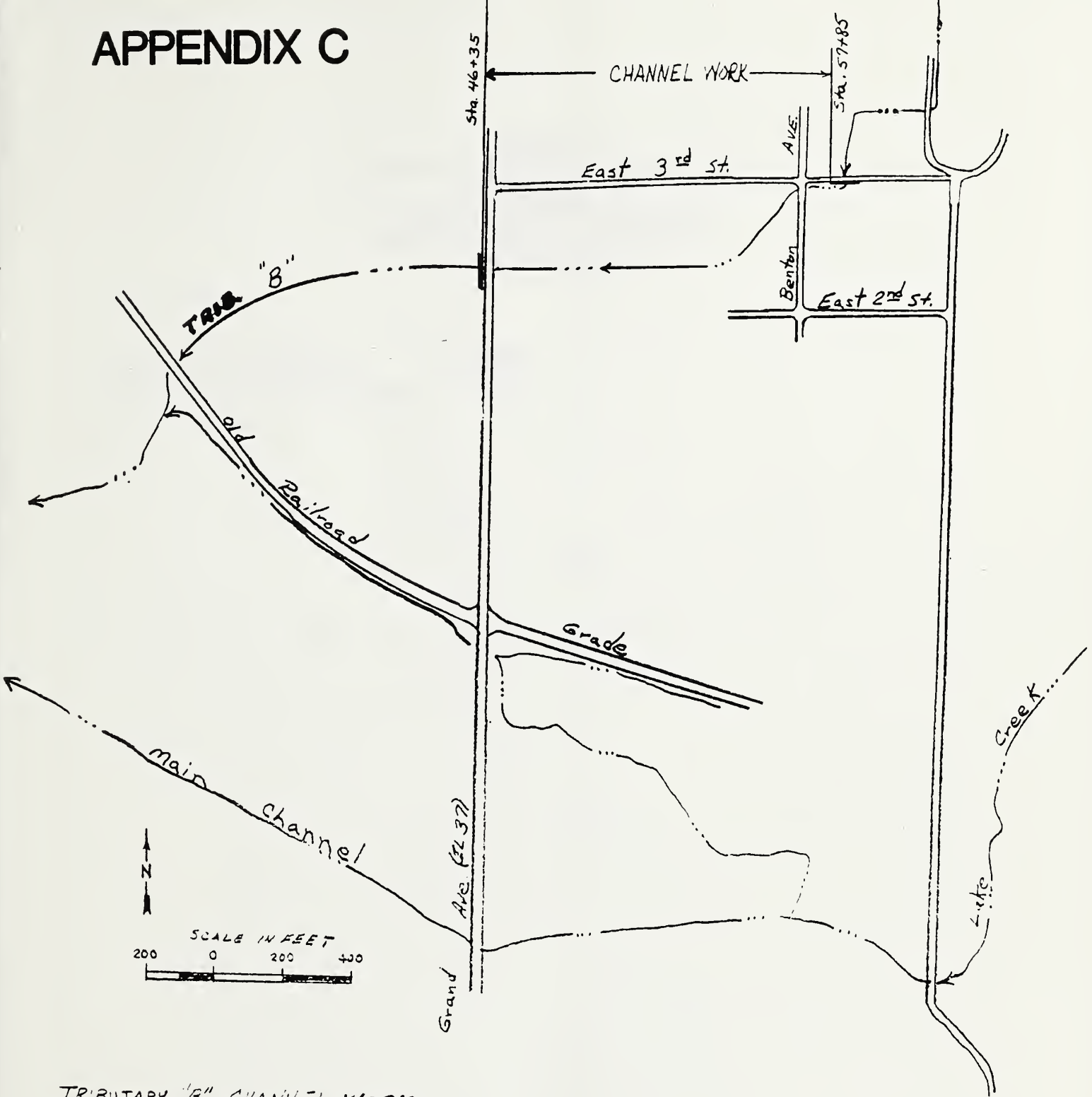
## NOAH AVENUE CULVERT

NEW 52" high x 77" wide C.M. Pipe Arch  
 (65' LONG)

## ALTERNATIVE-G

LAKE CREEK & TRIBS. WATERSHED  
 AT JOHNSTON CITY  
 WILLIAMSON COUNTY, ILLINOIS

# APPENDIX C



TRIBUTARY "5" CHANNEL WORK

BOTTOM WIDTH 10 FT.  
 DEPTH 4 to 5.5 FT.  
 LENGTH 1,050 FT.  
 SIDE SLOPES 2:1

BENTON AVE. CULVERT

ADD 5' DIA. C.M.P. (70' LONG)

## ALTERNATIVE-G

LAKE CREEK & TRIBS. WATERSHED  
 AT JOHNSTON CITY  
 WILLIAMSON COUNTY, ILLINOIS



APPENDIX D  
LAKE CREEK & TRIBUTARIES WATERSHED  
AT JOHNSTON CITY  
FLOODPLAIN MANAGEMENT STUDY  
Easement Purchase - ALTERNATIVE C  
COST ESTIMATE

