

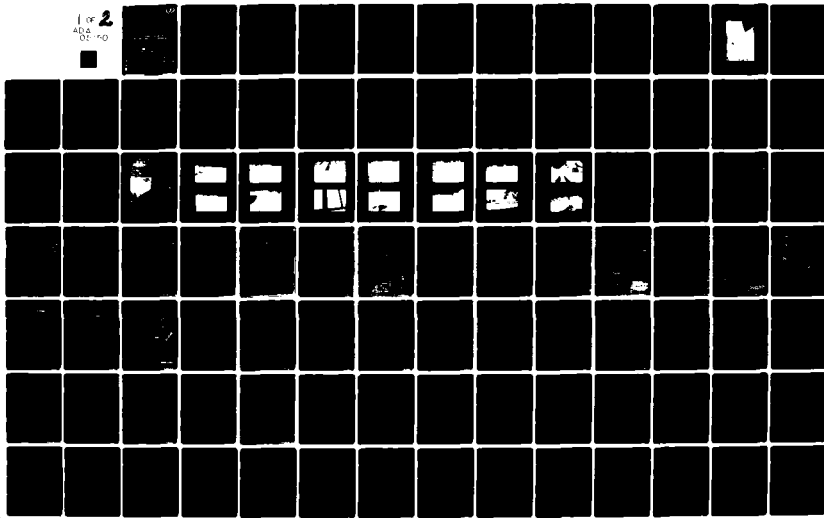
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NATIONAL DAM SAFETY PROGRAM. PLATTE RIVER TRIBUTARIES DAM 3-B (-ETC(U)
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LEVEL II



MISSOURI-NEMAHA-NODAWAY BASIN

PLATTE RIVER TRIBUTARIES DAM 3-B

WORTH COUNTY, MISSOURI

MO. 11054

PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



United States Army
Corps of Engineers

... Serving the Army
... Serving the Nation

St. Louis District

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

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| 4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Platte River Tributaries Dam 3-B (MO 11054) Worth County, Missouri | | 5. TYPE OF REPORT & PERIOD COVERED Final Report | |
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| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property. | | | |

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PLATTE RIVER TRIBUTARIES DAM 3-B
WORTH COUNTY, MISSOURI
MISSOURI INVENTORY NO. MO 11054

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY
HOSKINS-WESTERN-SONDEREGGER, INC.
CONSULTING ENGINEERS
LINCOLN, NEBRASKA

UNDER DIRECTION OF
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
FOR
GOVERNOR OF MISSOURI

JUNE, 1980

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REPLY TO
ATTENTION OF

SUBJECT: Platte River Tributaries Dam 3-B - MO 11054

This report presents the results of field inspection and evaluation of the Platte River Tributaries Dam 3-B. It was prepared under the National Program of Inspection of Non-Federal Dams.

SIGNED

SUBMITTED BY:

Chief, Engineering Division

25 SEP 1980
24 SEP 1980

Date

APPROVED BY:

SIGNED

Colonel, CE, District Engineer

25 SEP 1980

Date

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM
ASSESSMENT SUMMARY

| | |
|--------------------|----------------------------------|
| Name of Dam | Platte River Tributaries Dam 3-B |
| State Located | Missouri |
| County Located | Worth County |
| Stream | Tributary to Platte River |
| Date of Inspection | June 4, 1980 |

Platte River Tributaries Dam 3-B was inspected by an interdisciplinary team of engineers from Hoskins-Western-Sonderregger, Inc. The purpose of the inspection was to make an assessment of the general conditions of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations, and private engineers.

Platte River Tributaries Dam 3-B has a height of thirty-two (32) feet and a storage capacity at the minimum top elevation of the dam of forty-six (46) acre-feet. In accordance with the guidelines, a small size dam has a height greater than or equal to twenty-five (25) feet but less than forty (40) feet and a storage capacity greater than or equal to fifty (50) acre-feet but less than one thousand (1,000) acre-feet. The size classification is determined by either the storage capacity or height, whichever gives the larger size category. Platte River Tributaries Dam 3-B is classified as a small size dam.

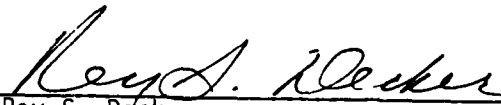
In accordance with the guidelines and based on visual observation, the dam is classified as having a high potential for damage and loss of life. Failure would threaten life and property. The estimated damage zone extends approximately one (1) mile downstream of the dam. Within the damage zone are 24 dwellings located in the town of Sheridan which is located between three-tenths and six-tenths of a mile downstream from the dam.

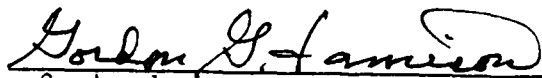
Our inspection and evaluation indicates that the spillways meet the criteria set forth in the recommended guidelines for a small dam having a high hazard potential. Considering the small volume of water impounded, one-half of the Probable Maximum Flood is the appropriate spillway design flood. The spillways will pass the 100-year flood (1% probability flood - a flood having a one percent chance of being exceeded in any year) without overtopping the dam. The spillways will pass 65% of the Probable Maximum Flood without overtopping the dam. The Probable Maximum Flood (PMF) is defined as the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

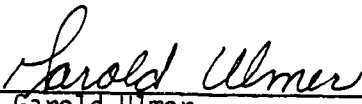
Based on available design data and on the observations made during the field inspection, no recommendation is made to modify the spillways or to increase the height of the dam.

The following recommendations are made in regard to maintenance of the dam:

- a. Trees and brush should be removed from the upstream slope and measures taken to prevent their recurrence. Removal of large trees should be done under the guidance of a professional engineer experienced in the design and construction of dams.
- b. The activity and extent of the slides in the right bank of the scour hole should be monitored. Measures to eliminate the ponding of surface runoff in the area above the slide should facilitate stabilization of the slide area.
- c. Regular inspections of the structure should be continued with the reports made a part of this project file.


Rey S. Decker
E-3703


Gordon Jamison


Harold Ulmer
E-19246

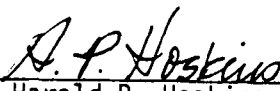

Harold P. Hoskins, Chairman of the Board
Hoskins-Western-Sonderegger, Inc.
E-8696



PHOTO NO. 1 - OVERVIEW

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
PLATTE RIVER TRIBUTARIES DAM 3-B MO 11054
WORTH COUNTY, MISSOURI

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer directed that a safety inspection of Platte River Tributaries Dam 3-B be made.
- b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.
- c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams", Appendix D to "Report of the Chief of Engineers on the National Program of Inspection of Dams," dated May, 1975, and published by the Department of the Army, Office of the Chief of Engineers.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances.
 - (1) The dam is an earth fill designed by the Soil Conservation Service and constructed for flood control. It is about 32 feet in height and 350 feet in length. It has a storage capacity at the minimum top elevation of the dam of 46 acre-feet. It is located in the loess-till area of the north western section of Missouri.
 - (2) The principal spillway is uncontrolled and consists of a 6' x 2' reinforced concrete drop inlet (riser) connected to a 24-inch diameter reinforced concrete pipe which passes through the embankment.
 - (3) An uncontrolled, vegetated earth spillway is cut through the left abutment. It has a bottom width of 50 feet and side slopes of 1V on 3H.

- b. Location. The dam is located in the extreme northwest section of Worth County about 0.3 mile northwest of the town of Sheridan, Missouri in the SE 1/4 Sec. 15, T66N, R33W.
- c. Size Classification. Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1c above. This dam has a height of 32 feet and a storage capacity at the minimum top elevation of the dam of 46 acre-feet. This dam is classified as a small dam. A small dam has a height greater than or equal to 25 feet but less than 40 feet and a storage capacity greater than or equal to fifty acre-feet but less than 1,000 acre-feet. The size classification is determined by either the storage capacity or height, whichever gives the larger size category.
- d. Hazard Classification. Guidelines for determining hazard classification are presented in the same guidelines as referenced in paragraph 1.1c above. Based on referenced guidelines and visual observation, this dam is in the High Hazard Classification. The estimated damage zone extends about one mile downstream of the dam. Within the damage zone are 24 dwellings located in the town of Sheridan which is located between three-tenths and six-tenths of a mile downstream from the dam.
- e. Ownership. The dam is located on property owned by Lucile Aldrich, Sheridan, Missouri 64486. Inspection and maintenance is done by the Worth County Soil Conservation District, Grant City, Missouri 64456.
- f. Purpose of Dam. The dam was constructed for flood control.
- g. Design and Construction History. The dam was investigated and designed by the Soil Conservation Service, Columbia, Missouri. The dam was constructed in 1961 with SCS personnel providing construction control and inspection.
- h. Normal Operating Procedure. There are no operating procedures for this structure. The level of the lake is dependent upon precipitation, infiltration, evaporation and the capacity of the uncontrolled spillways.

1.3 PERTINENT DATA (SCS PLANS)

- a. Drainage Area. 112 acres (0.175 square miles).
- b. Discharge at Damsite.
 - (1) All discharges at the damsite are through an uncontrolled 6' x 2' reinforced concrete drop inlet which is connected to a 24-inch reinforced concrete pipe conduit and through an uncontrolled, vegetated earth emergency spillway.

- (2) Estimated maximum flood at damsite -- unknown.
- (3) The principal spillway capacity varies from 0 c.f.s. at elevation 120.0 feet to 68 c.f.s. at the crest of the emergency spillway (elevation 123.6 feet) to 73 c.f.s. at the minimum top of dam (elevation 127.1 feet, field measurement).
- (4) The emergency spillway capacity varies from 0 c.f.s. at its crest (elevation 123.6 feet) to 970 c.f.s. at the minimum top of dam (elevation 127.1 feet).
- (5) Total spillway capacity at the minimum top of dam is 1,043 c.f.s. \pm .

c. Elevations (feet - assumed).

- (1) Observed pool - 120
- (2) Normal pool - 120
- (3) Spillway crest (s)
Principal - 120
Emergency - 123.6
- (4) Maximum experienced pool - Unknown
- (5) Top of dam (minimum) - 127.1

d. Reservoir. Length (feet) of pool -

- (1) At principal spillway crest - 500 \pm
- (2) At emergency spillway crest - 650 \pm
- (3) At top of dam (minimum) - 850 \pm

e. Storage (Acre-feet).

- (1) Observed pool - 20.6
- (2) Normal pool - 20.6
- (3) Spillway crest (s)
Principal - 20.6
Emergency - 31.4

(4) Maximum experienced pool - Unknown

(5) Top of dam (minimum) - 46.0

f. Reservoir Surface (Acres).

(1) Observed pool - 2.7

(2) Normal pool - 2.7

(3) Spillway crest (s).

Principal - 2.7

Emergency - 3.6

(4) Maximum experienced pool - Unknown

(5) Top of dam (minimum) - 4.8

g. Dam.

(1) Type - Homogeneous rolled earth fill

(2) Length - 350 feet \pm

(3) Height - 32 ft. \pm - measured

(4) Top width - 15 ft.

(5) Side slopes.

(a) Downstream - 1V on 2.5H (Plans) 1V on 3+H (measured)
with 10 ft. berm at elevation 108.0

(b) Upstream - 1V on 2.5H (Plans) 1V on 4.4H (measured
on exposed face) with 10 ft. berm at elevation 120.0.

(6) Zoning - None

(7) Impervious core - homogeneous section

(8) Cutoff - 8 ft. bottom width with 1V on 1H side slopes and
varying in depth from 3 to 10 ft.

(9) Grout curtain - None

(10) Wave protection - vegetated earth berm 10 ft. in width.

(11) Drains - None

h. Diversion Channel and Regulating Tunnel. None

i. Spillway.

(1) Principal

(a) Type - a 6' x 2' uncontrolled, reinforced concrete drop inlet (riser) equipped with an anti-vortex device and a trash rack and connected to a 24-inch diameter reinforced concrete conduit with 3 anti-seep collars.

(b) Crest (invert) elevation - 120.0

Outlet - 99.0 (99.7 measured)

(c) Length - 130 ft.

(2) Emergency

(a) Type - Uncontrolled, vegetated earth spillway having a bottom width of 50 feet and side slopes of 1V on 3H.

(b) Control section - Level section, 20 feet in length located downstream from the centerline of the dam.

(c) Crest elevation - 123.6

(d) Upstream Channel - Upstream channel is excavated 3 ft. lower than the control section and has an inverse grade into the reservoir. The channel is vegetated.

(e) Downstream Channel - Downstream channel is excavated and/or diked on slope of 8%. The channel is vegetated.

j. Regulating Outlets. None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Design data were available for this dam from the SCS office in Grant City, Missouri. Copies of the plans are included in Appendix C. The geologic and soil mechanics reports were not available. However, the geologic profiles are included in the plans, and basic soil mechanics data with slope stability analyses were secured from the SCS Soil Mechanics laboratory records in Lincoln, Nebraska. The Soil Mechanics data are included as part of Appendix C.

2.2 CONSTRUCTION

No construction data were readily available. It was reported by SCS personnel that the dam was constructed in 1961, that there were no unusual problems, and that the dam was constructed according to the construction specifications.

2.3 OPERATION

No data were available on spillway operation.

2.4 EVALUATION

- a. Availability. All data in the Grant City SCS office and the Lincoln Soil Mechanics Lab were readily available.
- b. Adequacy. The plans and data supplied by SCS, and the field surveys and visual observations presented herein are considered adequate to support the conclusions of this report. Results of stability analyses (with full phreatic line) are shown on Plates C-19 and C-20. Although the safety factors reported for the downstream slope are somewhat lower than generally accepted, the analyses are considered adequate since the dam has been in place for almost 20 years without any shear failures.
- c. Validity. All available information and reports on construction control are considered to be valid.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

- a. General. A visual inspection of the Platte River Tributaries Dam 3-B was made on June 4, 1980. Engineers from Hoskins-Western-Sonderegger, Inc., Lincoln, Nebraska making the inspection were: R. S. Decker, Geotechnical, Garold Ulmer and Gordon Jamison, Hydrology and Hydraulics.
- b. Dam.
 - (1) Geology and Soils (abutment and embankment). This dam is located in the dissected till plains area of the Central Lowlands Physiographic Region. Upland soils consist of moderately thick deposits of CL loess (Grundy and Lagonda Series). Abutment materials consist of loess overlying Kansan age glacial till. Bedrock of the Shawnee Group, Virgilian Series, Pennsylvanian System underlies the glacial till at undetermined depths. Neither glacial till nor bedrock were exposed on the site or in the area. Materials in the embankment consist of CL-CH soils borrowed from the reservoir area and the abutments.
 - (2) Upstream Slope. The upstream slope is very well vegetated with adapted grasses. A few small shrubs are growing near the downstream edge of the berm. Measurements on the exposed slope indicate that the slope is flatter than shown on the plans in Appendix C. No deformations, rodent holes, slumps or significant erosion were observed on the slope. Photo No. 2 shows the upstream slope.
 - (3) Crest. The crest is well vegetated except for a few sparse spots in the slightly used vehicular tracks. No cracks or slumps were observed on the crest. The constructed crest elevation was planned at 127.4 ft. Measurements indicate that the crest elevation equals or exceeds this elevation except at station 4+00 where it was 127.1 ft. Apparently, settlement of the crest has not been as much as anticipated. Photo No. 3 shows the crest.
 - (4) Downstream Slope. The downstream slope is very well vegetated with adapted grasses. No deformations, slumps, slides, rodent holes or seepage were observed on the slope, along the toe or below the toe of the dam. There wasn't any sign of seepage into the scour hole of the pipe spillway, which is unusual. Measurements indicate that the downstream slope is flatter than shown on the plans. Photo No. 4 shows the downstream slope.

- (5) Miscellaneous. The excellent vegetative cover and the nature of the materials in the embankment indicate that this dam could withstand considerable overtopping without serious damage.

c. Appurtenant Structures.

- (1) The principal spillway is uncontrolled. It consists of a 6' x 2' reinforced concrete drop inlet (riser) connected to a 24-inch reinforced concrete pipe conduit passing through the dam. No signs of deterioration were noted in the riser or the outlet of the conduit. Measurements indicate that it was constructed according to the plans. Photos 5, 6, 7, and 9 show the inlet and outlet of the principal spillway. Flow through the spillway was estimated at 0.5 c.f.s. There is a shear failure (circular arc) on the right side of the scour hole. It is felt that this slide results from the accumulation of surface runoff along the edge of the cultivated field along the right (south) side of the spillway outlet. Photos 8 and 10 show the shear slide on the right side of the scour hole. No seepage was observed into or around the scour hole. The reservoir level was at the crest of the spillway when inspected.
- (2) The uncontrolled emergency spillway is cut through the left abutment. The spillway is very well vegetated. No slumps, slides or erosion was observed in the spillway. Measurements indicate that it was constructed according to the plans. There were no indications that the emergency spillway has operated. Spillway flows should not endanger the embankment. Photos 11 and 12 show the emergency spillway.
- (3) Drawdown Facilities. There are no drawdown facilities for this dam.

d. Reservoir Area. No significant erosion was observed around the shoreline. The shoreline supports a lush growth of tules and grasses. Photo No. 5 shows a portion of the reservoir.

e. Downstream Channel. The downstream channel appears to be stable. It is overgrown with trees and brush. Photo No. 8 shows the channel.

3.2 EVALUATION

This dam appears to be in excellent condition with no observable potential of failure. Safety factors against shear failure should be significantly higher than reported since slopes are flatter than shown in the plans. The flatter slopes do not appear to be the result of settlement and spreading since the crest elevations are generally

as constructed and there were no observable deformations on the slopes. Apparently, the slope design was modified during construction. There are no indications of any seepage on the downstream slope, along the toe or in the abutment troughs. Slumps and slides on the right side of the scour hole should be corrected, but they do not impair the integrity of the dam.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no controlled outlet works for this dam. The pool level is controlled by rainfall, infiltration, evaporation, and the capacity of the uncontrolled spillways.

4.2 MAINTENANCE OF DAM

The Worth County Soil Conservation District conducts regular inspections of this structure. Maintenance of the structure appears to be very good. Slides in the scour hole (stilling basin) should be stabilized, but they do not pose any threat to the safety of the dam.

4.3 MAINTENANCE OF OPERATING FACILITIES

No operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

There is no warning system in effect for this dam.

4.5 EVALUATION

This dam is very well maintained. The few small trees and brush should be removed from the upstream slope and the slides in the scour hole at the downstream end of the principal spillway should be stabilized.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

- a. Design Data. Plans for this dam were obtained from the Grant City Soil Conservation Service office.
- b. Experience Data. The drainage area, reservoir surface area, and elevation-storage data were obtained from the plans. The hydraulic computations for the spillway and dam overtopping discharge ratings were based on data collected in the field at the time of the field inspection, and data obtained from the plans.
- c. Visual Observations.
 - (1) The principal spillway riser weir and trash rack are in good condition. There is some heavy grass growing over the weir (see Photo No. 6) that could be cleaned off, but there is no heavy debris. The sloughing on the right side of the outlet stilling basin poses no problem at the present time but bears watching for further developments.
 - (2) The emergency spillway is in very good shape and has an excellent grass cover.
 - (3) There are no drawdown facilities to evacuate the pool.
- d. Overtopping Potential. The spillways are too small to pass the probable maximum flood without overtopping. The spillways will pass 65% of the probable maximum flood and the 1% probabilistic flood without overtopping. The results of the routings through the dam are tabulated in regards to the following conditions:

| <u>Frequency</u> | <u>Inflow Discharge c.f.s.</u> | <u>Outflow Discharge c.f.s.</u> | <u>Maximum Pool Elevation</u> | <u>*Maximum Depth Over Dam Feet</u> | <u>Duration Over Top Hours</u> |
|------------------|--|---|---------------------------------------|---|--|
| 1/2 PMF | 960 | 800 | 126.5 | 0 | --- |
| PMF | 1920 | 1720 | 128.0 | .9 | .4 |
| 0.65 PMF | 1240 | 1080 | 127.1 | 0 | --- |

* Minimum Top of Dam Elevation - 127.1

According to the recommended guidelines from the Department of the Army, Office of the Chief of Engineers, this dam is classified as having a high hazard rating and a small size. Therefore, the 1/2 PMF to PMF is the test for the adequacy of the dam and its spillway.

The estimated damage zone is described in Paragraph 1.2d in this report.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observation. This dam is in excellent condition and is considered to be structurally stable. Measurements indicate that the embankment slopes are flatter than shown on the plans. There are no indications of seepage on the downstream side of the dam. Minor deficiencies in maintenance, small trees and shrubs on the upstream slope and slides on the right bank of the scour hole could lead to problems if left uncontrolled:
- b. Design and Construction Data. Design data and analyses and reports on construction control are considered adequate to support the conclusions in this report.
- c. Operating Records. There are no controlled operating facilities for this dam.
- d. Post Construction Changes. The inspection team is not aware of any post-construction changes.
- e. Seismic Stability. This dam is located in Seismic Zone 1. An earthquake of the magnitude predicted in this area is not expected to cause structural failure of this dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

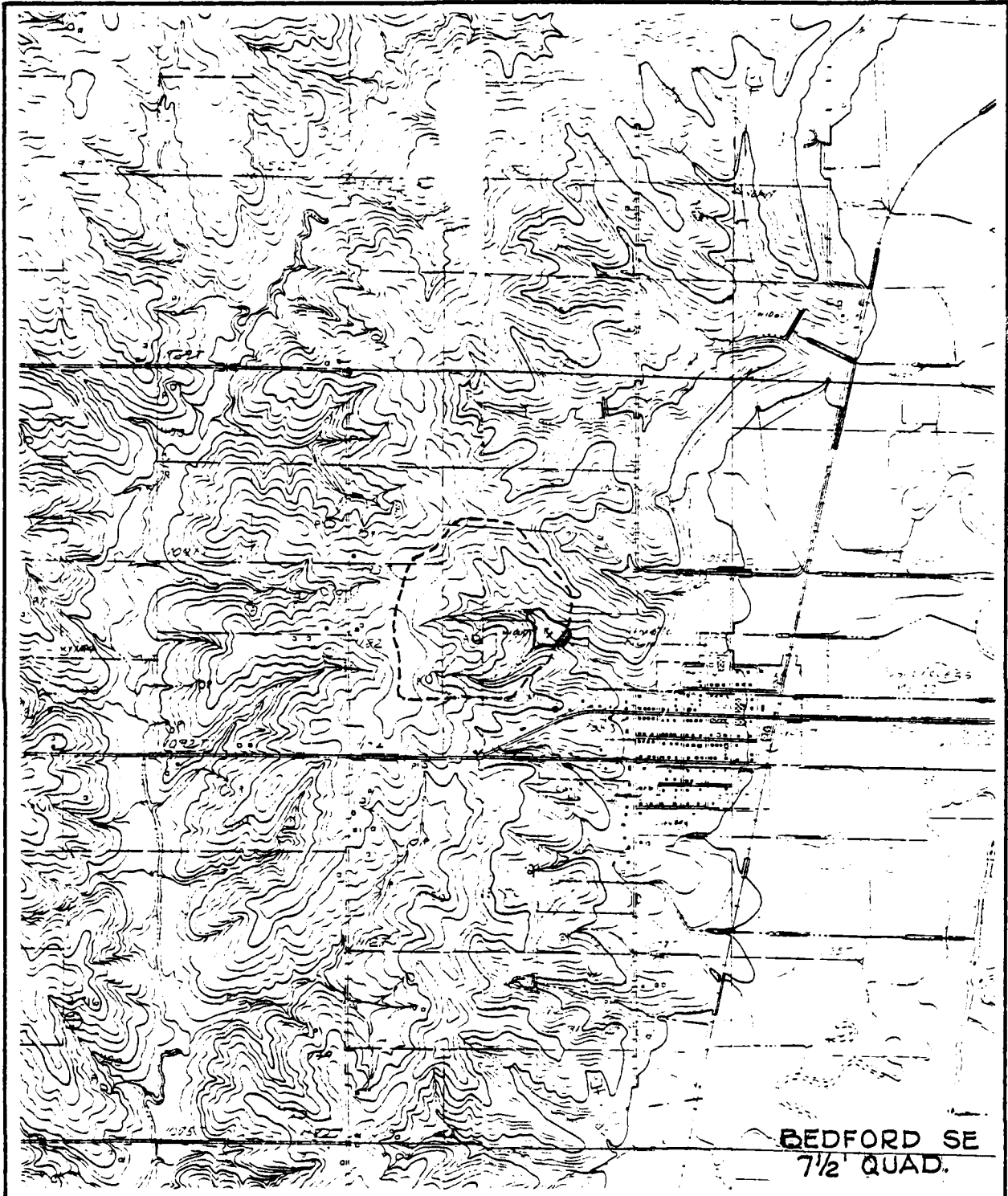
7.1 DAM ASSESSMENT

- a. Safety. This dam is considered to be structurally safe and hydrologically adequate. The spillways will pass 65% of the probable maximum flood without overtopping the dam and the probable maximum flood will overtop the dam by 0.9 foot for 0.4 hour which should not result in significant damage to the dam. Small trees and brush should be removed from the upstream slope and measures taken to stabilize the slides in the right bank of the scour hole.
- b. Adequacy of Information. Information available on design of this structure, visual observations, and 19 years of satisfactory performance are considered adequate to support conclusions in this report.
- c. Urgency. There does not appear to be any urgency to accomplish the remedial measures recommended in paragraph 7.2.
- d. Necessity for Further Investigations. Further investigations are not considered necessary.
- e. Seismic Stability. This dam is located in Seismic Zone 1. An earthquake of this magnitude is not expected to be hazardous to this dam.

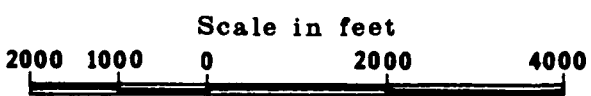
7.2 REMEDIAL MEASURES

- a. Alternatives.
 - (1) No modifications are considered necessary.
- b. Operation and Maintenance Procedures.
 - (1) Trees and brush should be removed from the upstream slope and measures taken to prevent their recurrence. Removal of large trees should be done under the guidance of a professional engineer experienced in the design and construction of dams.
 - (2) The activity and extent of the slides in the right bank of the scour hole should be monitored. Measures to eliminate the ponding of surface runoff in the area above the slide should facilitate stabilization of the slide area.
 - (3) Regular inspections of the structure should be continued with the reports made a part of this project file.

APPENDIX A
MAPS



BEDFORD SE
7 1/2' QUAD.



Contour Interval - 20'



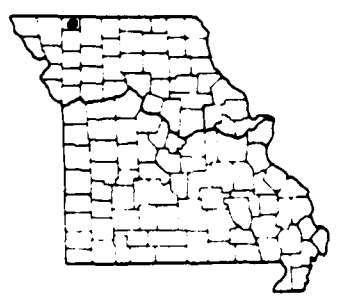
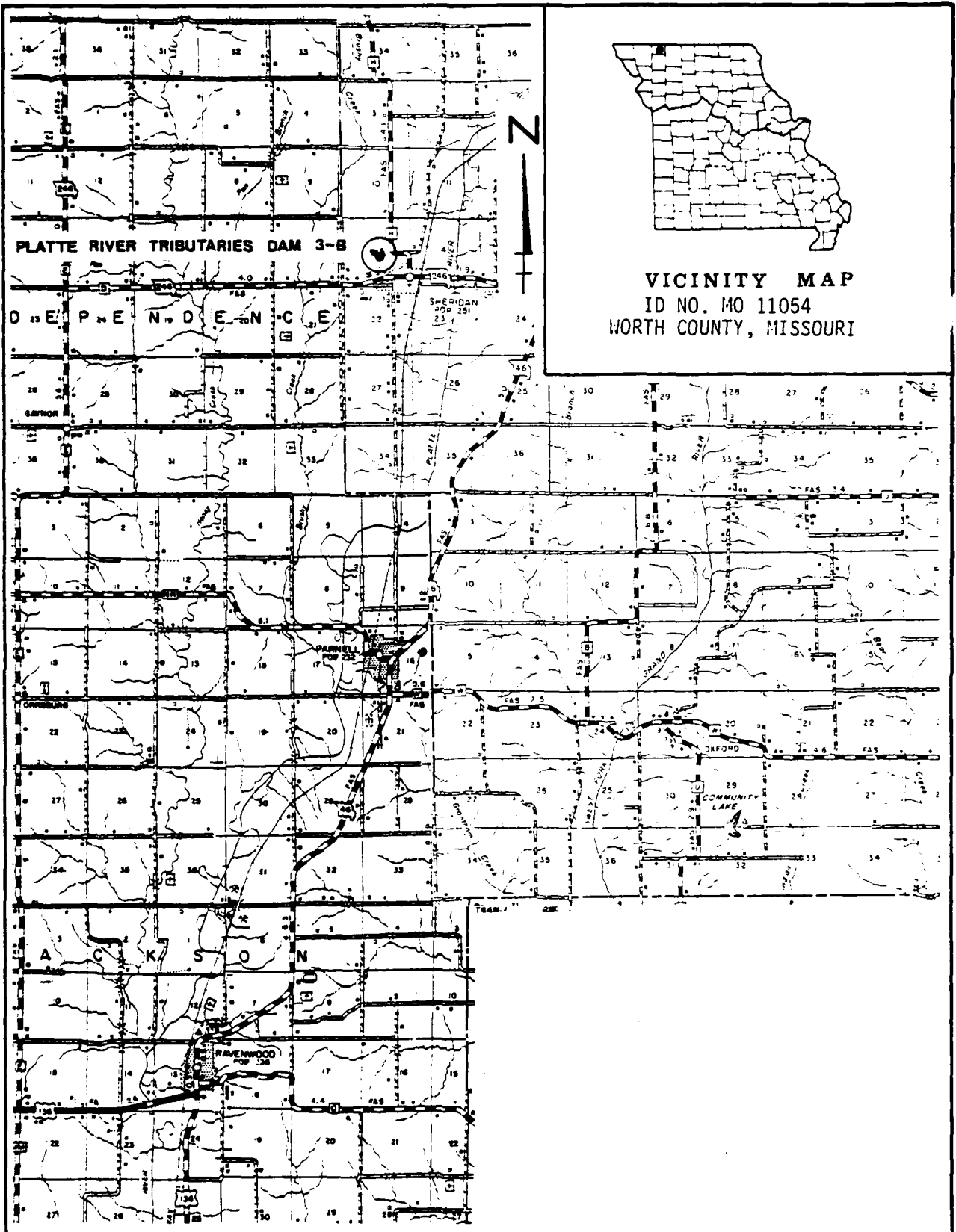
VICINITY TOPOGRAPHY

PLATTE RIVER TRIBUTARIES DAM 3-B

WORTH COUNTY, MISSOURI

MO. 11054

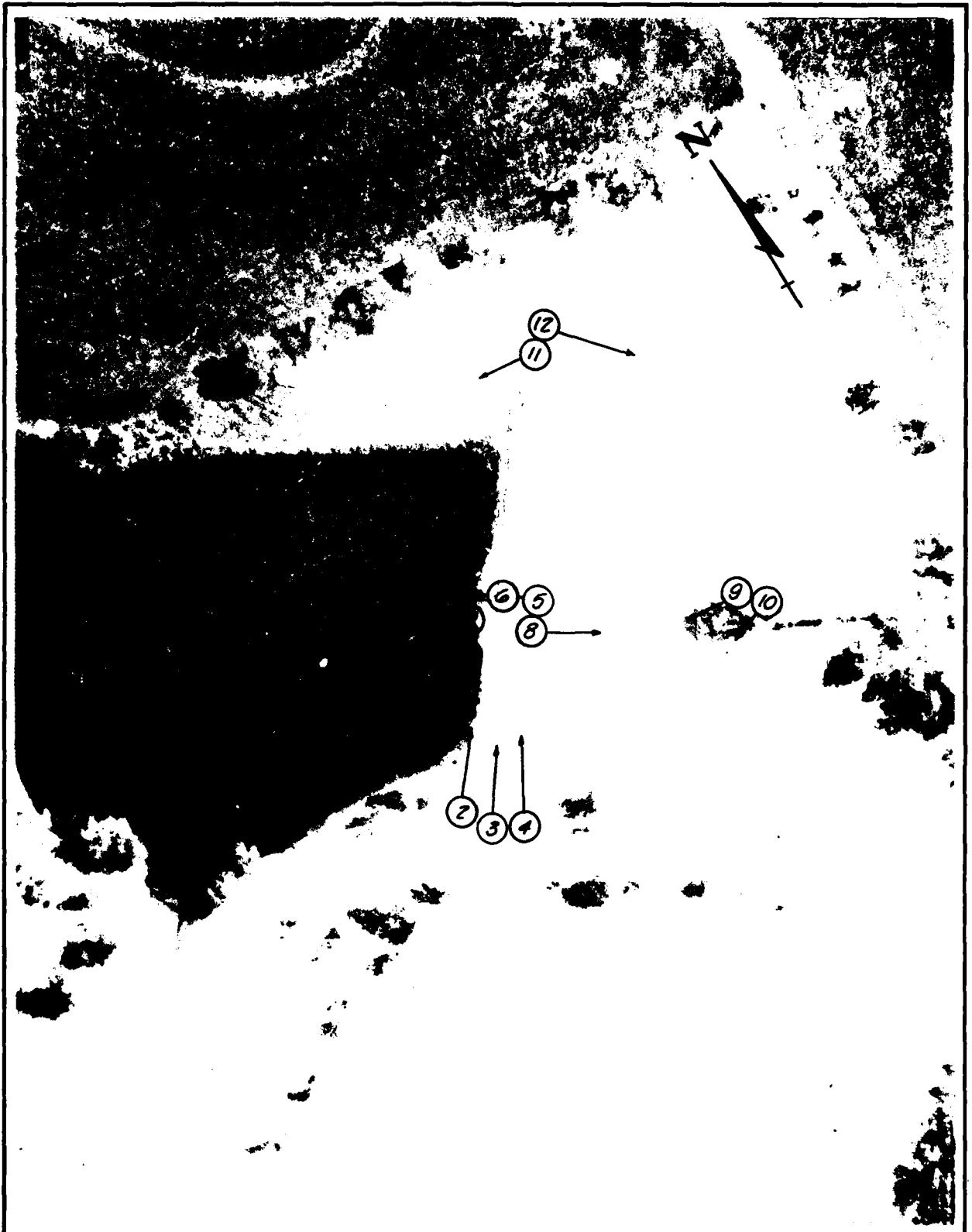
PLATE A-1



VICINITY MAP
 ID NO. MO 11054
 WORTH COUNTY, MISSOURI

LOCATION MAP
 PLATE A-2

APPENDIX B
PHOTOGRAPHS



PLATTE RIVER TRIBUTARIES DAM 3-B
WORTH COUNTY, MISSOURI
MO 11054

PHOTO INDEX

PLATE B-1

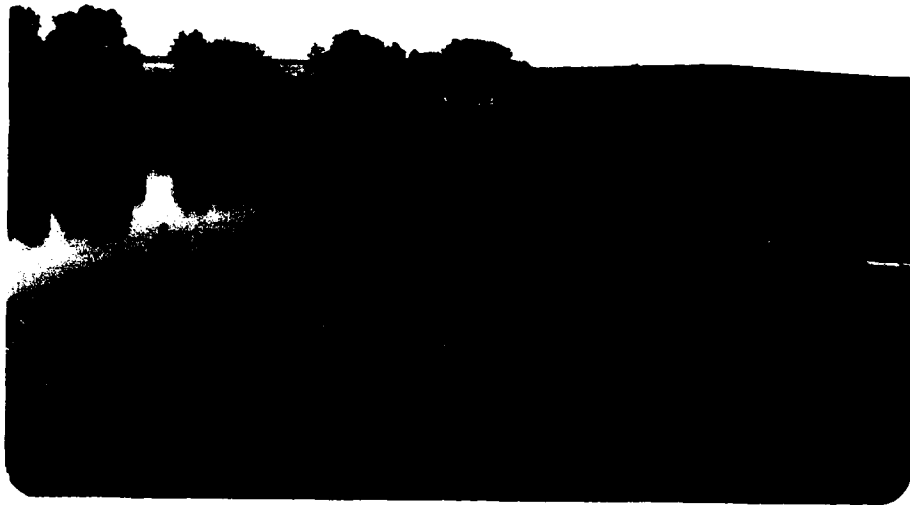


PHOTO NO. 2 - UPSTREAM SLOPE FROM RIGHT END.



