Meetings Cy

FLOOD PLAIN INFORMATION

ASHLAND, NEBRASKA
SALT CREEK
WAHOO CREEK

PREPARED FOR
CITY OF ASHLAND STATE OF NEBRASKA

BY

DEPARTMENT OF THE ARMY, OMAHA DISTRICT, CORPS OF ENGINEERS, 68102

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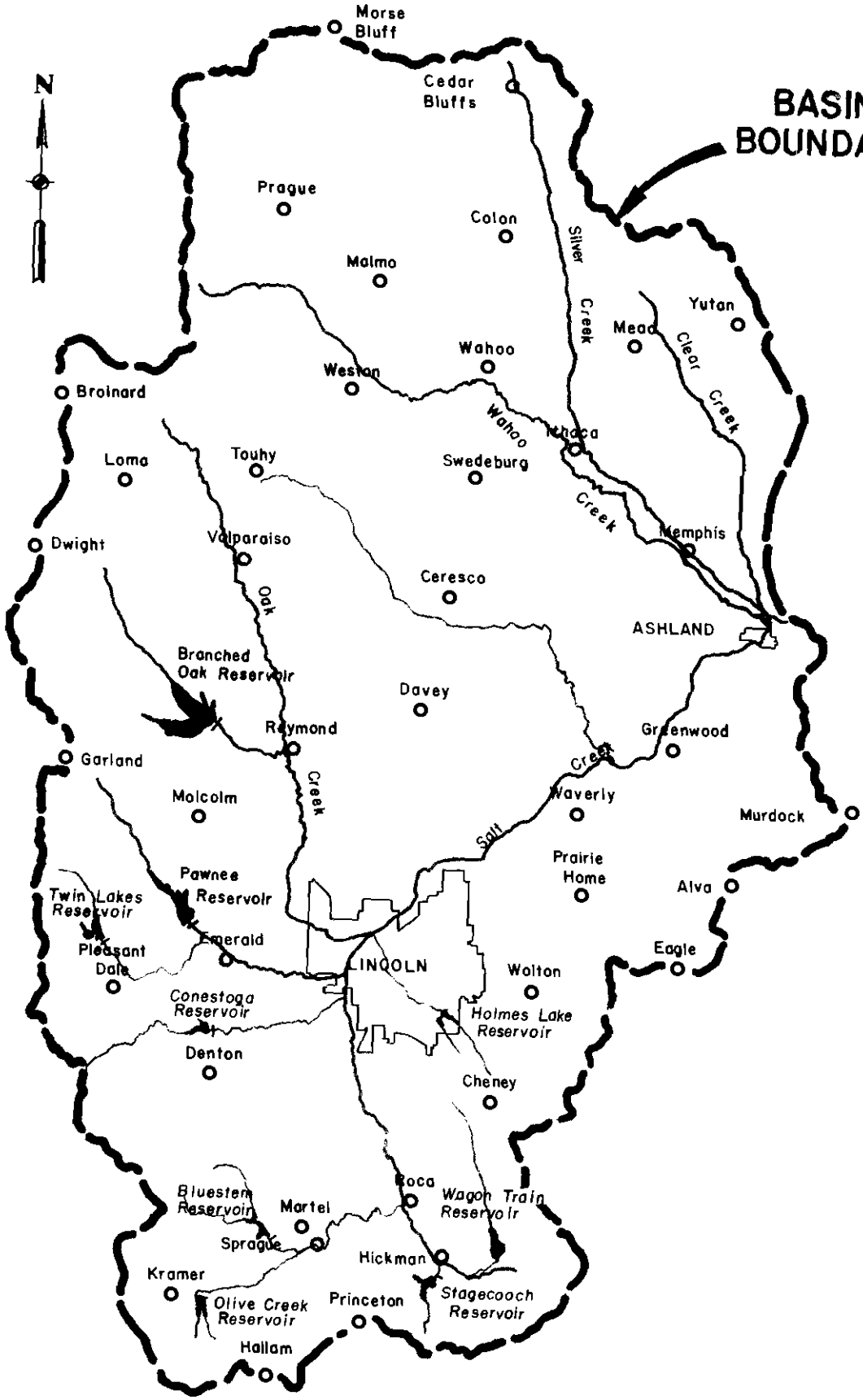

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PREFACE

This report describes the flood characteristics for Salt and Wahoo Creeks in the vicinity of Ashland, Nebraska. The areas subject to flooding by Salt and Wahoo Creeks include primarily residential, recreational, commercial and agricultural lands. Large floods have occurred along these streams in the past and even larger floods are possible in the future.

This report was prepared for the guidance of local officials in planning in the use and regulation of the flood plain. In addition to accounts of past flooding at Ashland, two potential floods are used to represent degrees of major flooding that may occur in the future. These two floods, Intermediate Regional and Standard Project Floods, are fully defined in the Glossary and should be given appropriate consideration in planning for safety of development in the flood plain. The two potential floods are shown by flooded area maps that delineate the approximate areas that would be inundated. Flood profiles show the water depths relative to the streambed and an elevation reference is given that can be applied across the width of the valley. Cross sections are presented to indicate ground level across the valley at specified locations and the overlying flood depths. The flood profiles and flooded area data presented are based on existing conditions of the basin, stream and valley when the report was prepared, and are reasonable indications of probable occurrences. Possible future improvements to control floods are not a consideration of this report. The information in this report does not imply any Federal interest or authority to zone or regulate use of the flood plains; this is a local responsibility. The report provides a suitable basis for the adoption of land use controls to guide flood plain development, with consideration for environmental attributes, and thereby prevent intensification of loss problems. Since it identifies flood problems, the report will stimulate the development of other flood damage reduction techniques such as flood control, removal of obstructions and flood-proofing, which might be used in an overall Flood Plain Management (FPM) program.

This report was provided by the Omaha District, Corps of Engineers, in accordance with the authority granted by Section 206 of the Flood Control Act of 1960 (Public Law 86-645) as amended. The study was requested by the city of Ashland and endorsed by the Nebraska Natural Resources Commission. DeWild Grant Reckert & Associates Company prepared the report under contract with the Omaha District.

The cooperation of local officials and private citizens in providing assistance and information was most helpful.

The Corps of Engineers will provide interpretation and technical assistance, if requested, in application of the report data. Other guidelines available from the Corps of Engineers are a pamphlet, "Guidelines for Reducing Flood Damages" and a booklet, "Introduction to Flood Proofing".

BACKGROUND INFORMATION

SETTLEMENT

The westward migration of people, livestock and vehicles across the Nebraska Platte River Valley contributed not only to the settlement of the western United States but left a legacy of courage, virtue and determination to following generations.

Nebraska was part of the great Louisiana Purchase consummated in 1803. In 1819, Major Stephen H. Long reported Nebraska unfit for cultivation and uninhabitable.

Numerous people, however, pushed across Nebraska with their eyes to the West. The Oregon Trail, which began at several points along the Missouri River, came together before reaching Saline Ford (Ashland) on Salt Creek, where the only known rock-bottomed ford lay to furnish a safe crossing for freight caravans. Many people used the ford during the 1840's in their push west. Several attempts were made to claim a town site at the ford but they proved unsuccessful until Joseph Stambaugh, his wife and three children arrived in August 1856. Reuben Warbritton, his wife, and John Aughe joined them, built homes and staked a townsite the following March.

Freighting became the first enterprise attributed to the residents of the town with the first business (a general store) starting with the completion of the first frame building in 1863. A mill, blacksmithshop and hotel followed in 1864. The 1860's and 1870's saw a bank, lumber yard, meat market, photograph gallery, wagon shop, road house and hardware stores added.

Ashland has developed into a predominantly agricultural community during the years following its conception as a pioneering village, supporting a number of locally oriented businesses and individual enterprises.[1]

THE STREAM AND ITS VALLEY

The Salt Creek basin is located in southeastern Nebraska and drains about 1,640 square miles near the mouth. Land use in the basin is predominantly agricultural. Salt Creek is a right bank tributary of the Platte River and has its origin south of Lincoln, Nebraska. Flowing in a northeasterly direction from Lincoln to Ashland, Salt Creek is joined on the left bank by Wahoo Creek and then turns southeast for a distance of three miles to the Platte River. Wahoo Creek drains approximately 511 square miles. Principal tributaries to Wahoo Creek which are pertinent to this report are Silver Creek and Clear Creek. They are both left bank tributaries and originate north of Ashland.

Average annual precipitation in the basin region is on the order of 28 inches per year. Elevations vary between 1,500 feet, mean sea level (m.s.l.) and 1,050 feet m.s.l. Average temperatures in the basin range from 78 degrees F. in the summer to less than 23 degrees F. in the winter.

A number of flood control dams have been built on Salt Creek tributaries which also provide recreational features. Major structures and reservoirs are shown on the Basin Map located facing the preface of this report.

[1]From THE FIRST 100 YEARS, published by the Centennial Committee of the Ashland Chamber of Commerce.

The Salt Creek study reach extends from a point 1.5 miles east of Ashland a distance of 5.2 miles in a southwesterly direction to a point 3.7 miles upstream of the city. The Wahoo Creek study reach extends from the confluence with Salt Creek, also east of Ashland, northwesterly approximately 5.7 miles into Section 27, T13N, R9E. Within the study reach Salt Creek slopes about 1.8 feet per mile and Wahoo Creek slopes about 3.4 feet per mile.

Salt and Wahoo Creeks within the study reach are bordered by pasture and crop lands. The banks are lined with brush and trees. Flood plain widths, channel widths and channel depths are shown in Tables 1 and 2.

TABLE 1
TYPICAL PHYSICAL DIMENSIONS[1/]
SALT CREEK

Location by Reference Point	Flood Plain Width, Feet	Channel Width, Feet	Channel Depth, Feet
U/S Limits to Pt 2	4,500	180	21
Pt 2 to Pt 3	5,800	180	21
Pt 3 to Pt 6	4,500	180	22
Pt 6 to Pt 11	1,500	170	20
Pt 11 to Pt 14	[2/]	200	19

[1/] These dimensions are approximate averages for the reaches described

[2/] Salt Creek, Wahoo Creek and the Platte River share a common flood plain

TABLE 2

TYPICAL PHYSICAL DIMENSIONS[1/]

WAHOO CREEK

Location by Reference Point	Flood Plain Width, Feet	Channel Width, Feet	Channel Depth, Feet
U/S limits to			
Pt 18	6,000	70	20
Pt 18 to Pt 21	6,200	90	18
Pt 21 to mouth	[2/]	110	17

[1/] These dimensions are approximate averages for the reaches described

[2/] Salt Creek, Wahoo Creek and the Platte River share a common flood plain

DEVELOPMENTS IN THE FLOOD PLAIN

The city of Ashland is situated along Salt Creek, approximately four creek miles west of the confluence with the Platte River. The primary business district of Ashland and a large portion of the residential area is located west and north of Salt Creek. The greater portion of these areas are at an elevation that precludes flood damage. Low lying areas in the vicinity of the 13th Street bridge and the Silver Street bridge are subjected to the greatest frequency of flooding and related damages. Major contributions to the flooding conditions north and east of town are made by Wahoo Creek and its tributaries, Silver and Clear Creeks, which join Salt Creek approximately one channel mile east of the town.

The Ashland economy, although based primarily on agriculture, includes benefits from the quarrying operations located east of the community. The Salt Creek flood plain is almost entirely under cultivation with the incorporated limits of Ashland and the area immediately adjacent to the creeks as the only exceptions. The quarrying activities located east of the city are not subject to flooding from Salt Creek.