Land Rights:

57 acres @ \$100/ac	\$ 5,700
Total installation cost	\$ 5,700
Average annual cost (.08627)	\$490

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 Ring Dikes & Raising Hwy 37 - ALTERNATIVE C & D  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
<u>Restaurant Levee</u>			
Earthfill	5116 cu yds	\$3/cu yd	\$15,348
Excavation	622 cu yds	\$3/cu yd	1,866
Topsoil stripping	3130 sq yds	\$0.50/sq yd	1,565
Internal drain system	1 job	lump sum	2,000
Seeding, fert & mulch	1 acre	\$3000/acre	3,000
		Subtotal	<u>\$23,779</u>
<u>Motel Levee</u>			
Earthfill	4140 cu yds	\$3/cu yd	\$12,420
Excavation	666 cu yds	\$3/cu yd	1,998
Topsoil stripping	2800 cu yds	\$0.50/sq yd	1,400
Internal drain system	1 job	lump sum	2,000
Seeding, fert & mulch	0.9 acre	\$3000/ac	2,700
		Subtotal	<u>\$20,518</u>
<u>Raise Highway #37</u>			
Traffic control	1 job	lump sum	\$10,000
Excavation (old roadway)	1200 cu yds	\$10/cu yd	12,000
Earthfill	4100 cu yds	\$3/cu yd	12,300
New Roadway	770 LF	\$65/LF	50,050
Driveways	3 each	\$700/each	2,100
		Subtotal	<u>\$86,450</u>
Subtotal			130,747
10% contingency			13,053
Construction Cost			<u>143,800</u>
Engineering Services & Project Admin (20% Const Cost)			28,800
Land Rights:			
Restaurant	1.0 acres	\$1000/ac	\$1,000
Motel	0.9 acres	\$1000/ac	900
Move trailer	lump sum	\$1000/ac	\$1,000
Total Installation Cost			<u>175,500</u>
Average Annual Cost (0.08627)			\$15,140
O&M Annual Cost			710
Total Annual Cost			<u>\$15,850</u>



APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "B" Add Culvert under Hwy 37 - ALTERNATIVE C & D  
 (5' x 5' x 70' RC box culvert)  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Concrete	72 cu yds	\$400/cu yd	\$28,800
Steel	9400 lbs	\$0.60/lb	5,640
Structural excavation	650 cu yds	\$10/cu yd	6,500
Structural backfill	350 cu yds	\$10/cu yd	3,500
New roadway	100 LF	\$65/LF	6,500
Traffic control	1 job	lump sum	12,000
Riprap	50 cu yds	\$80/cu yd	4,000
		Subtotal	<u>\$66,940</u>
	10% contingency		6,660
		Total	<u>\$73,600</u>

Construction cost	\$73,600
Engr services & project admin	
20% of constr cost	14,700
Total installation cost	<u>\$88,300</u>

Average annual cost (.08627)	7,620
O&M	520
Total annual cost	<u>\$ 8,140</u>

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 Lowering Hwy #37 - ALTERNATIVE D  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Structure excavation	780 cu yds	\$10/cu yd	\$ 7,800
New roadway	450 LF	\$65/LF	<u>29,250</u>
		Subtotal	<u>\$37,050</u>
	10% contingency		<u>3,700</u>
		Total	<u>\$40,750</u>
Construction cost		\$40,750	
Engr services & project admin			
20% of constr cost		8,150	
Total installation cost		<u>\$48,900</u>	
Average annual cost (.08627)		4,220	
O&M		270	
Total annual cost		<u>\$ 4,490</u>	

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 Remove brush, trees, logs & debris - ALTERNATIVE E  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Access	1 job	1 lump sum	\$ 5,000
Remove snag drifts	4 each	\$6,000/each	24,000
Clear & snag channel	1 job	1 lump sum	<u>51,615</u>
		Subtotal	\$80,615
	10% contingency		<u>8,085</u>
		Total	\$88,700

Construction cost \$88,700

Engr Services & project admin

20% of constr cost 17,740

Land Rights:

Easement: 17.6 ac @\$100/ac = \$1,760

Purchase: 5/ac @ \$300/ac = 1,500

\$3,260 3,260

Total installation cost \$109,700

Average annual cost (.08627) 9,460

O&M 1,300

Average annual replacement cost

(10yrs) .06699 x 109,700 7,350

Total annual cost \$18,110

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "A" CHANNEL WORK - ALTERNATIVE F  
 (Sta. 47+80 to Davis Av)  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Excavation, channel	1100 cu yds	\$5.50/cu yd	\$6050
Seeding, fert & mulch	1.1 acre	\$3000/ac	3300
		Subtotal	<u>\$9350</u>
	10% contingency		<u>950</u>
		Total	\$10300