PHOTO NO. 3 - CREST FROM RIGHT END.



PHOTO NO. 4 - DOWNSTREAM SLOPE FROM RIGHT END.

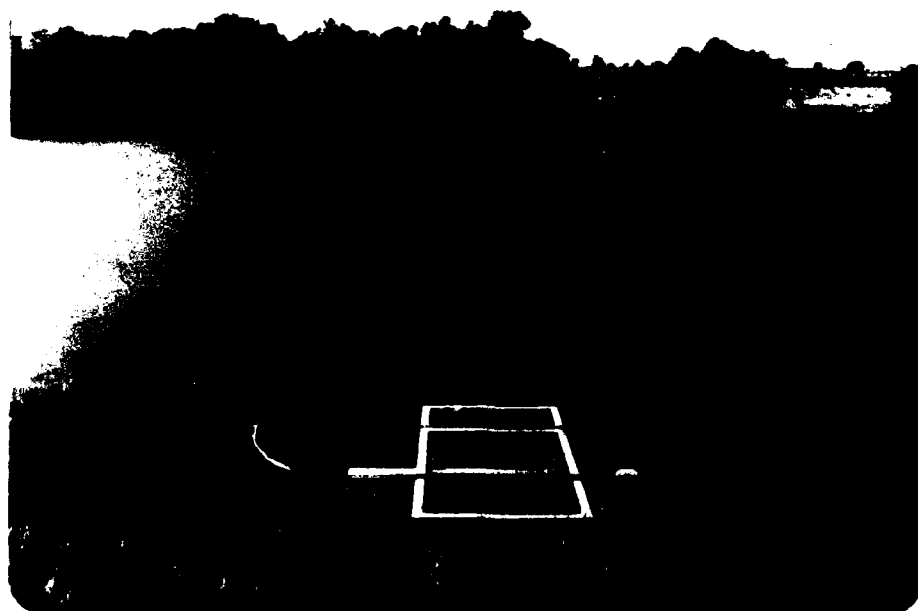


PHOTO NO. 5 - VIEW UPSTREAM WITH PRINCIPAL SPILLWAY INLET IN FOREGROUND.

FRONT

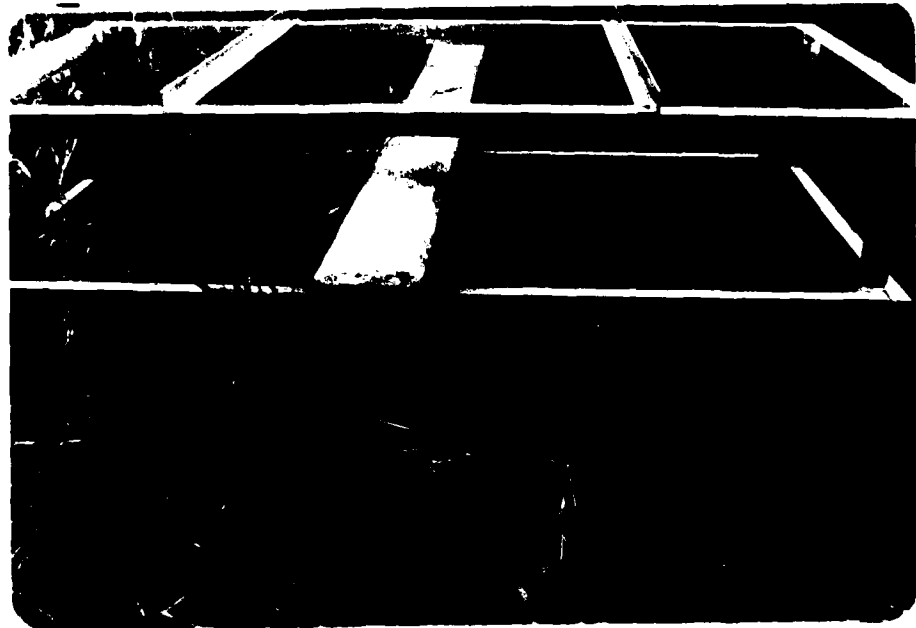


PHOTO NO. 6 - PRINCIPAL SPILLWAY INLET FROM LEFT SIDE.

FORM 2



PHOTO NO. 7 - VIEW LOOKING DOWN INTO PRINCIPAL SPILLWAY INLET.

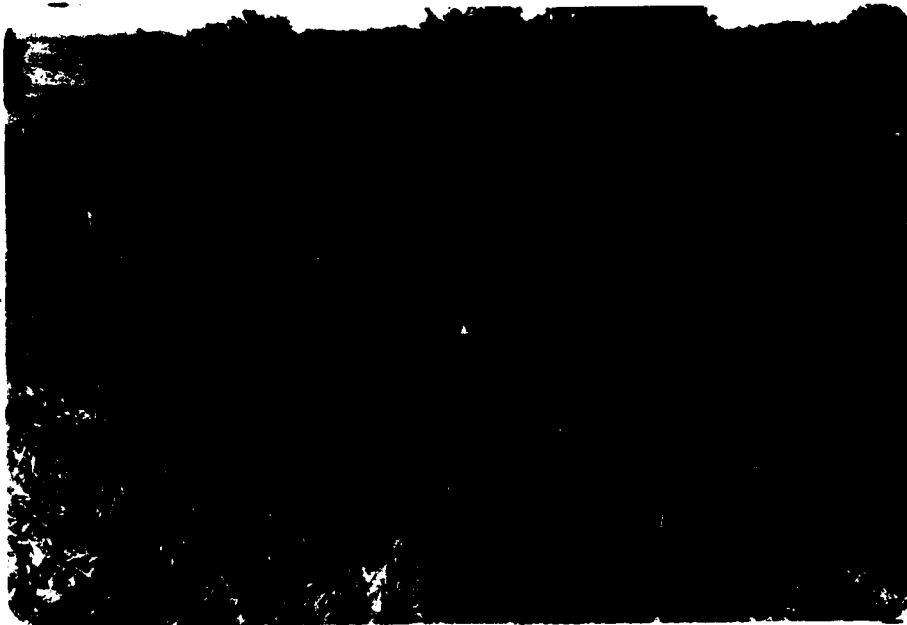


PHOTO NO. 8 - OUTLET END OF PRINCIPAL SPILLWAY SHOWING SLUMP
ON RIGHT SIDE OF SCOUR HOLE.



PHOTO NO. 9 - VIEW OF OUTLET END OF PRINCIPAL SPILLWAY.



PHOTO NO. 10 - SLUMP AREA ON RIGHT SIDE OF SCOUR HOLE.



PHOTO NO. 11 - VIEW UPSTREAM IN EMERGENCY SPILLWAY.



PHOTO NO. 12 - VIEW DOWNSTREAM IN EMERGENCY SPILLWAY.



PHOTO NO. 13 - VIEW LOOKING WEST (UPSTREAM). FOOTBRIDGE
CROSSES CHANNEL. (SEE PLATE A-1)

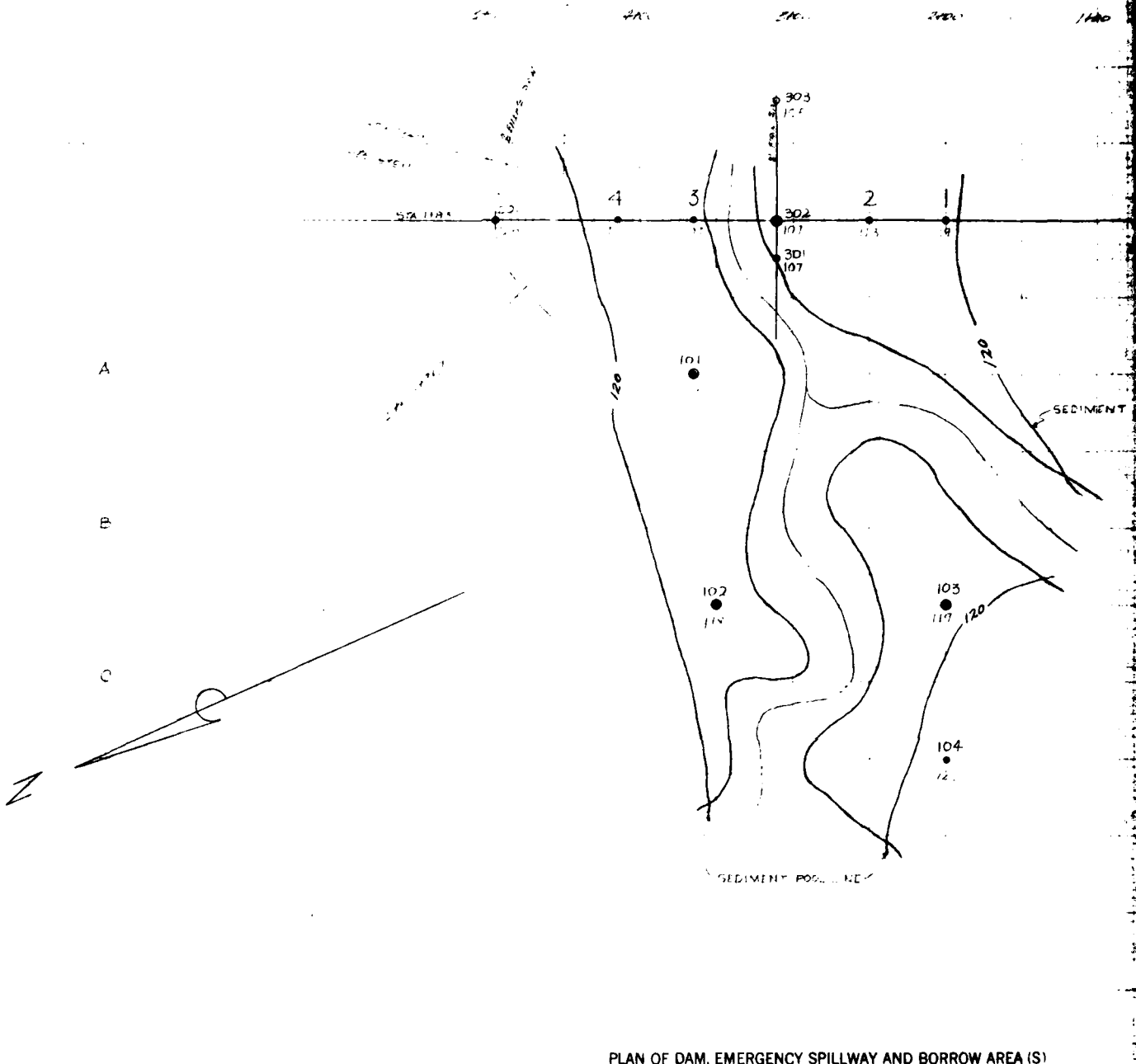


PHOTO NO. 14 - VIEW LOOKING EAST, RIGHT BANK OF CHANNEL
AT LEFT CENTER (SEE PLATE A-1).

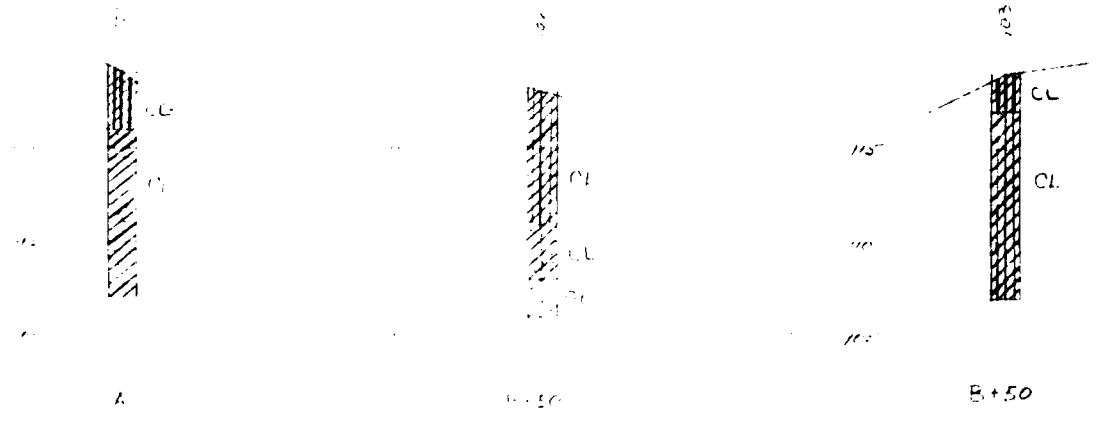


PHOTO NO. 15 - VIEW LOOKING EAST ALONG STREAM CHANNEL ON
RIGHT (SEE PLATE A-1).

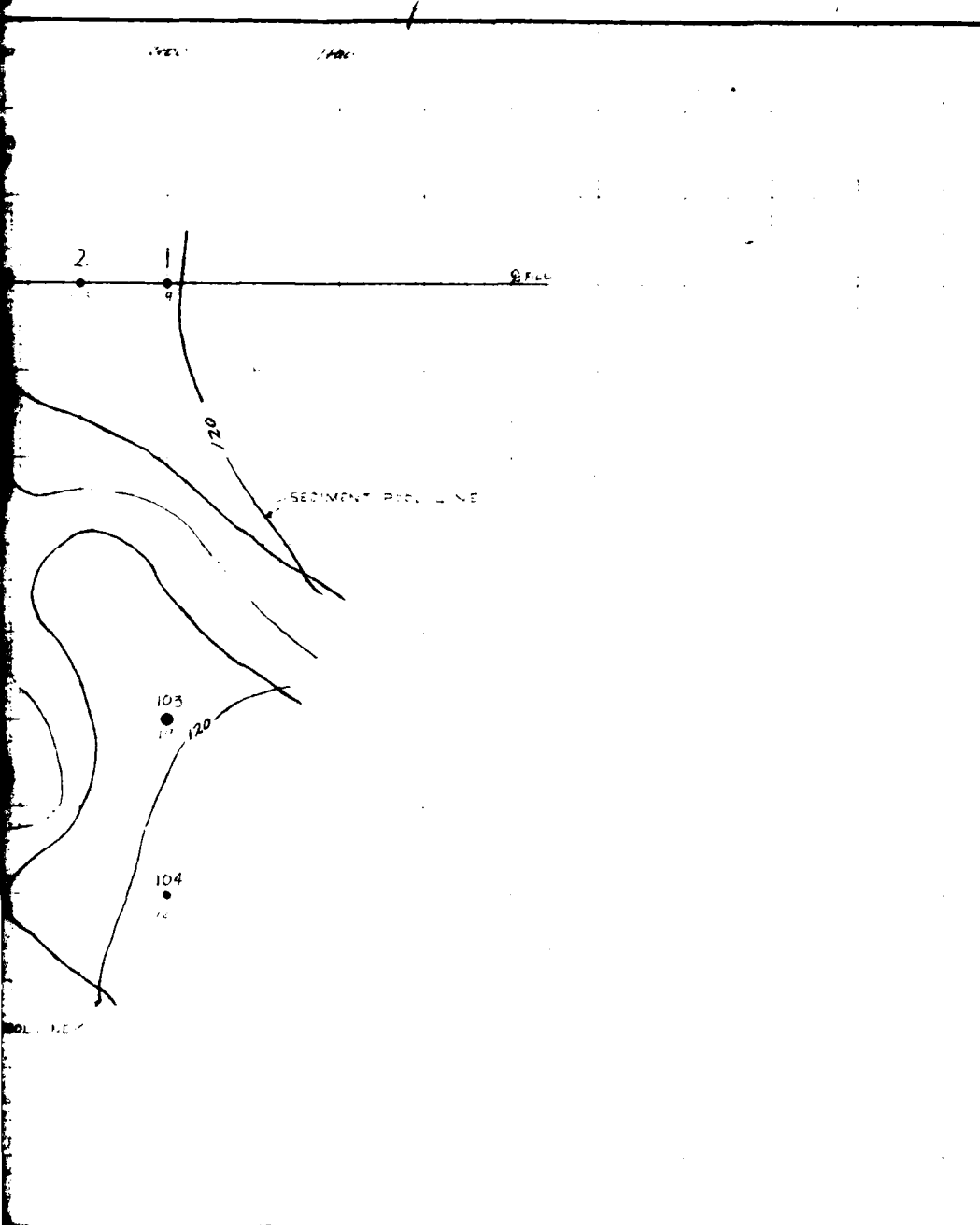
APPENDIX C
PROJECT PLATES



PLAN OF DAM, EMERGENCY SPILLWAY AND BORROW AREA (S)



GEOLOGIC CROSS SECTIONS OF BORROW AREA (S)



LEGEND SYMBOLS UNCONSOLIDATED MATERIAL

| | | | | |
|--------------------|------------------|----------------|----------------|-------------------|
| gravel | sand | silt | clay | lobbles, boulders |
| gravel, sandy | sand, gravelly | silt, gravelly | clay, gravelly | peat |
| gravel, silty | sand, silty | silt, sandy | clay, sandy | gypsiferous |
| gravel, clayey | sand, clayey | silt, clayey | clay, silty | calcareous |
| gravel, sand, silt | sand, silt, clay | organic silt | organic clay | |

CONSOLIDATED MATERIAL Sedimentary Rocks

| | | | | |
|------------------|----------------------|------------------|-------|--------------|
| shale | sandstone | limestone | chalk | coal |
| calcareous shale | calcareous sandstone | cherty limestone | marl | gypsum |
| sandy shale | shaly sandstone | sandy limestone | chert | conglomerate |
| siltstone | breccia | dolomite | | |

Metamorphic Rocks

| | |
|-----------|------------|
| quartzite | slate |
| gneiss | schist |
| marble | soapstone |
| | talc |
| | serpentine |

Igneous Rocks

| | |
|-------------|-----------|
| intrusive | extrusive |
| pyroclastic | |

Undifferentiated

| | | | | |
|--------|----------|------|--------|-----------|
| quartz | feldspar | mica | illite | kaolinite |
|--------|----------|------|--------|-----------|

* to be added to Standard Symbol when significant amounts of dispersed gypsum or calcified zones are present in the section

○ hole logged only
● hole sampled

↘ dip and strike
⊖ pit or trench

ABBREVIATIONS

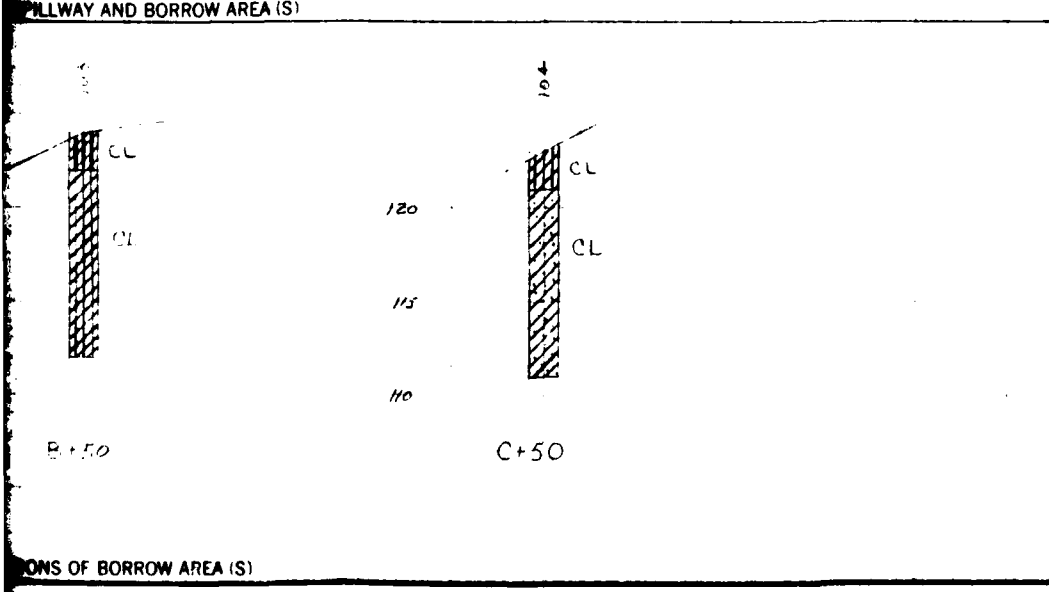
| | |
|------------------------|---|
| aq aquifer | fr friable |
| cav cavities | lam laminated |
| cl centerline | mas massive |
| con concretions | TD total depth |
| US undisturbed samples | v very |
| DS disturbed samples | w/ with |
| dip dipping | wea weathered |
| frac fractured | WL (date) groundwater level on a specified date |

TEST HOLE NUMBERING SYSTEM

| | |
|--------------------------------|-----------|
| Centerline of dam | 1 - 99 |
| Borrow area | 101 - 199 |
| Emergency spillway | 201 - 299 |
| Centerline of outlet structure | 301 - 399 |
| Stream channel | 401 - 499 |
| Relief wells | 501 - 599 |
| | 601 - 699 |
| | 701 - 799 |

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

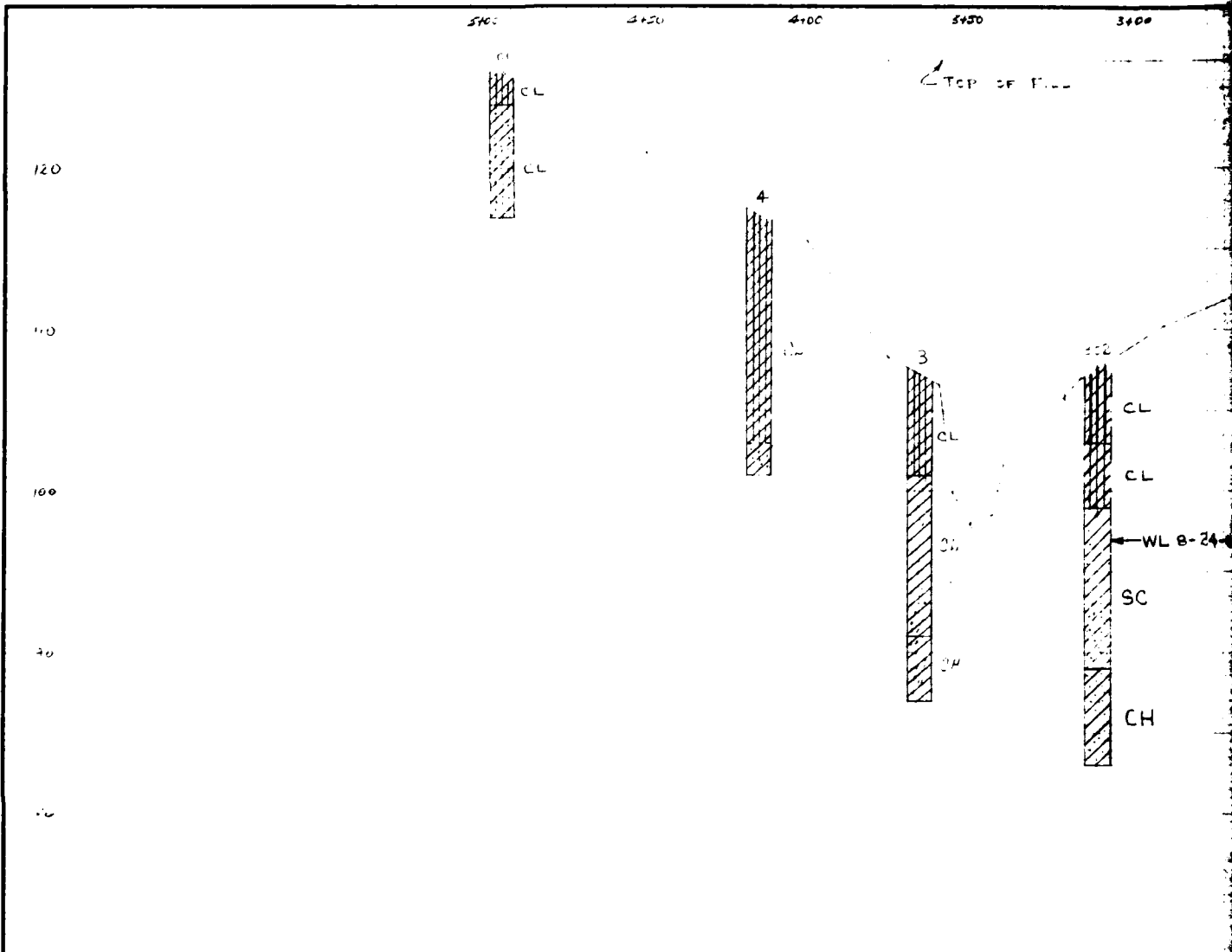
| | |
|----|---|
| GW | Well graded gravels; gravel-sand mixtures |
| GP | Poorly graded gravels |
| GM | Silty gravels; gravel-sand-silt mixtures |
| GC | Clayey gravels; gravel-sand-clay mixtures |
| SW | Well graded sands; sand-gravel mixtures |
| SP | Poorly graded sands |
| SM | Silty sand |
| SC | Clayey sands; sand-clay mixtures |
| ML | Silts; silty, v. fine sands; sandy or clayey silts |
| CL | Clays of low to medium plasticity; silty, sandy or gravelly clays |
| CH | Inorganic clays of high plasticity; fat clays |
| MH | Elastic silts; micaceous or diatomaceous silts |
| OL | Organic silts and organic silty clays of low plasticity |
| OH | Organic clays of medium to high plasticity |



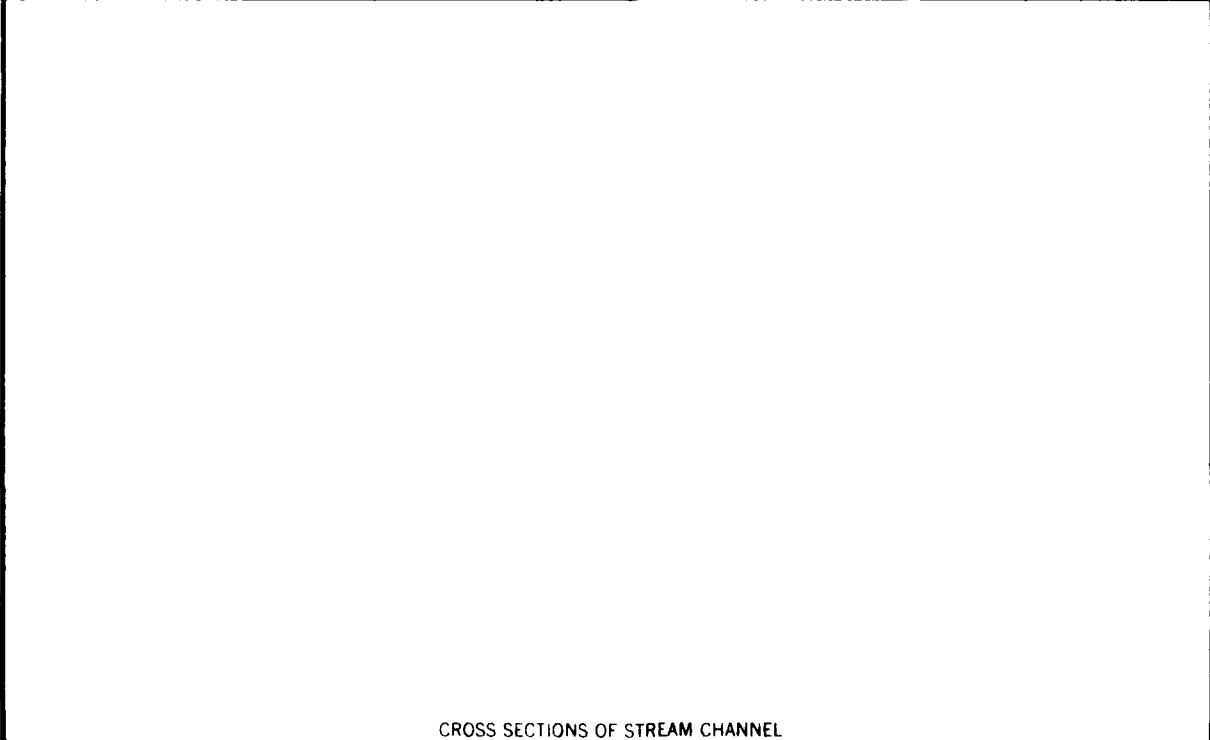
PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS
STRUCTURE #3-B
 PLATTE RIV. TRIB. WATERSHED P. 544
 WORTH CO. S.C.D. MISSOURI

U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

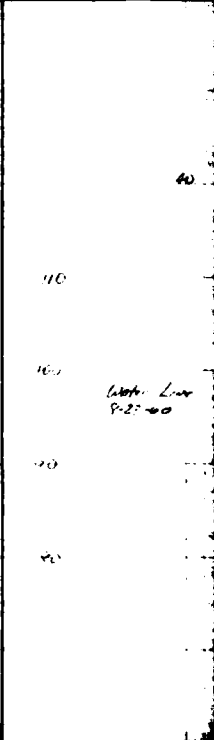
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| Investigated by O.M. FINKELSON | Date 8-23-69 | Approved by Title |
| Title GEOLOGIST | | |
| Checked by E.H. NOLTE | Date 9-6-69 | Title |
| Title | Sheet No. / of // | Drawing No. 3-E-46041-G |

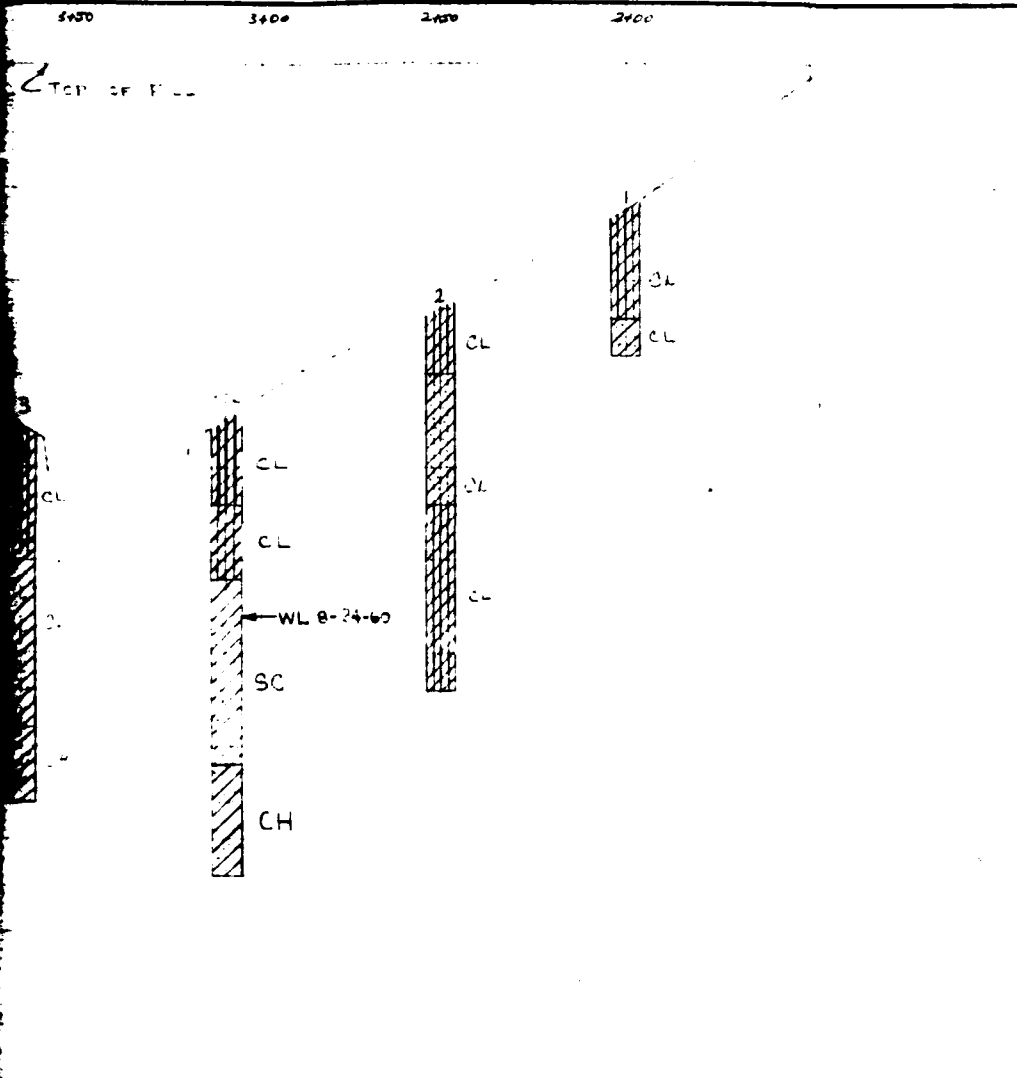


PROFILE AND GEOLOGIC SECTION: CENTERLINE OF DAM

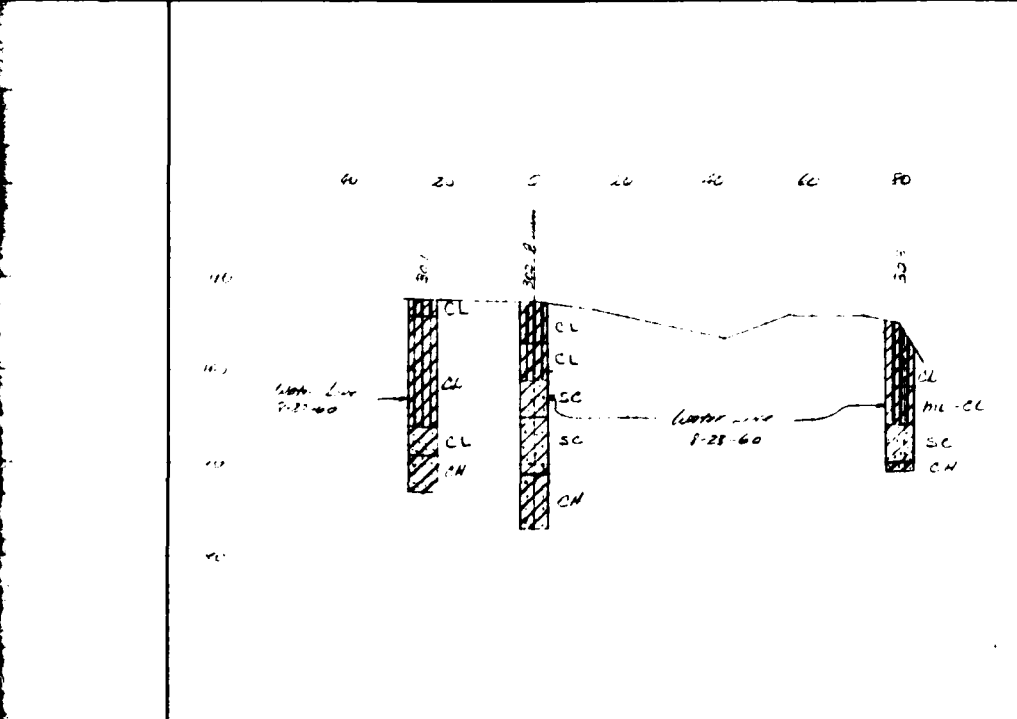


CROSS SECTIONS OF STREAM CHANNEL





SECTION CENTERLINE OF DAM



PROFILE: CENTERLINE OF PRINCIPAL SPILLWAY

LEGEND SYMBOLS

UNCONSOLIDATED MATERIAL

| | | | | |
|--------------------|------------------|----------------|----------------|-------------------|
| gravel | sand | silt | clay | cobbles, boulders |
| gravel, sandy | sand, gravelly | silt, gravelly | clay, gravelly | peat |
| gravel, silty | sand, silty | silt, sandy | clay, sandy | gypsumiferous |
| gravel, clayey | sand, clayey | silt, clayey | clay, silty | calcareous |
| gravel, sand, silt | sand, silt, clay | organic silt | organic clay | |

* to be added to Standard Symbol when significant amounts of dispersed gypsum or calcified zones are present in the section.