The population of Ashland grew from 1,786 in 1930 to 2,176 in 1970. In that 40-year period the compound rate of growth was equivalent to 3 percent per year. The population statistics indicate the continuing trend for the urbanization of rural areas. Unless future developments in the flood plain are controlled, additional flood damages in Ashland could result. Figures 1 through 5 show photographs typical of conditions along Salt and Wahoo Creeks in the Ashland area.

Figure 1. Salt Creek through Ashland

Figure 2. Salt Creek improved channel looking downstream from west line of Section 10, T12N, R9E

Figure 3. Development near upstream limit of Wahoo Creek

Figure 4. Development near Wahoo Creek on Nebraska State Highway 63

Figure 5. Wahoo Creek channel looking east from Nebraska State Highway 63

FLOOD SITUATION

SOURCES OF DATA AND RECORDS

Flood peak stages and discharge quantities for the study reach were obtained from a gaging station maintained by the U. S. Geological Survey from 1947 through 1967. This station was located near the center of the Salt Creek channel on the downstream side of the pier of the U. S. Highway 6 bridge 1 mile east of Ashland, and 2½ miles upstream from the creek mouth. The basin drainage area at the gage location is approximately 1,640 square miles. This station was removed from service prior to the 1973 flood.

Information on past floods was obtained from Corps of Engineers flood records and from the Ashland Gazette, Lincoln Star, and Lincoln Nebraska Journal. Photographs in this report were obtained from the City Clerk, local residents and the Corps of Engineers' files.

Detailed channel and valley cross sections utilized in the preparation of this report were surveyed by the Nebraska Natural Resources Commission in 1974. Aerial photographs used in the report were provided by the Lower Platte South Natural Resources District. Topographical mapping utilized was in the form of quadrangle maps supplied by the U. S. Geological Survey.

FLOOD SEASON AND FLOOD CHARACTERISTICS

Major floods have occurred in the study reach during the months of March through October. These months coincide with periods of high rainfall, or rainfall combined with heavy snow melt as in the case of some March floods. Past floods may not be indicative of today's floods because of the control afforded by levees and upstream reservoirs

which have been installed within the last 25 years. The 7 July 1908 flood, the largest to strike the Ashland area, was caused by unusually large amounts of rainfall of high intensity.

FACTORS AFFECTING FLOODING AND ITS IMPACT

Obstructions to floodflows - Three highway bridges and three railroad bridges span Salt Creek, two highway bridges and two railroad bridges span Wahoo Creek, two highway bridges span Clear Creek and one highway bridge spans Silver Creek in the study reach. The degree of flood plain obstruction presented by each roadway depends upon such parameters as roadway embankment height, area of bridge opening, number of piers, elevation of the bridge and number of bridges.

The railroad embankments in the flood plain near Ashland are quite high with fairly large bridge openings. The railroad bridges are high enough to allow smaller floods to pass with constriction caused only by abutments and pilings, however, the railroad embankments will represent a major obstruction to larger floods.

Highways in the Ashland area do not extend appreciably above the surrounding flood plain. However, highway bridges with smaller openings will represent a major obstruction to lower floods. Larger floods will completely submerge the roads and cross them with little head loss.

Floating debris can collect at bridges raising upstream water levels. Prediction of the degree or location of the accumulated debris is impossible; therefore, for the purposes of this report, it was necessary to assume that there would be no accumulation of debris to clog any of the bridge openings. During floods, trees, brush and other

vegetation growing in floodways impede flood flows, thus creating backwater and increased flood heights. The degree of overbank flow obstruction due to vegetation and buildings in the flood plain was considered in the hydraulic computations.

Flood damage reduction measures - Levees have been constructed along the left bank of Salt Creek at the 13th Street bridge and along both upstream and downstream banks at the Silver Street bridge. The left bank levee begins at 15th Street extended south and ends approximately 2,500 feet north and east of the Silver Street bridge. The right bank levee extends from the railroad embankment approximately 1,000 feet south of Silver Street and continues north and east from Silver Street for a distance of 2,000 feet. A number of reservoirs have been constructed in the upper reaches of the Salt Creek basin. These reservoirs lessen the downstream flow because of their storage capacity. The size and configuration of the drainage basin allows adequate flood warning to the Ashland area; however, slow response by residents of the flood plain to warnings of potential flooding could add to flood damages and flood hazards.

Other factors and their impacts - Salt Creek and the Platte River share a common flood plain near the juncture of the two streams. The common flood plain can be flooded by either stream or a combination of both streams. A future large flood on Salt or Wahoo Creeks should involve the community in emergency flood fighting steps at the earliest possible warning. Warning of a coming flood makes orderly evacuation possible and allows for some damageable material to be removed from flood hazard areas. A plan for emergency action is necessary to establish lines of authority and areas of responsibility and to insure that vital equipment and supplies will not be lacking. During a flood, floatable material in the flood plain can create problems by blocking stream flow at constricted openings such as bridges.

Flood warning and forecasting - The city of Ashland relies on telephone communication from upstream in the Salt Creek basin for information on storms and resultant high stream flows. The City officials at Lincoln, Nebraska are one such source of information.

Flood fighting and emergency evacuation plans - Although no formal emergency flood action plan exists at Ashland, the area residents, under direction of police, fire department and local officials, combine to form a volunteer force which functions to build sandbag dikes at known points of flooding, monitor the condition of levees and carry out necessary evacuation procedures.

Material storage on the flood plain - Often floatable material stored on the flood plain is washed away during flooding and collects at points downstream impeding flood flows. Since Salt Creek and its tributaries drain predominantly agricultural lands, they are relatively free of such materials; therefore any debris problem is expected to be contributed by natural sources.

PAST FLOODS

SUMMARY OF HISTORICAL FLOODS

Notable floods on Salt Creek and its tributaries in the study reach occurred in 1881, 1908, 1947, 1948, 1949, 1951, 1958, 1960, 1963 and 1973. The largest floods occurred in 1908, 1951 and 1963. No discharge records are available for the 1908 flood, however, local residents compared it with the 1951 flood when the peak discharge was 46,200 cubic feet per second downstream from the mouth of Wahoo Creek. The 1963 flood on Wahoo Creek produced a peak discharge of 77,400 cubic feet per second at Ithaca, Nebraska.

FLOOD RECORDS

Annual peak flows for Salt Creek and its tributaries near Ashland are available from U. S. Geological Survey records. Discharge records for the U.S.G.S. Gaging Station at Ashland are available starting in 1947 and continuing through 1967 when this station was removed from service. Additional records for Wahoo Creek are available from the Lower Platte South Natural Resources District office in Lincoln, Nebraska and from the U.S. Geological Survey.

Local newspapers and Corps of Engineers flood reports contain narrative accounts of past floods. Table 3 shows flood peak discharges for Salt Creek at Ashland and is indicative of peak flows in the study reach. Table 4 shows flood peak discharges on Salt Creek near Greenwood, Nebraska, and Table 5 shows flood peak discharges on Wahoo Creek near Ithaca, Nebraska. Since 1967, flows have been partially regulated by reservoirs located upstream from Ashland.

TABLE 3

HISTORIC FLOOD PEAK DISCHARGES

SALT CREEK NEAR ASHLAND, NEBRASKA[1]/

Date, Year	Elevation Above Mean Sea Level (MSL)	Maximum Discharge - cfs Ashland Gaging Station
7 July 1908	1068.25	-- (discharge not available)
2/		
13 June 1947	1062.17	21,000
19 March 1948	1060.47	20,100
6 March 1949	1061.18	26,100
2 June 1951	1061.76	46,200
11 July 1958	1059.76	21,600
29 March 1960	1060.01	23,100
25 June 1963	1061.86	87,000
17 June 1964	1060.20	23,700
29 June 1965	1059.24	23,400
21 June 1967	1059.29	21,600

1/ Data taken from the U. S. Geological Survey gaging station located one mile east of Ashland at U. S. Highway 6.

2/ Records not available from 1909 through 1947 and after 1967 when the gage was discontinued.

TABLE 4

HISTORIC FLOOD PEAK DISCHARGES

SALT CREEK NEAR GREENWOOD, NEBRASKA[1/2/]

Date, Year	Elevation Above Mean Sea Level (MSL)	Maximum Discharge - cfs Greenwood Gaging Station
28 March 1960	1088.14	26,400
24 June 1963	1091.60	41,000
17 June 1964	1090.33	34,200
22 May 1965	1088.04	26,000
7 June 1967	1087.53	24,400
11 October 1974	1091.64	39,400

1/ Data taken from the U.S. Geological Survey gaging station located one-half mile west of Greenwood, Nebraska.

2/ Records available from November 1951 to date.

TABLE 5

HISTORIC FLOOD PEAK DISCHARGES

WAHOO CREEK NEAR ITHACA, NEBRASKA[1/2/]

Date, Year	Elevation Above Mean Sea Level (MSL)	Maximum Discharge - cfs Ithaca Gaging Station
31 May 1951	1132.82	18,900
2 August 1959	1133.70	45,300
24 June 1963	1133.41	77,400 *
15 June 1964	1132.36	13,800
17 June 1964	1132.47	15,400
9 June 1967	1132.28	12,500

1/ Data taken from the U.S. Geological Survey gaging station located one-half mile south of Ithaca on State Highway 63.

2/ Records available from October 1949 to date.

FLOOD DESCRIPTIONS

7 July 1908 - Heavy, high intensity rains caused the worst flooding in the Ashland area residents memory. The 1908 flood not only caused great damage to houses and bridges in the Ashland vicinity, but also took a life, that of W. P. Snell. This flood also produced a hero, a youth named Guy Hooker, who saved many lives with his small boat and tireless efforts.

Worst Flood In Local History

Hundreds of Dollars' Worth of Property Destroyed on Salt Creek Bottoms in Ashland Precinct.

Flood Claimed But One Victim

W. P. Snell, a Resident of the Town Since 1865, Drowned in Trying to Save His Chickens.

RELIEF EXTENDED TO THE NEEDY

Heroic Rescues of Imperiled Inhabitants Performed by Many, Guy Hooker Taking the Lead With His Boat on the North Side of the Creek and a Sailor on the Opposite Side.

July 7, 1908, will stand out in local history as the time of the most destructive flood that ever visited this section of the country. All Sunday night the flood gates of the heavens were opened, and the rain came down in sheets. By Monday morning reports from Lincoln stated that the greatest volume of water ever known had fallen in that locality. Similar reports came from Rock creek, the Wahoo and all of the small tributaries that center at Ashland.Warnings came from Lincoln to prepare for the flood, as it would be the most severe ever known in the history of Salt creek.

It is impossible to form an accurate estimate of the losses. The whole of Salt Creek valley is one scene of desolation, so ar as the crops are concerned. There is scarcely a bridge standing on the stream. The new bridge on Silver street, in process of erection, lies in the bed of the creek. The loss to the Canton Bridge Company will probably be nearly total. The Third street bridge just above the dam is also gone. The only place where crossing will be possible for many weeks to come is the old Main street bridge which will be practically discarded when the new Silver street bridge is completed.

The height of the flood is without a parallel in the history of Ashland. It was fully two feet higher than the memorable flood of March, 1881, and three and a half feet higher than in May, 1903. W. B. Roberts, who has lived in the vicinity southeastof Ashland for forty-four years, said he never saw anything to approach it for severity.

The rainfall at this place, according to the gauge kept by Dr. Mansfelde, was 2.70 inches. It was much heavier up the creek, at Lincoln the report being 5 inches. All along Rock creek and the Calahan it was also much heavier than here.