Construction cost	\$10300
Engr services & project admin	
20% of construction cost	2100
Land Rights:	
1.1 acres @ \$1000/ac	<u>1100</u>
Total installation cost	<u>\$13500</u>
Average annual cost (.08627)	1165
O&M	<u>450</u>
Total annual cost	\$ 1615

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "A" New Culvert @ Noah Av - ALTERNATIVE F  
 (4'h x 5.5'w x 65' box culvert)  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Structural excavation	290 cu yds	\$10/cu yd	\$ 2,900
Structural backfill	180 cu yds	\$10/cu yd	1,800
Structure removal	1 job	lump sum	2,000
Concrete	50 cu yds	\$400/cu yd	20,000
Steel	6500 lbs	\$0.60/lb	3,900
Riprap	40 cu yds	\$80/cu yd	3,200
New roadway	50 LF	\$65/LF	3,250
Traffic control	1 job	lump sum	2,000
		Subtotal	<u>\$39,050</u>
	10% contingency		<u>3,950</u>
		Total	<u>\$43,000</u>
Construction cost		\$43,000	
Engr services & project admin			
20% of cons cost		<u>8,600</u>	
Total installation cost		<u>\$51,600</u>	
Average annual cost (.08627)		4,450	
O&M		<u>460</u>	
Total annual cost		<u>\$ 4,910</u>	

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "B" Add Culvert @ Benton Av - ALTERNATIVE F  
 (5' x 5' x 70' box culvert)  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Structural excavation	280 cu yds	\$10/cu yds	\$ 2,800
Structural backfill	150 cu yds	\$10/cu yd	1,500
Concrete	55 cu yds	\$400/cu yd	22,000
Steel	7150 lbs	\$0.60/lb	4,290
Riprap	50 cu yds	\$80/cu yd	4,000
New Roadway	50 LF	\$65 LF	3,250
Traffic Control	1 job	lump sum	2,000
		Subtotal	<u>\$39,840</u>
	10% contingency		3,960
		Total	<u>\$43,800</u>

Construction cost	\$43,800
Engr service & project admin	
20% of constr cost	<u>8,800</u>
Total installation	<u>\$52,600</u>

Average annual cost (.08627)	4,540
O&M	<u>460</u>
Total annual cost	<u>\$ 5,000</u>

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "A" New Culvert @ W 9th - ALTERNATIVE F & G  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Structural excavation	180 cu yds.	\$10/cu yd	\$ 1,800
Structural backfill	150 cu yds	\$10/cu yd	1,500
5' dia. CMP	50 L.F.	\$85/LF	4,250
New roadway	50 L.F.	\$65/LF	3,250
Structure removal	1 job	lump sum	1,000
Traffic control	1 job	lump sum	2,000
Riprap	40 cu yds	\$80/cu yd	3,200
		Subtotal	<u>\$17,000</u>
	10% contingency		1,700
		Total	<u>\$18,700</u>
Construction cost	\$18,700		
Engr services & project admin			
20% of constr cost	3,700		
Total installation cost	<u>\$22,400</u>		
Average annual cost (.08627)	1,930		
O&M	410		
Total Annual Cost	<u>\$ 2,340</u>		

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "B" Channel Work - ALTERNATIVE F & G  
 (Hwy #37 to 3rd Street)  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Excavation, channel	2300 cu yds	\$5.50/cu yd	\$12,650
Seeding, fert & mulch	1.3 acres	\$3000/ac	3,900
		Subtotal	<u>\$16,550</u>
	10% contingency		1,650
		Total	<u>\$18,200</u>

Construction cost	\$18,200
Engr services & project admin	
20% of constr cost	3,600
Land Rights:	
1.3 acres @ \$1000/ac	1,300
Total installation cost	<u>\$23,100</u>

Average annual cost (.08627)	1,990
O&M	470
Total annual cost	<u>\$2,460</u>



APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "A" Channel Work - ALTERNATIVE G  
 Johnson Av to Trout Av  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Excavation	960 cu yds	\$5.50/cu yd	\$ 5,280
Seeding, fert & mulch	0.9 acres	\$3000/acre	2,700
		Subtotal	<u>\$ 7,980</u>
	10% contingency		820
	Construction total		<u>\$ 8,800</u>
Construction cost		\$ 8,800	
Engr services & project admin		1,800	
Land Rights:			
0.9 acre @ \$1000/acre	900		
Total installation cost		<u>\$11,500</u>	
Average annual cost (.08627)		990	
O&M		440	
Total annual cost		<u>\$ 1,430</u>	

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "A" New Culvert @ Noah Av - ALTERNATIVE G  
 (52" x 77" CM pipe arch)  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Structural Excavation	260 cu yds	\$10/cu yd	\$ 2,600
Structural backfill	200 cu yds	\$10/cu yd	2,000
Structural removal	1 job	lump sum	2,000
52" x 77" CM pipe arch	65 LF	\$165/LF	10,725
Riprap	40 cu yds	\$80/cu yd	3,200
New roadway	50 LF	\$65/LF	3,250
Traffic control	1 job	lump sum	2,000
		Subtotal	<u>\$25,775</u>
	10% contingency		2,525
		Total	<u>\$28,300</u>