CONSOLIDATED MATERIAL

Sedimentary Rocks

| | | | | |
|------------------|----------------------|------------------|-------|--------------|
| shale | sandstone | limestone | chalk | coal |
| calcareous shale | calcareous sandstone | cherty limestone | marl | gypsum |
| sandy shale | shaly sandstone | sandy limestone | chert | conglomerate |
| siltstone | breccia | dolomite | | |

Metamorphic Rocks

| | | | |
|-----------|-----------|-------------|------------|
| quartzite | slate | intrusive | extrusive |
| gneiss | schist | pyroclastic | |
| marble | soapstone | talc | serpentine |

Other Symbols

- hole logged only
- hole sampled
- ↘ dip and strike
- pit or trench

ABBREVIATIONS

| | | | |
|------|---------------------|-----|--|
| aq | aquifer | fr | frable |
| cav. | cavities | lam | laminated |
| c | centerline | mas | massive |
| con | concretions | TD | total depth |
| US | undisturbed samples | v. | very |
| DS | disturbed samples | w/ | with |
| dip | dipping | wea | weathered |
| frac | fractured | WL | (date) groundwater level on a specified date |

TEST HOLE NUMBERING SYSTEM

| | |
|--------------------------------|-------------------------------------|
| Centerline of dam | 1 - 99 |
| Borrow area | 101 - 199 |
| Emergency spillway | 201 - 299 |
| Centerline of outlet structure | 301 - 399 |
| Stream channel | 401 - 499 |
| Relief wells | 501 - 599 601 - 699 701 - 799 |

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

| | |
|------|--|
| GW | Well graded gravels; gravel-sand mixtures |
| GP | Poorly graded gravels |
| GM | Silty gravels; gravel-sand-silt mixtures |
| GC | Clayey gravels; gravel-sand-clay mixtures |
| SW | Well graded sands; sand-gravel mixtures |
| SP | Poorly graded sands |
| SM-1 | Silty coarse sand |
| SM-2 | Silty fine sand |
| SC | Clayey sands; sand-clay mixtures |
| ML | Silts, silty v. fine sands; sandy or clayey silts |
| CL-1 | Clays of low plasticity; silty, sandy or gravelly clays |
| CL-2 | Clays of medium plasticity; silty, sandy or gravelly clays |
| CH | Clays of high plasticity; fat clays |
| MH | Elastic silts, micaceous or diatomaceous silts |
| OL | Organic silts and organic silty clays of low plasticity |
| OH | Organic clays or silts of medium to high plasticity |

PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS

STRUCTURE #3-B

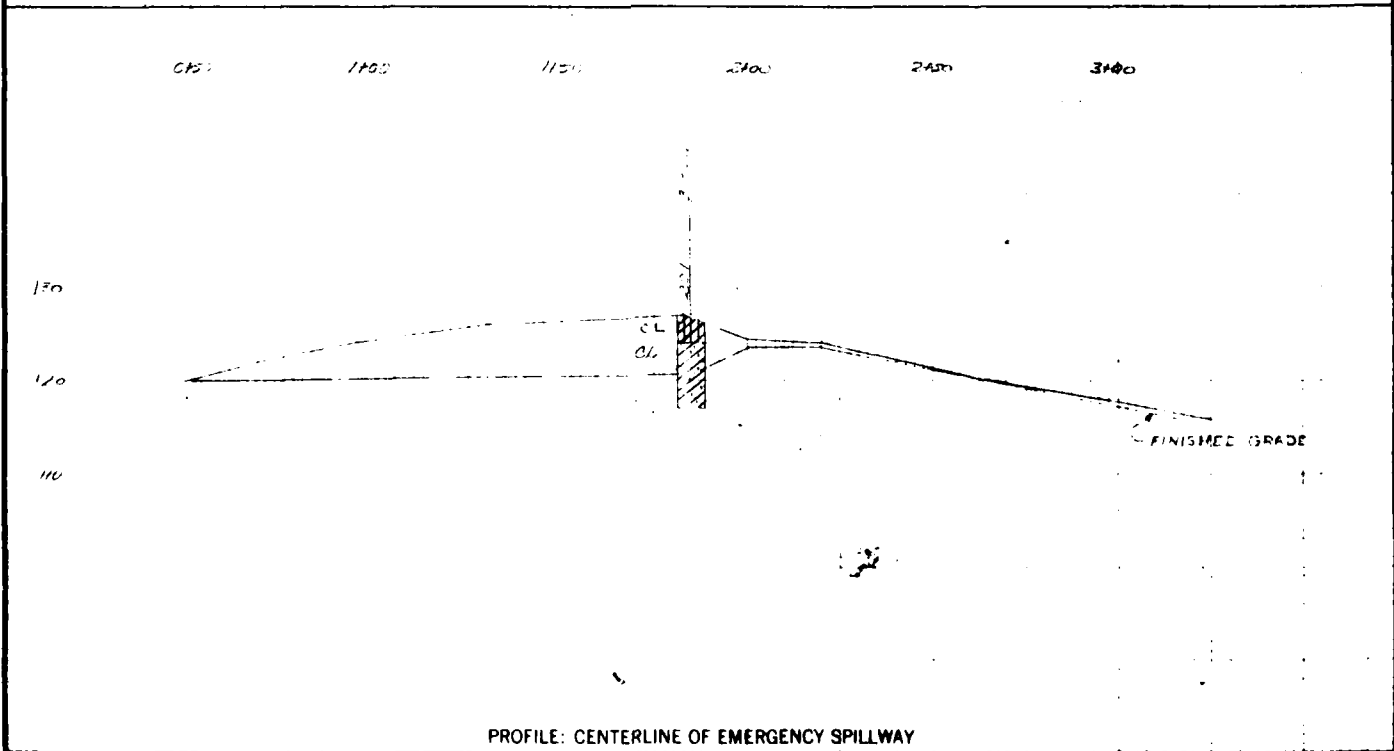
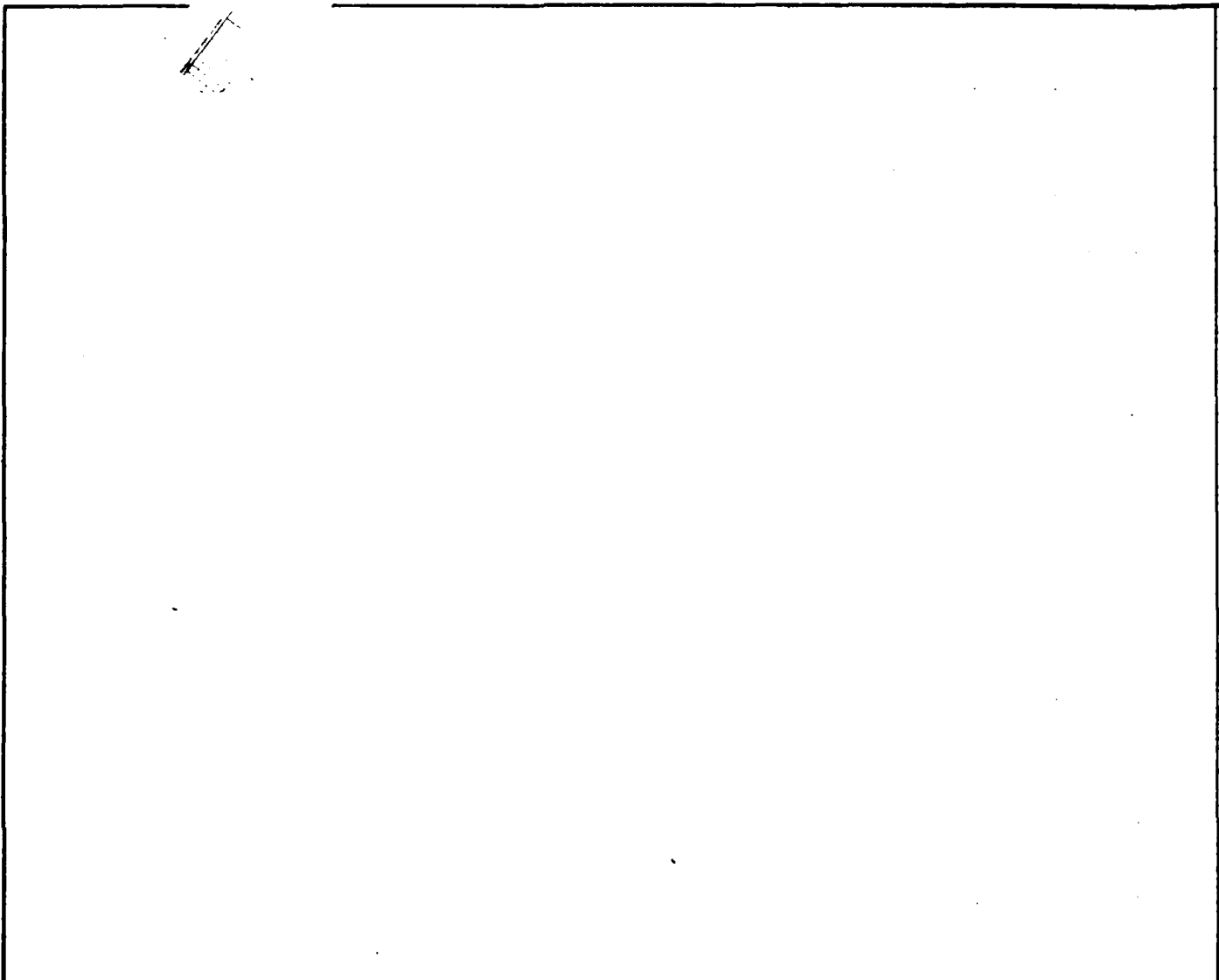
PLATTE RIV. TRIB. WATERSHED P...

WORTH CO. SCD MISSOURI

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

| | | | |
|-----------------|---------|-------------|--|
| Investigated by | Date | Approved by | |
| O. M. FINKELSON | 8-28-60 | | |
| Title | | Title | |
| GEOLOGIST | | | |
| Checked by | Date | Title | |
| D. H. NOLTE | 9-60 | | |
| Title | Sheet | Drawing No. | |
| AGRI. ENGINEER | No 2 | 3-E-46041-G | |
| | of 11 | | |

PLATE C-2



PROFILE: CENTERLINE OF EMERGENCY SPILLWAY

LEGEND

SYMBOLS
UNCONSOLIDATED MATERIAL

| | | | | |
|--------------------|------------------|----------------|----------------|-------------|
| gravel | sand | silt | clay | boulders |
| gravel, sandy | sand, gravelly | silt, gravelly | clay, gravelly | peat |
| gravel, silty | sand, silty | silt, sandy | clay, sandy | gypsiferous |
| gravel, clayey | sand, clayey | silt, clayey | clay, silty | calcareous |
| gravel, sand, silt | sand, silt, clay | organic silt | organic clay | |

* to be added to Standard Symbol when significant amounts of dispersed gypsum or calcified zones are present in the section

CONSOLIDATED MATERIAL
Sedimentary Rocks

| | | | | |
|------------------|----------------------|------------------|-------|--------------|
| shale | sandstone | limestone | chalk | coal |
| calcareous shale | calcareous sandstone | cherty limestone | marl | gypsum |
| sandy shale | shaley sandstone | sandy limestone | chert | conglomerate |
| siltstone | breccia | dolomite | | |

| | | | |
|--------------------------|-----------------------------|----------------------|-----------|
| Metamorphic Rocks | | Igneous Rocks | |
| quartzite | slate | intrusive | extrusive |
| gneiss | schist | pyroclastic | |
| marble | soapstone, talc, serpentine | undifferentiated | |

- Other Symbols**
- hole logged only
 - hole sampled
 - ↘ dip and strike
 - pit or trench

ABBREVIATIONS

| | |
|------------------------|---|
| aq aquifer | fn friable |
| cav. cavities | lam laminated |
| can centerline | mas massive |
| con concretions | TD total depth |
| US undisturbed samples | v. very |
| DS disturbed samples | w/ with |
| dip dipping | wea weathered |
| frac fractured | WL (date) groundwater level on a specified date |

TEST HOLE NUMBERING SYSTEM

| | |
|--------------------------------|-------------------------------------|
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UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

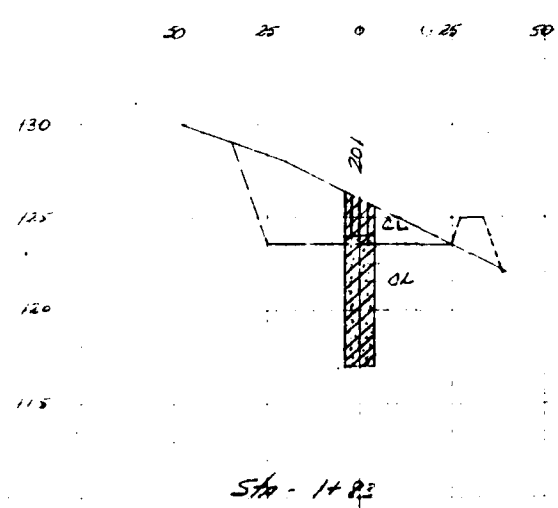
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| CL | Clays of low to medium plasticity; silty, sandy or gravelly clays |
| CH | Inorganic clays of high plasticity; fat clays |
| MH | Elastic silts; micaceous or diatomaceous silts |
| OL | Organic silts and organic silty clays of low plasticity |
| OH | Organic clays of medium to high plasticity |

PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS
STRUCTURE #3-B
PLATTE RIV. TRIB. WATERSHED
WORTH CO. S.C.D. MISSOURI

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

| | | |
|--|------------------------|-----------------------------------|
| Investigated by D.M. FINNELSON | Date 8-22-66 | Approved by _____ |
| Title GEOLOGIST | | Title _____ |
| Checked by B.H. NOLTE | S.C.D. _____ | Title _____ |
| Title AGRI. ENGINEER | Sheet No. 11 | Drawing No. 3-E-46041-6 |

GEOLOGIC CROSS SECTIONS OF EMERGENCY SPILLWAY



3+00

FINISHED GRADE

LEGEND

| | | | |
|---|-------|---|-------|
| State Line | ----- | Levee | ..... |
| County Line | ----- | Clearing and/or Grubbing Boundary | ..... |
| Township Line | ----- | Building | ..... |
| Section Line | ----- | School | ..... |
| Property Line | ----- | Church | ..... |
| Paved Road | ----- | Cemetery | ..... |
| Improved Road | ----- | Windmill | ..... |
| Dirt Road | ----- | Well | ..... |
| Private or Field Road | ----- | Spring | ..... |
| Railroad | ----- | Mine, Quarry, or Gravel Pit | ..... |
| Base Line | ----- | Section Corner | ..... |
| Offset Line | ----- | Section Center | ..... |
| Center Line of Improvements | ----- | Bench Mark, Permanent | ..... |
| Watershed Boundary | ----- | Bench Mark, Temporary | ..... |
| Sub-Watershed Boundary | ----- | Control Point, Permanent | ..... |
| Fence | ----- | Control Point, Temporary | ..... |
| Fence to be Removed | ----- | Point on Offset Line | ..... |
| Telegraph and Telephone Line (Location of Pole) | ----- | Point of Intersection | ..... |
| Power Line (Location of Pole) | ----- | Lake or Pond | ..... |
| Telephone and Power Line (Location of Pole) | ----- | Intermittent Lake or Pond | ..... |
| High Voltage Transmission Line (Location of Towers) | ----- | Approximate Limit of Work Area | ..... |
| Pipe Line or Buried Cable | ----- | Stock Watering System | ..... |
| Water Pipe Line (Farm) | ----- | Foundation Trench Drain | ..... |
| Existing Tile Line | ----- | *Contours | ..... |
| Proposed Tile Line | ----- | *Gully Banks (indicates elevation of decima point) | ..... |
| Junction Box | ----- | *Dashed lines indicate existing contours or gully banks within areas of excavation and fill | ..... |
| Open Ditch (4' deep or over) | ----- | North Arrow (True North) | ..... |
| Shallow Ditch (Less than 4' deep) | ----- | Drop Inlet | ..... |
| Open Ditch to be Cleaned Out | ----- | Drop Spillway | ..... |
| Terrace, Graded | ----- | Box Inlet Drop Spillway | ..... |
| Terrace, Level | ----- | Box Inlet Culvert | ..... |
| Diversion | ----- | Culvert | ..... |
| Grassed Watercourse | ----- | Culvert Extension | ..... |
| Stream (Large) | ----- | Inlet on Culvert | ..... |
| Stream (Small) | ----- | Sod Flume (gutter) | ..... |
| Intermittent Stream | ----- | Chute | ..... |
| Stream Disappears on Flat | ----- | Box Inlet Chute | ..... |
| Stream Disappears in Sink Hole | ----- | Bridge | ..... |
| Sink Hole or Depression | ----- | | |
| Marsh | ----- | | |

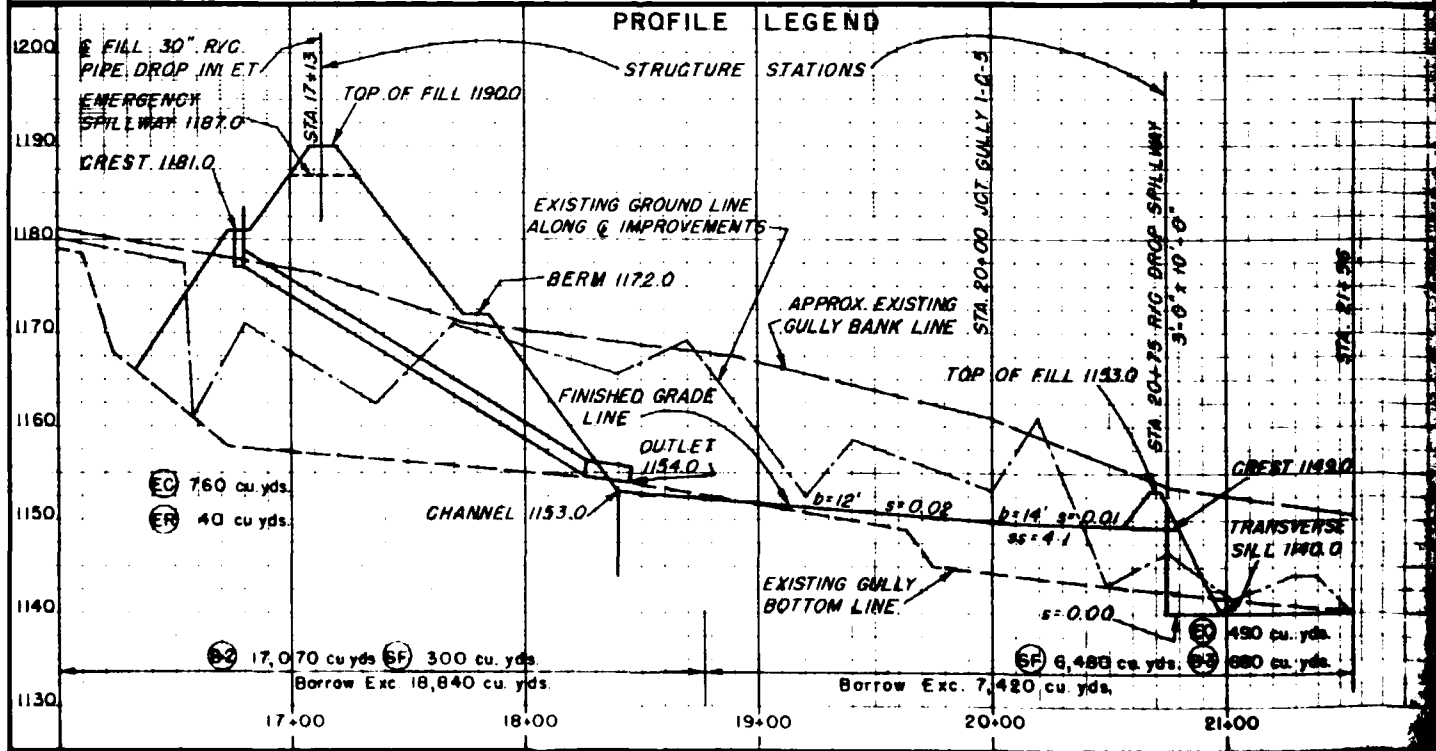
| | | | |
|--------------------------|----|----|----|
| 1 gravel | 6 | 11 | 16 |
| 2 gravel, sandy | 7 | 12 | 17 |
| 3 gravel, silty | 8 | 13 | 18 |
| 4 gravel, clayey | 9 | 14 | 19 |
| 5 gravel, sand, silt | 10 | 15 | 20 |
| 26 shale | 30 | 34 | 38 |
| 27 calcareous shale | 31 | 35 | 39 |
| 28 sandy shale | 32 | 36 | 40 |
| 29 siltstone | 33 | 37 | 41 |
| Metamorphic Rocks | | | |
| 46 quartzite | 49 | 52 | 55 |
| 47 gneiss | 50 | 53 | 56 |
| 48 marble | 51 | 54 | 57 |

TEST HOLE NUMBERING

Centerline of dam
 Borrow area
 Emergency spillway
 Centerline of outlet structure
 Stream channel
 Relief wells

UNIFIED

GW Well graded gravels, gravel
 GP Poorly graded gravels
 GM Silty gravels, gravel-sand
 GC Clayey gravels, gravel-sand
 SW Well graded sands, sand-gravel
 SP Poorly graded sands
 SM Silty sand
 SC Clayey sands, sand-clay



SOIL BORING SYMBOLS

UNCONSOLIDATED MATERIAL

| | | | | |
|----------------------|---------------------|-------------------|-------------------|----------------------|
| 1 gravel | 6 sand | 11 silt | 16 clay | 21 cobbles, boulders |
| 2 gravel, sandy | 7 sand, gravelly | 12 silt, gravelly | 17 clay, gravelly | 22 peat |
| 3 gravel, silty | 8 sand, silty | 13 silt, sandy | 18 clay, sandy | 23 gypsi-ferous |
| 4 gravel, clayey | 9 sand, clayey | 14 silt, clayey | 19 clay, silty | 24 calcareous |
| 5 gravel, sand, silt | 10 sand, silt, clay | 15 organic silt | 20 organic clay | 25 |

* to be added to Standard Symbol when significant amounts of dispersed gypsum or calcified zones are present in the section

CONSOLIDATED MATERIAL

Sedimentary Rocks

| | | | | |
|---------------------|-------------------------|---------------------|----------|-----------------|
| 26 shale | 30 sandstone | 34 limestone | 38 chalk | 42 coal |
| 27 calcareous shale | 31 calcareous sandstone | 35 cherty limestone | 39 marl | 43 gypsum |
| 28 sandy shale | 32 shaly sandstone | 36 sandy limestone | 40 chert | 44 conglomerate |
| 29 siltstone | 33 breccia | 37 dolomite | 41 | 45 |

Metamorphic Rocks

| | |
|--------------|------------------------------|
| 46 quartzite | 49 slate |
| 47 gneiss | 50 schist |
| 48 marble | 51 soapstone talc serpentine |

Igneous Rocks

| | |
|----------------|--------------|
| 52 intrusive | 54 extrusive |
| 53 pyroclastic | 55 |

Undifferentiated

| |
|----|
| 56 |
|----|

OTHER SYMBOLS

Typical Soil Boring

| | |
|--------------------|------------------|
| 1 hole logged only | 3 dip and strike |
| 2 hole sampled | 4 pit or trench |

WL (date) groundwater level on a specified date

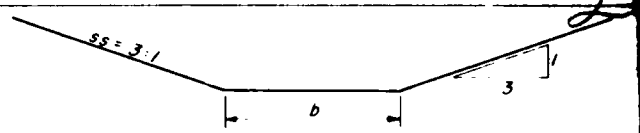
TEST HOLE NUMBERING SYSTEM

| | |
|--------------------------------|-----------|
| Centerline of dam | 1 - 99 |
| Borrow area | 101 - 199 |
| Emergency spillway | 201 - 299 |
| Centerline of outlet structure | 301 - 399 |
| Stream channel | 401 - 499 |
| Relief wells | 501 - 599 |
| | 601 - 699 |
| | 701 - 799 |

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

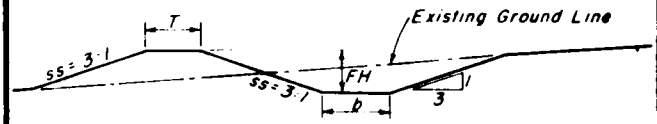
| | |
|--|--|
| GW Well graded gravels; gravel-sand mixtures | ML Silts; silty, v. fine sands; sandy or clayey silts |
| GP Poorly graded gravels | CL Clays of low to medium plasticity, silty, sandy or gravelly clays |
| GM Silty gravels; gravel-sand-silt mixtures | CH Inorganic clays of high plasticity, fat clays |
| GC Clayey gravels; gravel-sand-clay mixtures | MH Elastic silts; micaceous or diatomaceous silts |
| SW Well graded sands; sand-gravel mixtures | OL Organic silts and organic silty clays of low plasticity |
| SP Poorly graded sands | OH Organic clays of medium to high plasticity |
| SM Silty sand | |
| SC Clayey sands; sand-clay mixture | |

TYPICAL CROSS SECTIONS



IMPROVED DRAINAGEWAYS

CHANNELS, GRADED WATERCOURSES, SOD FLUMES, ETC.



DIVERSIONS & EMERGENCY SPILLWAYS

DEFINITIONS OF TERMS

s - Grade of channel in feet of drop per foot of length
 b - Bottom width of channel in feet
 ss - Side slope ratio, horizontal to vertical
 T - Top width of dike, levee or fill in feet
 FH - Fill height of dike in feet (vertical distance from bottom of channel to top of dike)

TABLE OF STANDARD DIMENSIONS

| IMPROVEMENT | T | ss |
|---------------------------|-----|-----------------------------|
| Improved Drainageways | - | 3:1 or As shown on drawings |
| Diversions | 6' | 3:1 or As shown on drawings |
| Levees | 8' | 3:1 or As shown on drawings |
| Drop Inlet Embankments | 10' | 3:1 or As shown on drawings |
| Chute Embankments | 8' | 3:1 or As shown on drawings |
| Drop Spillway Embankments | 8' | 3:1 Upstream-2:1 Downstream |

NOTE:

1. Use standard dimensions unless otherwise shown on drawings
2. Use s, b, and FH as shown on drawings

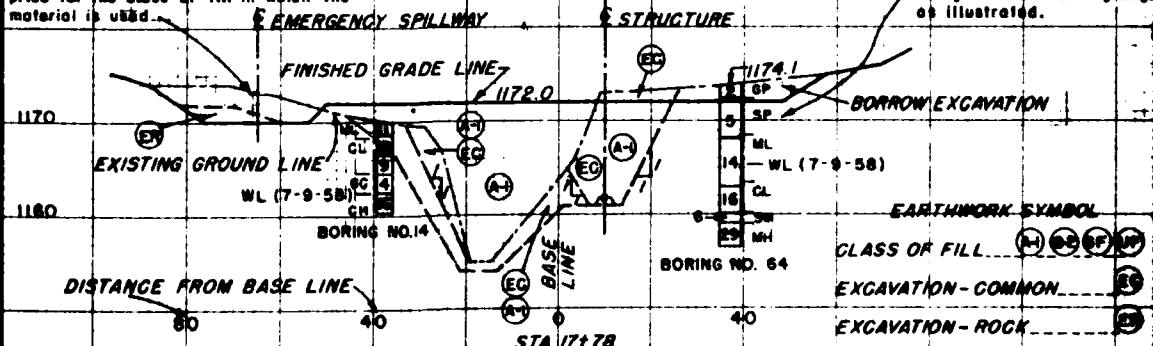
GENERAL NOTES

Improvements are along Base Line unless otherwise indicated
 Elevations of pipes refer to invert elevations
 Cross sections shown as looking downstream
 Lines showing limits of structure excavation are on a 1:1 slope unless otherwise indicated

CROSS SECTION LEGEND

Note: Excavation when not labeled will be paid for at the contract price for the class of fill in which the material is used.

Note: Unified Soil Classification Symbols shall be shown along with Soil Boring Log as illustrated.



LEGENDS AND INFORMATION

STRUCTURES 3B, 5A & 5B
 Platte River Tributaries Watershed,
 PL 566, Worth County S.C.D., Missouri
 U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

| | | |
|----------|------|-------------|
| Designed | Date | Approved by |
| Drawn | | Title |
| Traced | | Title |
| Checked | | Scale |
| | | Sheet No. |
| | | File No. |

(Rev. 8-13-59)

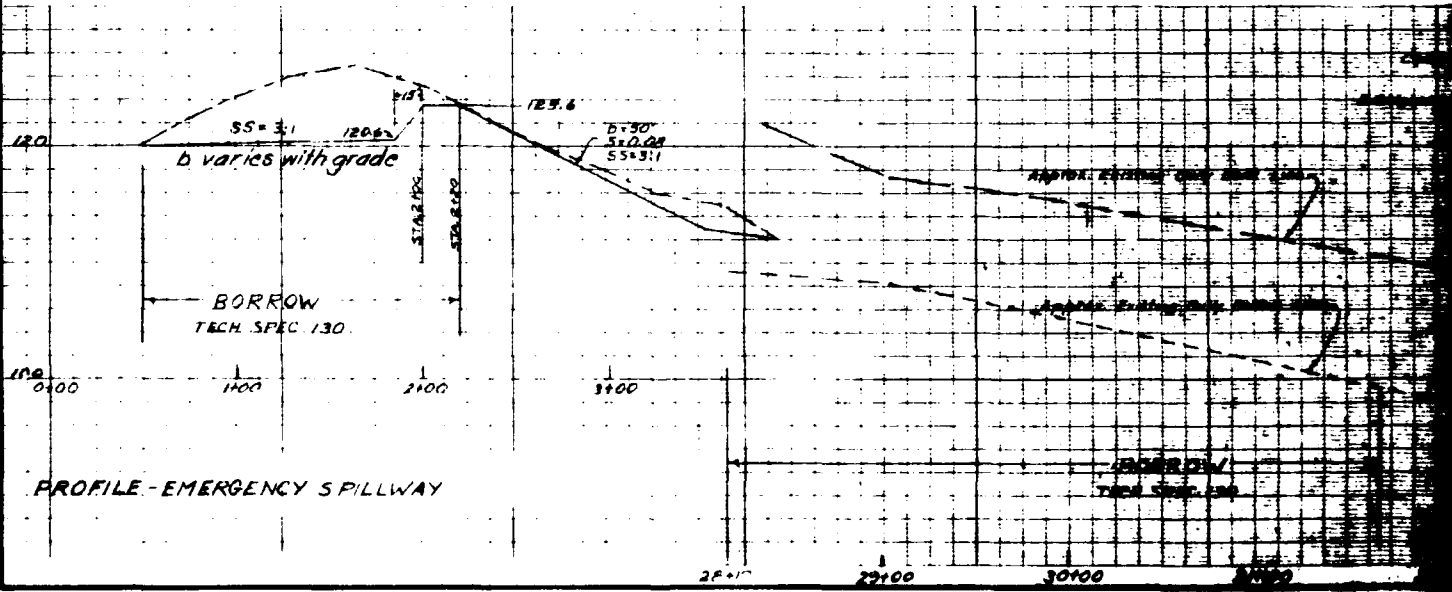
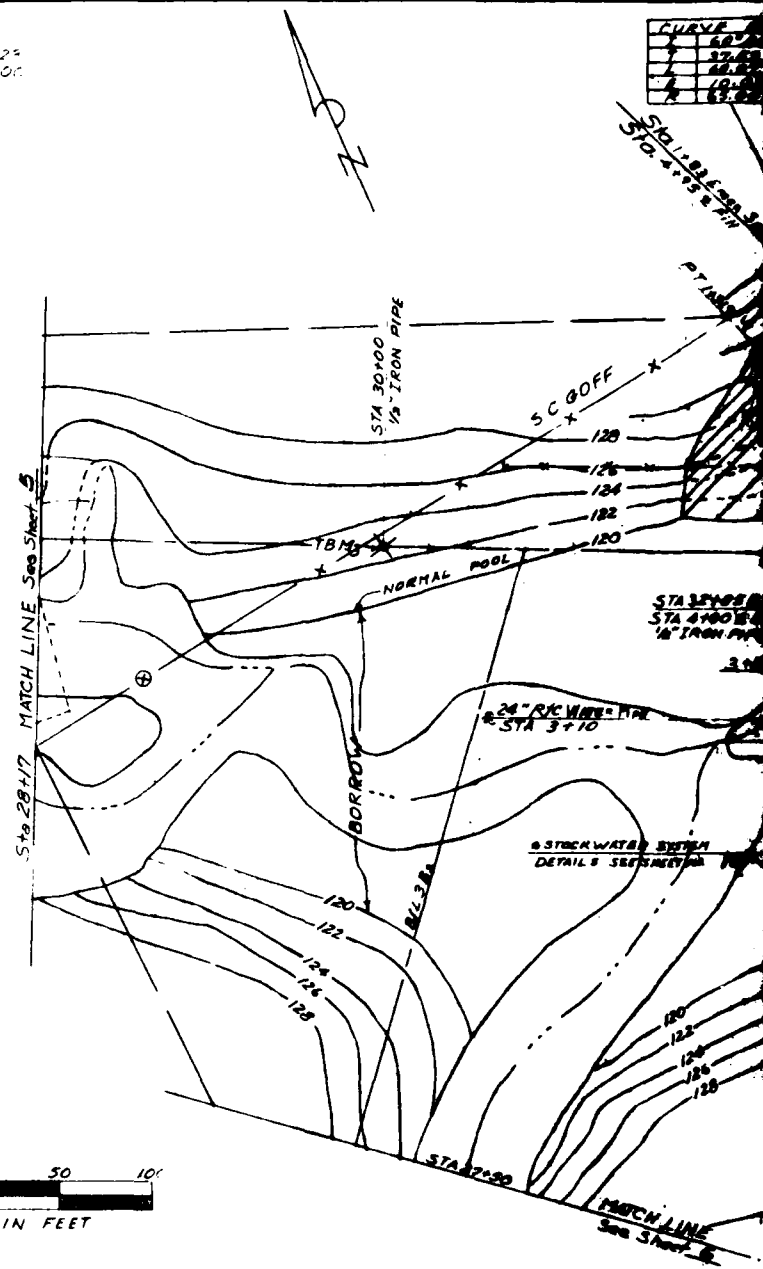
TBM₂ 1/2 I.P. 5. STA 30+00 Elev. 106.29
 TBM₃ 1/2 I.P. 5. STA 30+10 Elev. 123.01

| CURVE | PC | PT | PI | EA | EB |
|-------|-------|-------|-------|--------|--------|
| 1 | 27.67 | 32.67 | 30.17 | 123.01 | 123.01 |
| 2 | 32.67 | 37.67 | 35.17 | 123.01 | 123.01 |
| 3 | 37.67 | 42.67 | 40.17 | 123.01 | 123.01 |
| 4 | 42.67 | 47.67 | 45.17 | 123.01 | 123.01 |

| CLEARING & GRUBBING SIZE (DIAM) | NUMBER |
|---------------------------------|--------|
| 3'-6" | 205 |
| 6'-9" | 189 |
| 9'-12" | 109 |
| 12'-15" | 37 |
| 15'-18" | 15 |
| 18'-24" | 10 |
| 24'-30" | 7 |
| 30'-36" | 2 |
| 60'+ | 2 |