ASHLAND GAZETTE - JUNE 11, 1947

SALT CREEK FLOODED FARMS AND RESIDENCES

Went On Rampage Thursday; Was Highest Since 1908; Other Creeks Not Flooded

Salt Creek went on a rampage last Wednesday night and flood waters inundated several thousand acres of adjoining farm land. The flood reached its peak early Thursday afternoon, and about 10 blocks of Ashland residential properties located in the low area west of the creek were several feet under water at one time. This water came from a break in the dike some distance west of the south Salt Creek bridge on the highway cutoff to Lincoln. The actual rainfall in Ashland was not heavy, about 1.70 inches, but the water came from cloudbursts west of Lincoln. Fortunately Wahoo and Silver creeks did not flood, except in isolated spots, and their waters did not add to the heavy damage toll.

The equally large residential area east of Salt Creek, toward the Burlington depot, did not flood even though the stream and backwaters were many feet above the homes. The long dike back of the Clyde Smith residence on Silver street was saved through heroic efforts of city, power company employees and residents who kept a night long vigil. As the water continued to raise Thursday they started throwing sandbags in the low spots, where the water tried to lap over. At times there were fifteen to twenty men working to hold back the flood, and their efforts were well rewarded as this entire area was kept dry. The sandbags can still be seen along the top of the dike. The same kind of barrier on the west side of the creek would have protected those unfortunate residents.

Thursday morning water started pouring over the pavement at the west approach to the Salt creek bridge, and by noon all traffic had been blocked off at the order of Mayor O. J. Lohr. The highway cut-off to Lincoln was covered for more than a block, and traffic was likewise blocked in this direction.

From the high point of ground at the Bob Cooper farm west of town, water could be seen extending over hundreds of acres of rich bottom land, most of which had been planted to corn. The road going west of Coopers was completely blocked by water at the foot of the hill. The John Weaver farm out on highway No. 6 was inundated and there was about six inches of water in the house.

A panoramic view of the flooded residential area could be obtained from the corner of the small city park. The band shell, almost directly in front, was under five feet of water which rushed across Silver street in a raging torrent. To the south was a lake as far as the eye could reach.

Al Ulstrup said that the water was four feet deep in his home. It has never been higher since 1908, and in 1942 the water came up about two feet at his place. The Julius Olesen home across Silver street was at one time surrounded by water, but it didn't get into the house.

ASHLAND GAZETTE- JUNE 18, 1947

SECOND FLOOD IN WEEK WAS HIGHEST SINCE 1908

Flood of June 12-13 Followed June 5 Inundation; Homes on Both Sides of Creek Under Water; All Creeks Added to 40-Year High Mark

The most disastrous flood in the Ashland area since 1908 started Thursday morning and continued through Friday, reaching its crest between 10 a.m. and 12 noon Friday, June 13. From that time it began receding gradually and then more rapidly until next morning Salt Creek was back within its banks. The farm area and highway No. 63 north of town receded later Saturday morning.

The flood followed within a week the one of June 5, and several factors contributed to its near record height. Salt creek was again swollen by heavy rains near Lincoln, and this time Rock creek was out of its banks adding more water to the Salt Creek flood. Wahoo and Clear creeks, which empty into Salt Creek below Ashland were also at flood stage from heavy rains toward Wahoo. The crest of all these streams converged on Ashland about the same time. At its peak the flood was within inches of the 1908 record at several points. Others who were living here at that time claimed that it went above the previous record. The peak seems to vary according to location, presence of dikes and other factors but in most cases older residents said that it did not exceed the 1908 mark.

Early Thursday morning Salt Creek was running bank full. With better than two inches of rainfall here; an equal or greater amount in the Lincoln area, and more to come.

From the high point of ground on highway No. 6 there was a sea of water to the southwest as far as the horizon. Hundreds of spectators gathered at vantage points on both sides of the creek to watch the surging waters. The "lake" north of town extended over many acres, and the water continued in a giant horseshoe around Ashland until it crossed the road west of the Bob Cooper farm which is southwest of the city. Salt Creek valley was flooded from above Lincoln to the Platte river.

Water flowed in a stream across the football field toward the northeast corner, and then poured in a roaring torrent across the road and swirled around the home occupied by Mrs Raymond Campbell at the edge of the old city park. The Legion ball diamond was completely covered. The Julius Olesen garage was battered by force of the rushing water but remained on its foundation. They moved out Thursday evening, even though the water at its crest did not get into the house. About six inches of water flooded the Olesen home in 1908. However, the water reached as far up the hill as Harold Alley's place, owned by Al Ulstrup, the first house west of Olesens. At Clyde Smith's on the far east end of the flooded residential area the water came up on the front porch to the door sill, but did not get into the house. This was the highest since he had lived there. Homes between these two points had from two to eight feet of water inside, and some were badly damaged.

The first water went across Silver street near the Al Ulstrup and Julius Olesen homes about 5 p.m. Thursday. From then on it rose steadily for the next 19 hours.

At the very heighth of the flood, water reached to within 2½ boards of the bandshell windows and was five steps from the top of the slippery slide in the small city park. Highway No. 63 north of

(Continued)

June 18, 1947 (continued)

town was closed late Thursday afternoon. The water eventually reached as high as the windows on the Rischel filling station at the north end of 14th street. The cut-off toward Lincoln was closed at 2 p.m. Thursday, and by evening highway No. 104 toward Ceresco was the only main road open out of Ashland.

Meanwhile crews of men, including the volunteer firemen and others, worked steadily to save the dike back of the Clyde Smith residence on east Silver street. Water seeped through underneath the dike aboutt 11 p.m. and the fight was given up. The break came shortly afterwards and by 1:30 a.m. Friday the residential area east of the creek, which had been saved the week before, was under several feet of water. Salt creek bridge on Silver remained an isolated island between the two bodies of water.

The National Guard camp east of Ashland was conpletely inundated. Phillip Paguio said that water stood 12 inches deep in the caretakers house. They were moved out by army trucks Friday morning, but were able to get back in Saturday. He is faced with the task of cleaning out mud up to 18 inches deep in most of the buildings.

ASHLAND GAZETTE- JUNE 7, 1951

Floods of June 1 and 2, 1951 Have Set New Records In Ashland Area

Is Highest North Of Town, Ithaca And at Memphis

Flooding At Ashland Is Worst In 43 Years

Ashland community is again digging out and surveying the damages of another ravaging flood.North of town the June 1 and 2, 1951, rampage must go down as the worst on record. There it reached homes that have never before been flooded. Wahoo creek was the main offender.

In Ashland, Salt Creek behaved through the early stages of the flood and then let loose about 5 a.m. Saturday with a blow that staggered the town. The crest was higher than anything in the last 43 years and there are those who question whether the flood of 1908 was any worse. This matters rests with the old timers whose opinions are divided.

It all began early last Thursday with torrential rains in the vicinity of Schuyler, David City and Wahoo. By Thursday afternoon Wahoo creek had completely isolated the Saunders county seat. Cottonwood and Sand creeks had added their burden of water all of which came surging toward Ithaca, which was hard hit by the north flood as noted elsewhere.

All day Friday the weather was threatening and it began raining late in the afternoon. Salt Creek was running bank full and had spilled over at only the lowest spots. In the early evening debris jammed up on the Silver street bridge and the county dragline was brought in to help break it loose. Between 7 and 8 p.m. the skies let loose with a deluge of rain that varied from 2 to 4 inches between here and above Lincoln.

The county dragline could be seen pulling huge trees, poles and debris from alongside the Silver street bridge. The eerie rays of searchlights shown through the steady rain. Lightning and thunder rolled overhead as though giving warning of disaster to come.

Between 3 and 4 a.m. there was hint of impending trouble. The Salt Creek water began rising rapidly. The dragline had cleared the Silver street bridge and was working on south 13th bridge when it was moved back to higher ground. The water came onto the bridge floor and on up and up along the city dikes. At 5 a.m. the fire alarm was again sounded. Firemen not already on duty responded to evacuate those who early felt safe enough to remain. There was another flurry of activity and those who started immediately were able to get nearly all their possessions to safety. A few refused to cooperate and got out with only the clothes on their back.

At the John Karloff home a mile and a quarter north of town water entered the house for the first time, and was about five inches deep on the floors. In 1908 it had covered one corner of the back porch but never before had gone inside.

Ashland Memorial stadium had water over the top of the first row of seats. One large light pole was washed out and another nearly pulled down. Small buildings and other debris floated across the football field or lodged at various nearby points. Most of the damage was to the field proper but it can be repaired.

At the Lowell Rutledge home north of town there was 4 and one half inches of water in the house for the first time. The next highest flood lacked 11 inches of reaching the floor.

The Clyde Smith home on east Silver street has never been flooded in 37 years and this time the water stood 24 inches deep in the dining room. Mr Smith said that in 1947 the house was surrounded by water but it did not get inside.

ASHLAND GAZETTE- June 27, 1963

Flood Hits City, One of Largest

It was as if the flood gates of heaven opened up on the southeastern part of Nebraska as Ashland received approximately 4.87 inches of rain, but suffered flood damage along Salt and Wahoo Creeks because of six to seven inch rains further up the two streams.

Salt Creek rose all day Monday and finally crested about 1:00 o'clock Tuesday afternoon. The Wahoo Creek crest hit the area Tuesday morning.

It was estimated that 96,000 acres were under water in Saunders county. In Ashland an estimated 3,000 sandbags and countless loads of sand was hauled from near Linoma Beach and later from the Ken Del Heights area as traffic over the Silver St. bridge became hazardous.

A Burlington railroad bridge one and a quarter miles north of town collapsed under the pressure of the surging water and served to relieve much of the pressure being exerted on the community.

LINCOLN JOURNAL OCTOBER 10, 1973

Storm Triggers Local Flooding

The early morning storm that dumped nearly five inches of rain Wednesday on some portions of Lancaster County already saturated by earlier storms triggered what local officials called predicable local flooding south of Lincoln.

The major problem Wednesday morning appeared to be near Roca, where Salt Creek on the west side of the town was 4.32 feet over flood stage, which is 15 feet.

Hal Schroeder, general manager of the Lower Platte South Natural Resources District (NRD), said the flooding that occurred Wednesday was normal under present conditions.

Rains the past two weeks have left the ground saturated, Schroeder said, meaning additional rainfall simply runs off.

And since there are limited upstream flood control structures south of Lincoln, he said, the flooding that occurred Wednesday should be considered normal.

ASHLAND GAZETTE-OCTOBER 18, 1973

High Water Is Brief But Severe

Heavy rains in eastern Nebraska late last week caused major flooding in the Big Blue River basin and other areas, with Salt Creek reaching its highest levels here since June, 1963. Partially because the water rose and fell rather fast, partially because of yeoman work by volunteer firemen when a dike started to crumble two blocks south of Ashland's Silver Street bridge, and partly because a rural dike near the Martin Ballou place above town did break, the city area suffered relatively little damage considering the enormous volume of water that poured through.

Flood stage according to a marker at the Silver Street bridge is 19 feet, and this was submerged in the rushing waters, that bore tree logs and other junk downstream. Highway 63 between the U. S. 6 turnoff south of town to the city limits just north of the South 13th Street bridge was closed off about 1:00 a.m. Friday, Police Chief Sandy Wolkow reported. Dave West was there with a city loader to place the sand in the dike gaps through which the asphalted highway goes, and a state dragline was there to assist with floating debris. The water was up in the railings there and backed up southward into the low field and pasture areas. The south underpass of No. 63 was half inundated. Firemen filled sandbags with dirt from a nearby field to plug a weak dike spot. This route was reopened at 9:00 Saturday morning.