Construction cost	\$28,300
Engr services & project admin	
20% of constr cost	<u>5,700</u>
Total installation cost	<u>\$34,000</u>

Average annual cost	2,930
O&M	<u>430</u>
Total annual cost	<u>\$ 3,360</u>

APPENDIX D  
 LAKE CREEK & TRIBUTARIES WATERSHED  
 AT JOHNSTON CITY  
 FLOODPLAIN MANAGEMENT STUDY  
 TRIB. "B" Add Culvert @ Benton Av - ALTERNATIVE G  
 (5' dia CMP 70' long)  
 COST ESTIMATE

ITEM	QUANTITY	UNIT PRICE	TOTAL PRICE
Structural excavation	250 cu yds	\$10/cu yd	\$ 2,500
Structural backfill	220 cu yds	\$10/cu yd	2,200
5' dia CMP	70 LF	\$85/LF	5,950
Riprap	50 cu yds	\$80/cu yd	4,000
New roadway	50 LF	\$65/LF	3,250
Traffic control	1 job	lump sum	2,000
		Subtotal	<u>\$19,900</u>
	10% contingency		2,000
		Total	<u>\$21,900</u>

Construction cost	\$21,900
Engr services & project admin	
20% of constr cost	<u>4,400</u>
Total installation cost	<u>\$26,300</u>

Average annual cost (.08627)	2,270
O&M	<u>420</u>
Total annual cost	<u>\$ 2,690</u>



Group #1 : 1A to 23 (House Numbers)