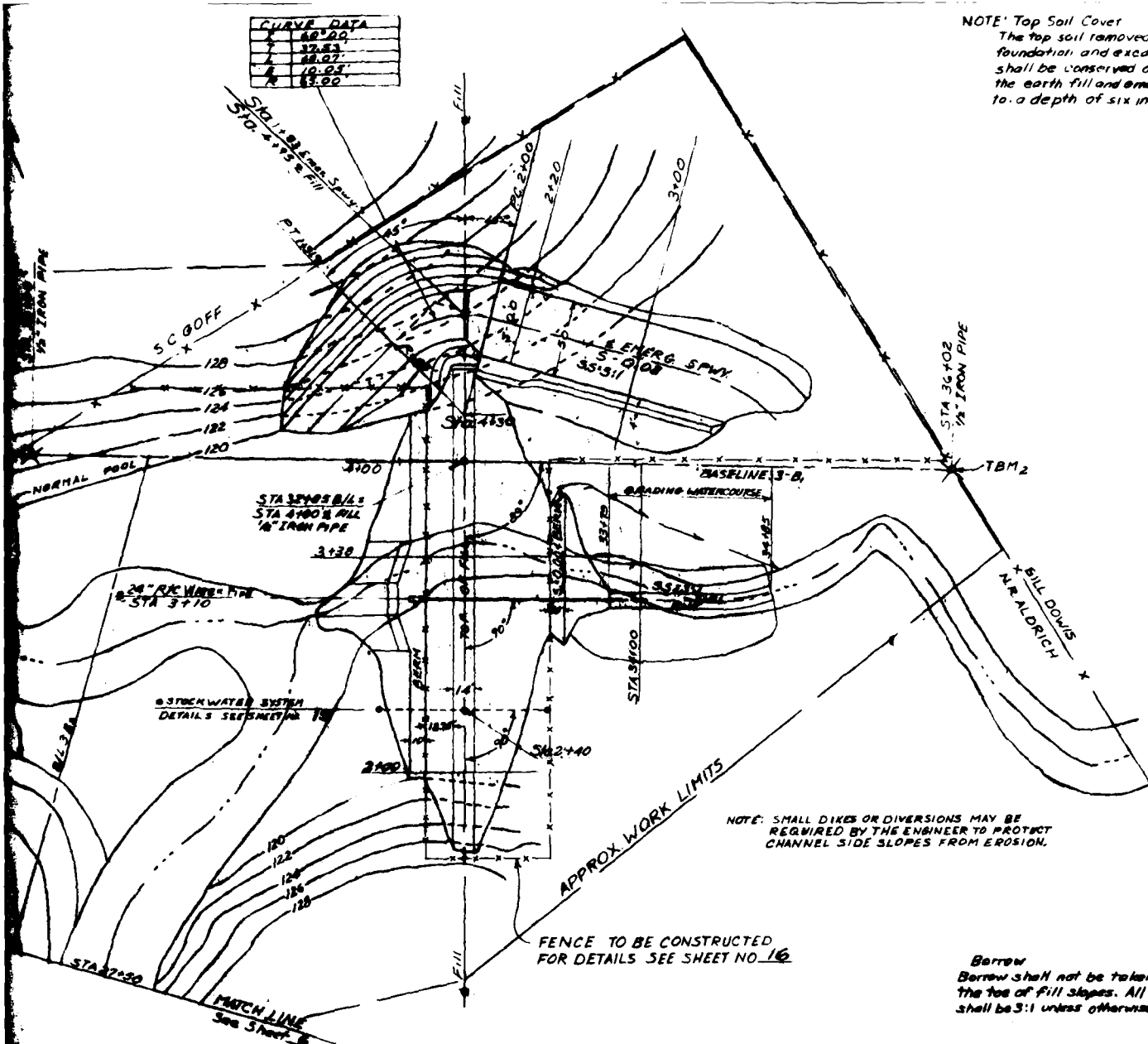
| GRUBBING STUMPS SIZE (DIAM) | NUMBER |
|-----------------------------|--------|
| 3'-6" | 6 |
| 6'-9" | 6 |
| 9'-12" | 1 |
| 15'-18" | 1 |
| 24'-30" | 3 |

CLEARING AND GRUBBING OF BRUSH SMALLER THAN 3 INCH DIAM. SHALL BE CONSIDERED INCIDENTAL TO THE JOB AND WILL NOT BE COUNTED.



| CURVE DATA | |
|------------|-------|
| L | 60.20 |
| T | 22.53 |
| E | 10.03 |
| R | 63.00 |

NOTE: Top Soil Cover
 The top soil removed from the foundation and excavation areas shall be conserved and spread over the earth fill and emergency spillway to a depth of six inches.



NOTE: SMALL DICES OR DIVERSIONS MAY BE REQUIRED BY THE ENGINEER TO PROTECT CHANNEL SIDE SLOPES FROM EROSION.

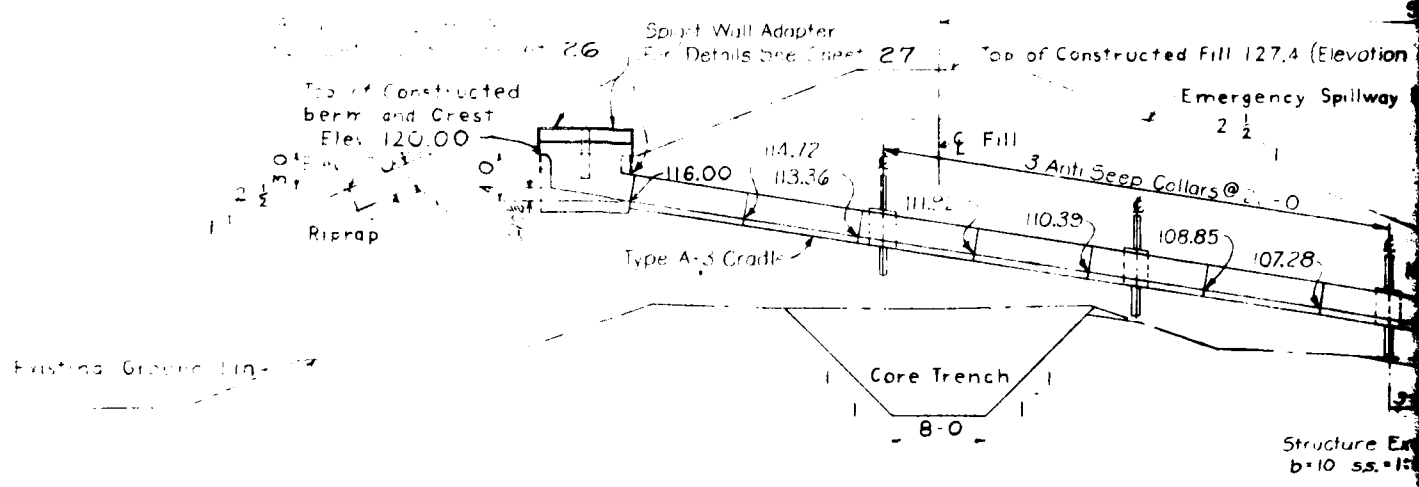
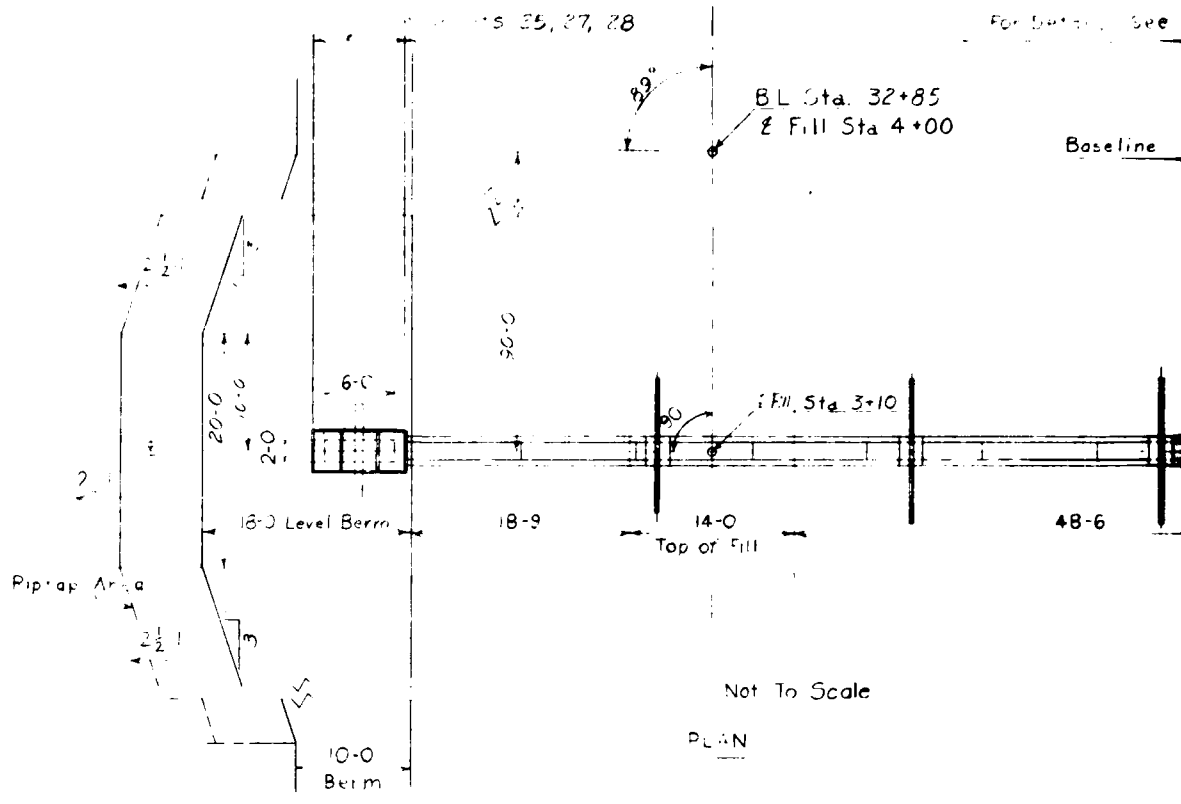
FENCE TO BE CONSTRUCTED FOR DETAILS SEE SHEET NO. 16

Borrow
 Borrow shall not be taken within 25 ft of the toe of fill slopes. All borrow slopes shall be 3:1 unless otherwise specified.



STRUCTURE 3-B
PLAN AND PROFILE
 WHITE RIVER TRIBUTARIES WATERSHED, PL-566
 WORTH COUNTY S.C.D., MISSOURI
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

| | | | |
|-------------------------------------|------------------------|------------------------------------|------------------------|
| Designed by M.B. TOWNSEND | Date 6-50 | Checked by G.D. JENNINGS | Date 2-20-56 |
| Drawn by G.D. JENNINGS | Date 2-20-56 | Reviewed by J.H. NOLTE | Date 2-20-56 |
| Project No. 3-E-46041-P | | | Sheet No. 7 |



SECTION ON CENTERLINE

QUANTITIES

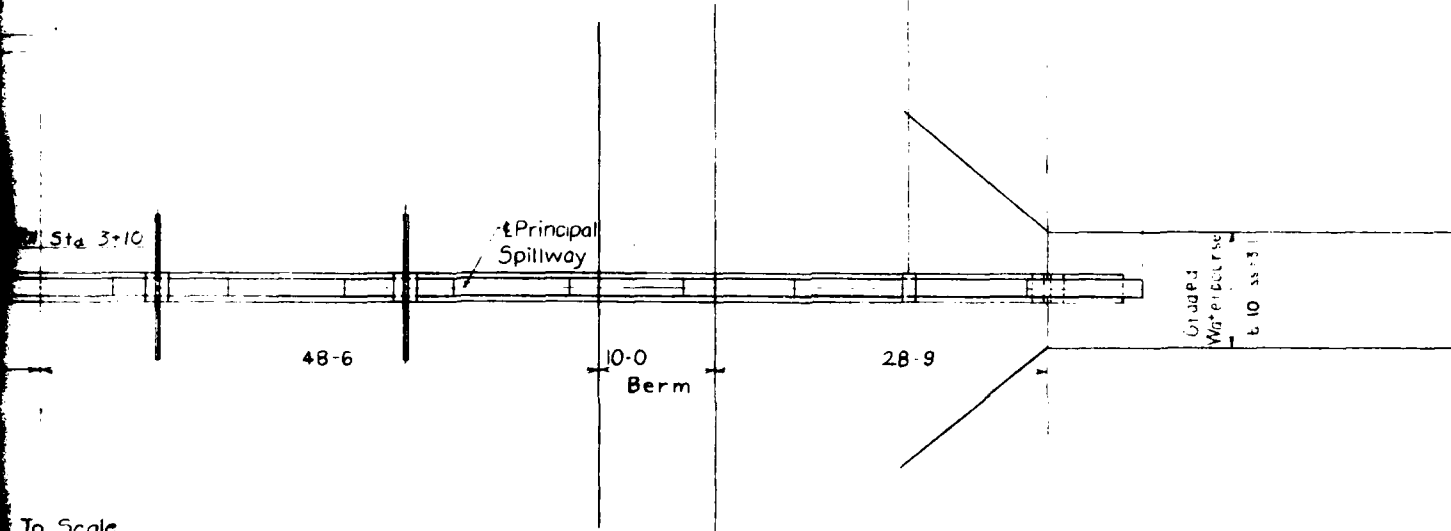
1. Concrete for Spill Wall and
Steel Reinforcement
2. Riprap for Core Trench
3. 4" Dia. Special 4 1/2" Gasket Type Joints
4. Anti Seep Collars
5. Gravel for Core Trench

For Data See Sheets 23, 27, 28

For Data See Sheets 21, 28

L Sta. 32+85
 Fill Sta 4+00

Baseline 3-B.

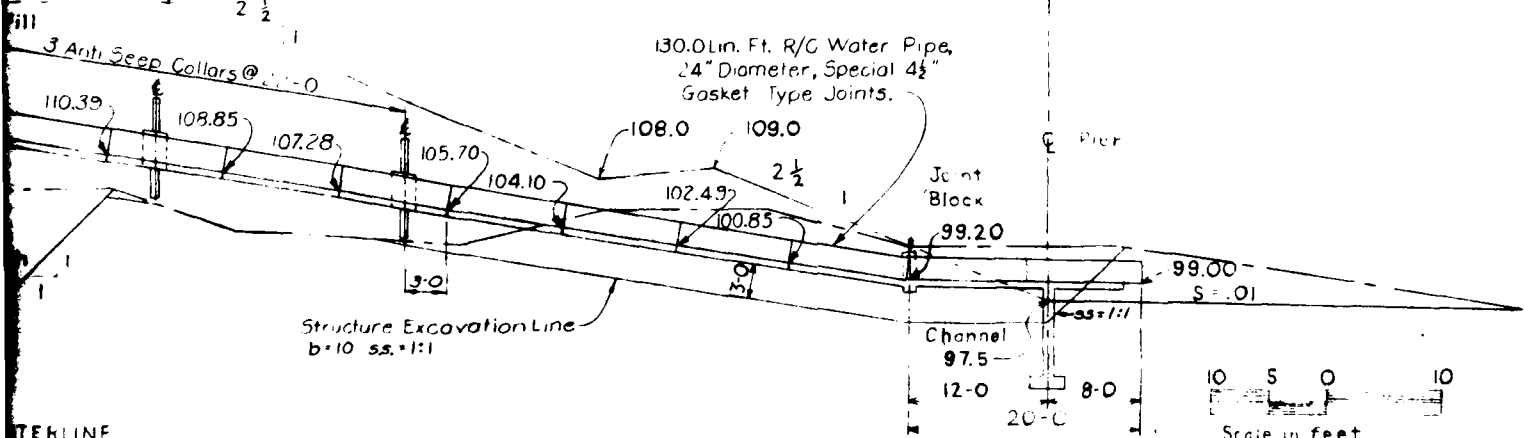


94-3

Note: Camber Pipe in accordance with elevations shown.

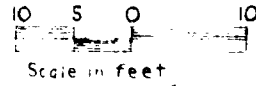
Top of Constructed Fill 127.4 (Elevation Varies)

Emergency Spillway Crest 123.6



Structure Excavation Line
 b=10 ss=1:1

Channel
 97.5
 12-0
 8-0
 20-C



STRUCTURE 3-B
 BASELINE STA. 32+85

TERLINE

28.9 Cu. Yds.
 1,305 Pounds
 130.0 Lin. Ft.
 Part Job
 41 Cu. Yds.

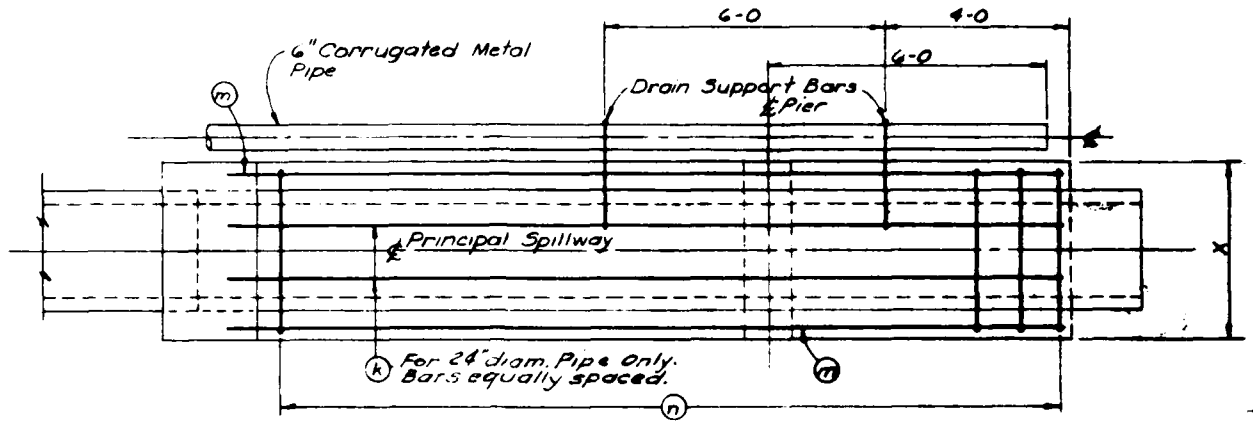
R/C DRAIN INLET FOR 24" DIAM. PIPE
 GENERAL LAYOUT
 Platte River Tributaries Watershed
 Worth County, S.C.D., Missouri, Pl. 566

U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

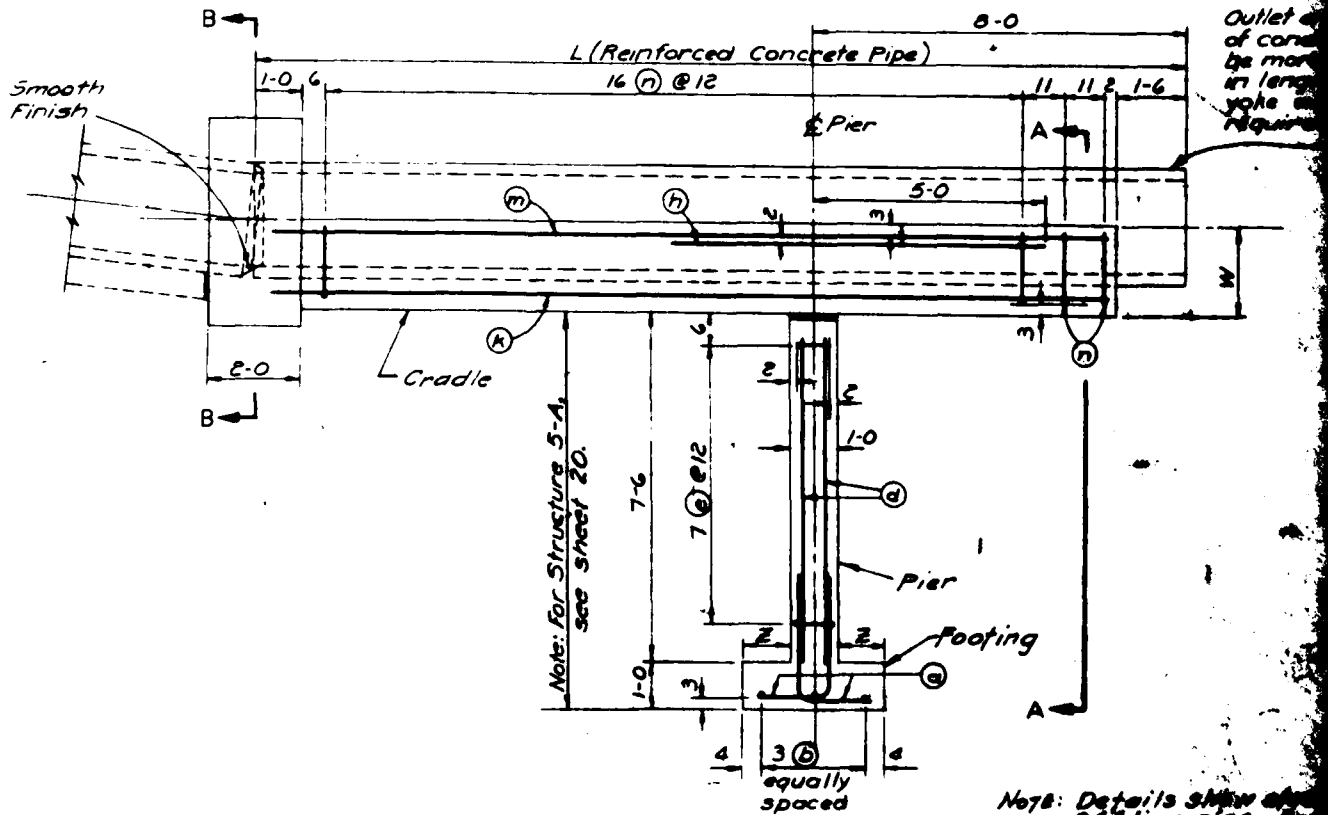
| | | | | | |
|----------|--------------------|------|--------|-------------|-------------|
| Designed | H. J. ... | Date | 6-60 | Approved by | |
| Drawn | Townsend C. Derosa | Date | 2-8-61 | Title | |
| Traced | W. N. Riggs | Date | | Title | |
| Checked | Townsend | Date | | Sheet No | 3-E-46041-P |
| | | | | Drawing No | |

PLATE C-6 Form 828-313 (November 1958)

Note: Corrugated Metal Pipe and drain support bars to be used only when shown on the General Layout. (One or both sides of principal spillway).

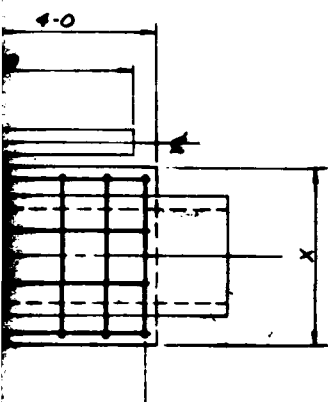


PLAN

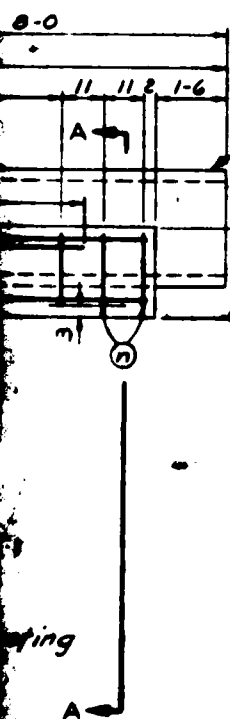


SIDE ELEVATION

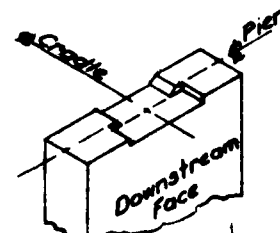
Note: Details show for 24" diam. pipe. For diam. pipe see structure 5-A.



| STEEL SCHEDULE | | | | | | | | | | | | | | | | |
|----------------|-------|---------|--------|------|--------|----------|--------|------|--------|--------|------|--------|-----|-----|----------|-------|
| Pipe Diameter | | 18" | | | | | | | | | | 24" | | | | |
| Location | Mark | Type | Size | Quan | Length | A | B | C | Total | Size | Quan | Length | A | B | C | Total |
| Footing & Pier | a | 3 | #4 | 6 | 3-9 | 2-6 | 1-3 | | 22-6 | #4 | 8 | 4-0 | 2-6 | 1-6 | | 52-0 |
| Footing | b | 1 | " | 3 | 2-6 | | | | 7-6 | " | 3 | 3-0 | | | | 9-0 |
| Pier | d | 1 | " | 6 | 7-0 | | | | 42-0 | " | 8 | 7-0 | | | | 56-0 |
| Cradle | e | 4 | #3 | 14 | 4-3 | 1-9 | 0-8 | 1-9 | 59-6 | #3 | 14 | 4-9 | 2-0 | 0-8 | 2-0 | 66-6 |
| | h | 1 | #5 | 2 | 8-0 | | | | 16-0 | #6 | 2 | 8-0 | | | | 16-0 |
| | k | 1 | #4 | 2 | 18-0 | | | | 36-0 | #4 | 4 | 18-0 | | | | 72-0 |
| | m | 1 | #3 | 2 | 18-0 | | | | 36-0 | #3 | 2 | 18-0 | | | | 36-0 |
| " | n | 4 | #4 | 18 | 4-6 | 0-11 | 2-7 | 0-11 | 81-0 | #4 | 18 | 5-9 | 1-3 | 3-2 | 1-3 | 103-6 |
| Quantities | Steel | #3 | 39.50 | Feet | 22.37 | Pounds | 66.90 | Feet | 25.0 | Pounds | | | | | | |
| | | #4 | 183.00 | " | 126.25 | " | 272.50 | " | 122.03 | " | | | | | | |
| | | #5 | 52.00 | " | 54.84 | " | 96.00 | " | 37.35 | " | | | | | | |
| | | #6 | — | " | — | " | 16.00 | " | 24.03 | " | | | | | | |
| Total | — | — | 402.9 | — | — | Pounds | — | — | 268.6 | — | — | — | — | — | Pounds | |
| Concrete | — | — | 3.53 | — | — | Cu. Yds. | — | — | 4.54 | — | — | — | — | — | Cu. Yds. | |
| Dimension | L | 20-0 | | | | | 20-0 | | | | | | | | | |
| | U | 3-11 | | | | | 4-6 | | | | | | | | | |
| | W | 1-3 1/2 | | | | | 1-9 | | | | | | | | | |
| | X | 2-11 | | | | | 3-8 | | | | | | | | | |
| | Z | 0-9 | | | | | 1-0 | | | | | | | | | |

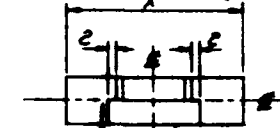


Outlet end section of conduit should be more than 6'-0" in length so a yoke will not be required.



ISOMETRIC VIEW

3 Str. 3# 3.18 Cu. Yd.
3 Str. 5# 178.7

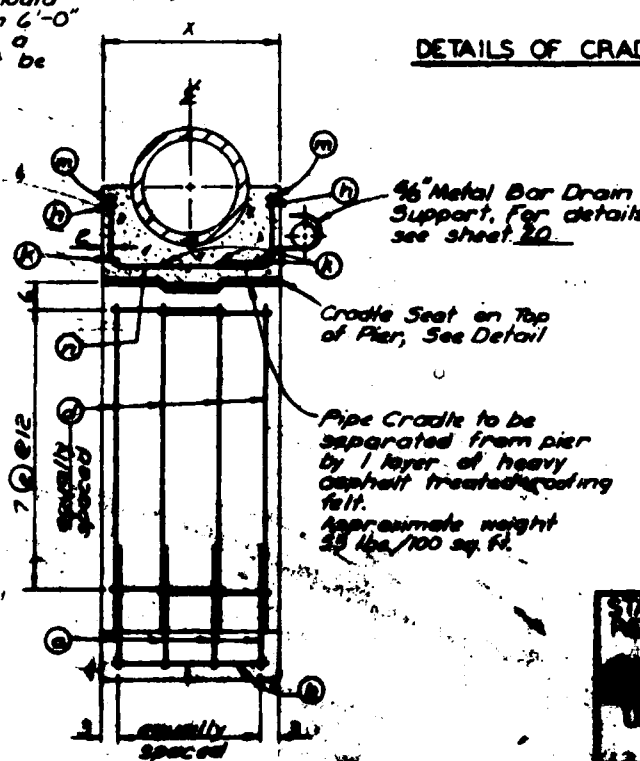


PLAN



FRONT ELEVATION

DETAILS OF CRADLE SEAT ON TOP OF PIER

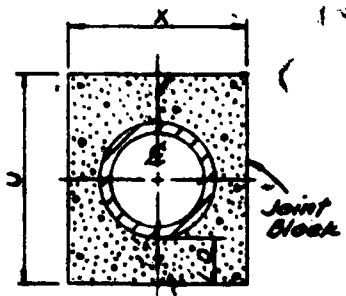


3/8" Metal Bar Drain Support. For details see sheet 20.

Cradle Seat on Top of Pier, See Detail

Pipe Cradle to be separated from pier by 1 layer of heavy asphalt treated roofing felt. Approximate weight 25 lbs./100 sq. ft.

SECTION A-A



SECTION B-B

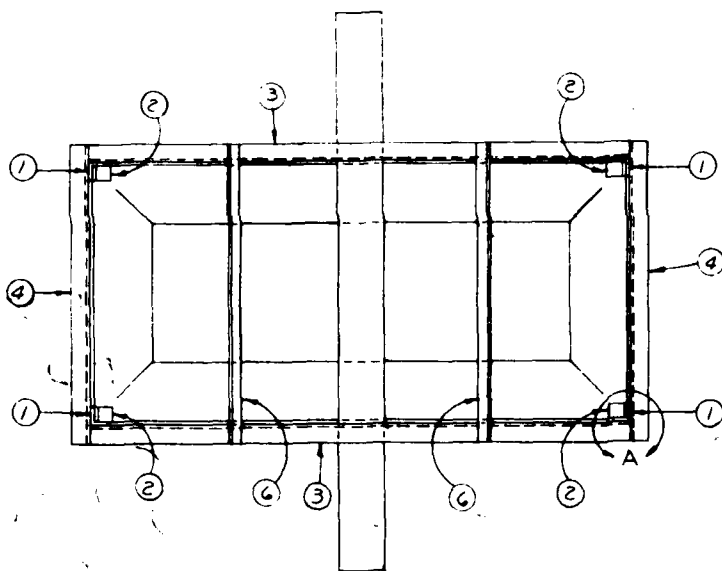
Note: Details show steel for 24" diam. pipe. For 18" diam. pipe see Steel Schedule.



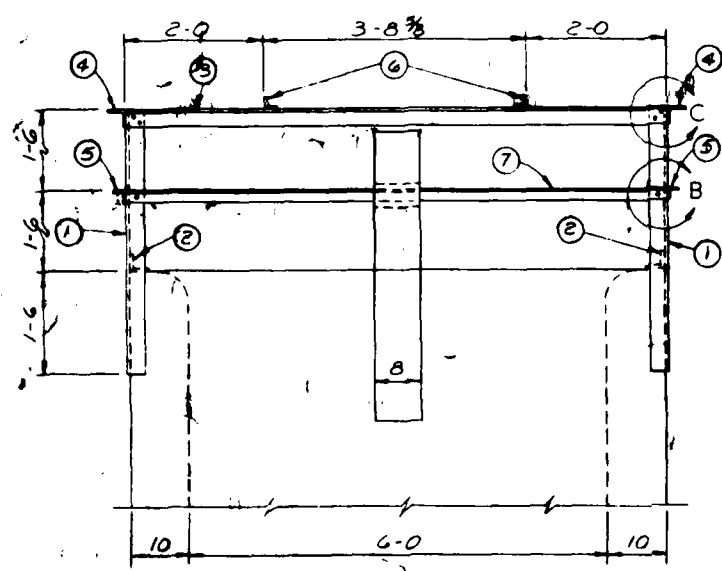
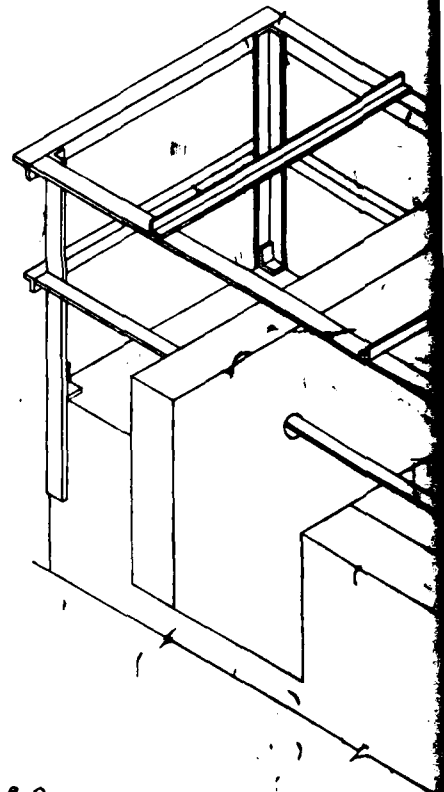
STANDARD DETAILS FOR CASTLEWOOD REINFORCED CONCRETE PIPE OUTLET FOR 18" & 24" PIPE DIAMETERS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

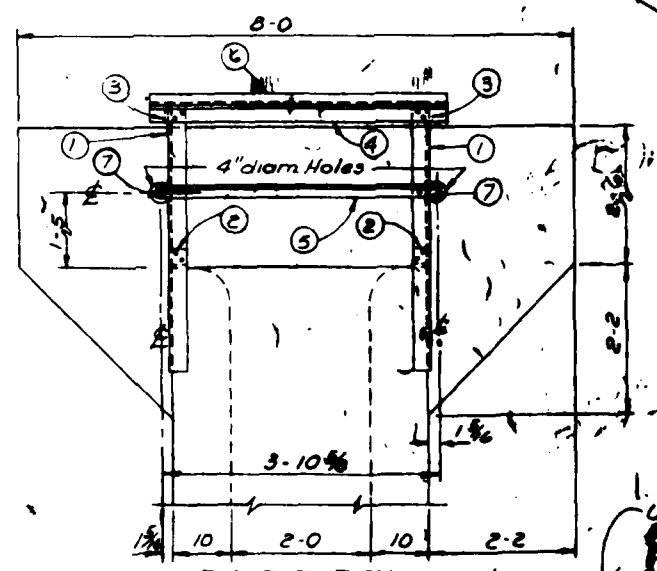
W.S. Mough
T. Sarge



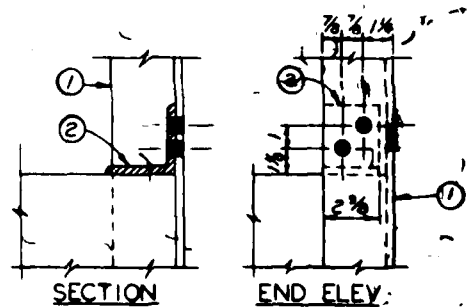
PLAN



SIDE ELEVATION

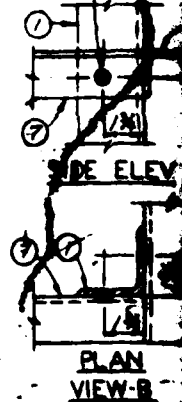


END ELEVATION



SECTION

END ELEV.