At the Silver Street bridge a Saunders county dragline was busy through the high water period, picking up logs on the south side of the bridge and swinging them across to be dumped into the downstream flow, on the north.

Water in Wahoo Creek was up north of town, covering a portion of No. 63 at 14th and Furnas, as shown in a picture on this page. This was nothing like some floods of past years in that spot. The nearby baseball park was flooded, but the dikes around the high school football field saved the playing turf, although some seepage occurred on the sidelines.

3.31 Inches In Last Week Add To Flood

Rainfall of 3.31 inches here last week with far greater amounts received in the upland areas of the Salt Valley in southern Lancaster county caused the high water and flooding in the valley last Thursday and Friday. Far greater amounts and much more damage occurred from Gage county west.

The moisture brought the month's total to 3.47 inches, which is about double normal, and the year's total to date to 35.28 inches. Only a few years in the past 90 years of observations at Ashland have topped this figure in an entire 12 months, including 1965 with 47.97 inches; 1964 with 37.37 inches; 1957, 1958, and 1959, all in the 37 or 38-inch bracket; 1944 with 37.48 inches; 1908 with 35.33 inches, a year that included the most famous Ashland flood; 1903, with 35.29 inches; 1891, with 38.64 inches; and 1884, with 42.67 inches. Old-time unofficial records recorded 47.35 inches in 1869 here.

Figure 6. Flood damage on Silver Street
July 1908 (Courtesy City of Ashland)

Figure 7. Bridge one block south of present Silver Street
bridge - July 1908 (Courtesy City of Ashland)

Figure 8. 1951 flood near Silver Street
(Courtesy Mr. Clyde Smith)

Figure 9. Cover picture 13th Street bridge
June 1951

Figure 10. June 1951 flood, Silver Street near Burlington Depot

Figure 11. June 1951 flood, location unknown

Figure 12. 1963 flood, 13th Street underpass

Figure 13. 1964 flood, debris at 13th Street bridge

FIGURE 14 - 1973 FLOOD AT ASHLAND

FUTURE FLOODS

Floods of the same or larger magnitude as those that have occurred in the past could occur in the future. Larger floods have been experienced in the past on streams with similar geographical and physiographical characteristics as those found in the study area. Similar combinations of rainfall and runoff which caused these floods could occur in the study area. Therefore, to determine the flooding potential of the study area, it was necessary to consider storms and floods that have occurred in regions of like topography, watershed cover, and physical characteristics. The estimates of the Intermediate Regional Floods and the Standard Project Floods as presented in this report are based on the existing development of the watershed.

INTERMEDIATE REGIONAL FLOOD

The Intermediate Regional Flood is defined as one that occurs once in 100 years on the average, although it could occur in any year. The peak flow of this flood was developed from statistical analysis of stream flow records and the development of flood hydrographs in the absence of stream flow records. The Salt Creek Intermediate Regional Flood was based on analysis of records at the Ashland and Greenwood gaging stations. The Wahoo Creek Intermediate Regional Flood, which includes the tributaries of Clear Creek and Silver Creek was based on streamflow gages located near Ithaca for both Wahoo Creek and Silver Creek and by development of flood hydrographs in the absence of streamflow data. Within the study reach, the Intermediate Regional Flood discharge on Salt Creek at Ashland is 60,000 cfs for the upstream limit, 60,000 cfs above the confluence with Wahoo Creek and 98,000 cfs below the junction with Wahoo Creek. The Intermediate Regional Flood for Wahoo Creek is 53,000 cfs for the upstream limit and 49,000 cfs above the confluence with Salt Creek.

STANDARD PROJECT FLOOD

The Standard Project Flood is presented in this report as the practical upper limit of flooding. Storms that would produce this flood are uncommon, and it is difficult to assign frequencies of occurrence with any reasonable degree of accuracy. The Corps of Engineers, in cooperation with the NOAA National Weather Service, has made comprehensive studies and investigations based on the past records of experienced storms and floods and has developed generalized procedures for estimating the flood potential of streams. The Standard Project Flood discharge on Salt Creek at Ashland would be 112,000 cfs for the upstream limit of the study reach, 112,000 cfs above the confluence with Wahoo Creek and 180,000 cfs below the junction with Wahoo Creek. The Standard Project Flood discharge for the Wahoo Creek Basin in the study reach would be 108,000 cfs for the upstream limits and 104,000 cfs above the confluence with Salt Creek.

FREQUENCY

The Standard Project Flood is not the largest flood that can occur in the study reach, but the probability of larger floods becomes increasingly remote. The 1908 flood on Salt Creek was larger than the Intermediate Regional Flood and less than the Standard Project Flood. However, floods smaller than either the Intermediate Regional Flood or the Standard Project Flood are much more common, with an average peak annual discharge of about 21,300 cfs for the 20 years between 1947 and 1967 at the U. S. Geological Survey gaging station at Ashland.

HAZARDS OF LARGE FLOODS

The extent of damage caused by any flood depends on the topography of the area flooded, depth and duration of flooding, velocity of flow, rate of rise, and developments on the flood plain. An Intermediate Regional or Standard Project Flood on Salt Creek and Wahoo Creek would result in the inundation of a large amount of agricultural land and some residential, recreational and commercial properties in the study area. Deep floodwater, flowing at high velocity and carrying floating debris, would create conditions hazardous to persons and vehicles attempting to cross flooded areas. In general, floodwater two or more feet deep and flowing at a velocity of three or more feet per second could easily sweep an adult person off his feet, thus creating definite danger of injury or drowning. Rapidly rising and swiftly flowing floodwater may trap persons in homes that are ultimately destroyed, or in vehicles that are ultimately submerged or floated. Water lines can be ruptured by deposits of debris and the force of floodwaters, thus creating the possibility of contaminated domestic water supplies. Damaged sanitary sewer lines and sewage treatment plants could result in the pollution of floodwaters creating health hazards. Isolation of areas by floodwater could create hazards in terms of medical, fire, or law enforcement emergencies.

Flooded areas and flood damages - The areas along the study reach that would be flooded by the Intermediate Regional Flood and the Standard Project Flood are shown on plates 3 through 6. Water surface profiles for these floods were determined using the backwater computer program HEC-2, "Water Surface Profiles" developed by the U. S. Army Corps of Engineers. The profiles on plates 7 and 8 show the elevations of the water surfaces and water depths relative to the streambed. Plates 9 and 10 show cross sections across the flood plain and show

ground elevation and depths of overbank flooding. Reference points coinciding with the location of cross sections are provided to locate flood elevations at intervals along the stream. The reference points are located on both the "Flooded Area" plates and the "Profile" plates. Tables 6 and 7 list reference point data including approximate elevations of the streambed and the Intermediate Regional and Standard Project Floods for Salt Creek and Wahoo Creek respectively. Table 8 lists the overbank flood elevations near the upstream limit of Wahoo Creek. Depths of flow for the Intermediate Regional and Standard Project Floods can be estimated from the profiles, cross sections, or reference tables. Where accuracy is needed to delineate flooded area, the appropriate flood elevation can be taken from one of these sources and compared to a surveyed ground point elevation on the flood plain.

Wahoo Creek, near the upstream study limits, is located at the extreme edge of the flood plain. The channel banks in this area are at a higher elevation than the Silver Creek channel banks and the adjacent flood plain. During a major flood the water surface elevation in the Wahoo Creek channel would generally be higher than the water surface elevation on the adjacent flood plain. Floodwater would overflow the Wahoo Creek channel banks and flow overland to reach either the Silver Creek flood plain or the adjacent Wahoo Creek flood plain. The overflow from the channel would be shallow sheet type flow unless an obstruction were encountered. Cross sections 5-5 and 6-6 on plate 10 show this relationship of the Wahoo Creek channel to the flood plain and the Silver Creek channel. Table 8 shows the flood elevations on the flood plain where they are different from the flood elevations in the channel of Wahoo Creek.

Potential flood damage exists north of Ashland for a farm house and out-buildings on the right bank of Wahoo Creek and a residence on

the left bank of Wahoo Creek in the NW ¼ of Section 35, T13N-R9W. Potential inundation of portions of Nebraska State Highway 63 and some county roads north of Ashland also is apparent. The Intermediate Regional and Standard Project Floods in this reach will be about one mile in width. The small increase in the flooded area for the Standard Project Flood is due to the relatively steep slopes bordering the flood plain.

The Ashland city limits extend across the Salt Creek flood plain. Development in the flood plain is less dense than for the other portions of the city. The development includes many residences south of Ash Street and east of 12th Street on the left bank and a trailer park and a number of residences on the right bank east to Seventh Street. The flood plain outside of the Ashland city limits is used for agricultural purposes. The flooded area upstream from Ashland would be approximately 1 mile in width and about 1,500 feet within the Ashland city limits. Depths of potential floods at specific locations in the study reach are shown by photographs on Pages 37 and 38.

Obstructions - During floods, debris collecting on bridges could decrease their carrying capacity and cause greater water depths (backwater effect) upstream of these structures. Since the occurrence and amount of debris are indeterminate factors, only the physical characteristics of the structures were considered in preparing profiles of the Intermediate Regional and Standard Project Floods. Similarly, the maps of flooded areas show the backwater effect of obstructive bridges, but do not reflect increased water surface elevation that could be caused by debris collecting against the structures, or by deposition of silt in the stream channel under structures. The water surface profiles show the effect of the structures on flood flows. Raised roadways as well as buildings on the flood plain will also tend to obstruct flows.

Velocities of flow - Overbank flow velocities would not be great during large potential floods because of the width of the flood plain and relatively flat flood plain slopes. Velocities will be much greater in areas where the flood waters are constrictive due to bridges and roads or a narrow flood plain.

A major constriction on Salt Creek is the relatively narrow flood plain passing through the Ashland city limits. Channel and overbank velocities would be about 10 feet per second and 2.5 feet per second, respectively, for the IRF and 12 feet per second and 4 feet per second for the SPF. Flood water velocities would be further increased through road and railroad bridge openings.

Upstream from Ashland, Salt Creek channel and overbank velocities would be about 4 feet per second and 1 foot per second, respectively, for both the IRF the SPF.

Wahoo Creek channel and overbank velocities would be about 5 feet per second and 2.5 feet per second, respectively, for the IRF and 6 feet per second and 3 feet per second, respectively, for the SPF.

Rate of rise and duration of flooding - The rate of rise, or peaking time, of future large floods on Salt Creek at Ashland is about one day. Flood duration is about two days. Flood duration for Wahoo Creek is about one day.

Figure 15. Depth of potential floods - 14th and Cedar Streets

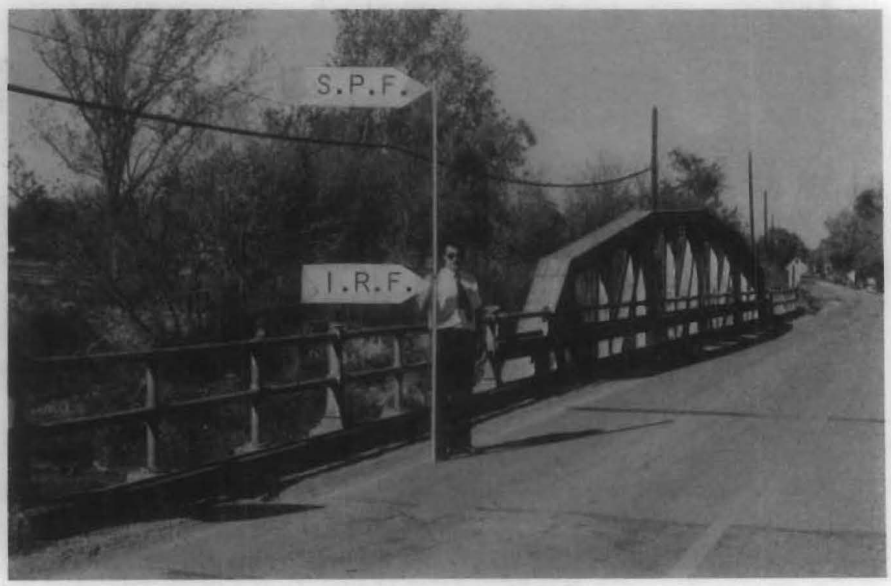


Figure 16. Depth of potential floods - 13th Street Bridge

Figure 17. Depth of potential floods - Ashland City Park

Figure 18. Depth of potential floods - Ashland Municipal Sewage Treatment Plant

GLOSSARY

Backwater

The resulting high water surface in a given stream due to a downstream obstruction or high stages in an intersecting stream.