Group #2 : 24 to 29

and 75, 76

Group #3 : 30 to 51

Group #4 : 53 to 64

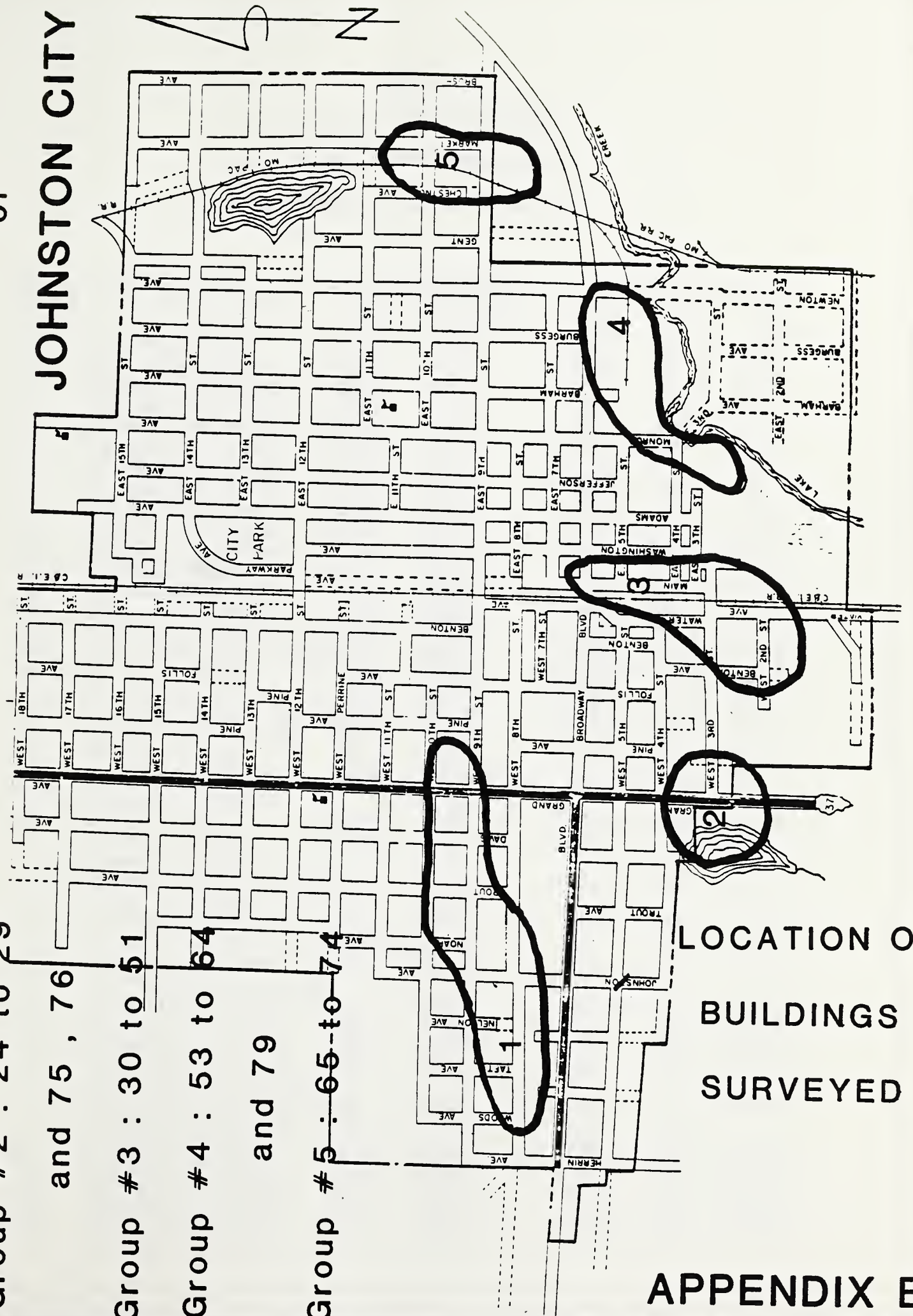
and 79

Group #5 : 65 to 74

Street Map

of

JOHNSTON CITY



LOCATION OF  
BUILDINGS  
SURVEYED

APPENDIX E



## APPENDIX F

## LAKE CREEK AND TRIBUTARIES

## FLOODPLAIN MANAGEMENT STUDY

## BUILDING AND FLOOD WATER ELEVATIONS

Building Identification Eval #	Address/Description	Building Elevation		Flood water Elevation		
		First Floor	Low Water Entry	10% Chance	1% Chance	0.2% Chance
1A	516 Broadway Blvd	403.4	403.4	403.0	403.7	404.5
2A	402 Broadway Blvd	403.8	403.8	402.3	403.3	404.3
3	602 West 8th Street	409.6	409.6	406.1	406.9	407.3
4	713 West 8th Street	409.8	408.5	408.3	408.9	409.0
4A	713 West 8th Street	408.5	408.5	408.3	408.9	409.0
5	716 West 8th Street	410.7	410.7	408.4	409.1	409.2
7	717 West 9th Street	412.6	412.6	409.6	410.6	410.9
7A	717 West 9th Street	411.0	411.0	409.6	410.6	410.9
8	713 West 9th Street	413.5	413.5	409.6	410.6	410.9
9	905 West 9th Street	414.5	414.5	413.4	414.3	414.7
9A	905 West 9th Street	414.1	414.1	413.4	414.3	414.7
10	903 Noah Street	412.4	412.4	413.8	414.2	414.6
11	904 Noah Street	415.0	415.0	412.8	414.0	414.5
12A	906 West 9th Street	413.6	413.6	414.4	414.6	414.9
14A	907 Trout & 9th Street	415.0	415.0	414.6	415.2	415.4
15A	Trout St(NE corner 10th)	417.5	417.5	416.6	417.0	417.2
16	905 Trout Street	419.5	419.5	416.6	417.0	417.2
17A	Trout St(1st E of 16)	416.7	416.7	417.1	417.4	417.5
18A	Trout St(2nd E of 16)	416.8	416.8	417.2	417.5	417.7
19A	Trout St(1st E of 20)	416.8	416.8	417.2	417.5	417.7
20	903 Trout Street	418.1	418.1	417.2	417.5	417.7
21	1st bldg W of Hwy 37 on S side of 10th	423.0	423.0	420.7	421.0	421.2
21A	Garage for #21	419.7	419.7	420.7	421.0	421.2
22	Laundry on Hwy 37 between 9th & 10th	424.8	424.8	424.0	425.1	425.2
23	Grocery Store SE corner of Hwy 37 & 10th	424.6	424.6	424.0	425.1	425.2
24	Trailer W of motel W side of Hwy 37, S of corporate limits	400.9	400.9	401.2	402.2	402.8
25	South unit of motel (S of corporate limits)	399.7	399.7	401.2	402.2	402.8
26	Ctr unit Motel Grand Av	399.7	399.7	401.2	402.2	402.8
27	North unit of motel	400.1	400.1	401.2	402.2	402.8
27A	Garage back of motel	398.5	398.5	401.2	402.2	402.8
28	Restaurant E side of Hwy 37 across from motel	400.5	400.5	402.7	403.3	403.7
29	Service Station N of restaurant E side of Hwy 37	400.5	400.5	402.7	403.3	403.7
75	713 West 4th Street	403.6	403.6	400.5	402.3	402.8
76A	713 West 4th Street	401.5	401.5	400.5	402.3	402.8
30A	402 West 2nd Street	408.4	408.4	402.2	403.3	403.7
31	206 West 2nd Street	404.7	404.7	402.4	403.5	403.9
31A	206 West 2nd Street	404.7	404.7	402.4	403.5	403.9