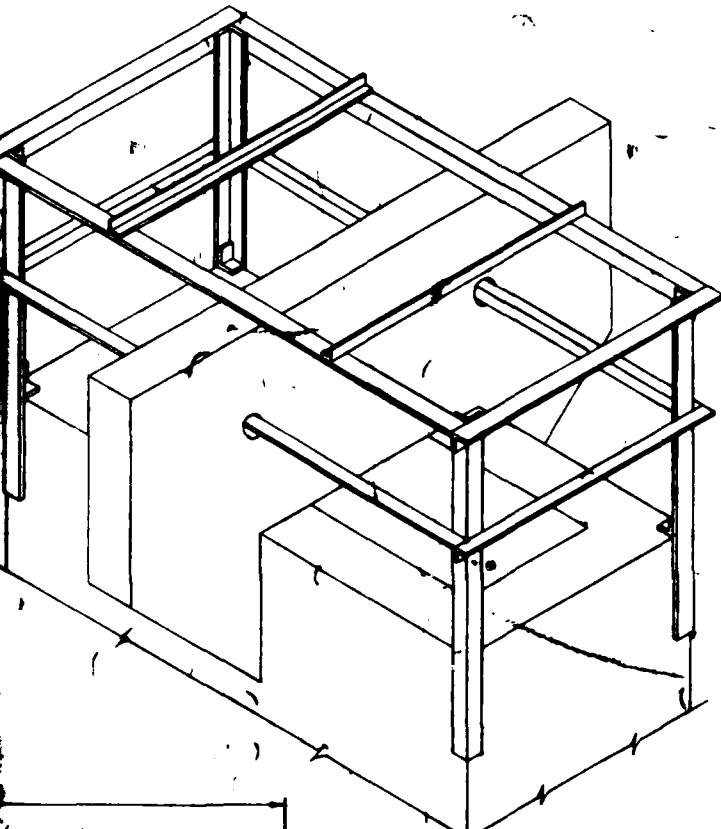
PLAN VIEW-B

Note: Angles (1) to be supported by clip angles (2). Clip angles to rest on top of structure.

VIEW-A

Scale in Feet

Scale in Feet

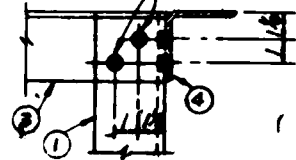
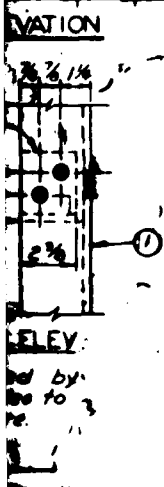
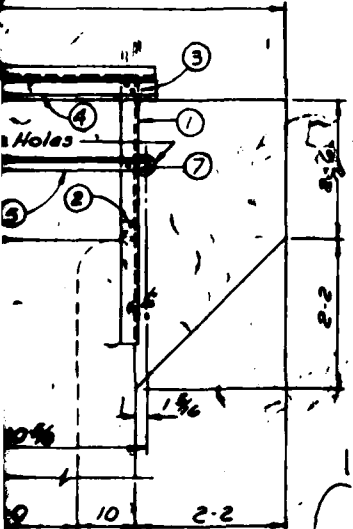


ISOMETRIC VIEW
Not to Scale

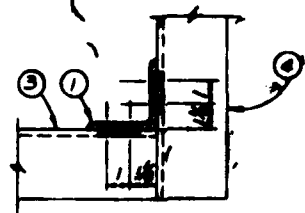
| BILL OF MATERIAL | | | |
|---|-------|--------------------------------|---------|
| Mark | Quan. | Item | Length |
| 1 | 4 | ∠ 3x3x3/8 (2 Left and 2 Right) | 4-6 |
| 2 | 4 | " " " " | 0-2 1/2 |
| 3 | 2 | " " " " | 7-8 1/2 |
| 4 | 2 | " " " " | 4-2 1/2 |
| 5 | 2 | " 2x2x3/8 | 4-0 1/2 |
| 6 | 2 | " " " " | 4-2 1/2 |
| 7 | 2 | " " " " | 7-8 1/2 |
| 3/8" 1/2" Aluminum Bolts with Lock Washer | | | 0-1 1/2 |

Notes:
 Trash Rack and Guard Rail to be fabricated of aluminum angles bolted together with 3/8" bolts.
 All aluminum surfaces in contact with concrete or other dissimilar material shall be cleaned and given a heavy coat of alkali-resistant bituminous paint and allowed to dry before assembly.
 Gaskets of compressed paper or asphaltic joint filler may be used in lieu of painting.
 All contacting surfaces of aluminum to aluminum shall be cleaned and coated with Zinc Chromate primer and allowed to dry before assembly.
 All cuts shall be saw cuts.
 All holes for bolts shall be 1/8" larger than bolt diameter.

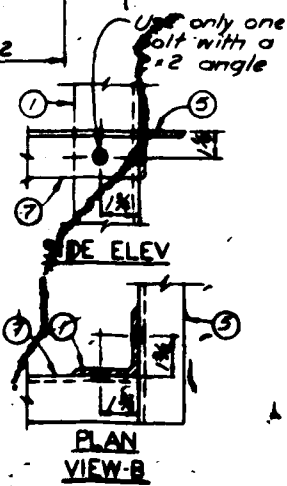
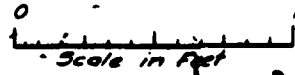
Two bolts shall be used when connecting two 3x3 angles



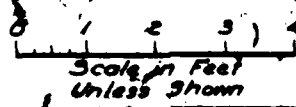
SIDE ELEV



PLAN VIEW-C



PLAN VIEW-B



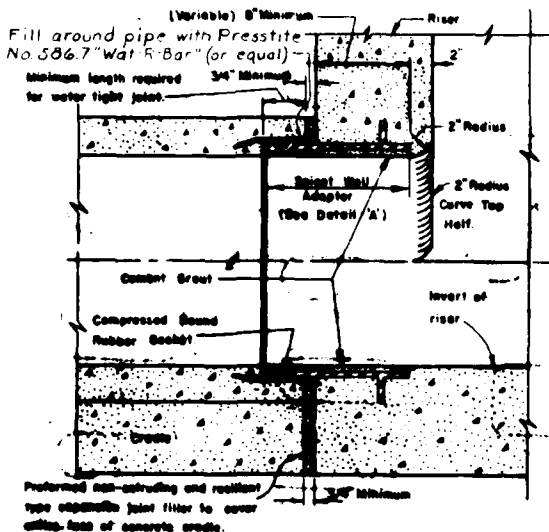
Revised 5-25-61 J.A.S.

STRUCTURES 3-B 5-A & 5-B

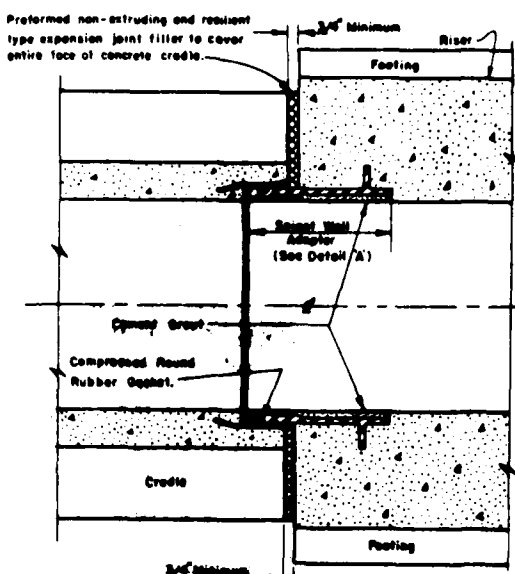
DETAILS OF TRASH RACK AND/OR GUARD RAIL FOR INLET SIZE 2'-0" x 6'-0" Platte River Tributaries Watershed, Pl. 566, North Carolina, S.C.B. Missouri

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

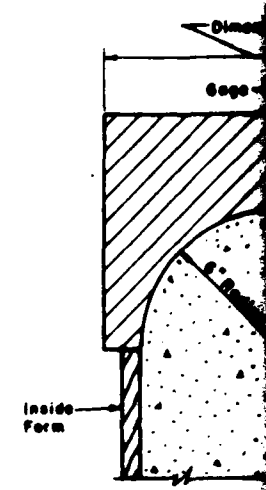
| | |
|---------------------------------|----------------------------|
| By D. J. Neubauer 8-60 | Checked by |
| App'd by A. J. Sarge 9-60 | Approved by |
| Drawn by D. J. Neubauer 8-60 | Project No. 3-E-46041-P |



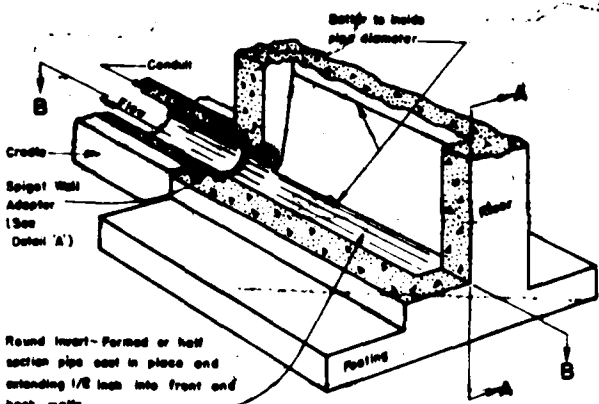
SECTION A-A ON CENTERLINE



SECTION B-B



Material—Wood or Sheet Steel—Use
use gage. Except for bottom gage,
the option of builder. Under no
waters, etc. be so located as to
shaping of curved weir section of
entire length.

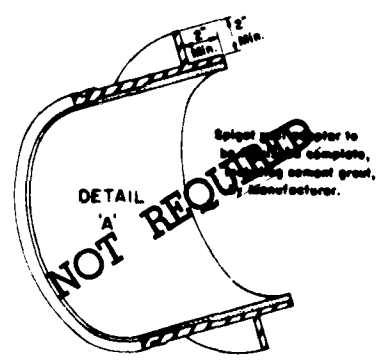


PERSPECTIVE VIEW

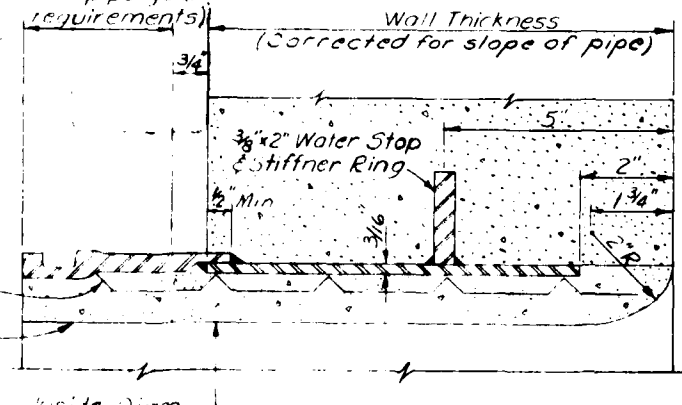
**SPIGOT WALL ADAPTER
STEEL RING
REV. 8-28-00**

To permit a good concrete bond, steel and gasket surfaces shall be thoroughly cleaned.
Spigot Wall Adapter (steel ring with gasket) to be supplied by manufacturer for size shown in table.
Note: Spigot Wall Adapter and material to be included with unit price for size conduit.

| Size (in.) | Weight (lb.) | Price (per lb.) | Adapter Length (in.) |
|------------|--------------|-----------------|----------------------|
| 3-B | 32.85 | 24 | 15 3/8" |
| 4-A | 31.00 | 24 | 13 3/8" |
| 3-B | 14.45 | 18 | 13 3/8" |



(Length in accordance with pipe joint requirements)

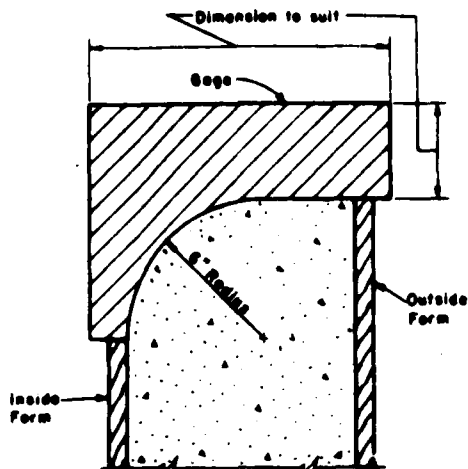


Wire Mesh Welded to Spigot Ring.
Concrete joint furnished by the Manufacturer

**SECTION SPIGOT WALL ADAPTER
(DETAIL 'A')**

WEIR RACE
ALTERNATE:
At the Contractor's own
may be formed with a
edging tool in lieu of the

| GRADATION TABLE FOR FILTER MAT | |
|--------------------------------|------------|
| Sieve No. | Percentage |
| 2" | 100 |
| 1 1/2" | 100 |
| 1" | 100 |
| 3/4" | 100 |
| 5/8" | 100 |
| 3/8" | 100 |
| 4" | 100 |
| 8" | 100 |
| 16" | 100 |
| 30" | 100 |
| 50" | 100 |
| 100" | 100 |
| 200" | 100 |



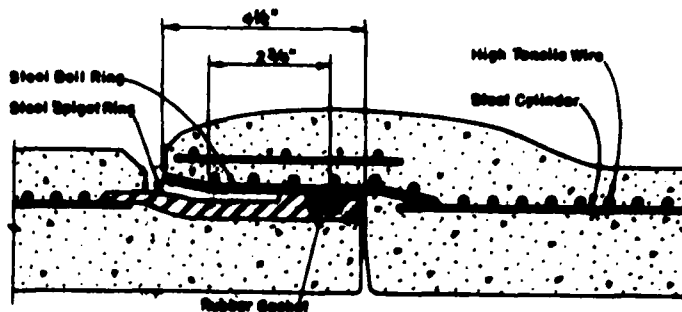
Material—Wood or Sheet Steel—1 Req'd. Builder to provide and use gage. Except for bottom going edge, shape of gage is at the option of builder. Under no circumstances should forms, braces, walers, etc. be so located as to interfere with the accurate shaping of curved weir section of corners and throughout its entire length.

WEIR RADIUS GAGE

ALTERNATE:

At the Contractor's own option the weir edge may be formed with a minimum 3/4" radius edging tool in lieu of the above WEIR RADIUS GAGE.

| GRADATION TABLE FOR FILTER MATERIAL | |
|-------------------------------------|-----------|
| Sieve No. | % Passing |
| 2" | 100 |
| 1 1/2" | 94-100 |
| 1" | 87-100 |
| 3/4" | 81-100 |
| 5/8" | 73-94 |
| 3/4" | 68-89 |
| 4" | 54-76 |
| 8" | 41-65 |
| 16" | 29-54 |
| 30" | 18-42 |
| 50" | 5-30 |
| 100" | 0-18 |
| 200" | < 5 |



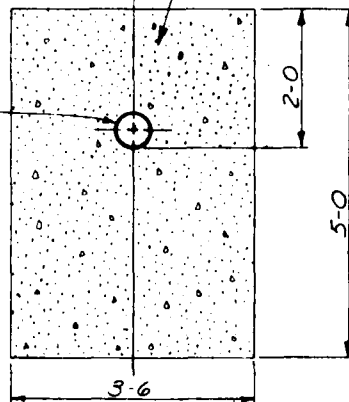
Special steel bell and spigot joint 4 1/2" long, as manufactured by the "Leak Joint Pipe Company and shown on their drawing No. D-2-246-30", or equivalent.

(SCHEMATIC ONLY)
DETAIL OF SPECIAL PIPE JOINT

Special Joints are required for Structure Nos. 3-B, 5-A and 5-B.

Porous filter continuous along perforated pipe drain consisting of graded sand and gravel mixture.

6" diam. Perforated Helical Corrugated Metal Pipe Drain



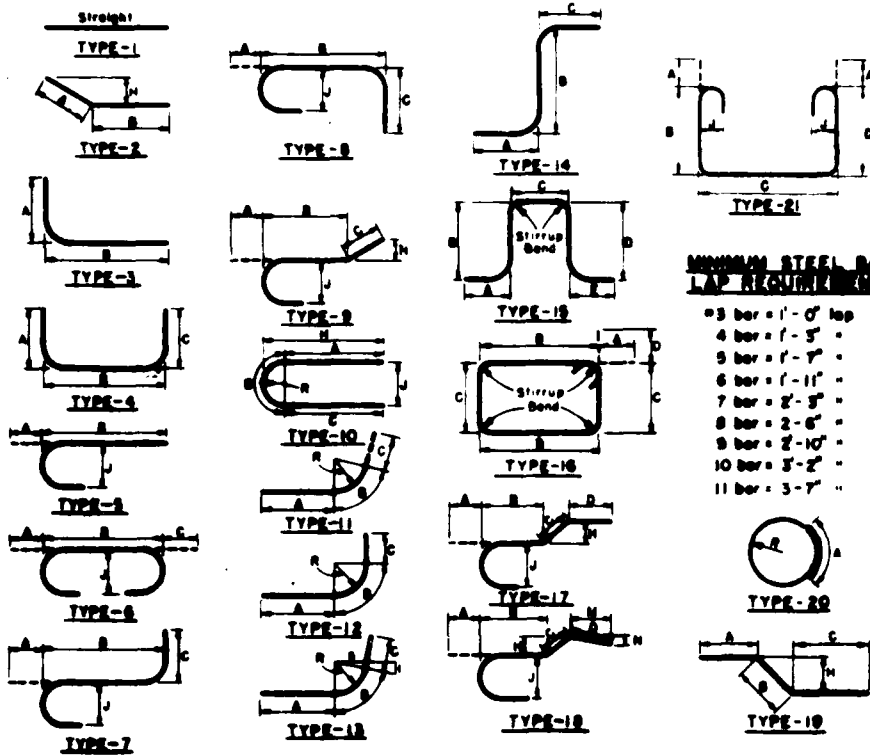
CROSS SECTION OF POROUS FILTER FOR 6" PERFORATED HELICAL CM. PIPE

STANDARD DETAILS

Platte River Tributaries Watershed, PL 566
Worth County S.C.D., Missouri

**U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE**

Drawn: _____
Title: _____
Project: _____
Checked: R.G. Heckman 5/6/57
Sheet: 3-E-46041-P



MINIMUM STEEL BAR LAP REQUIREMENTS

- #3 bar = 1'-0" lap
- 4 bar = 1'-3" "
- 5 bar = 1'-7" "
- 6 bar = 1'-11" "
- 7 bar = 2'-3" "
- 8 bar = 2'-6" "
- 9 bar = 2'-10" "
- 10 bar = 3'-2" "
- 11 bar = 3'-7" "

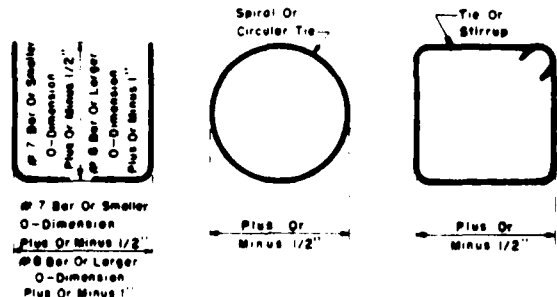
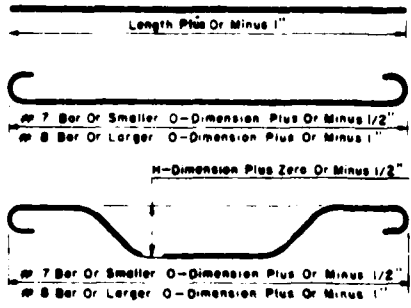
Forous filter a pipe drain con sand and gra

6" diam. Perforated Helical C.M. Pipe Drain

NOTE: All bands not otherwise specified shall conform to the proposed standard A.C.I. code, recommended sizes. All dimensions are measured from outside to outside of bar, except where otherwise specified. It shall be the responsibility of the fabricator to assign a code number to bars for each structure and parts thereof.

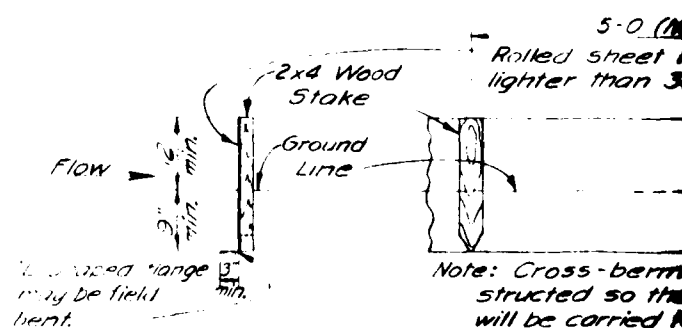
CROSS SECTION
6" PERFORATED

BAR TYPE DETAILS
Revised 1-22-54



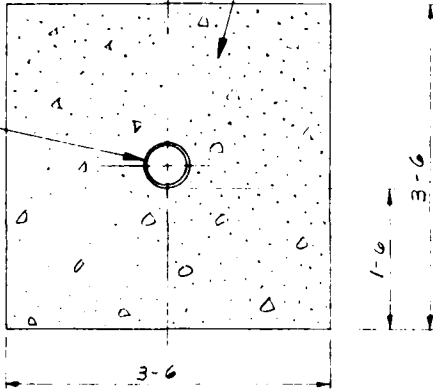
NOTE: Tolerances for outside to outside dimensions of bar types not shown shall conform to the tolerances of similar bar types and specified bar sizes as given in Manual of Standard Practice for Detailing Reinforced Concrete Structures A.C.I. 318

TYPICAL PERMISSIBLE TOLERANCES
9-22-59



DETAILS OF WATERWAY CROSS SECTION

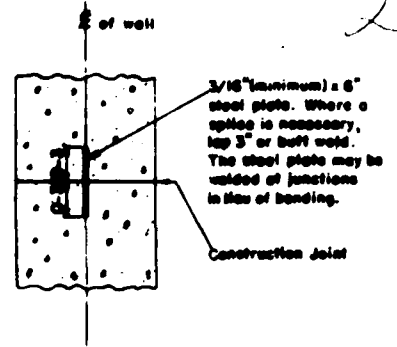
Porous filter continuous along perforated pipe drain consisting of Pit-Run sand and gravel mixture



CROSS SECTION OF POROUS FILTER FOR 6" PERFORATED HELICAL C. M. PIPE

Note: Metal plate shall be free from dirt, oil, grease, paint, mill scale, loose or thick rust, or other coating which might destroy or reduce its bond with concrete.

Metal plate and installation to be included with unit price for concrete.

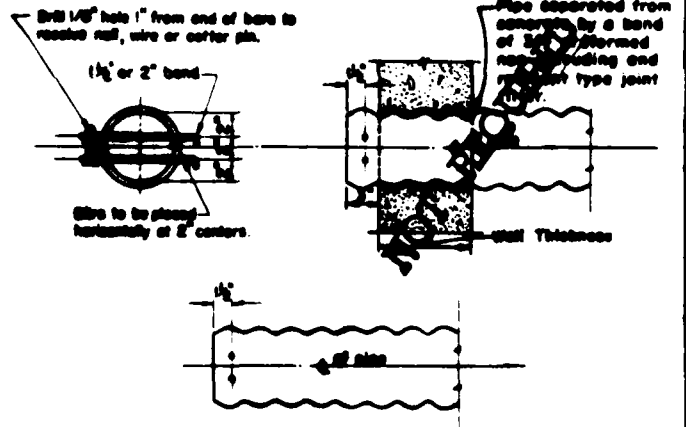


DETAIL OF METAL PLATE TYPE CONSTRUCTION JOINT

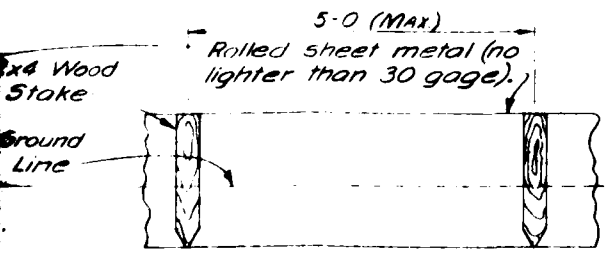
Rev. 9-2-59

| BILL OF MATERIAL | | | |
|------------------|------------|----------|--------|
| Pipe Diam. | Bar Size | Quantity | Length |
| 6" | # 3 or # 4 | 2 | 1'-0" |
| 8" | # 3 or # 4 | 3 | 1'-3" |
| 10" | # 3 or # 4 | 4 | 1'-6" |

All holes in pipe to receive bars shall be 1/8" dia.



DETAILS OF ANIMAL GUARD



Note: Cross-berms shall be constructed so that the drainage will be carried to the side channels.

DETAILS OF WATERWAY CROSS-BERM

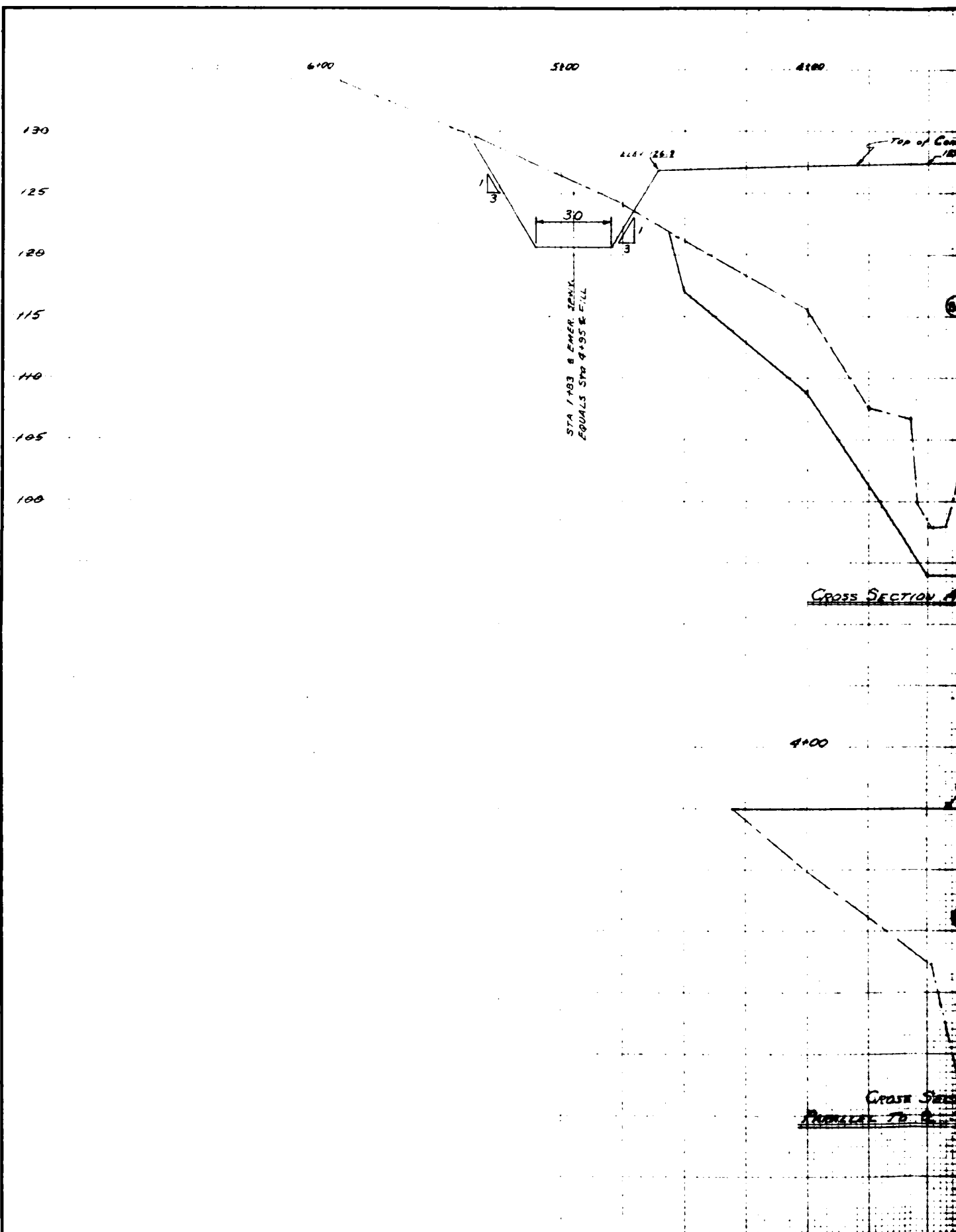
Notes
Cost of material, fabrication and installation of the Cross Berms to be included in the unit bid price for "Waterway Improvement" Tech. Spec.-17, Amend. No. 1 (Total approximate lengths-230 Lin. Ft.)

STANDARD DETAILS

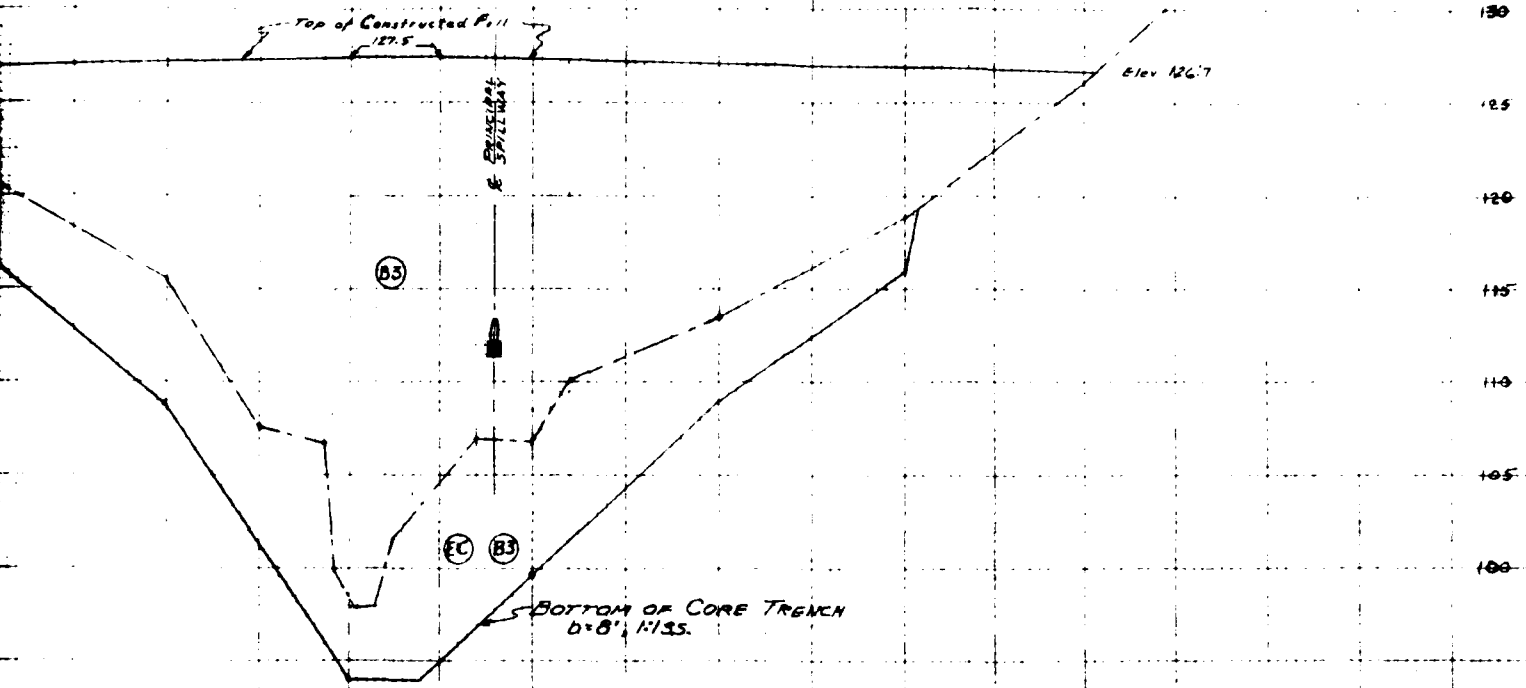
Platte River Tributaries Watershed, PL 566, Worth County S.C.D., Missouri

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

| | | | |
|---------------------|---------|-------------|--|
| Project | Sheet | Approved by | |
| Date | Scale | Title | |
| Drawn | Checked | Drawn | |
| Revised | Revised | Revised | |
| R.C. Heckman 5/6/61 | | 3-E-46041-P | |