Flood

An overflow on 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 streamflow 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, use of ground water coincident with increased streamflow, and other problems.

Flood Crest

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

Flood Plain

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

Right Bank

The bank on the right side of a river, stream or water course, looking downstream.

Sheet Flow

The water which is diverted from the main floodflow by obstructions and variances in topography. This water flows at shallow depths and normally at elevations different from that water flowing in the adjacent channel or on the adjacent flood plain. Due to the shallow depths and irregular flow patterns associated with this type of flow computations to predict flow depth are considered impractical.

Standard Project Flood

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

Top of Waterway

This is the roof of the opening in a stream crossing through which water flows under normal conditions. It is the underside of the deck span - sometimes called "low steel", the roof of a box culvert or the crown of an arched or circular culvert.

TABLE 6

FLOOD PLAIN REFERENCE DATA

SALT CREEK - ASHLAND, NEBRASKA

Identification	Reference Point Number		Distance In Feet From Mouth	Stream[1/] Bed Elevation Ft. (M.S.L.)	Intermediate Regional Flood Elevation Ft. (M.S.L.)	Standard Project Flood Elevation Ft. (M.S.L.)
Upstream Limits of Study	1		41,300	1054.7	1082.0	1089.2
Township Road	2	U/S	36,400	1052.7	1081.6	1089.0
		D/S			1081.5	1088.8
Section 1-1	3		33,900	1050.5	1081.4	1088.7
	4		30,400	1050.2	1081.3	1088.7
	5		28,540	1049.7	1081.0	1088.4
Burlington Northern Railroad	6	U/S	25,800	1052.2	1079.2	1086.0
		D/S			1077.0	1082.5
Section 2-2	7		24,800	1049.0	1076.2	1081.5
13th Street	8	U/S	23,800	1046.0	1076.0	1081.3
		D/S			1075.4	1080.7
Section 3-3	9		22,450	1046.0	1073.4	1078.3
Silver Street	10	U/S	21,650	1044.8	1073.0	1076.9
		D/S			1072.9	1076.7
Section 4-4	11		20,930	1046.8	1072.3	1075.9
	12		19,560	1046.0	1070.5	1072.8

TABLE 6 (continued)

FLOOD PLAIN REFERENCE DATA

SALT CREEK - ASHLAND, NEBRASKA

Identification	Reference Point Number	Distance In Feet From Mouth	Stream Bed Elevation Ft. (M.S.L.) [1]	Intermediate Regional Flood Elevation Ft. (M.S.L.)	Standard Project Flood Elevation Ft. (M.S.L.)
Burlington Northern Railroad	/13 U/S	17,300	1044.7	1070.3	1072.6
	D/S			1068.1	1070.6
Wahoo Creek	--	15,000	--	--	--
Burlington Northern Railroad & Downstream Limits of Study	/14	13,800	1046.6	1067.4	1070.0

[1] Approximate stream bed elevation

TABLE 7

FLOOD PLAIN REFERENCE DATA

WAHOO CREEK - ASHLAND, NEBRASKA

Identification	Reference Point Number		Distance In Feet From Mouth	Stream[1/] Bed Elevation Ft. (M.S.L.)	Intermediate Regional Flood Elevation Ft. (M.S.L.)	Standard Project Flood Elevation Ft. (M.S.L.)
Upstream Limits of Study and Section 5-5	15		30,000	1060.8	1081.0	1081.1
	16		26,800	1060.1	1079.8	1080.1
Township Road	17	U/S	26,500	1061.0	1079.3	1079.7
		D/S			1079.3	1079.7
	18		26,300	1059.9	1079.0	1079.5
Burlington Northern Railroad	19	U/S	25,300	1058.9	1078.2	1078.9
		D/S			1078.0	1078.7
	20		22,500	1053.0	1073.0	1075.8
Section 6-6	21		17,500	1049.2	1071.2	1073.6
Nebraska State Highway 63	22	U/S	14,100	1051.0	1070.9	1073.2
		D/S			1070.7	1073.2
	23		9,000	1050.5	1070.5	1072.8
Burlington Northern Railroad	24	U/S	1,500	1041.2	1070.3	1072.6
		D/S			1068.1	1070.6
Mouth of Wahoo Creek	25		0	1044.0	1067.6	1070.2

[1/] Approximate stream bed elevation

TABLE 8

FLOOD PLAIN REFERENCE DATA

WAHOO CREEK OVERFLOW

Identification	Reference Point Number	Intermediate Regional Flood Elevation Ft. (M.S.L.)	Standard Project Flood Elevation Ft. (M.S.L.)
Upstream Limits of Study and Section 5-5	A	1076.8	1079.5
	B	1074.6	1077.5
	C	1073.0	1075.8