## APPENDIX F

## LAKE CREEK AND TRIBUTARIES

## FLOODPLAIN MANAGEMENT STUDY

## BUILDING AND FLOOD WATER ELEVATIONS

Building Identification Eval #	Address/Description	Building Elevation		Flood water Elevation		
		First Floor	Low Water Entry	10% Chance	1% Chance	0.2% Chance
32	204 West 2nd Street	410.9	410.9	402.4	403.5	403.9
33	202 West Benton	407.3	407.3	402.5	403.6	404.0
33A	202 West Benton	404.7	404.7	402.5	403.6	404.0
34	204 West Benton	405.3	405.3	403.1	404.1	404.3
35	207 West 3rd Street	405.9	405.9	403.0	404.0	404.3
35A	207 West 3rd Street	403.6	403.6	403.0	404.0	404.3
36	205 West 3rd Street	406.7	406.7	403.1	404.1	404.3
36A	205 West 3rd Street	403.6	403.6	403.9	404.4	404.6
37	203 West 3rd Street	405.2	405.2	403.7	404.7	404.9
37A	203 West 3rd Street	403.6	403.6	404.1	404.6	404.8
38A	203 West 3rd Street	404.9	404.9	405.5	405.7	405.8
39	200 West 3rd Street	406.9	406.9	405.5	405.9	406.0
40	108 Benton Street	407.0	407.0	405.6	406.1	406.2
41	207 Benton Street	408.4	408.4	405.5	405.7	405.8
41A	207 Benton Street	406.7	406.7	405.5	405.7	405.8
42	211 Benton Street	406.3	406.3	405.5	405.7	405.8
43	107 West 3rd Street	406.8	406.8	405.5	405.7	405.8
44	106 West 3rd Street	405.7	405.7	405.5	405.9	406.0
45	104 West 3rd Street	406.3	406.3	405.5	405.9	406.0
46	Bank W of RR;N side of Broadway	418.0	415.4	413.8	414.9	415.6
47	Feed Store E of RR; N of 7th Street	415.7	415.7	414.8	415.9	416.5
48	102 Water Street	407.6	407.6	403.5	405.3	405.7
49	106 Water Street	407.6	407.6	403.7	405.5	405.9
50	1st house N of #48	406.4	406.4	403.6	405.4	405.8
51	2nd house N of #48	407.4	407.4	403.7	405.5	405.9
53	317 South Monroe Street	409.0	409.0	406.0	408.1	408.8
54	407 South Monroe Street	409.9	409.9	406.4	408.5	409.2
55	615 Broadway Blvd	412.3	412.3	407.9	410.2	411.0
79	613 Broadway Blvd	412.5	410.5	407.8	410.1	410.9
56	617 Broadway Blvd	412.1	412.1	408.0	410.3	410.8
57	619 Broadway Blvd	410.8	410.8	408.1	410.4	410.8
57A	619 Broadway Blvd	409.7	409.7	407.6	409.9	410.7
58	621 Broadway Blvd	412.0	412.0	407.9	410.1	410.9
59	625 Broadway Blvd	412.0	412.0	408.0	410.2	411.0
60	3rd bldg S of Broadway W side of Newton St	410.7	410.7	407.8	410.0	410.8
61	Furniture Store N of #60	411.0	411.0	407.8	410.0	410.8
62	Bldg on SW corner of Broadway Blvd & Newton St	412.0	412.0	407.8	410.0	410.8



APPENDIX F  
 LAKE CREEK AND TRIBUTARIES  
 FLOODPLAIN MANAGEMENT STUDY  
 BUILDING AND FLOOD WATER ELEVATIONS

Building Identification Eval #	Address/Description	Building Elevation		Flood water Elevation		
		First Floor	Low Water Entry	10% Chance	1% Chance	0.2% Chance
63	Garage on SE corner of Broadway Blvd & Newton St	410.7	410.7	408.0	410.3	411.1
64	Residence on NE corner Broadway Blvd & Newton St	412.3	412.3	408.0	410.3	411.1
64A	Garage at residence #64	410.8	410.8	408.2	410.5	411.3
65	906 9th & Market Street	414.5	414.5	411.3	412.3	412.5
66	908 Market Street	414.5	414.5	412.6	413.1	413.2
66A	908 Market Street	411.4	411.4	412.6	413.1	413.2
67	910 Market Street	415.2	415.2	412.9	413.5	413.6
68	915 Market Street	415.9	415.9	413.0	413.6	413.7
68A	915 Market Street	414.7	414.7	413.0	413.6	413.7
69	912 10th Street	415.4	415.4	413.5	413.9	413.9
70	1003 Market Street	416.0	416.0	414.5	415.1	415.3
71	1004 Market Street	416.5	416.5	414.5	415.1	415.3
72	1008 Market Street	416.4	415.0	414.3	414.9	415.1
72A	1008 Market Street	415.0	415.0	414.3	414.9	415.1
73	1012 Market Street	416.5	416.5	414.5	415.1	415.3
74	1005 Market Street	416.5	416.5	414.6	415.2	415.4
69A	912 10th Street	411.4	411.4	413.2	413.6	413.7

ENG5:4



## APPENDIX G INVESTIGATIONS AND ANALYSIS

### Surveys and Mapping

Hydraulic surveys were performed by the State of Illinois, Department of Transportation, Division of Water Resources (DWR) as part of its contribution as co-sponsors of this study. These surveys included valley cross sections and centerline of roads along with bridge and culvert dimensions for use in analyzing hydraulic characteristics. The SCS obtained first floor and low water entry elevations for 91 residences, businesses and related structures for use in the flood damage analysis.