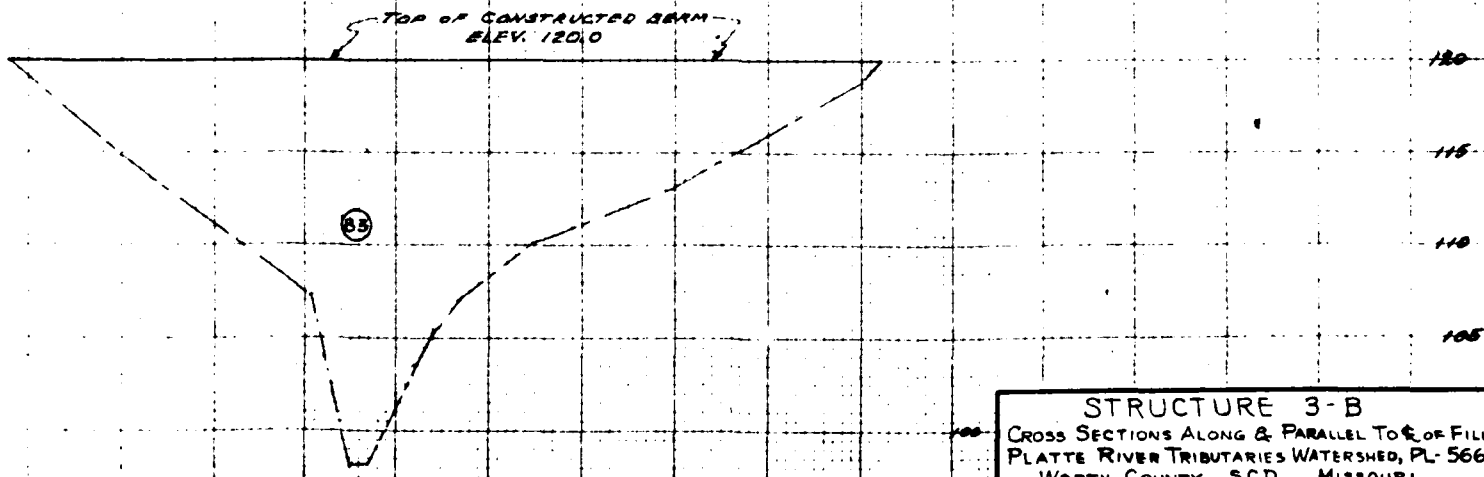


4100 3100 2100 1100



CROSS SECTION ALONG E. OF FILL

4100 3100 2100



CROSS SECTION OF BERM
PARALLEL TO E. SIDE OF FILL

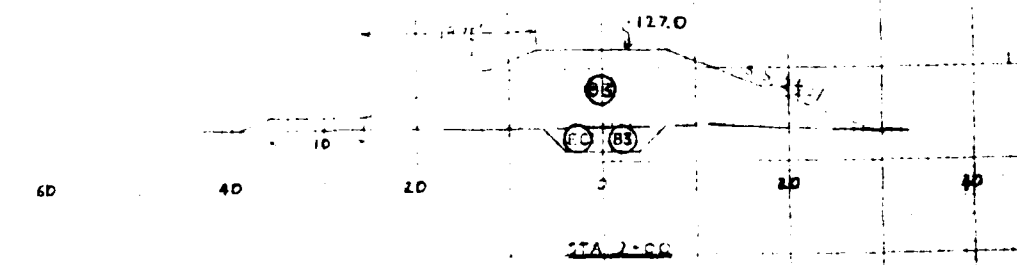
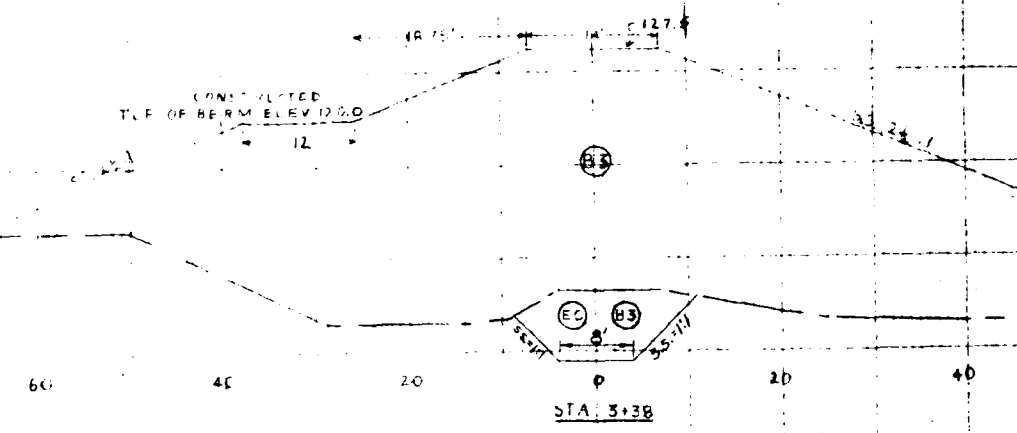
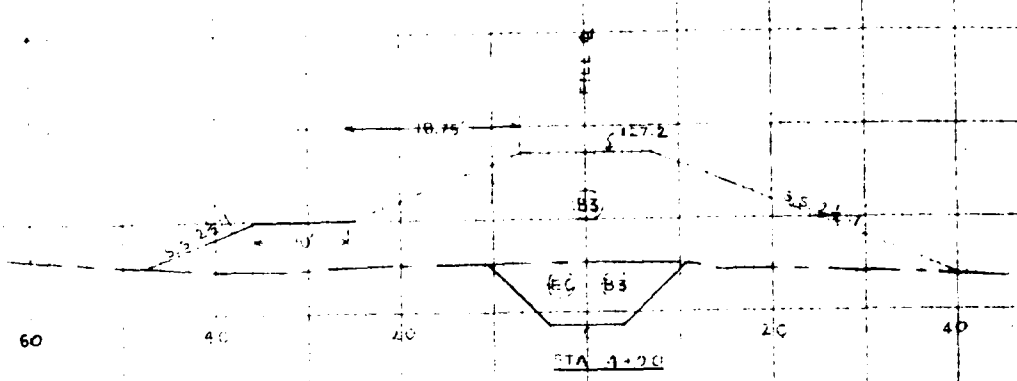
STRUCTURE 3-B
CROSS SECTIONS ALONG & PARALLEL TO E. OF FILL
PLATE RIVER TRIBUTARIES WATERSHED, PL-566
WORTH COUNTY SCD, MISSOURI.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

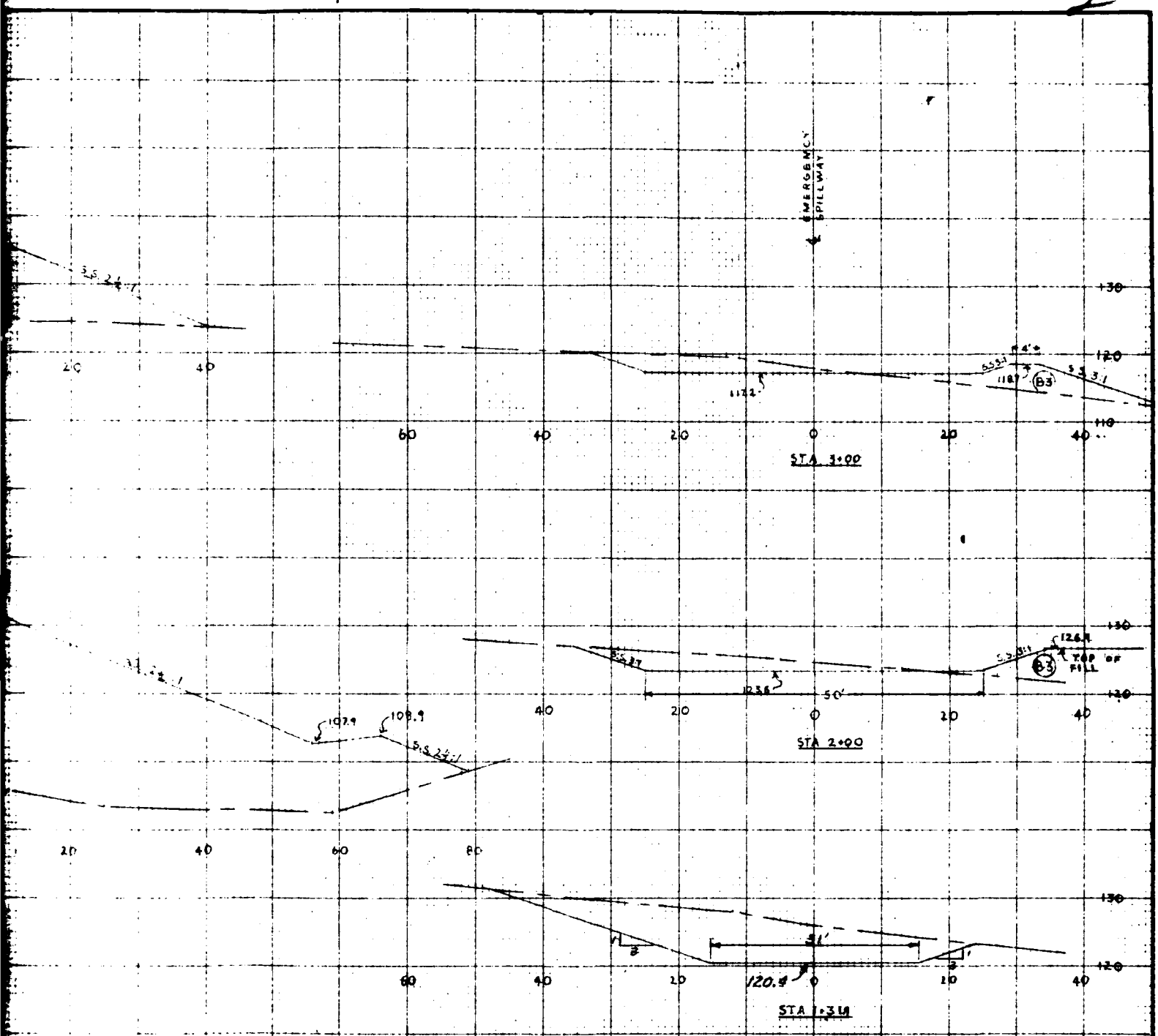
| | | |
|---------------------------|-----------------|----------------------|
| Designed H. J. JAWHARA | Date 2-61 | Approved by Title |
| Drawn O. KINDERLIN | Date 2-6-61 | Title |
| Checked Townsend | Date 2-14-61 | Sheet 3-E-46041-C |

PLATE 566

130
120
110
135
125
115
105
95
135
125
115



TYPICAL CROSS SECTIONS
PERPENDICULAR TO FILL



STA 3+00

STA 2+00

STA 1+34

TYPICAL CROSS SECTIONS OF EMERGENCY SPILLWAY

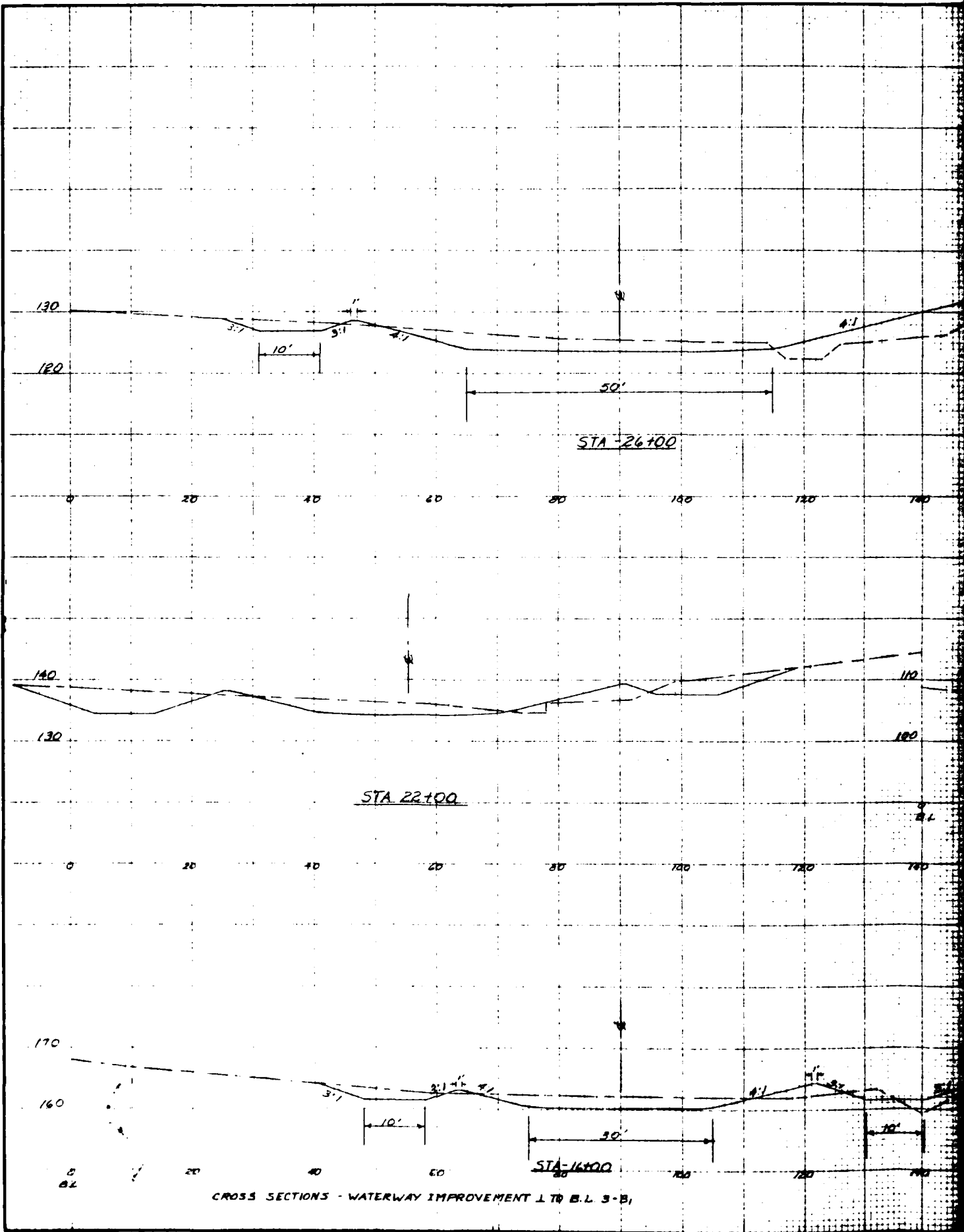
STRUCTURE 3-B
 CROSS SECTIONS OF FILL & EMER. SPWAY
 PLATTE RIVER TRIBUTARIES WATERSHED PL. 56C
 WORTH COUNTY, MO, MISSOURI

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

| | | |
|----------------------------|--------------------|----------------------------|
| Designed H. B. Townsend | Date 2-67 | Approved by Title |
| Drawn W. N. BIGGS | Date 2-76 | Title |
| Checked Townsend | Sheet No. 2-461 | Drawing No. 3-E-46041-C |

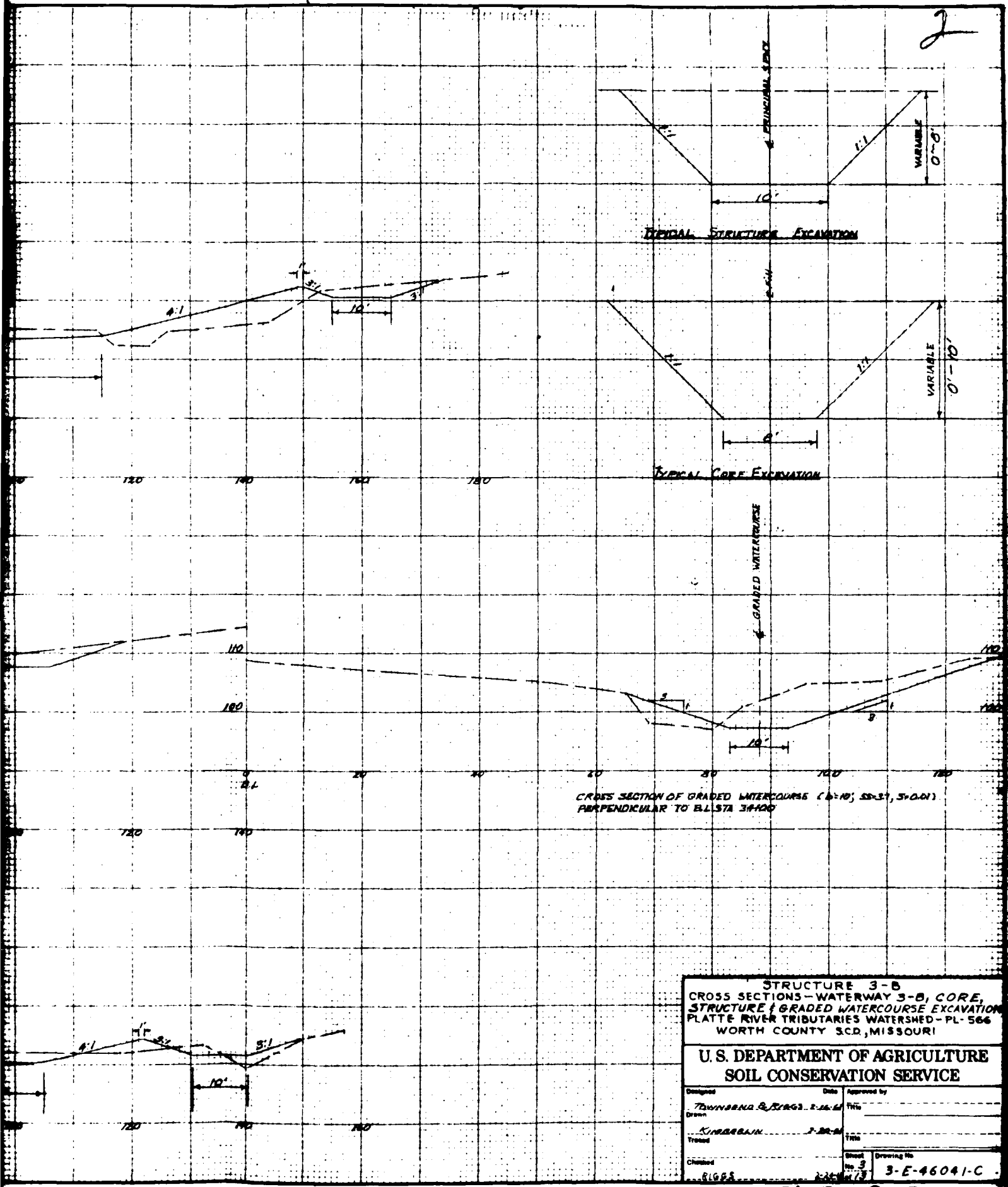
CTIONS OF FILL &

PLATTE RIVER



CROSS SECTIONS - WATERWAY IMPROVEMENT 1 TO B.L. 3-B,

2



TYPICAL STRUCTURE EXCAVATION

TYPICAL CORE EXCAVATION

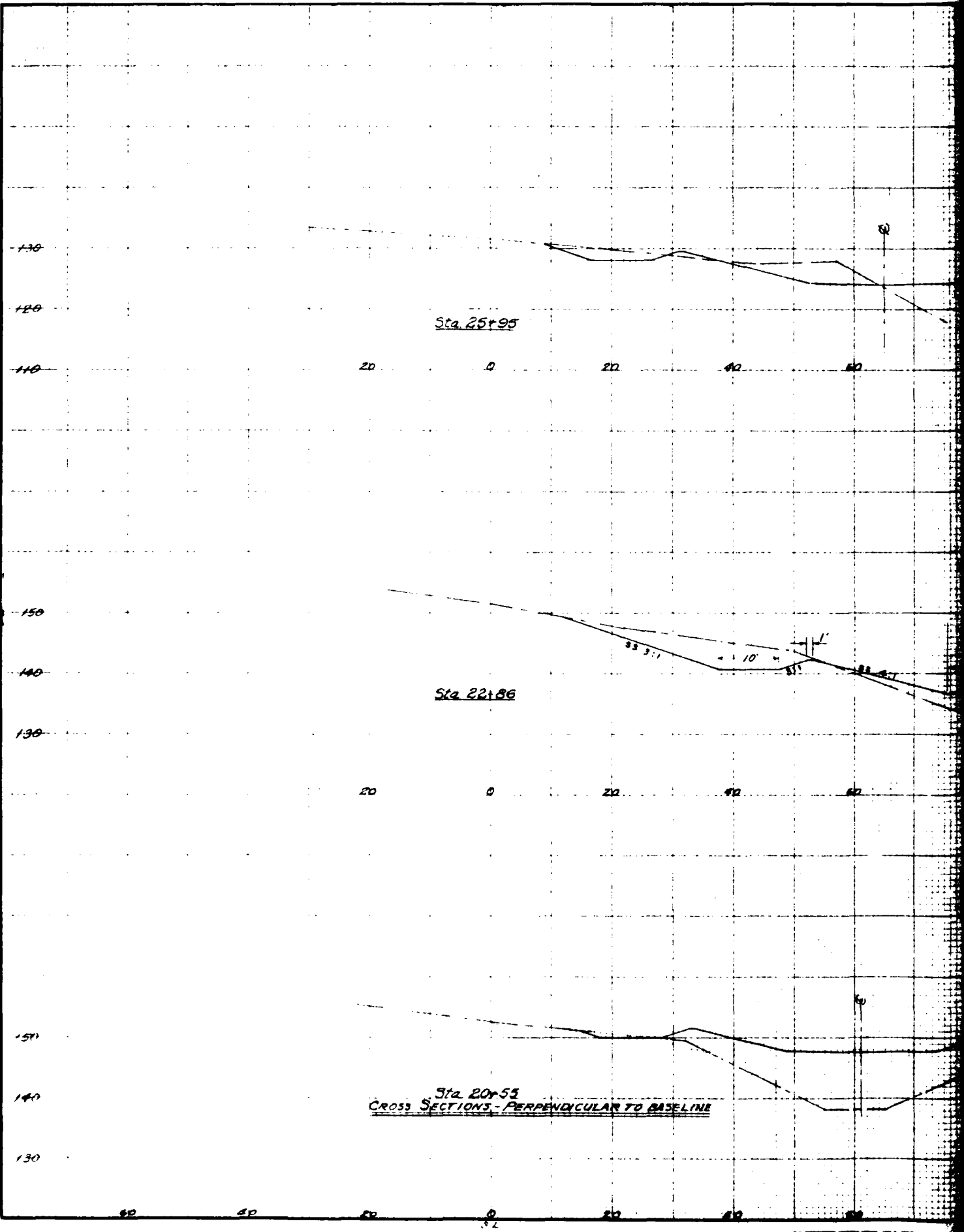
CROSS SECTION OF GRADED WATERCOURSE (4'-10"; 50:3", 5+0.01)
PERPENDICULAR TO B.L. STA 34+00

STRUCTURE 3-B
 CROSS SECTIONS - WATERWAY 3-B, CORE,
 STRUCTURE & GRADED WATERCOURSE EXCAVATION
 PLATTE RIVER TRIBUTARIES WATERSHED - PL-566
 WORTH COUNTY SCD, MISSOURI

U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

| | | |
|----------|-------------|-------------|
| Designed | Date | Approved by |
| Drawn | | Title |
| Checked | | Title |
| Sheet | Drawing No. | |
| 3 | 3-E-46041-C | |

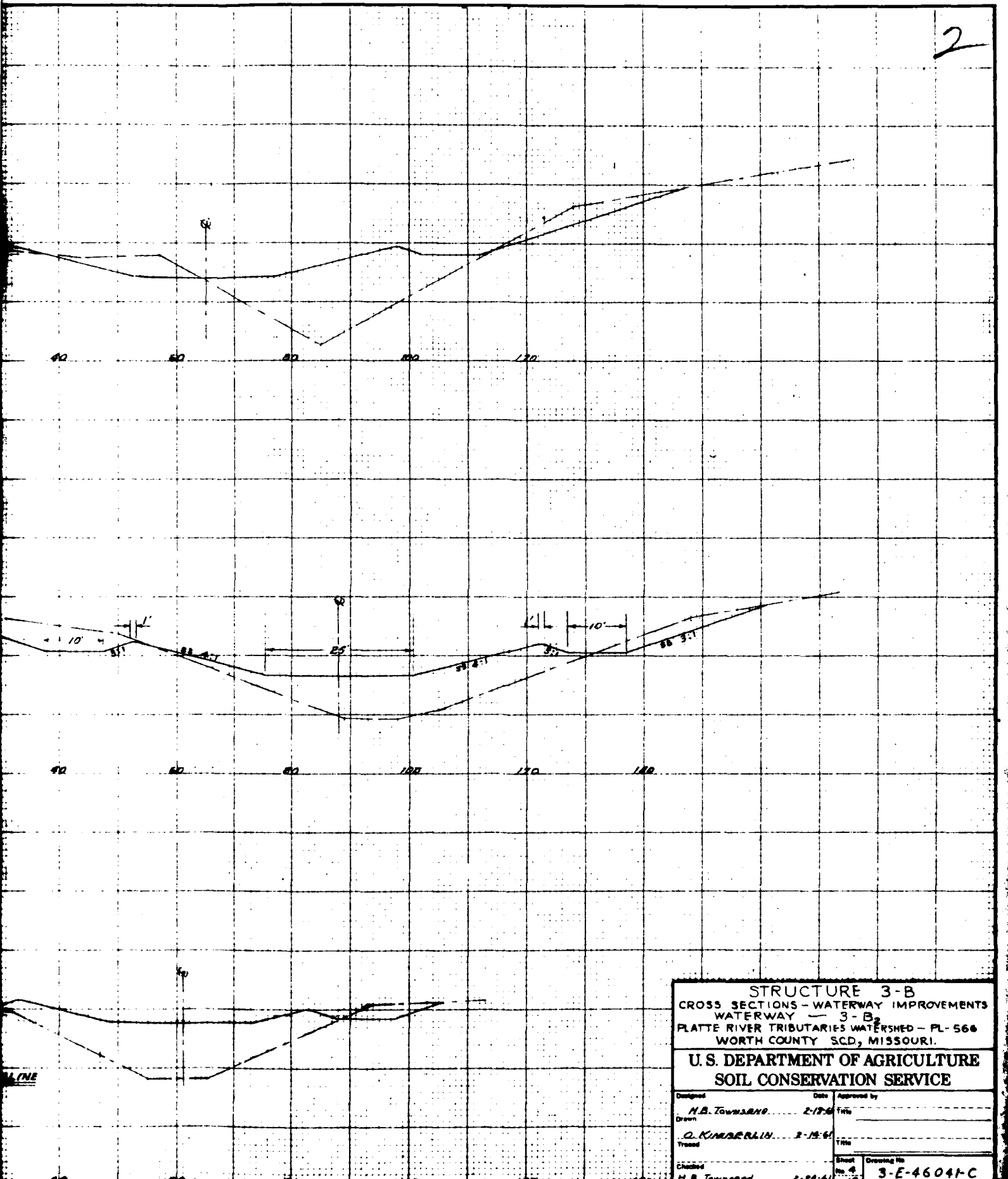
PLATE C-19 15 November 1968



Sta. 25+95

Sta. 22+86

Sta. 20+53
CROSS SECTIONS - PERPENDICULAR TO BASELINE



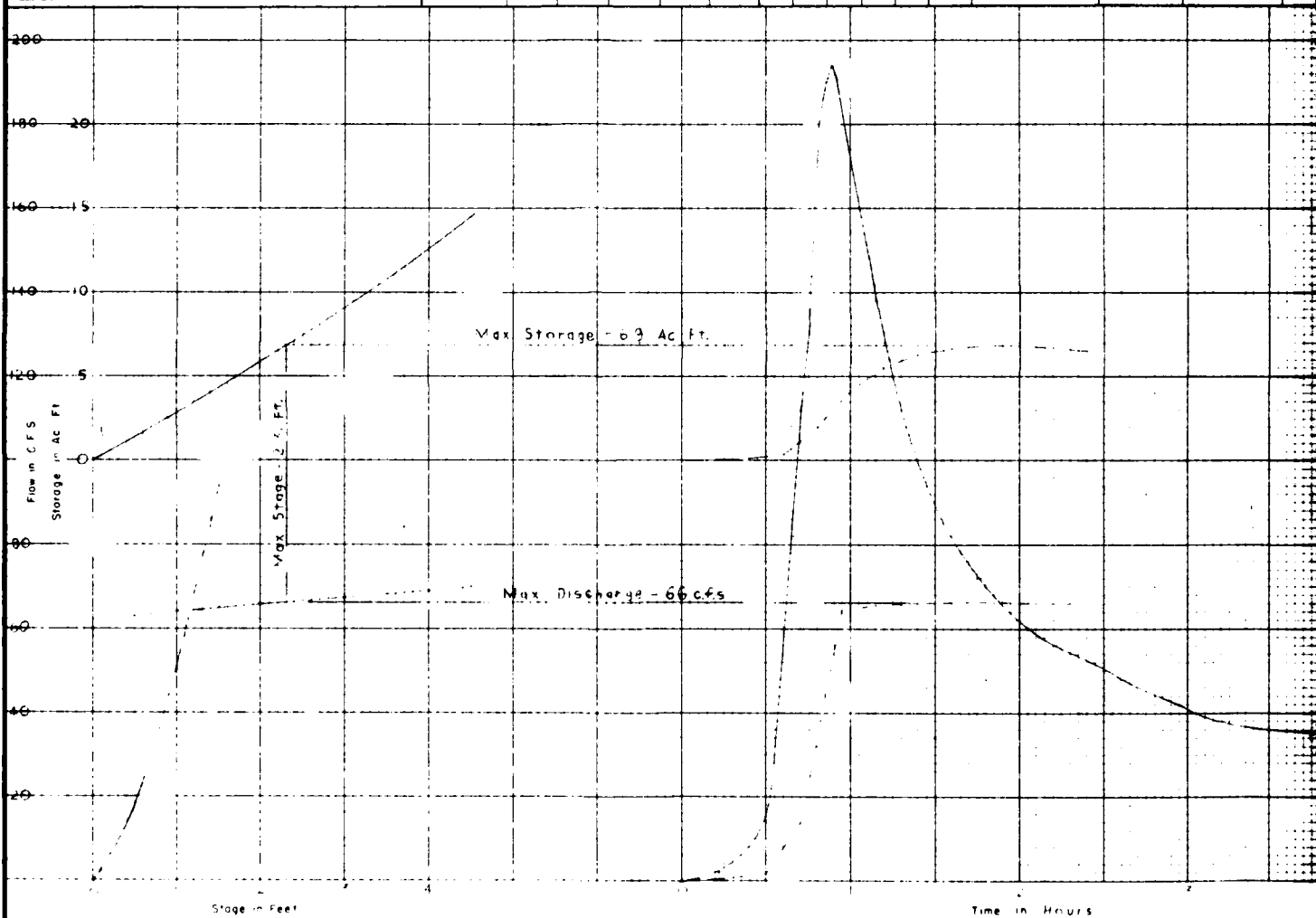
STRUCTURE 3-B
 CROSS SECTIONS - WATERWAY IMPROVEMENTS
 WATERWAY 3-B₂
 PLATTE RIVER TRIBUTARIES WATERSHED - PL-566
 WORTH COUNTY SCD, MISSOURI.

U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

| | | |
|---------------------------|-----------------|---------------------------|
| Designed H.B. Townsend | Date 2-17-61 | Approved by |
| Drawn O. Kimberlin | Date 2-15-61 | Title |
| Checked H.B. Townsend | Date 2-24-61 | Sheet No. 4 |
| | | Drawing No. 3-E-4604-C |

PLATE 2-11-61

| WATERSHED DATA | | | | AVAILABLE SEDIMENT & SPILLWAY STORAGE | | | | PRINCIPAL SPILLWAY | | | | | | | | |
|---|--------------|------------|---------|---------------------------------------|---------------|--------------------|------------------------|---|-----------|-----------|-----------------|----------------------|---------|---|---|-----|
| | | | | ELEV. | Stage in Feet | Area Flooded Acres | Interval Storage Ac Ft | Cumulative Storage Sediment Water Ac Ft | WEIR | | ORIFICE | | CONDUIT | | | |
| Drainage Area A | Uncontrolled | Controlled | Total A | | | | | | Low Stage | Low Stage | Type of Conduit | Length of Conduit ft | Size | n | K | K L | See |
| 0.175 | 0.175 | 0.175 | 0.175 | 38.0 | 0.1 | 0 | 0 | 0 | Size | Size | | | | | | |
| 108.0 | 108.0 | 108.0 | 108.0 | 120.0 | 0.5 | 3.0 | 3.0 | 3.0 | Q | Q | | | | | | |
| 120.0 | 120.0 | 120.0 | 120.0 | 126.0 | 1.0 | 5.6 | 8.6 | 8.6 | h | h | | | | | | |
| 130.0 | 130.0 | 130.0 | 130.0 | 140.0 | 2.0 | 11.6 | 20.2 | 20.2 | Q | Q | | | | | | |
| 140.0 | 140.0 | 140.0 | 140.0 | 144.0 | 3.0 | 16.6 | 36.8 | 36.8 | h | h | | | | | | |
| 148.0 | 148.0 | 148.0 | 148.0 | 145.0 | 4.0 | 19.6 | 56.4 | 56.4 | Q | Q | | | | | | |
| 150.0 | 150.0 | 150.0 | 150.0 | 150.0 | 6.0 | 29.6 | 86.0 | 86.0 | h | h | | | | | | |
| Estimated SEDIMENT STORAGE Required Ac Ft | | | | 207 | | | | | | | | | | | | |
| Notes | | | | | | | | | | | | | | | | |



| HYDROGRAPH DATA | | | | Hydrograph Coordinates | | | | | | | | | | | | | | |
|-----------------|---------|------------------|-----|------------------------|-------|-------|-----------------------|-----------|---------------------|----------|-------|-------|-----------------------|-----------|---------------------|----------|-------|-------|
| Dr. Area | Time | Runoff Condition | No. | Line No. | Hours | q cfs | Controlled Inflow cfs | Total cfs | Accum Runoff inches | Line No. | Hours | q cfs | Controlled Inflow cfs | Total cfs | Accum Runoff inches | Line No. | Hours | q cfs |
| 0.175 sq mi | 2.2 hrs | II | 11 | 1 | 0.00 | 0 | 0 | 0 | 0 | 15 | 3.0 | 39 | 0 | 0 | 0 | 500 | 0.92 | 16 |
| | | | | 2 | 0.25 | 2 | 0 | 2 | 2 | 16 | 3.2 | 37 | 0 | 0 | 2 | 500 | 0.97 | 17 |
| | | | | 3 | 1.1 | 6 | 0 | 6 | 6 | 17 | 3.54 | 36 | 0 | 0 | 6 | 31 | | |
| | | | | 4 | 2.6 | 22 | 0 | 22 | 22 | 18 | 3.76 | 35 | 0 | 0 | 12 | 32 | | |
| | | | | 5 | 2.82 | 194 | 0 | 194 | 194 | 19 | 3.9 | 35 | 0 | 0 | 18 | 33 | | |
| | | | | 6 | 3.1 | 148 | 0 | 148 | 148 | 20 | 4.11 | 35 | 0 | 0 | 24 | 34 | | |
| | | | | 7 | 3.2 | 108 | 0 | 108 | 108 | 21 | 4.22 | 35 | 0 | 0 | 30 | 35 | | |
| | | | | 8 | 3.5 | 65 | 0 | 65 | 65 | 22 | 4.35 | 35 | 0 | 0 | 36 | 36 | | |
| | | | | 9 | 3.7 | 42 | 0 | 42 | 42 | 23 | 4.47 | 34 | 0 | 0 | 37 | 37 | | |
| | | | | 10 | 3.9 | 22 | 0 | 22 | 22 | 24 | 4.59 | 33 | 0 | 0 | 38 | 38 | | |
| | | | | 11 | 4.1 | 8 | 0 | 8 | 8 | 25 | 4.71 | 32 | 0 | 0 | 39 | 39 | | |
| | | | | 12 | 4.4 | 2 | 0 | 2 | 2 | 26 | 4.83 | 31 | 0 | 0 | 40 | 40 | | |
| | | | | 13 | 4.6 | 0 | 0 | 0 | 0 | 27 | 4.95 | 30 | 0 | 0 | 41 | 41 | | |
| | | | | 14 | 4.8 | 0 | 0 | 0 | 0 | 28 | 5.07 | 29 | 0 | 0 | 42 | 42 | | |

| PRINCIPAL SPILLWAY DISCHARGE | | | | | | | | | | EMERGENCY | | | | | | | | | |
|--|----------------------|------|-------|-------|----------------|------|----------------------|------|-------|--|--------------|------|----------------------|------|-------------|-------|-------|------|--|
| CONDUIT | | | | | WEIR | | | | | CONDUIT | | | | | TOTAL DISCH | | | | |
| $Q = \frac{2g}{15} (10 + K_1 L_1 + K_2 L_2 + K_3 L_3) \sqrt{H} \sqrt{h}$ | | | | | at Elev. 120.0 | | | | | $Q = \frac{2g}{15} (10 + K_1 L_1 + K_2 L_2 + K_3 L_3) \sqrt{H} \sqrt{h}$ | | | | | | | | | |
| Type of Conduit | Length of Conduit ft | Size | n | K L | Size 2' x 6" | R/C | Length of Conduit ft | Size | n | K L | Size 2' x 6" | R/C | Length of Conduit ft | Size | | n | K L | | |
| 10 | 150 | 24" | 0.013 | 0.124 | 1.61 | 1.61 | 150 | 24" | 0.013 | 0.124 | 1.61 | 1.61 | 150 | 24" | | 0.013 | 0.124 | 1.61 | |



| | | | |
|-------------------------------------|--------|---------|---------|
| Emergency Crest Elev. ft | 120.0 | | |
| Maximum Allowable Vc ft/s | 1.0 | | |
| Design Calculations with References | | | |
| Vem | | | |
| Final Design Values | | | |
| L = | ft | | |
| n = | | | |
| HP (feet) | dc cfs | dc feet | Q (cfs) |
| | | | |
| Check Vc max | | | |
| Vc max | | | f.p.s. |
| Exit Channel Slope | | | |
| So min | | | |
| So max | | | |