☆U. S. GOVERNMENT PRINTING OFFICE: 1976-669-709

N

SALT CREEK BASIN
ASHLAND, NEBRASKA

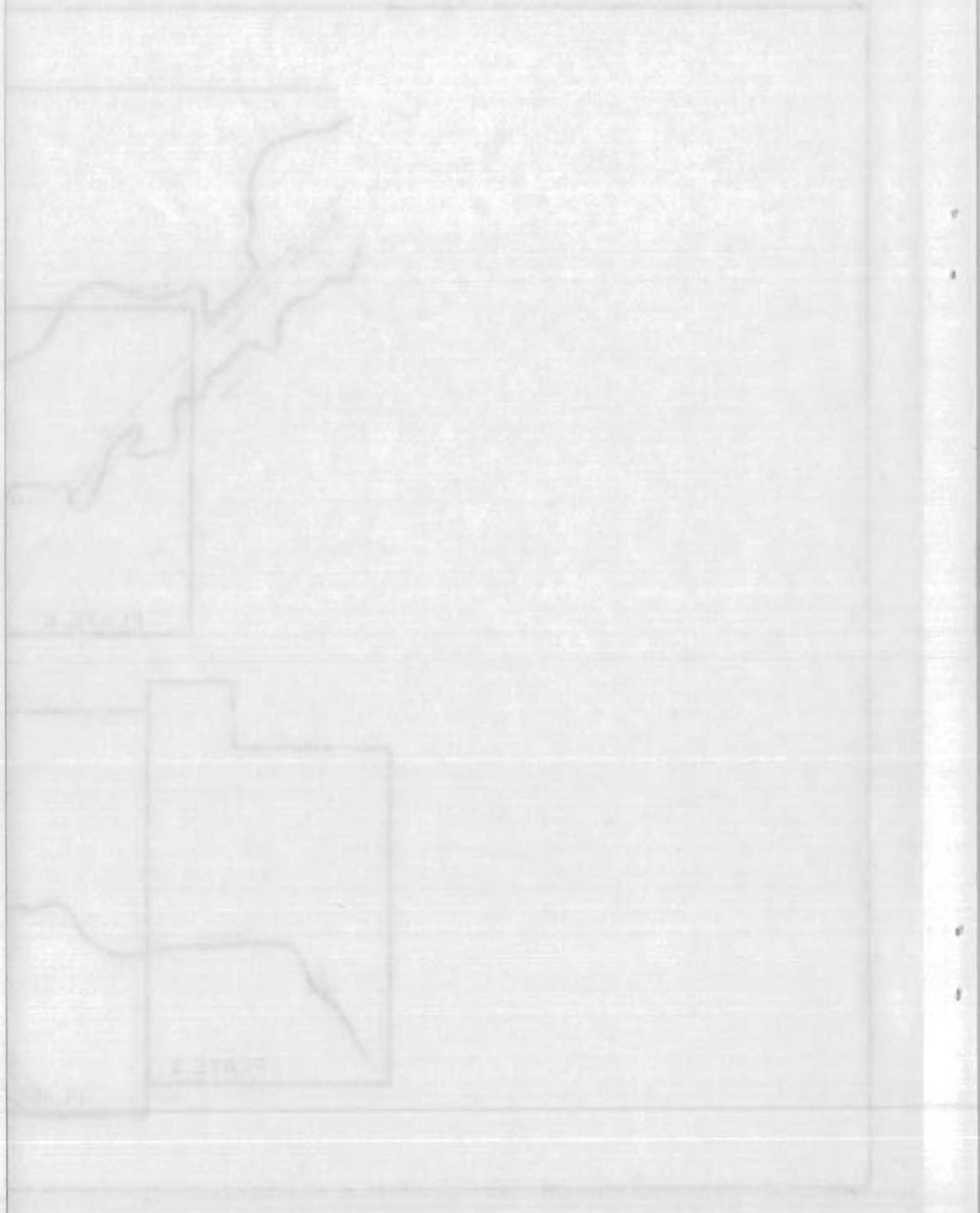
SALT CREEK
WAHOO CREEK
PLATE INDEX MAP

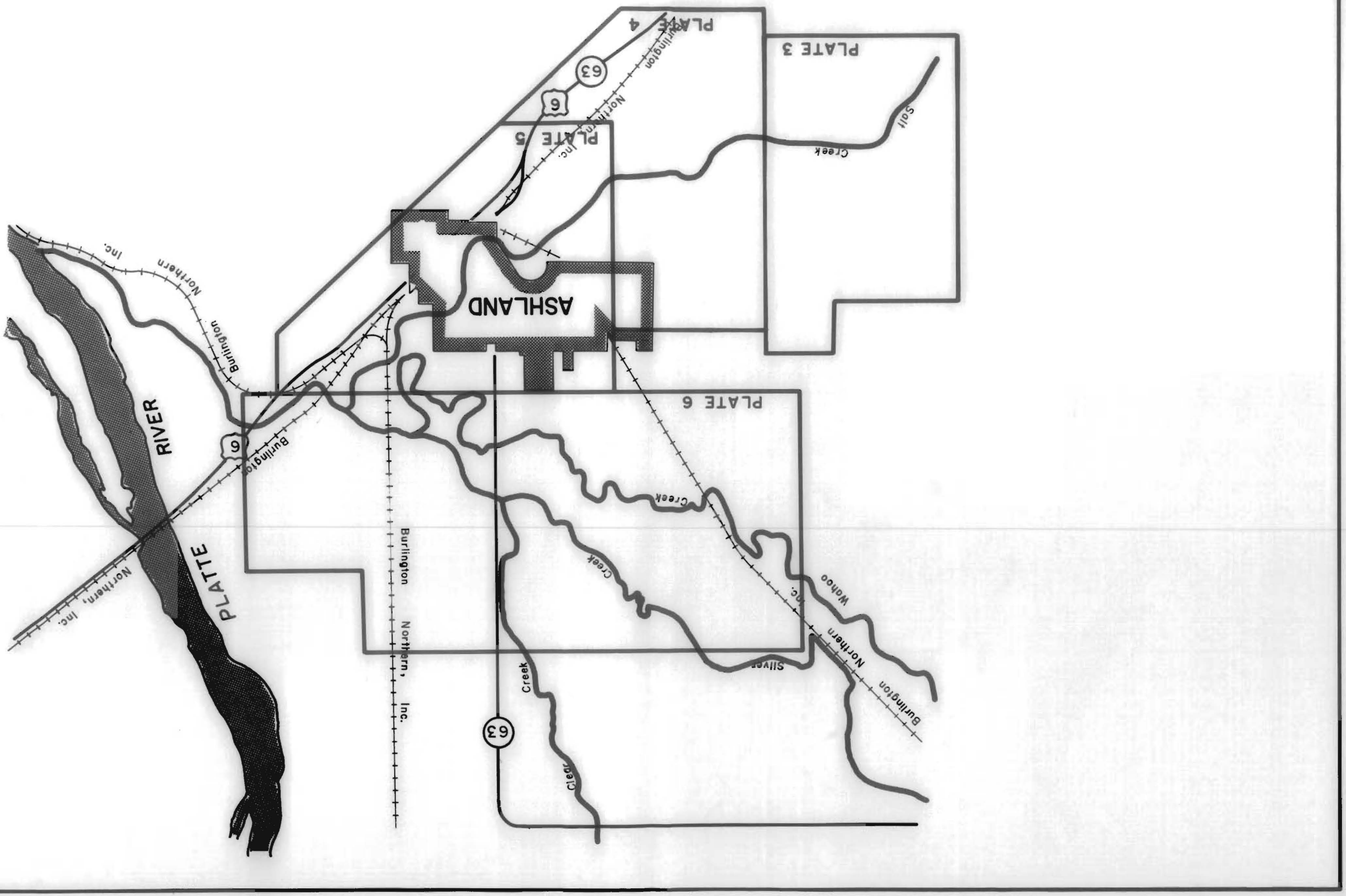
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

JULY 1976

NO SCALE

PLATE 2

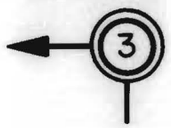



PLATTE 4
PLATTE 3
PLATTE 5
PLATTE 6
ASHLAND
RIVER
PLATTE
Burlington Northern, Inc.
Burlington Northern, Inc.
Burlington Northern, Inc.
Burlington Northern, Inc.
Burlington Northern, Inc.
Salt Creek
Creek
Creek
Creek
Silver Creek
Wahoo
6
63
6
63

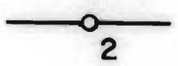
LEGEND:

INTERMEDIATE REGIONAL FLOOD

STANDARD PROJECT FLOOD



Channel and Valley Cross Section



Reference Point — Also locations of surveyed cross sections

NOTES:

1. For the location of this plate see Plate Index Map (Plate 2).
2. For Profile, see Plate 7.
3. For flood elevation at the reference points, see Table 6.

SCALE IN FEET

1000 0 1000 2000

SALT CREEK BASIN
ASHLAND, NEBRASKA

SALT CREEK
FLOODED AREAS

U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

JULY 1976

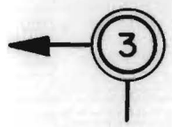
PLATE 3


TOWNSHIP
ROAD
SALT CREEK
flow
Upstream limits of study
MATCH LINE PLATE 4
N
Upstream limits of study

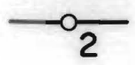
LEGEND:

INTERMEDIATE REGIONAL FLOOD

STANDARD PROJECT FLOOD



Channel and Valley Cross Section



Reference Point — Also locations of surveyed cross sections

NOTES:

1. For the location of this plate see Plate Index Map (Plate 2)
2. For Illustrated Cross Sections, see Plate 9.
3. For Profile, see Plate 7.
4. For flood elevation at the reference points, see Table 6.

SCALE IN FEET

1000 0 1000 2000

SALT CREEK BASIN
ASHLAND, NEBRASKA

SALT CREEK
FLOODED AREAS

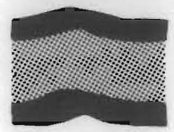
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA

JULY 1976

PLATE 4

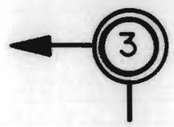

MATCH LINE PLAT 3
MATCH LINE PLAT 5
BURLINGTON NORTHERN, INC.
BALTIMORE
CREEK
CITY OF
ASHLAND
BURLINGTON
NORTHERN, INC.
SILVER STREET

LEGEND:

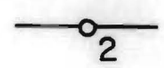


INTERMEDIATE REGIONAL FLOOD

STANDARD PROJECT FLOOD



Channel and Valley Cross Section



Reference Point — Also locations of surveyed cross sections

NOTES:

1. For the location of this plate see Plate Index Map (Plate 2).
2. For Illustrated Cross Sections, see Plates 9 and 10.
3. For Profile, see Plates 7 and 8.
4. For flood elevation at the reference points, see Tables 6,7and 8.

SCALE IN FEET

1000 0 1000 2000

SALT CREEK BASIN

ASHLAND, NEBRASKA

SALT CREEK
WAHOO CREEK
FLOODED AREAS

U. S. ARMY ENGINEER DISTRICT, OMAHA

CORPS OF ENGINEERS OMAHA, NEBRASKA

JULY 1976

PLATE 5


MATCH LINE PLATE 4
SALT CREEK
CITY OF ASHLAND
SILVER STREET
BURLINGTON NORTHERN INC.
FURNAS STREET
MATCH LINE PLATE 6
City Park
Sewage Treatment Plant
Wagner Creek
Domestic stream
limits of study
N

SALT CREEK BASIN

ASHLAND, NEBRASKA

SALT CREEK
WAHOO CREEK
FLOODED AREAS

U. S. ARMY ENGINEER DISTRICT, OMAHA

CORPS OF ENGINEERS OMAHA, NEBRASKA

JULY 1976

SCALE IN FEET

1000 0 1000 2000

FOR NOTES AND LEGEND SEE PLATES 3, 4 & 5

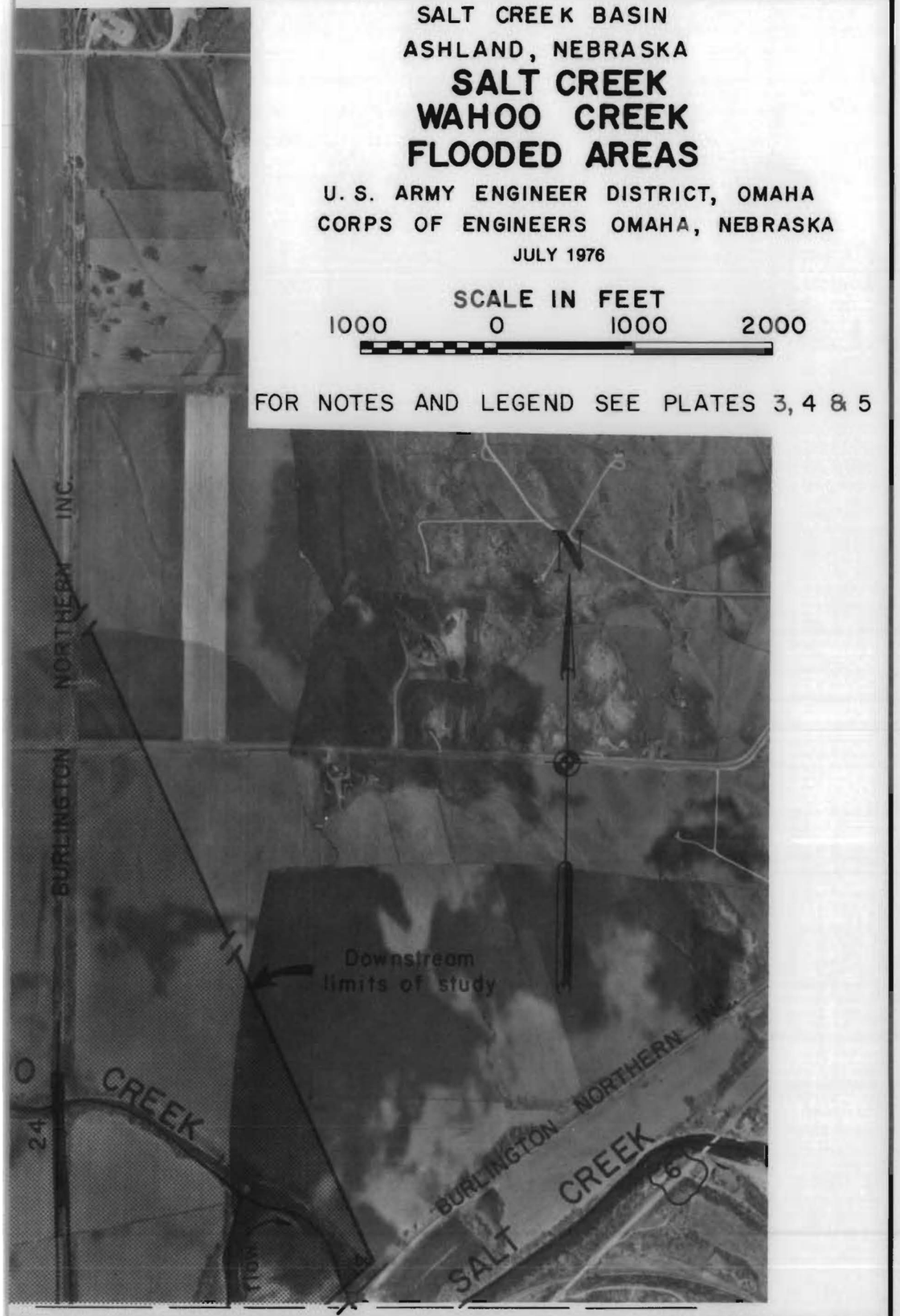
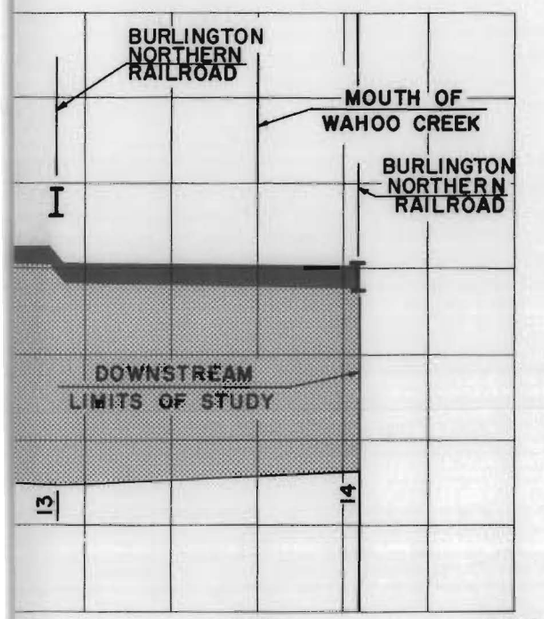


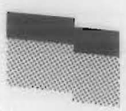
PLATE 6


TOWNSHIP ROAD
Upstream limits of study
IRF and SPF Sheet flow
IRF Sheet Flow
A
B
C
SILVER CREEK
CLEAR CREEK
Downstream limits of study
6
5
IRF and SPF Sheet Flow
TOWNSHIP ROAD
flow
flow
CREEK
TOWNSHIP ROAD
MATCH LINE PLATE 5



LEGEND:

I —Deck
Bridge
—Top Of Waterway



INTERMEDIATE REGIONAL FLOOD

STANDARD PROJECT FLOOD

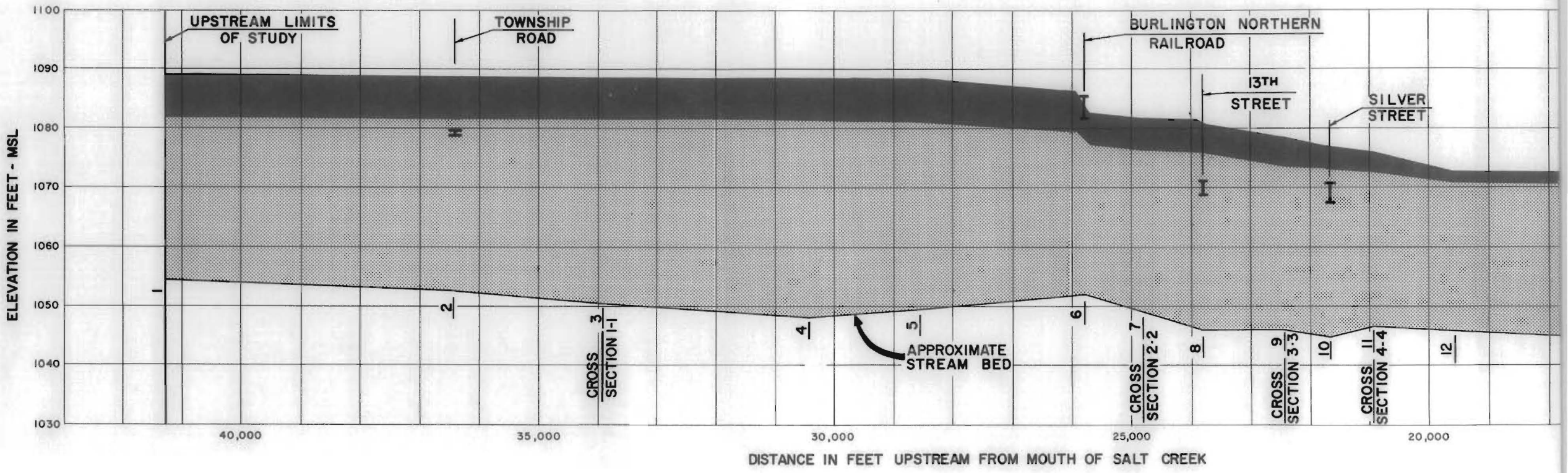
2 —— Reference Point

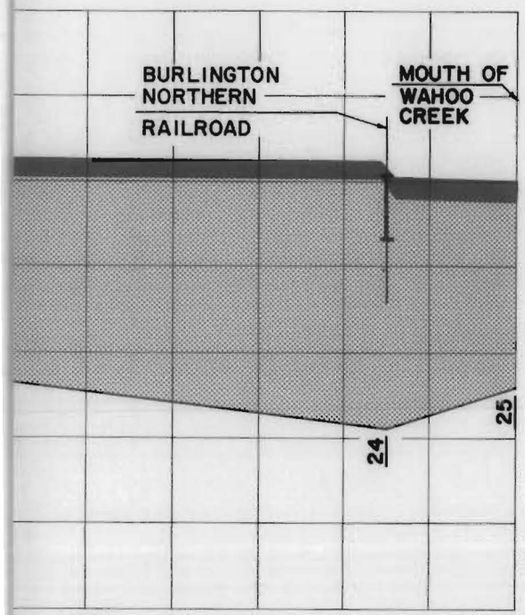
NOTES:

1. For location of Cross Sections, see Plates 4 & 5.
2. For Illustrated Cross Sections, see Plate 9.
3. For flood elevations at the reference points, see Table 6.

SALT CREEK BASIN
ASHLAND, NEBRASKA
SALT CREEK
PROFILE
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
JULY 1976

PLATE 7


UPSTREAM LIMITS OF STUDY
TOWNSHIP ROAD
BURLINGTON NORTHERN RAILROAD
13TH STREET
SILVER STREET
1100
1090
1080
1070
1060
1050
1040
1030
ELEVATION IN FEET - MSL
1
2
CROSS SECTION 1-1
3
4
5
APPROXIMATE STREAM BED
6
CROSS SECTION 2-2
7
8
CROSS SECTION 3-3
9
10
CROSS SECTION 4-4
11
12
40,000
35,000
30,000
25,000
20,000
DISTANCE IN FEET UPSTREAM FROM MOUTH OF SALT CREEK



LEGEND:

Deck
Bridge
Top Of Waterway

INTERMEDIATE REGIONAL FLOOD

STANDARD PROJECT FLOOD

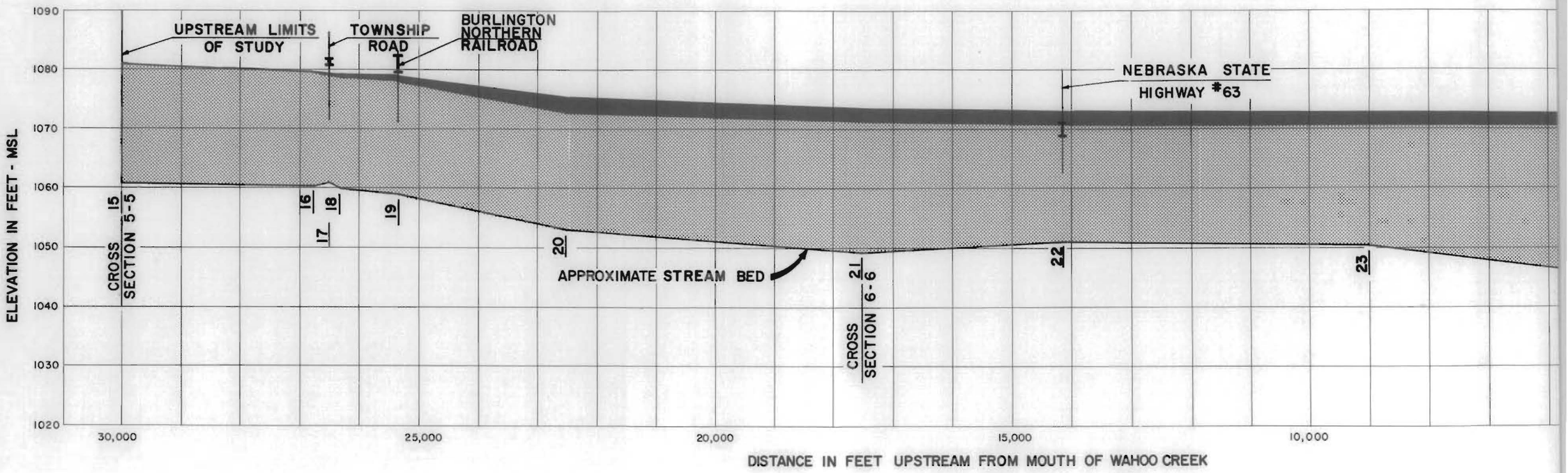
2 — Reference Point

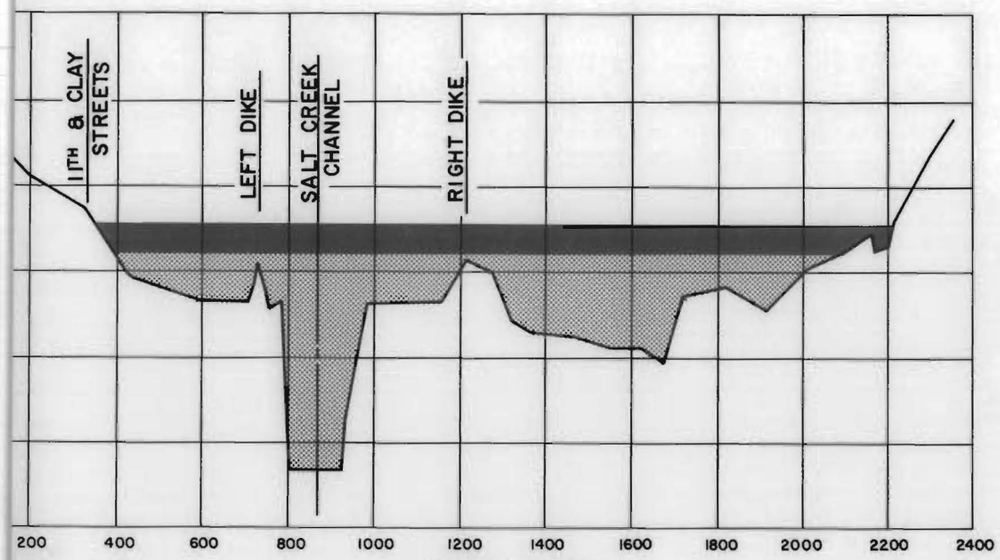
NOTES:

1. For location of Cross Sections, see Plate 6.
2. For Illustrated Cross Sections, see Plate 10.
3. For flood elevations at the reference points, see Tables 7 & 8.

SALT CREEK BASIN
ASHLAND, NEBRASKA
WAHOO CREEK
PROFILE
U. S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
JULY 1976

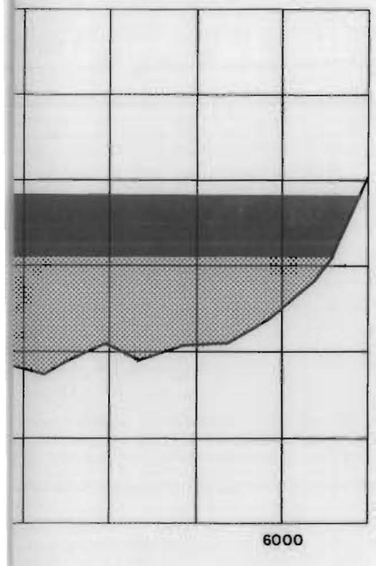
PLATE 8


UPSTREAM LIMITS OF STUDY
TOWNSHIP ROAD
BURLINGTON NORTHERN RAILROAD
NEBRASKA STATE HIGHWAY #63
APPROXIMATE STREAM BED
CROSS SECTION 5-5
CROSS SECTION 6-6
15
16
17
18
19
20
21
22
23
1090
1080
1070
1060
1050
1040
1030
1020
ELEVATION IN FEET - MSL
30,000
25,000
20,000
15,000
10,000
DISTANCE IN FEET UPSTREAM FROM MOUTH OF WAHOO CREEK



DISTANCE IN FEET

CROSS SECTION 4-4
REFERENCE POINT 11
SALT CREEK



INTERMEDIATE REGIONAL FLOOD

STANDARD PROJECT FLOOD

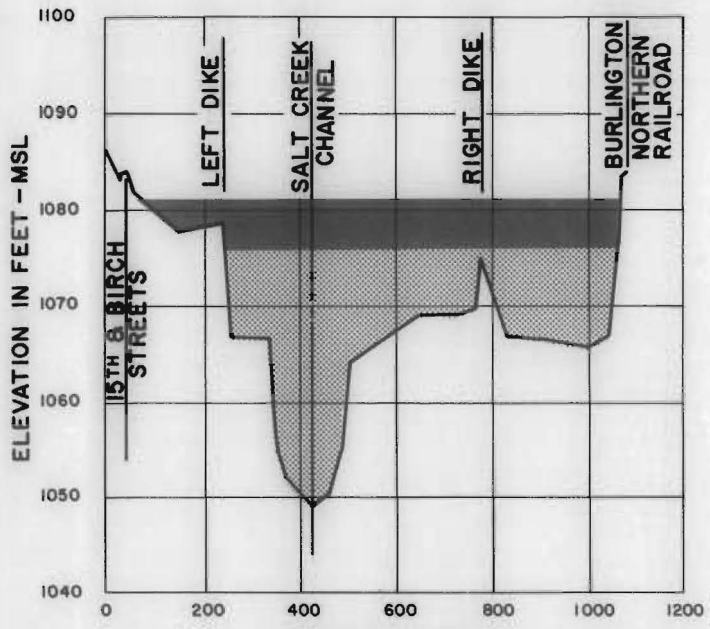
NOTES:

1. For location of cross sections see,

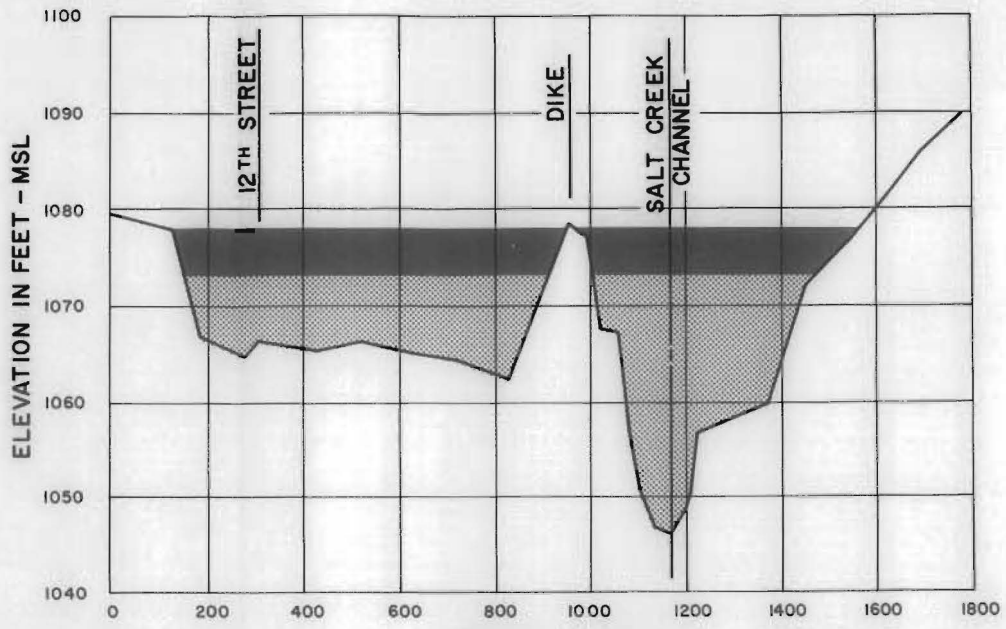
Cross Sections	Plate
1-1	4
2-2	4&5
3-3	4&5
4-4	4&5

SALT CREEK BASIN
ASHLAND, NEBRASKA
SALT CREEK
CROSS SECTIONS
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
JULY 1976

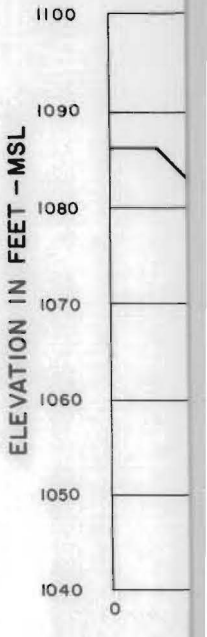
PLATE 9

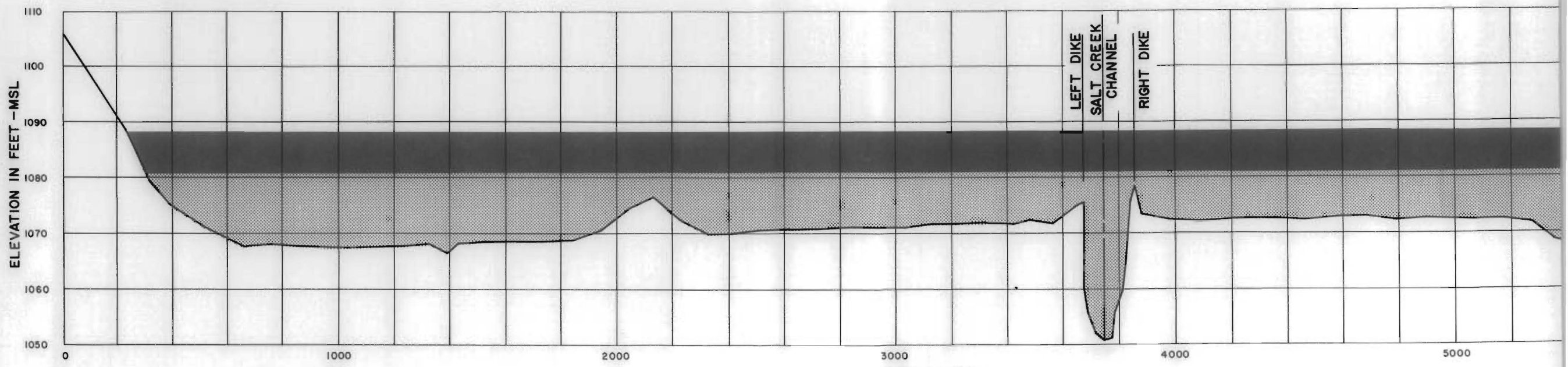


CROSS SECTION 2-2
REFERENCE POINT 7
SALT CREEK

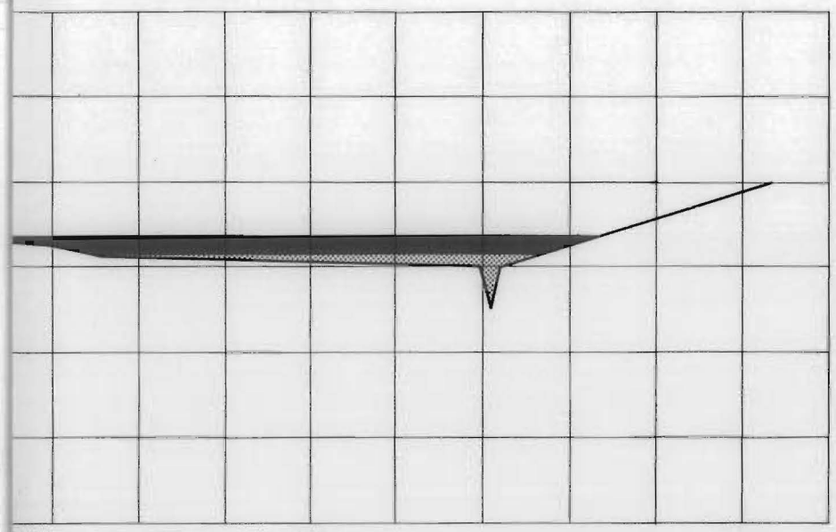


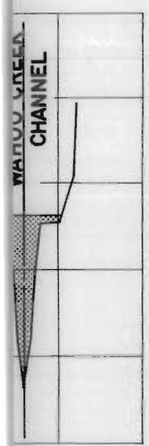
CROSS SECTION 3-3
REFERENCE POINT 9
SALT CREEK





CROSS SECTION 1-1
REFERENCE POINT 3
SALT CREEK





} INTERMEDIATE REGIONAL FLOOD

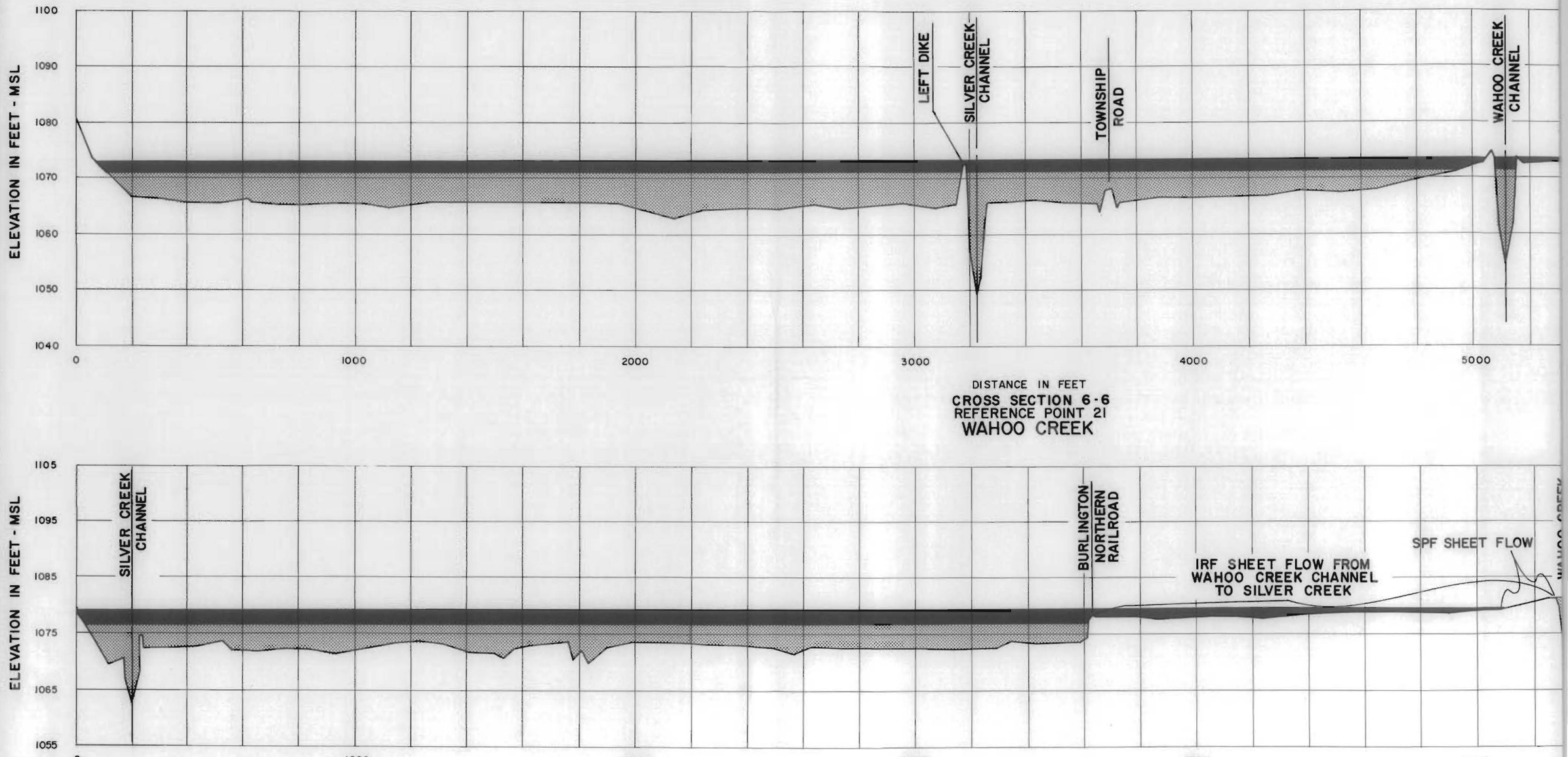
} STANDARD PROJECT FLOOD

NOTES:

1. For location of cross sections see plate 6.

SALT CREEK BASIN
ASHLAND, NEBRASKA
WAHOO CREEK
CROSS SECTIONS
U.S. ARMY ENGINEER DISTRICT, OMAHA
CORPS OF ENGINEERS OMAHA, NEBRASKA
JULY 1976

PLATE 10



CROSS SECTION 6-6
REFERENCE POINT 21
WAHOO CREEK

CROSS SECTION 5-5
REFERENCE POINT 15
WAHOO CREEK