Detailed topographic maps prepared by DWR in 1980 with 1 inch = 200 feet scale and 2 foot contour interval were used for the initial evaluation of the floodprone areas. In 1985, DWR provided reduced prints of these maps for inclusion in the Lake Creek report. These final maps are printed at a scale of 1 inch = 400 feet. The topographic maps were used as base maps for alternative evaluation, economic evaluation, expanded basic data, and preparation of floodplain and floodway maps included in this report.

### Hydrology

Hydrologic modeling for this study was completed through the use of the SCS Computer Program for Project Formulation (Technical Release 20, Reference 7). This program is an advanced hydrologic model which simulates flood stages and discharges. The stages and discharges are related to watershed characteristics such as drainage area, hydrologic soil group, land use and cover, time of concentration, and channel and floodplain hydraulic characteristics. Given these characteristics and rainfall amounts, the model will develop hydrographs for local drainage areas and perform a specified series of channel and reservoir routings as well as hydrograph additions. The result is peak discharges, hydrograph shape, and runoff volumes at specified locations throughout the watershed.

The present and future runoff conditions are expected to be the same. Local residents and planning officials do not see a change in land use in the foreseeable future.

The SCS Type 2 storm distribution with 24 hour rainfall values as presented in Technical Paper 40, US Department of Commerce-Weather Bureau, May 1961, was used in the TR-20 model. It was necessary to prepare one TR-20 evaluation without the Johnston City Reservoir, to assure proper calibration of the hydrologic model. The following table summarizes the results of the TR-20 evaluation by frequency at various locations in the watershed.

SUMMARY OF PEAK DISCHARGES  
LAKE CREEK & TRIBUTARIES  
WILLIAMSON COUNTY, ILLINOIS

Name of Stream	Location	Drainage Area (sq mi)	Peak Discharges			
			10yr cfs	50yr cfs	100yr cfs	500yr cfs
Lake Creek	NW1/4 NW1/4 Sec 23 Broadway Blvd 1mi W Johnston City	25.6	2070	3160	3780	5260
Lake Creek	NW1/4 NW1/4 Sec 24 Herrin Av S of Johnston City	18.2	1830	3150	3650	4900
Lake Creek	NE1/4 NE1/4 Sec 19 County Road E of Johnston City	13.6	1880	3320	3950	5270
Tributary A	SE1/4 SE1/4 Sec 14 at Valley Section 1730A	0.6	200	250	265	300
Tributary A	SE1/4 SW1/4 Sec 14 at Valley Sec 4150A	0.3	340	465	500	600
Tributary B	NE1/4 Sec 24 at Hwy 37	0.4	220	300	330	400
Tributary B	NW1/4 NW1/4 Sec 19 at Valley Sec 6300B	0.2	120	160	170	200
Shakerag Trib	W1/4 NE1/4 Sec 19 at Broadway Blvd	0.5	320	450	495	600
Shakerag Trib	SW1/4 SW1/4 Sec 18 at 14th Street	0.3	270	370	400	490

An evaluation was made of the importance of the Johnston City Reservoir for controlling floods on Lake Creek. It is estimated that at Herrin Avenue, the 100 year peak without the reservoir would be 5130 cfs instead of the 3650 cfs we used in this study. The 10 year peak at Herrin would be 2700 cfs instead of 1830 cfs. This illustrates the impact the existing reservoir has on the depth and frequency of flooding at the businesses along Highway 37.

The flood discharges were certified in accordance with the state Floodplain Study Review Procedure. The review was conducted by the Illinois State Water Survey with certification by the Illinois Division of Water Resources.

### Hydraulics

An analysis of the hydraulic characteristics of the creek was carried out to provide stage estimates for floods of selected recurrence intervals. The water surface elevations (stages) were established utilizing the physical characteristics of the channel including channel size and shape, floodplain size and shape, bridge sizes and shapes, and estimates of Manning's roughness coefficients. The hydraulic computations were made using the SCS Hydraulic Model WSP-2 (Technical Release 61, Reference 8). This model employed the standard step method for backwater profiles which is a computational procedure that estimates total energy at each stream cross section accounting for friction losses between sections. The bridge effects on stream hydraulics were accounted for using the Bureau of Public Roads Method. The bridge method, which is included in WSP-2, was formulated using the principle of conservation of energy. The model employs this principle between the point of maximum backwater upstream from the bridge and a point downstream from the bridge at which normal stage has been established. Culverts were also evaluated using the principle of conservation of energy and depth of headwater and tailwater, the barrel shape and dimensions, type of inlet, and shape of headwall.