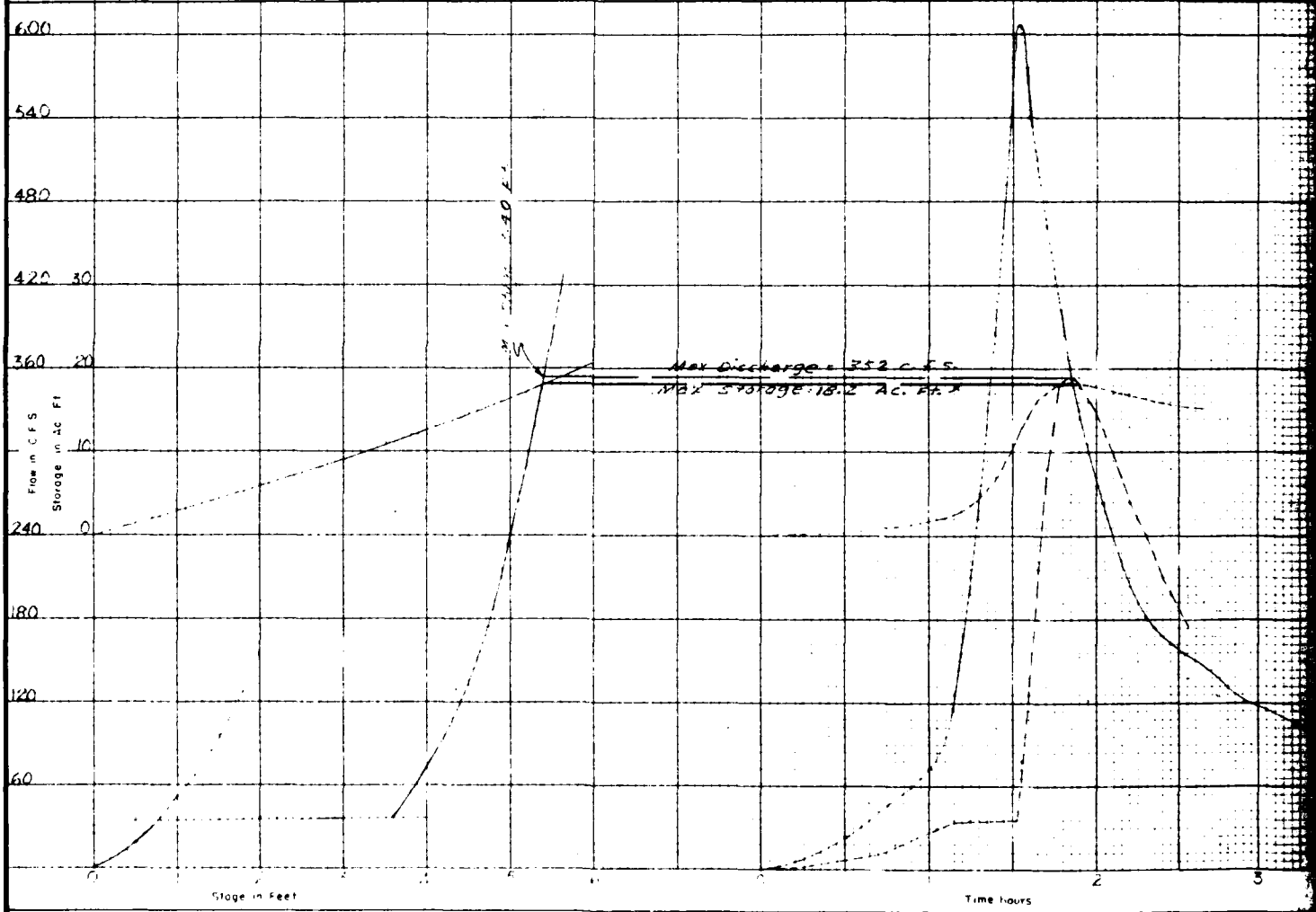
| TIME CONVERSION FACTOR | | | |
|--|---------------------------------------|-----------|-----------|
| T of ordinate ac ft | 726 | Principal | Emergency |
| T of ordinate cfs | | Freeboard | |
| T of ordinate min | | | |
| T of ordinate | | | |
| CHECK INFLOW HYDROGRAPH | | | |
| Area under inflow hydrograph equals computed volume of runoff | | | |
| Total Vol of Runoff R = 43560 ft ³ ac ft | | | |
| a | Area under inflow hydrograph in sq in | | |
| s | of ordinate in cfs | | |
| t | of horizontal in min | Freeboard | |
| | Principal | Emergency | board |
| sq in | (ac ft) | 2.826 | |
| s | (cfs) | 3.0 | |
| t | (min) | 3.0 | |
| a | sq in) | 27.72 | |
| R | (ac ft) | 22.20 | |
| R/Comp | (ac ft) | 2.21 | |
| Error | (ac ft) | 6.9 | |
| Error | (%) | 3.1 | |
| Permissible Limit ±3% | | | |
| CHECK OF FLOOD ROUTING | | | |
| Area between corresponding inflow and outflow curves equals Maximum Spillway Storage | | | |
| Storage = 43560 ft ³ ac ft | | | |
| a | Area between curves in sq in | | |
| s | of ordinate in cfs | | |
| t | of horizontal in min | Freeboard | |
| | Principal | Emergency | board |
| s | (cfs) | 3.0 | |
| t | (min) | 3.0 | |
| a | sq in) | 8.16 | |
| Storage | (ac ft) | 6.74 | |
| Storage (Max) | (from Curve) | 6.90 | |
| Error | (ac ft) | 0.16 | |
| Error | (%) | 2.4 | |
| Permissible Limit ±3% | | | |
| HYDROGRAPH EXTENSION | | | |
| T | Principal | Emergency | Freeboard |
| Hours | Outflow | Storage | Outflow |
| | cfs | ac ft | cfs |
| | | | ac ft |

| Hydrograph Coordinates | | | | | | | | | | |
|------------------------|-----|-------------------|-------|--------------|---------|-------|------|-------------------|-------|--------------|
| Time | Q | Controlled Inflow | Total | Accum Runoff | Line No | Time | Q | Controlled Inflow | Total | Accum Runoff |
| Hours | cfs | cfs | cfs | inches | | Hours | cfs | cfs | cfs | inches |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 10 | 3.9 | 0.92 | 1.91 | | 2 | 0.92 | 1.91 | 0.92 | 1.91 | |
| 32 | 17 | 0.37 | 1.79 | | 3 | 0.37 | 1.79 | 0.37 | 1.79 | |
| 54 | 16 | | | | 31 | | | | | |
| 76 | 15 | | | | 32 | | | | | |
| 99 | 14 | | | | 33 | | | | | |
| 121 | 13 | | | | 34 | | | | | |
| 143 | 12 | | | | 35 | | | | | |
| 165 | 11 | | | | 36 | | | | | |
| 187 | 10 | | | | 37 | | | | | |
| 209 | 9 | | | | 38 | | | | | |
| 231 | 8 | | | | 39 | | | | | |
| 253 | 7 | | | | 40 | | | | | |
| 275 | 6 | | | | 41 | | | | | |
| 297 | 5 | | | | 42 | | | | | |

| SUMMARY DATA | |
|------------------------------|---------------|
| Top of Embankment | Elev 126.7 ft |
| Emergency Spillway | Elev 123.6 ft |
| High Stage Inlet | Elev 120.0 ft |
| Low Stage Inlet | Elev NONE |
| Invert Inlet End of Conduit | Elev 118.0 ft |
| Invert Outlet End of Conduit | Elev 98.4 ft |
| Maximum Tailwater | Elev 98.4 ft |
| Degree of Hazard | Major |
| Design Rate of Runoff (in) | 2.38 |
| Peak Rate of Inflow (cfs) | 19.4 |
| Maximum Discharge (cfs) | 19.4 |
| Elev Maximum Stage (ft) | 122.3 |
| Maximum Storage (ac ft) | 6.3 |
| Available Sediment Storage | |
| Below Elev | 120.0 ft |
| Conduit Size | 2' x 6" |
| Riser Size | 2' x 6" |
| Orifice | NONE |

| | |
|---|---------------------------|
| STRUCTURE 3-B | |
| PLATTE RIVER TRIBUTARIES WATERSHED PL 566 | |
| WORTH COUNTY SCD MISSOURI | |
| FLOOD ROUTING PRINCIPAL SPILLWAY | |
| U. S. DEPARTMENT OF AGRICULTURE | |
| SOIL CONSERVATION SERVICE | |
| Designed | W.S. DAY (SON) Jr 6-22-66 |
| Drawn | W.N. RIGGS 5-15-67 |
| Checked | H.B. TOWNSEND 5-17-67 |
| Date | 6-22-66 |
| Approved by | |
| Sheet | 3-E-46041-H |
| Drawing No | |

| WATERSHED DATA | | | | SEDIMENT STORAGE | | | | WEIR | | | | ORIFICE | | | | CONDUIT | | | | SPILLWAY | |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|
| Drainage Area: A Uncontrolled: Acres: Sq Mi Controlled: Acres: Sq Mi Total A: Acres: Sq Mi Degree of Hazard: Hydrologic Soil Group: Weighted Design Runoff Curve: for Moist Cond II Design Runoff Curve: Time of Concentration: Feet Length of Watershed: Feet Difference in Elevation: Feet T _c : Hours Average Velocity: ft per sec. | | | | ELEV. V. Stage in Feet Area Flooded Acres Interval Storage Acre Feet Cumulative Storage Acre Feet Sediment Storage Acre Feet Water Storage Acre Feet | | | | Low Stage Size C Q h n h _{1/2} Q c.f.s. | | | | Low Stage Size C Q h n h _{1/2} Q c.f.s. | | | | Type of Conduit length of Conduit ft Size n K K L H in Feet H _{1/2} Q in c.f.s. | | | | Size O-CL C-CL Q-CL h Feet | |
| Estimated SEDIMENT STORAGE Required - Ac Ft Above Principal Spillway = 0.4 Below Principal Spillway = 4.2 Total = 4.6 Notes: | | | | 124.0 4.0 3.7 6.8 12.6 124.5 4.5 4.0 7.3 13.1 125.0 5.0 4.4 7.8 13.6 126.0 6.0 5.2 9.0 15.0 127.0 7.0 6.0 10.2 16.4 | | | | | | | | | | | | | | | | | |



| HYDROGRAPH DATA | | | | Hydrograph Coordinates | | | | | | | | | | | | | | |
|---|--|--|--|------------------------|---------|----------|--------------------------|--------------|---------------------|----------|---------|----------|--------------------------|--------------|---------------------|----------|---------|----------|
| Dr. Area: sq mi. T _c : hrs. Runoff Condition No. 22 Runoff Curve No. 2 Storm Distribution Curve 5 Storm Duration 6 hrs Rainfall Point 2.7 in Area 2.4 in Hydrograph Family No. 1 Q ₁ : c.f.s. Computed T _p : 0.7 T _p used: 0.7 hrs To: 1.7 hrs Computed T ₁₀ : 1.7 T ₁₀ used: 1.7 hrs Revised T _p : 0.7 hrs Q _p : 484 (484) c.f.s. Q _{ap} : 100 c.f.s. Rev T _p : 0.7 H ₁₀ column: 1.7 T ₁₀ Rev T _p H ₁₀ column: 1.7 Q _{ap} 100 | | | | Line No. | t Hours | q c.f.s. | Controlled Inflow c.f.s. | Total c.f.s. | Accum Runoff inches | Line No. | t Hours | q c.f.s. | Controlled Inflow c.f.s. | Total c.f.s. | Accum Runoff inches | Line No. | t Hours | q c.f.s. |
| | | | | 1 | 0.0 | 0 | 0 | 0 | 15 | 1.56 | 97 | 0 | 97 | 16 | 1.61 | 95 | 95 | |
| | | | | 2 | 0.1 | 10 | 10 | 10 | 17 | 1.61 | 86 | 10 | 96 | 17 | 1.70 | 82 | 92 | |
| | | | | 3 | 0.2 | 25 | 25 | 25 | 18 | 1.80 | 77 | 25 | 102 | 18 | 1.80 | 77 | 102 | |
| | | | | 4 | 0.3 | 45 | 45 | 45 | 19 | 1.88 | 73 | 45 | 147 | 19 | 1.88 | 73 | 147 | |
| | | | | 5 | 0.4 | 65 | 65 | 65 | 20 | 1.93 | 70 | 65 | 182 | 20 | 1.93 | 70 | 182 | |
| | | | | 6 | 0.5 | 80 | 80 | 80 | 21 | 1.95 | 66 | 80 | 212 | 21 | 1.95 | 66 | 212 | |
| | | | | 7 | 0.6 | 90 | 90 | 90 | 22 | 1.97 | 62 | 90 | 242 | 22 | 1.97 | 62 | 242 | |
| | | | | 8 | 0.7 | 95 | 95 | 95 | 23 | 1.98 | 58 | 95 | 270 | 23 | 1.98 | 58 | 270 | |
| | | | | 9 | 0.8 | 90 | 90 | 90 | 24 | 1.98 | 54 | 90 | 294 | 24 | 1.98 | 54 | 294 | |
| | | | | 10 | 0.9 | 80 | 80 | 80 | 25 | 1.97 | 50 | 80 | 314 | 25 | 1.97 | 50 | 314 | |
| | | | | 11 | 1.0 | 65 | 65 | 65 | 26 | 1.95 | 46 | 65 | 330 | 26 | 1.95 | 46 | 330 | |
| | | | | 12 | 1.1 | 50 | 50 | 50 | 27 | 1.92 | 42 | 50 | 342 | 27 | 1.92 | 42 | 342 | |
| | | | | 13 | 1.2 | 35 | 35 | 35 | 28 | 1.88 | 38 | 35 | 357 | 28 | 1.88 | 38 | 357 | |
| | | | | 14 | 1.3 | 20 | 20 | 20 | 29 | 1.83 | 34 | 20 | 367 | 29 | 1.83 | 34 | 367 | |

Hydrograph Coordinates on page 2

PRINCIPAL SPILLWAY DISCHARGE

EMERGENCY

TIME CONVERSION FACTOR

| CONDUIT | | WEIR | | CONDUIT | | TOTAL DISCH. |
|---------|--------|--------|------|---------|--------|--------------|
| Size | Length | Height | Area | Size | Length | |
| 18" | 106' | 1.8' | 10.0 | 18" | 106' | 18 |
| 24" | 106' | 2.4' | 10.0 | 24" | 106' | 34 |
| 30" | 106' | 3.0' | 10.0 | 30" | 106' | 34 |
| 36" | 106' | 3.6' | 10.0 | 36" | 106' | 34 |
| 42" | 106' | 4.2' | 10.0 | 42" | 106' | 34 |
| 48" | 106' | 4.8' | 10.0 | 48" | 106' | 34 |
| 54" | 106' | 5.4' | 10.0 | 54" | 106' | 34 |
| 60" | 106' | 6.0' | 10.0 | 60" | 106' | 34 |

| | |
|-------------------------------------|-----|
| Emergency Crest Elev. | 226 |
| Maximum Allowable Vc | 2.5 |
| Design Calculations with References | |
| Wm | 10' |

| | |
|---------------------|----|
| Final Design values | |
| h | 5 |
| b | 50 |
| E | 24 |
| Freeboard | 6 |

| | | | | | | | | | |
|----|----|-----|-----|------|------|-----|-------|-----|-----|
| h | ft | q | cfs | d | feet | w | ft | c | cfs |
| 24 | 2 | 492 | 37 | 73 | 5.4 | 0.4 | 50.75 | 36 | |
| 24 | 1 | 497 | 37 | 155 | 5.4 | 0.4 | 51.44 | 98 | |
| 25 | 2 | 492 | 37 | 242 | 5.4 | 0.4 | 52.31 | 204 | |
| 25 | 1 | 495 | 37 | 564 | 5.4 | 0.4 | 54.29 | 527 | |
| 25 | 0 | 505 | 38 | 1006 | 5.4 | 0.4 | 56.21 | 968 | |

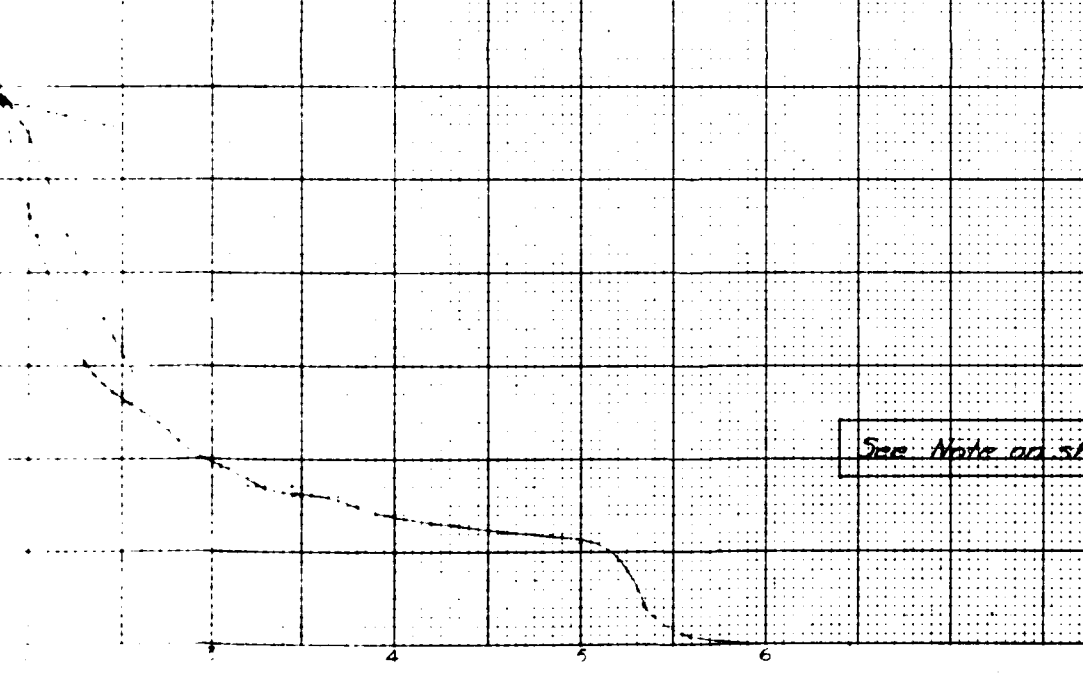
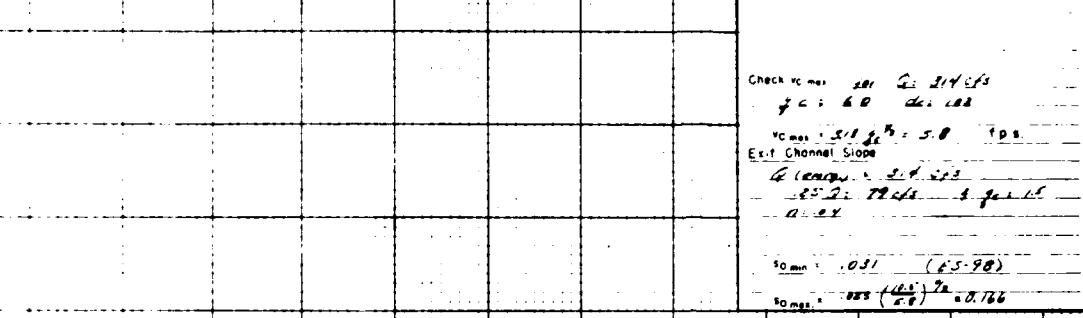
Area under inflow hydrograph equals computed volume of runoff

Total Value of Runoff $Q = 60 \text{ sec/min}$
43560 ft³/ac ft

Area under inflow hydrograph in sq-in
of ordinate in cfs
of horizontal in min

| | | |
|-----------|-----------|-----------|
| Principal | Emergency | Freeboard |
| 60 | 30 | 30 |
| 24.60 | 12.30 | 12.30 |
| 61.08 | 30.75 | 30.33 |
| 40.48 | 20.50 | 20.00 |
| 0.38 | 0.19 | 0.19 |
| 0.96 | 0.48 | 0.48 |

Permissible Limit ±3%



Check v_c max = 2.5 (214.5)
4.0 (60) (21.4)

v_c max = 5.1 (25) = 5.8 (10)

Exit Channel Slope
25.2 (10) (1.0) (1.0)

10 min = .031 (65-90)
10 min = .03 (65) (1.0) (0.166)

CHECK OF FLOOD ROUTING

Area between corresponding inflow and outflow curves equals Maximum Spillway Storage

Storage = $Q = 60 \text{ sec/min}$
43560 ft³/ac ft

Area between curves in sq-in
of ordinate in cfs
of horizontal in min

| | | |
|-----------|-----------|-----------|
| Principal | Emergency | Freeboard |
| 60 | 30 | 30 |
| 24.60 | 12.30 | 12.30 |
| 61.08 | 30.75 | 30.33 |
| 40.48 | 20.50 | 20.00 |
| 0.38 | 0.19 | 0.19 |
| 0.96 | 0.48 | 0.48 |

Permissible Limit ±3%

HYDROGRAPH EXTENSION

| Time | Principal | | Emergency | | Freeboard | |
|-------|-----------|---------|-----------|---------|-----------|---------|
| | Outflow | Storage | Outflow | Storage | Outflow | Storage |
| Hours | cfs | ac ft | cfs | ac ft | cfs | ac ft |

See Note on sheet 10 of 10

SUMMARY DATA

| | | | |
|--|------|-------|-----------|
| Top of Embankment | Elev | 149.7 | ft |
| Emergency Spillway | Elev | 123.0 | ft |
| High Stage Inlet | Elev | 123.0 | ft |
| Low Stage Inlet | Elev | 107.8 | ft |
| Invert Inlet End of Conduit | Elev | 116.0 | ft |
| Invert Outlet End of Conduit | Elev | 88.0 | ft |
| Maximum Tailwater | Elev | 100.0 | ft |
| Degree of Hazard | Prin | Emer | Freeboard |
| Design Rate of Runoff (in) | | | |
| Peak Rate of Inflow (cfs) | | | |
| Maximum Discharge (cfs) | | 332 | |
| Flow Maximum Stage (ft) | | 1.2 | |
| Maximum Storage (ac ft) | | 15.6 | |
| Available Sediment Storage Below Elev. 120.0 | | 11 | 206 ac ft |
| Conduit Size | | 24 | |
| Riser Size | | | |
| Orifice | | | |

STRUCTURE 3-B

PLATTE RIVER TRIBUTARIES WATERSHED PL 566

WORTH COUNTY SCD MISSOURI

FLOOD ROUTING EMERGENCY SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Designed by: [Signature]

Drawn by: [Signature]

Checked by: [Signature]

Date: [Blank]

Approved by: [Blank]

Time: [Blank]

Sheet no. 2 of 10

Drawing No. 3-E-46041-H

| WATERSHED DATA | | | AVAILABLE SEDIMENT STORAGE | | | | PRINCIPAL SPILLWAY | | | | | | | | |
|---|-------|------------|----------------------------|---------------|--------------------|-----------------------|---|-----------|-----------|-----------------|----------------------|---------|---|---|-----|
| Drainage Area - A | | | ELEV | Stage in feet | Area Flooded Acres | Interim Storage Ac-ft | Cumulative Storage Sediment Water Ac-ft | WEIR | | ORIFICE | | CONDUIT | | | |
| Uncontrolled | Acres | Sq M. | | | | | | Low Stage | Low Stage | Type of Conduit | Length of Conduit ft | Size | n | K | K L | Size | Q-CL | Q-S |
| Controlled | Acres | Sq M. | | | | | | Elev. | Elev. | | | | | | |
| Total A | Acres | Sq M. | | | | | | Size | Size | | | | | | |
| Degree of Hazard | | | | | | | | Q-CL | Q-CL | | | | | | |
| Hydrologic Soil Group | | | | | | | | Q-S | Q-S | | | | | | |
| Weighted Design Runoff Curve | | | | | | | | Q | Q | | | | | | |
| Design Runoff Curve | | | | | | | | n | n | | | | | | |
| Time of Concentration | | | | | | | | Feet | Feet | | | | | | |
| Length of Watershed | | Feet | | | | | | n/2 | n/2 | | | | | | |
| Difference in Elevation | | Feet | | | | | | Q cfs | Q cfs | | | | | | |
| Tc | | Hours | | | | | | | | | | | | | |
| Average Velocity | | ft per sec | | | | | | | | | | | | | |
| Estimated SEDIMENT STORAGE Required - Ac Ft | | | | | | | | | | | | | | | |
| Above Principal Spillway | | | 4.4 | | | | | | | | | | | | |
| Below Principal Spillway | | | 4.2 | | | | | | | | | | | | |
| Notes: Total | | | 8.6 | | | | | | | | | | | | |



| HYDROGRAPH DATA | | | | | | Hydrograph Coordinates | | | | | | | | |
|------------------|-------|--------------------------|-------|-----------------------|-----|------------------------|------|------|-------------------|-------|--------------|----------|------|-----|
| Dr. Area | sq mi | Tc | hrs | Runoff Condition | No. | Line No. | t | q | Controlled Inflow | Total | Accum Runoff | Line No. | t | q |
| Runoff Curve No. | | Storm Distribution Curve | | Storm Duration | hrs | 1 | 0 | 0 | 0 | 0 | 0 | 15 | 0.78 | 176 |
| Rainfall Point | ft | Area | sq mi | Hydrograph Family No. | | 2 | 0.27 | 11 | 11 | 11 | 11 | 16 | 0.65 | 162 |
| Computed Tp | hrs | Computed Tp | hrs | Revised Tp | hrs | 3 | 0.27 | 46 | 46 | 46 | 46 | 17 | 0.52 | 185 |
| ap | cfs | ap | cfs | ap | cfs | 4 | 0.27 | 85 | 85 | 85 | 85 | 18 | 0.59 | 181 |
| ap | cfs | ap | cfs | ap | cfs | 5 | 0.27 | 129 | 129 | 129 | 129 | 19 | 0.57 | 134 |
| ap | cfs | ap | cfs | ap | cfs | 6 | 0.27 | 170 | 170 | 170 | 170 | 20 | 0.54 | 127 |
| ap | cfs | ap | cfs | ap | cfs | 7 | 0.27 | 1166 | 1166 | 1166 | 1166 | 21 | 0.41 | 120 |
| ap | cfs | ap | cfs | ap | cfs | 8 | 0.27 | 132 | 132 | 132 | 132 | 22 | 0.48 | 49 |
| ap | cfs | ap | cfs | ap | cfs | 9 | 0.27 | 415 | 415 | 415 | 415 | 23 | 0.55 | 7 |
| ap | cfs | ap | cfs | ap | cfs | 10 | 0.27 | 221 | 221 | 221 | 221 | 24 | 0.62 | 0 |
| ap | cfs | ap | cfs | ap | cfs | 11 | 0.27 | 258 | 258 | 258 | 258 | 25 | 0.62 | 0 |
| ap | cfs | ap | cfs | ap | cfs | 12 | 0.27 | 440 | 440 | 440 | 440 | 26 | 0.51 | 211 |
| ap | cfs | ap | cfs | ap | cfs | 13 | 0.27 | 611 | 611 | 611 | 611 | 27 | 0.48 | 725 |
| ap | cfs | ap | cfs | ap | cfs | 14 | 0.27 | 1152 | 1152 | 1152 | 1152 | 28 | 0.57 | 226 |

STRUCTURE HYDRAULIC

| LOCATION | | WATERSHED | STRUCTURE | 3-B | 5-A | 5-B |
|----------------------------------|---------------------------------------|--------------------------------|------------|-------|------------|------------|
| GULLY | | | | | | |
| STATION | | | 32+90 | | 31+00 | 14+45 |
| TYPE | | | DROP INLET | | DROP INLET | DROP INLET |
| KIND (FULL FLOW OR DETENTION) | | | DET. | | DET. | DET. |
| WATERSHED AREA | CONTROLLED | ACRES | | 164 | | |
| | UNCONTROLLED | ACRES | | 09 | 162 | |
| | TOTAL | ACRES | | 271 | 162 | |
| DESIGN RATE OF INFLOW | FROM CONTROLLED AREA | CFS | | 37 | | |
| | FROM UNCONTROLLED AREA | CFS | 44 | 337 | 237 | |
| | TOTAL | CFS | 44 | 374 | 237 | |
| PRINCIPAL SPILLWAY OUTFLOW | | CFS | 66 | 3 | 38 | |
| RATIO OF OUTFLOW TO INFLOW | | Q _o /Q _i | 1.5 | 0.008 | 0.016 | |
| EMERGENCY SPILLWAY OUTFLOW | | CFS | 66 | 3 | 38 | |
| MAXIMUM STAGE ABOVE CREST | | FEET | 2.4 | 3.7 | 3.4 | |
| ESTIMATED STORAGE DATA | TEMPORARY WATER STORAGE ABOVE CREST | AC FT | 6.6 | 2.2 | 14.9 | |
| | TOTAL BELOW CREST | AC FT | 20.0 | 24.0 | 24.0 | |
| | REQUIRED WATER STORAGE BELOW CREST | AC FT | NONE | NONE | NONE | |
| | AVERAGE RATE OF SEDIMENT ACCUMULATION | ACFT/SQM/YR | 0.2 | 0.24 | 0.59 | |
| | REQUIRED SEDIMENT STORAGE | AC FT | 4.0 | 5.1 | 7.4 | |
| | SEDIMENT STORAGE BELOW CREST | AC FT | 4.0 | 4.7 | 6.8 | |
| | SEDIMENT STORAGE ABOVE CREST | AC FT | 2.4 | 2.4 | 6.6 | |
| | TOTAL SEDIMENT BASIN AVAILABLE | AC FT | 20.0 | 24.0 | 48.8 | |
| LIFE OF AVAILABLE SEDIMENT BASIN | YEARS | 24 | 23.8 | 32.6 | | |
| SEDIMENT TRAP EFFICIENCY | | PERCENT | 95 | 90 | 90 | |
| PERMANENT POOL AREA | | ACRES | 2.7 | 4.0 | 6.2 | |

CHANNEL HYDRAULIC

| LOCATION | | WATERSHED | STATION | | | | TO STATION | | | | |
|---------------------|---|-----------|---------|-------|-------|-------|------------|--|--|-------|--------|
| GULLY | | | | | | | | | | | |
| STATION | | | 33+79 | 4+70 | 24+35 | 4+02 | | | | 0+50 | 9+50 |
| TYPE OF IMPROVEMENT | | | 34+85 | 24+35 | 27+75 | 27+50 | | | | 12+40 | 12+50 |
| WATERSHED AREA | CONTROLLED | ACRES | 112 | | | | 271 | | | 162 | |
| | UNCONTROLLED | ACRES | | 33 | 75 | 27 | | | | | 51 |
| | TOTAL | ACRES | 112 | 33 | 75 | 27 | 271 | | | 162 | 51 |
| DESIGN FLOW | CONTROLLED | CFS | 66 | | | | 61 | | | 38 | |
| | UNCONTROLLED | CFS | | 61 | 25 | 49 | | | | | 51 |
| | TOTAL | CFS | 66 | 61 | 25 | 49 | 61 | | | 38 | 51 |
| VELOCITY | MAXIMUM ALLOWABLE (DESIGN) | FT/SEC | 4.0 | 4.0 | 4.0 | 4.0 | 4.5 | | | 5.0 | 3.0 |
| | CONTROLLED FLOW | FT/SEC | 3.9 | | | | 4.1 | | | 4.5 | 2.6 |
| | CONTROLLED & UNCONTROLLED FLOW | FT/SEC | 3.9 | 4.0 | 4.0 | 4.0 | 4.1 | | | 4.5 | 2.6 |
| DEPTH OF FLOW | CONTROLLED (TRAPEZOIDAL) | FEET | 1.3 | | | | 1.1 | | | 0.7 | |
| | CONTROLLED & UNCONTROLLED (TRAPEZOIDAL) | FEET | 1.3 | 1.3 | 1.4 | 1.3 | 1.1 | | | 0.7 | 1.5 |
| | CONTROLLED & UNCONTROLLED (PARABOLIC) | FEET | 1.3 | 1.3 | 1.4 | 1.3 | 1.1 | | | 0.7 | 1.5 |
| CHANNEL DATA | "N" VALUE (MANNINGS) OR RETARDANCE (COS ² φ) | | 0.04 | 0-A | 0-A | 0-A | 0.04 | | | 0.04 | 0-A |
| | BOTTOM WIDTH (TRAPEZOIDAL) | FEET | 10 | 30 | 50 | 20 | 10 | | | 10 | 20 |
| | SIDE SLOPES (HORIZONTAL/VERTICAL) | RATIO | 3:1 | 4:1 | 4:1 | 4:1 | 3:1 | | | 3:1 | 3:1 |
| | TOP WIDTH (PARABOLIC) | FEET | | | | | | | | | |
| SLOPE OF CHANNEL | | FT/FT | 0.01 | 0.045 | 0.025 | 0.05 | 0.015 | | | 0.027 | 0.0042 |

NOTE: CONTROLLED AREA AND FLOW REFERS TO THE AREA ABOVE AND THE DISCHARGE FROM A FLOOD DETENTION TYPE OF STRUCTURE.

THIS SPACE FOR PERTINENT DATA AND COMPUTATIONS NOT OTHERWISE SHOWN

* 1 Principal Spillway Hydrograph

3-FREEBOARD HYDROGRAPH

Note: In accordance with Engineering Memorandum S.C.S.-42 (Rev. 2) dated February 20, 1964, the conduit size for structure 3-B has been changed from 18" dia. to 24" dia.

The emergency and freeboard hydrograph summary values shown above for structure 3-B have not been revised. They are conservative for the new conduit size.