The hydraulic model requires the input of peak discharges in addition to the physical characteristics listed above. The peaks were taken from the hydrologic model at appropriate locations. Starting configuration was based on the estimated water surface slope 6000 feet downstream of Interstate 57. The starting slope used was 0.005 feet/feet. Manning's roughness coefficients were estimated on the basis of field observations using the SCS procedures (Reference 10). All elevations are National Geodetic Vertical Datum.

The floodway was determined for the studied reach on Lake Creek, Tributary A, Tributary B and Shakerag Tributary. It was computed on the basis of equal conveyance reduction from each side of the floodplain using the SCS Floodway Computer Program (Technical Release 64, Reference 9).

### Flood Damage Analysis

The economic data for floodwater damages for this study was gathered by personal interviews with floodplain residents during the summer of 1985. Data regarding damages to personal property, business property, loss of income, and the effects of flooding to safety and health was gathered. The final economic evaluation of personal property losses from floodwater was done by use of the Urban Floodwater Damage Economic Evaluation program (URB 1, Reference 13).

Properties within the floodplain were classified by major type that included basement structures, slab on grade, bi-level, tri-level, apartment, commercial and industrial. Engineering surveys were conducted to determine low water entry point, basement elevation and first floor elevations for each property. Coefficient damage curves published by the Federal Insurance Administration (FIA) and from the other urban studies were used in the URB 1 program to compute damages for each property. The coefficient damage curves represent percent damage factors by flood depth for buildings and contents of respective houses or other types of buildings. The URB 1 program locates each property based upon surveyed location and computes damages based upon frequency and depth of flooding related to the damage factors for that respective property.

HIGHWAY 37 - FLOODING DATA  
LAKE CREEK FLOODPLAIN MANAGEMENT STUDY

EVALUATION CONDITION		Frequency of Flood					
		2 yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Present Runoff Alternative A	Flood Elev	401.4	402.1	402.25	402.45	402.75	402.9
	Max Depth over Road (ft)	none	0.5	0.65	0.85	1.15	1.3
	Length overtopped	0	780	840	910	960	1010
Present Runoff with Dikes & raised road Alternative C	Flood elev	401.4	402.25	406.6	402.95	403.3	403.5
	Max depth over rd	none	0.55	0.9	1.25	1.4	1.8
	Length overtopped	0	200	300	375	480	900
	Increased Depth (ft) over road	0	0.05	0.25	0.40	0.35	0.50
Present Runoff with Dikes, raised road & lowered 450' to elev 402.0, additional culvert at LatB	Flood Elev	401.0	402.0	402.2	402.45	402.8	403.05
	Max Depth over	none	0.3	0.5	0.75	1.1	1.35
	Length overtopped	0	220	670	680	710	730
Alternative D	Increased over	0	-0.2	-0.15	-0.10	-0.05	0.05

The program lists the properties damaged for each alternative, and includes the following items for each property.

- a) damage to property (building) by each storm
- b) damage to contents by each storm
- c) sum of property (building) and contents damage by each storm
- d) sequence number listing of buildings
- e) frequency of each damaging storm in flood series
- f) total (building and contents) average annual damage for the property
- g) flood elevation for each damaging storm
- h) depth of flood in relation to first floor of building
- i) frequency damages begin
- j) computation of average annual damages for property and contents

Example of URB 1 output.

HOUSE NO. 146		STATION: 11000		(SECTION: C		STATION: 11260)		
CUF-DAMG: C								
PROPERTY DAMAGE	CONTENTS DAMAGE	PROPERTY & CONTENTS	PCT PROB	FLOOD ELEV	TO 1ST FLOOR	AVG. ANN. DAMAGE		
						PROPERTY	CONTENTS	TOTAL
80000	40000	120000	VAL			20	12	32
10169	5036	16207	0.2	605.80	0.40	16	10	26
C	C	C	0.5	605.50	0.10			
TOTAL AVE. ANN.						36	22	58

Interviews with floodplain residents indicated flooding of Illinois Highway 37 and Broadway Blvd right-of-way. These damages were not quantified as part of the study. Alternative D is the only alternative evaluated that will reduce right-of-way damages at Illinois Highway 37. None of the evaluated alternatives will increase damages to Broadway Blvd. The following table summarizes the impact of Alternative C and D on flooding of Highway 37.

The effects of floodwater damages were evaluated for present conditions and several structural alternatives.

All damage estimates were based upon current values (1985 price base). Damages from increased values of floodplain property due to expansion of existing facilities or the construction of new units were not evaluated.

Alternatives

This study was initiated following the floods of 1981 and 1983. The local people contacted the Illinois Division of Water Resources requesting that something be initiated to solve the problem. The information provided by the local people indicated the fact that the flooding in the area of Highway 37 was increasing. Both floods did significant damages to businesses located along Highway 37.

The steering committee that was formed to provide guidance for this study included representatives from the local sponsoring organizations as well as local citizens.

All of the alternatives were evaluated using a 100 year project life and a discount rate of 8 5/8%.