STRUCTURE HYDRAULICS

2

| -A | 5-B | | | | | | | | | | | | | | | | | | | |
|-------|------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 1.00 | 14+45 | | | | | | | | | | | | | | | | | | | |
| INLET | Drop inlet | | | | | | | | | | | | | | | | | | | |
| 1.2 | DET | | | | | | | | | | | | | | | | | | | |
| 1.09 | 1.2 | | | | | | | | | | | | | | | | | | | |
| 1.71 | 1.2 | | | | | | | | | | | | | | | | | | | |
| 2.1 | | | | | | | | | | | | | | | | | | | | |
| 3.7 | | | | | | | | | | | | | | | | | | | | |
| 3.20 | | | | | | | | | | | | | | | | | | | | |
| 3.59 | 2.37 | | | | | | | | | | | | | | | | | | | |
| 3.7 | 3.0 | | | | | | | | | | | | | | | | | | | |
| 3.1 | 3.37 | | | | | | | | | | | | | | | | | | | |
| 3.5 | 2.57 | | | | | | | | | | | | | | | | | | | |
| 3.74 | 3.0 | | | | | | | | | | | | | | | | | | | |
| 3.1 | 3.37 | | | | | | | | | | | | | | | | | | | |
| 3.1 | 3.8 | | | | | | | | | | | | | | | | | | | |
| 3.3 | 3.9 | | | | | | | | | | | | | | | | | | | |
| 3.6 | 3.9 | | | | | | | | | | | | | | | | | | | |
| 3.4 | 0.16 | | | | | | | | | | | | | | | | | | | |
| 3.17 | 0.078 | | | | | | | | | | | | | | | | | | | |
| 3.09 | 0.04 | | | | | | | | | | | | | | | | | | | |
| 3.6 | 0 | | | | | | | | | | | | | | | | | | | |
| 3.8 | 1.9 | | | | | | | | | | | | | | | | | | | |
| 3.7 | 3.53 | | | | | | | | | | | | | | | | | | | |
| 3.7 | 3.4 | | | | | | | | | | | | | | | | | | | |
| 4.9 | 4.4 | | | | | | | | | | | | | | | | | | | |
| 11.8 | 14.8 | | | | | | | | | | | | | | | | | | | |
| 21.2 | 24.0 | | | | | | | | | | | | | | | | | | | |
| 29.9 | 33.1 | | | | | | | | | | | | | | | | | | | |
| 24.0 | 48.8 | | | | | | | | | | | | | | | | | | | |
| ONE | NONE | | | | | | | | | | | | | | | | | | | |
| 2.24 | 0.59 | | | | | | | | | | | | | | | | | | | |
| 5.1 | 7.4 | | | | | | | | | | | | | | | | | | | |
| 4.7 | 4.8 | | | | | | | | | | | | | | | | | | | |
| 0.4 | 0.6 | | | | | | | | | | | | | | | | | | | |
| 24.0 | 48.8 | | | | | | | | | | | | | | | | | | | |
| 3.8 | 32.6 | | | | | | | | | | | | | | | | | | | |
| 9.0 | 9.0 | | | | | | | | | | | | | | | | | | | |
| 4.6 | 6.2 | | | | | | | | | | | | | | | | | | | |

CHANNEL HYDRAULICS

| — | — | 0+50 | 9+50 | | | | | | | | | | | | | | | | | |
|--------|-------------|-----------|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| — | — | 12+40 | 12+50 | | | | | | | | | | | | | | | | | |
| COURSE | WATERCOURSE | DIVERSION | WATERWAY | | | | | | | | | | | | | | | | | |
| 71 | 1.2 | | | | | | | | | | | | | | | | | | | |
| | | 51 | 41 | | | | | | | | | | | | | | | | | |
| 71 | 1.2 | 51 | 41 | | | | | | | | | | | | | | | | | |
| 61 | 3.8 | | | | | | | | | | | | | | | | | | | |
| | | 51 | 76 | | | | | | | | | | | | | | | | | |
| 61 | 3.8 | 51 | 76 | | | | | | | | | | | | | | | | | |
| 4.5 | 5.0 | 3.0 | 4.0 | | | | | | | | | | | | | | | | | |
| 4.1 | 4.5 | 2.6 | | | | | | | | | | | | | | | | | | |
| 3.1 | 4.5 | 2.6 | 4.0 | | | | | | | | | | | | | | | | | |
| 1 | 2.7 | | | | | | | | | | | | | | | | | | | |
| 1 | 0.7 | 1.5 | 1.8 | | | | | | | | | | | | | | | | | |
| 0.4 | 0.04 | 0.04 | D-A | | | | | | | | | | | | | | | | | |
| 10 | 10 | 10 | 24 | | | | | | | | | | | | | | | | | |
| 1 | 3.1 | 3.1 | 4.1 | | | | | | | | | | | | | | | | | |
| 0.15 | 0.027 | 0.0042 | 0.02 | | | | | | | | | | | | | | | | | |

Dated February 20, 1961, the principal spillway is to 24" dia.

values shown above for structure 3B have a conduit size.

GENERAL HYDRAULIC DATA
 Structures 3-B, 5-A & 5-B
 Platte River Tributaries Watershed PL 5
 Worth County S.C.D. Missouri

**U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE**

| | |
|-----------------------|------------|
| Designed | Date |
| Drawn | File |
| Checked | Time |
| Approved by | |
| A. Nolte 2-24-61 | |
| Checked | Sheet |
| H.B. Townsend 2-24-61 | 3-E-46041- |

PLATE C-18

SUMMARY OF SHEAR TEST DATA

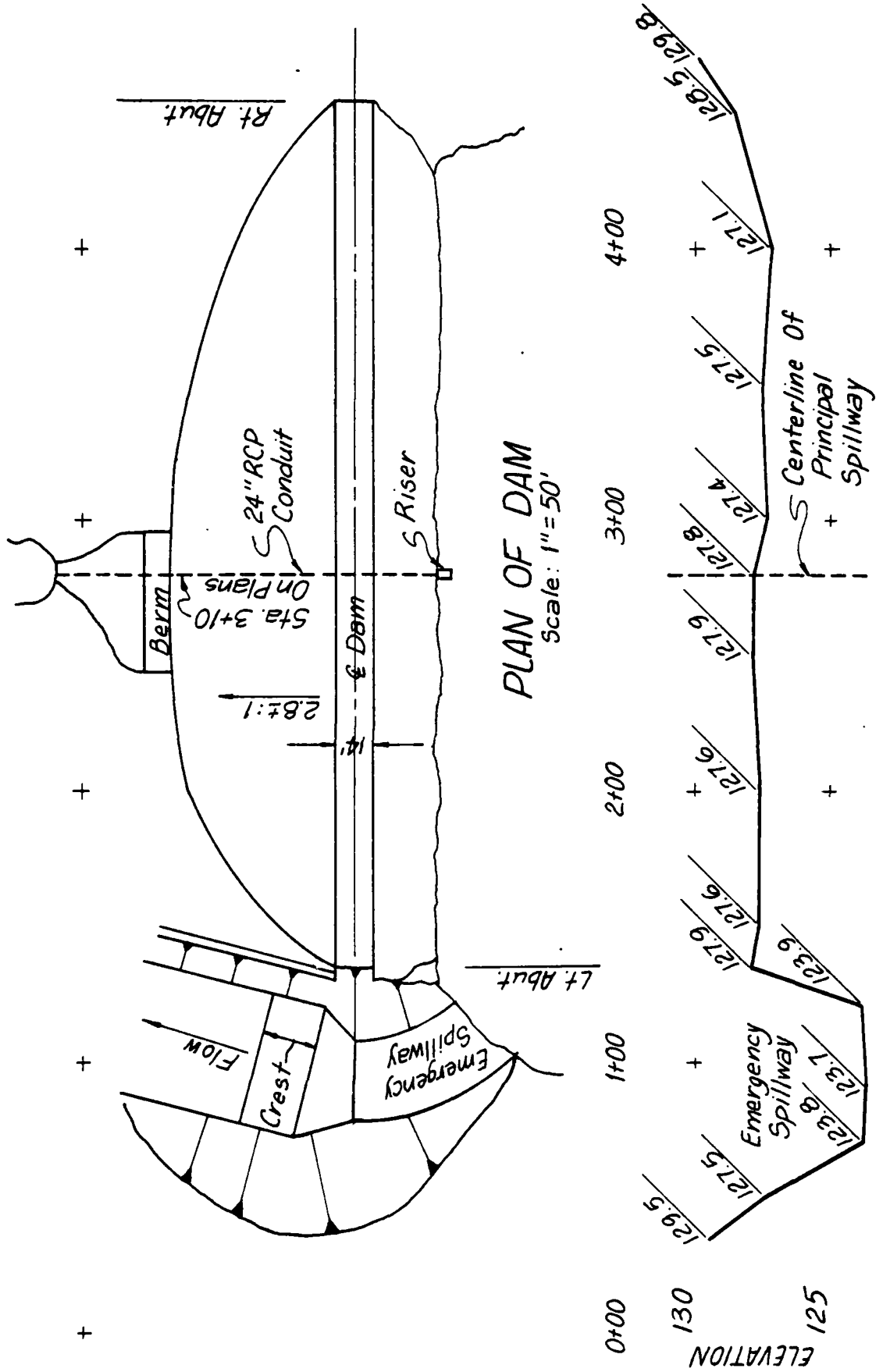
U. S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service

Method of Shear Test

Direct Shear Test

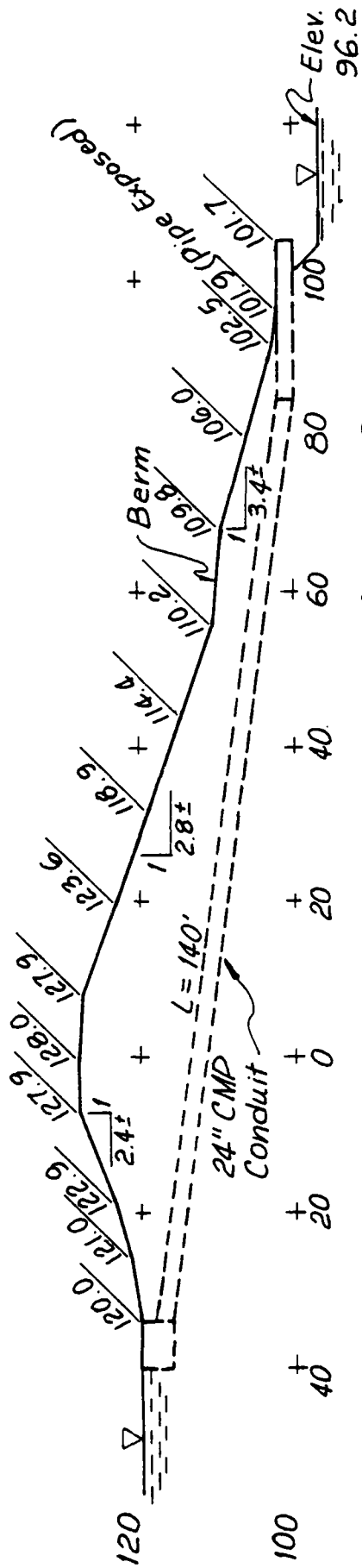
| Site No. | Laboratory Sample Number | Moisture Content | | | | Liquid Limit | | | | Plasticity Index | | | | Shear Test | | | | Soil Data | | | | Height of Embankment | | Slope Data | | | |
|----------|--------------------------|------------------|----------------|----------------|----------------|--------------|----|----|----------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------------|----------------|----------------|-----|-----|-----|
| | | W ₁ | W ₂ | W ₃ | W ₄ | LL | PL | PI | U ₁ | U ₂ | U ₃ | U ₄ | τ ₁ | τ ₂ | τ ₃ | τ ₄ | σ ₁ | σ ₂ | σ ₃ | σ ₄ | h ₁ | h ₂ | s ₁ | s ₂ | | | |
| 20 | 211/130 | 32 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' |
| 21 | 211/131 | 32 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 22 | 211/132 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 23 | 211/133 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 24 | 211/134 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 25 | 211/135 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 26 | 211/136 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 27 | 211/137 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 28 | 211/138 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 29 | 211/139 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |
| 30 | 211/140 | 31 | 31 | 31 | 31 | 25 | 12 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 23' | 23' | 23' | 23' | 23' | 23' | 23' |

APPENDIX D
HYDRAULIC AND HYDROLOGIC DATA

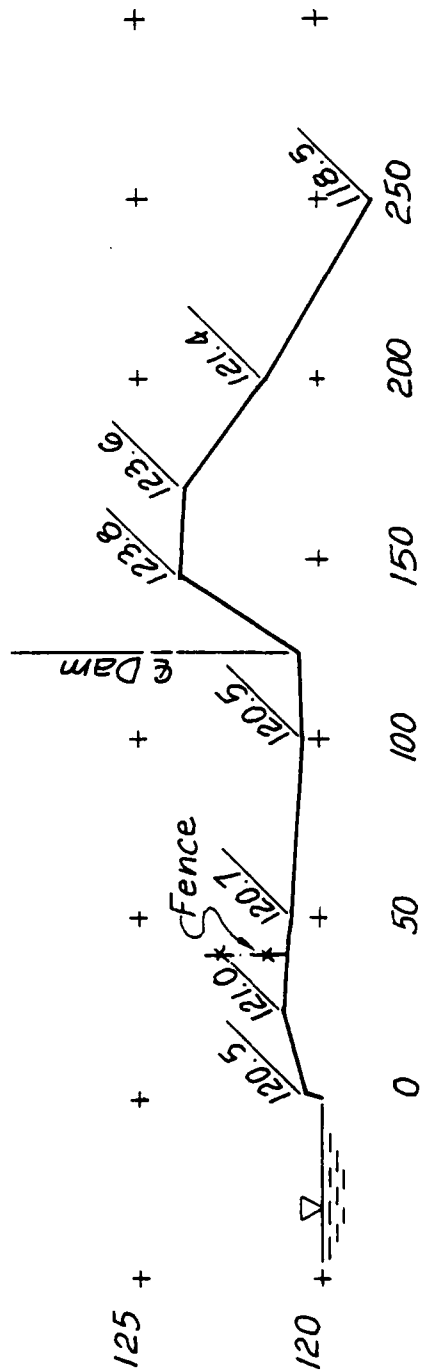


PLAN OF DAM
Scale: 1" = 50'

PROFILE ALONG CENTERLINE OF DAM
Scale: 1" = 50' H.
1" = 5' V.



MAXIMUM CROSS-SECTION OF DAM AT STA. 2+80
Scale: 1" = 20'



PROFILE ALONG CENTERLINE OF EMERGENCY SPILLWAY
Scale: 1" = 50' H.
1" = 5' V.

APPENDIX D
HYDRAULIC AND HYDROLOGIC DATA

HYDROLOGIC COMPUTATIONS

1. The SCS dimensionless unit hydrograph and the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Corps of Engineers, Davis, California, were used to develop the inflow hydrographs (See this Section).
 - a. Twenty-four hour, one percent probabilistic rainfall for the dam location was taken from the data for the rainfall station at Maryville, MO. as supplied by the St. Louis District, Corps of Engineers per their letter dated 4 March 1980. The twenty-four hour probable maximum precipitation was taken from the curves of Hydrometeorological Report No. 33 and current Corps of Engineers and St. Louis policy and guidance for hydraulics and hydrology. Precipitation was distributed according to EM 1110-2-1411 (Section 4a).
 - b. Drainage area = 0.175 square miles (112 acres).
 - c. Time of concentration of runoff = 13.5 minutes (taken from the SCS plans).
 - d. The antecedent storm conditions for the probable maximum precipitation were heavy rainfall and low temperatures which occurred on the previous 5 days (SCS AMC III). The antecedent storm conditions for the one percent probabilistic precipitation were an average of the conditions which have preceded the occurrence of the maximum annual flood on numerous watersheds (SCS AMC II). The initial pool elevation was assumed at the invert of the principal spillway.
 - e. The total twenty-four hour storm duration losses for the one percent probabilistic storm were 2.87 inches. The total losses for the PMF storm were 1.58 inches. These data are based on SCS runoff curve No. 75 and No. 88 for antecedent moisture conditions SCS AMC II and AMC III respectively. The watershed is composed of primarily SCS soil groups B and D (Sharpsburg, Adair, and Lagonda silty clay loam respectively) and consist of approximately 50% row crops on contour and 50% small grain.
 - f. Average soil loss rates = 0.05 inch per hour approximately (For PMF storm, AMC III).
2. The combined discharge rating consisted of three components: the flow through the principal spillway, the flow through the emergency spillway and the flow going over the top of the dam.
 - a. The principal spillway rating was developed by the SCS by using the weir and full conduit flow equations.

- (1) Weir Flow equation ($Q=CLH^{1.5}$)
where C = weir coefficient = 3.4 (from SCS Engr. Memo 50)
L = effective weir length, ft. = 15.0
H = total head, ft.

- (2) Full conduit flow equation

$$Q = a \sqrt{\frac{2gH}{1 + K_r + K_p L}}$$

where a = cross-sectional area of pipe, $\text{ft}^2 = 3.14$

H = total head, ft.

K_r = coefficient for riser = 0.65 (SCS plans)

K_p = coefficient for pipe friction loss = 0.0124
(ES-42, SCS NEH, Section 5)

L = length of pipe, ft. = 130 (SCS plans)

- b. The emergency spillway rating curve was developed by the SCS using ES-124 (see plans)
- c. The flows over the dam were determined by using the dam overtopping analyses (irregular top of dam) within the HEC-1 (Dam Safety Version) program.
3. Floods were routed through the reservoir using the HEC-1 (Dam Safety Version) program to determine the capabilities of the spillway and dam embankment crest. The input, output and plotted hydrographs are attached in this Section.

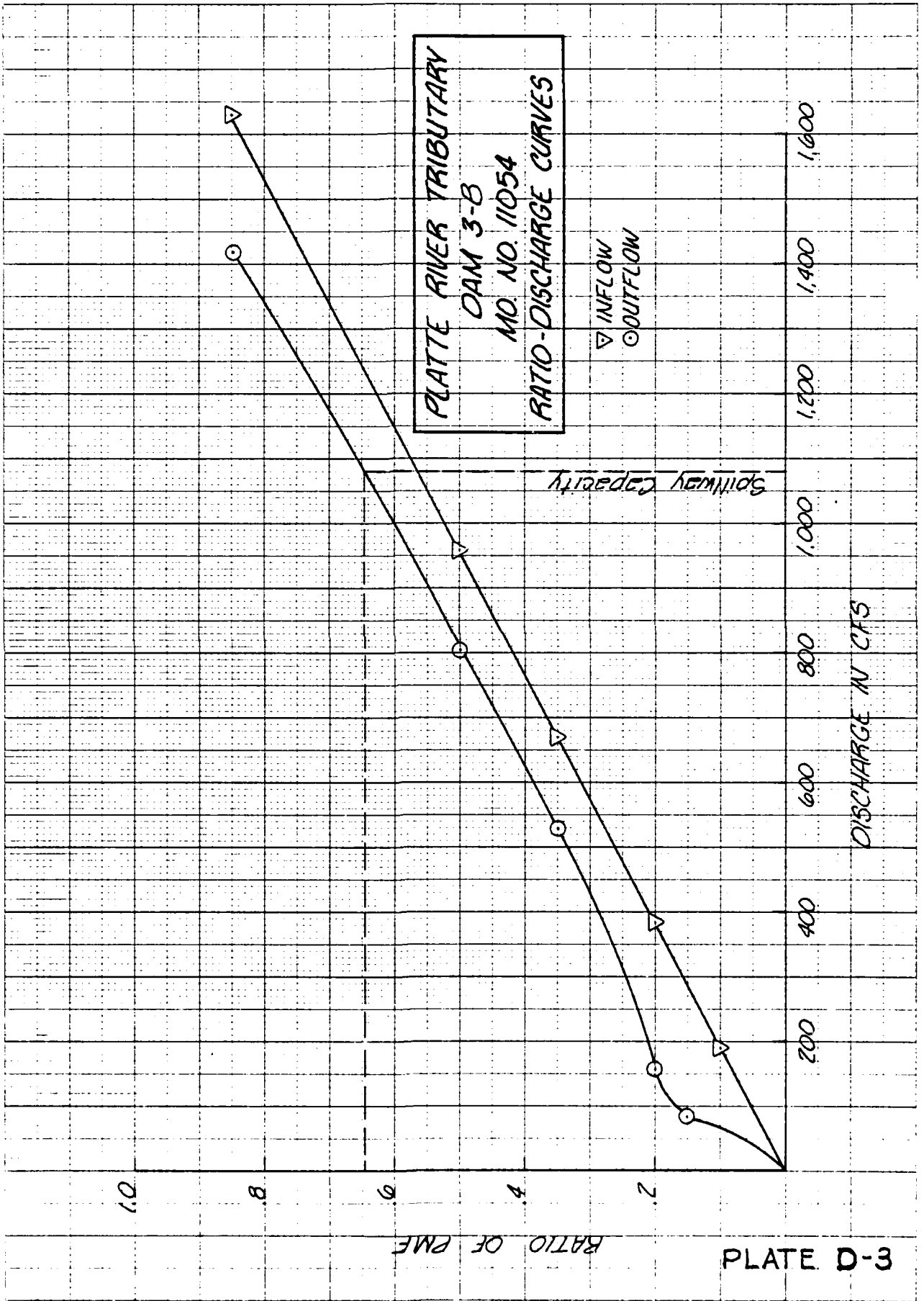


PLATE D-3

 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 26 FEB 79

RUN DATE# 00/06/74.
 TIME# 19.13.40.

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
 H & H ANALYSIS OF SAFETY OF PLATTE RIV TRIB DAM 3-B MD NJ 11054
 RATIOS OF PMF ROUTED THRU THE RESERVOIR

| NO | NHR | NFIN | IDAY | IFR | IMIN | HEIRC | IFLT | IFRT | NSTAN |
|-----|-----|------|-------|-----|-------|-------|------|------|-------|
| 288 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| | | | ROPER | NWT | LROFT | TRACE | | | |
| | | | 5 | 0 | 0 | 0 | | | |

MULTI-PLAN ANALYSES TO BE PERFORMED
 NPLAN= 1 NRATIO= 8 LRTIO= 1
 RTIOS= .05 .10 .15 .20 .25 .35 .50 .65 1.00

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDRO TO RESERVOIR 3-B

| IHYD | IUNG | TAREA | SNAP | TRSDA | TRSPC | RATIO | IENDM | ISAME | LOCAL |
|------|------|-------|------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | .18 | 0.00 | .18 | 1.00 | 0.000 | 0 | 1 | 0 |
| | | | | | | | | | |
| | | | | | | | | | |

PRECIP DATA

| SPFE | FMS | R6 | R12 | R24 | R48 | R72 | R96 |
|------|-------|--------|--------|--------|------|------|------|
| 0.00 | 23.70 | 102.00 | 121.00 | 130.00 | 0.00 | 0.00 | 0.00 |

LOSS DATA

| LROPT | STRPR | ULINR | RTIOL | ERAIN | STRKS | RTIOK | STRTL | CNSTL | ALSMX | RTIMP |
|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| 0 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | -1.00 | -88.00 | 0.00 | 0.00 |

CURVE NO) = -88.00 WETNESS = -1.00 EFFECT CN = 88.00

UNIT HYDROGRAPH DATA

IC= 0.00 LAG= .17

RECESSION DATA

STRIO= 0.00 GRFSN= -.01 RTIOR= 1.00

UNIT HYDROGRAPH 12 END OF PERIOD ORDINATES, IC= 0.00 HOURS, IAG= .17 VOL= 1.00
 1. 367. 237. 119. 64. 34. 18. 9.
 3. 1. 5.

END-OF-PERIOD FLOW

| NO. DA | HR. MIN | PERIOD | RAIN | EXCS | LOSS | COMP U | NO. DA | HR. MIN | PERIOD | RAIN | EXCS | LOSS | COMP O |
|--------|---------|--------|------|------|------|--------|--------|---------|--------|------|------|------|--------|
| 1.01 | 1.05 | 1 | .01 | 0.00 | .01 | 0. | 1.01 | 12.05 | 145 | .20 | .19 | .01 | 97. |
| 1.01 | 1.10 | 2 | .01 | 0.00 | .01 | 0. | 1.01 | 12.10 | 146 | .20 | .19 | .01 | 146. |
| 1.01 | 1.15 | 3 | .01 | 0.00 | .01 | 0. | 1.01 | 12.15 | 147 | .20 | .19 | .01 | 196. |
| 1.01 | 1.20 | 4 | .01 | 0.00 | .01 | 0. | 1.01 | 12.20 | 148 | .20 | .19 | .01 | 228. |
| 1.01 | 1.25 | 5 | .01 | 0.00 | .01 | 0. | 1.01 | 12.25 | 149 | .20 | .19 | .01 | 245. |
| 1.01 | 1.30 | 6 | .01 | 0.00 | .01 | 0. | 1.01 | 12.30 | 150 | .20 | .19 | .01 | 254. |
| 1.01 | 1.35 | 7 | .01 | 0.00 | .01 | 0. | 1.01 | 12.35 | 151 | .20 | .20 | .01 | 259. |
| 1.01 | 1.40 | 8 | .01 | 0.00 | .01 | 0. | 1.01 | 12.40 | 152 | .20 | .20 | .01 | 261. |
| 1.01 | 1.45 | 9 | .01 | 0.00 | .01 | 0. | 1.01 | 12.45 | 153 | .20 | .20 | .01 | 263. |
| 1.01 | 1.50 | 10 | .01 | 0.00 | .01 | 0. | 1.01 | 12.50 | 154 | .20 | .20 | .01 | 264. |
| 1.01 | 1.55 | 11 | .01 | 0.00 | .01 | 0. | 1.01 | 12.55 | 155 | .20 | .20 | .01 | 265. |
| 1.01 | 1.00 | 12 | .01 | 0.00 | .01 | 0. | 1.01 | 13.00 | 156 | .20 | .20 | .00 | 265. |
| 1.01 | 1.05 | 13 | .01 | 0.00 | .01 | 0. | 1.01 | 13.05 | 157 | .24 | .24 | .01 | 271. |
| 1.01 | 1.10 | 14 | .01 | 0.00 | .01 | 0. | 1.01 | 13.10 | 158 | .24 | .24 | .01 | 285. |
| 1.01 | 1.15 | 15 | .01 | 0.00 | .01 | 0. | 1.01 | 13.15 | 159 | .24 | .24 | .01 | 301. |
| 1.01 | 1.20 | 16 | .01 | 0.00 | .01 | 0. | 1.01 | 13.20 | 160 | .24 | .24 | .00 | 310. |
| 1.01 | 1.25 | 17 | .01 | 0.00 | .01 | 0. | 1.01 | 13.25 | 161 | .24 | .24 | .00 | 315. |
| 1.01 | 1.30 | 18 | .01 | 0.00 | .01 | 0. | 1.01 | 13.30 | 162 | .24 | .24 | .00 | 318. |
| 1.01 | 1.35 | 19 | .01 | 0.00 | .01 | 0. | 1.01 | 13.35 | 163 | .24 | .24 | .00 | 320. |
| 1.01 | 1.40 | 20 | .01 | 0.00 | .01 | 0. | 1.01 | 13.40 | 164 | .24 | .24 | .00 | 321. |
| 1.01 | 1.45 | 21 | .01 | 0.00 | .01 | 0. | 1.01 | 13.45 | 165 | .24 | .24 | .00 | 321. |
| 1.01 | 1.50 | 22 | .01 | 0.00 | .01 | 0. | 1.01 | 13.50 | 166 | .24 | .24 | .00 | 322. |
| 1.01 | 1.55 | 23 | .01 | 0.00 | .01 | 0. | 1.01 | 13.55 | 167 | .24 | .24 | .00 | 322. |
| 1.01 | 2.00 | 24 | .01 | 0.00 | .01 | 0. | 1.01 | 14.00 | 168 | .24 | .24 | .00 | 322. |
| 1.01 | 2.05 | 25 | .01 | 0.00 | .01 | 0. | 1.01 | 14.05 | 169 | .30 | .30 | .00 | 330. |
| 1.01 | 2.10 | 26 | .01 | 0.00 | .01 | 0. | 1.01 | 14.10 | 170 | .30 | .30 | .00 | 352. |
| 1.01 | 2.15 | 27 | .01 | 0.00 | .01 | 0. | 1.01 | 14.15 | 171 | .30 | .30 | .00 | 375. |
| 1.01 | 2.20 | 28 | .01 | 0.00 | .01 | 1. | 1.01 | 14.20 | 172 | .30 | .30 | .00 | 389. |
| 1.01 | 2.25 | 29 | .01 | 0.00 | .01 | 1. | 1.01 | 14.25 | 173 | .30 | .30 | .00 | 396. |
| 1.01 | 2.30 | 30 | .01 | 0.00 | .01 | 1. | 1.01 | 14.30 | 174 | .30 | .30 | .00 | 400. |
| 1.01 | 2.35 | 31 | .01 | 0.00 | .01 | 1. | 1.01 | 14.35 | 175 | .30 | .30 | .00 | 403. |
| 1.01 | 2.40 | 32 | .01 | 0.00 | .01 | 1. | 1.01 | 14.40 | 176 | .30 | .30 | .00 | 404. |
| 1.01 | 2.45 | 33 | .01 | 0.00 | .01 | 2. | 1.01 | 14.45 | 177 | .30 | .30 | .00 | 405. |
| 1.01 | 2.50 | 34 | .01 | 0.00 | .01 | 2. | 1.01 | 14.50 | 178 | .30 | .30 | .00 | 405. |
| 1.01 | 2.55 | 35 | .01 | 0.00 | .01 | 2. | 1.01 | 14.55 | 179 | .30 | .30 | .00 | 405. |
| 1.01 | 3.00 | 36 | .01 | 0.00 | .01 | 2. | 1.01 | 15.00 | 180 | .30 | .30 | .00 | 406. |
| 1.01 | 3.05 | 37 | .01 | 0.00 | .01 | 3. | 1.01 | 15.05 | 181 | .18 | .18 | .00 | 392. |
| 1.01 | 3.10 | 38 | .01 | 0.00 | .01 | 3. | 1.01 | 15.10 | 182 | .37 | .36 | .00 | 371. |
| 1.01 | 3.15 | 39 | .01 | 0.00 | .01 | 3. | 1.01 | 15.15 | 183 | .37 | .36 | .00 | 393. |
| 1.01 | 3.20 | 40 | .01 | 0.00 | .01 | 3. | 1.01 | 15.20 | 184 | .55 | .55 | .00 | 457. |
| 1.01 | 3.25 | 41 | .01 | 0.00 | .01 | 4. | 1.01 | 15.25 | 185 | .64 | .64 | .00 | 564. |
| 1.01 | 3.30 | 42 | .01 | 0.00 | .01 | 4. | 1.01 | 15.30 | 186 | 1.56 | 1.55 | .01 | 792. |
| 1.01 | 3.35 | 43 | .01 | 0.00 | .01 | 4. | 1.01 | 15.35 | 187 | 2.57 | 2.56 | .01 | 1335. |
| 1.01 | 3.40 | 44 | .01 | 0.00 | .01 | 4. | 1.01 | 15.40 | 188 | 1.01 | 1.01 | .00 | 1910. |
| 1.01 | 3.45 | 45 | .01 | 0.00 | .01 | 4. | 1.01 | 15.45 | 189 | .64 | .64 | .00 | 1916. |
| 1.01 | 3.50 | 46 | .01 | 0.00 | .01 | 4. | 1.01 | 15.50 | 190 | .55 | .55 | .00 | 1543. |
| 1.01 | 3.55 | 47 | .01 | 0.00 | .01 | 5. | 1.01 | 15.55 | 191 | .37 | .37 | .00 | 1166. |
| 1.01 | 4.00 | 48 | .01 | 0.00 | .01 | 5. | 1.01 | 16.00 | 192 | .37 | .37 | .00 | 892. |
| 1.01 | 4.05 | 49 | .01 | 0.00 | .01 | 5. | 1.01 | 16.05 | 193 | .28 | .28 | .00 | 700. |
| 1.01 | 4.10 | 50 | .01 | 0.00 | .01 | 5. | 1.01 | 16.10 | 194 | .28 | .28 | .00 | 567. |
| 1.01 | 4.15 | 51 | .01 | 0.00 | .01 | 5. | 1.01 | 16.15 | 195 | .28 | .28 | .00 | 482. |
| 1.01 | 4.20 | 52 | .01 | 0.00 | .01 | 5. | 1.01 | 16.20 | 196 | .28 | .28 | .00 | 434. |
| 1.01 | 4.25 | 53 | .01 | 0.00 | .01 | 6. | 1.01 | 16.25 | 197 | .28 | .28 | .00 | 409. |
| 1.01 | 4.30 | 54 | .01 | 0.00 | .01 | 6. | 1.01 | 16.30 | 198 | .28 | .28 | .00 | 394. |
| 1.01 | 4.35 | 55 | .01 | 0.00 | .01 | 6. | 1.01 | 16.35 | 199 | .28 | .28 | .00 | 386. |
| 1.01 | 4.40 | 56 | .01 | 0.00 | .01 | 6. | 1.01 | 16.40 | 200 | .28 | .28 | .00 | 383. |
| 1.01 | 4.45 | 57 | .01 | 0.00 | .01 | 6. | 1.01 | 16.45 | 201 | .28 | .28 | .00 | 382. |
| 1.01 | 4.50 | 58 | .01 | 0.00 | .01 | 6. | 1.01 | 16.50 | 202 | .28 | .28 | .00 | 381. |
| 1.01 | 4.55 | 59 | .01 | 0.00 | .01 | 6. | 1.01 | 16.55 | 203 | .28 | .28 | .00 | 381. |
| 1.01 | 5.00 | 60 | .01 | .01 | .01 | 7. | 1.01 | 17.00 | 204 | .28 | .28 | .00 | 381. |

| | | | | | | | | | | | | | |
|------|-------|-----|-----|-----|-----|-----|------|-------|-----|-----|-----|-----|------|
| 1.01 | 5.05 | 61 | .01 | .01 | .01 | 7. | 1.01 | 17.05 | 205 | .22 | .22 | .00 | 374. |
| 1.01 | 5.10 | 62 | .01 | .01 | .01 | 7. | 1.01 | 17.10 | 206 | .22 | .22 | .00 | 352. |
| 1.01 | 5.15 | 63 | .01 | .01 | .01 | 7. | 1.01 | 17.15 | 207 | .22 | .22 | .00 | 329. |
| 1.01 | 5.20 | 64 | .01 | .01 | .01 | 7. | 1.01 | 17.20 | 208 | .22 | .22 | .00 | 315. |
| 1.01 | 5.25 | 65 | .01 | .01 | .01 | 7. | 1.01 | 17.25 | 209 | .22 | .22 | .00 | 307. |
| 1.01 | 5.30 | 66 | .01 | .01 | .01 | 7. | 1.01 | 17.30 | 210 | .22 | .22 | .00 | 304. |
| 1.01 | 5.35 | 67 | .01 | .01 | .01 | 7. | 1.01 | 17.35 | 211 | .22 | .22 | .00 | 302. |
| 1.01 | 5.40 | 68 | .01 | .01 | .01 | 7. | 1.01 | 17.40 | 212 | .22 | .22 | .00 | 301. |
| 1.01 | 5.45 | 69 | .01 | .01 | .01 | 8. | 1.01 | 17.45 | 213 | .22 | .22 | .00 | 300. |
| 1.01 | 5.50 | 70 | .01 | .01 | .01 | 8. | 1.01 | 17.50 | 214 | .22 | .22 | .00 | 300. |
| 1.01 | 5.55 | 71 | .01 | .01 | .01 | 8. | 1.01 | 17.55 | 215 | .22 | .22 | .00 | 300. |
| 1.01 | 6.00 | 72 | .01 | .01 | .01 | 8. | 1.01 | 18.00 | 216 | .22 | .22 | .00 | 300. |
| 1.01 | 6.05 | 73 | .06 | .03 | .03 | 11. | 1.01 | 18.05 | 217 | .02 | .02 | .00 | 275. |
| 1.01 | 6.10 | 74 | .06 | .03 | .03 | 21. | 1.01 | 18.10 | 218 | .02 | .02 | .00 | 200. |
| 1.01 | 6.15 | 75 | .06 | .04 | .04 | 32. | 1.01 | 18.15 | 219 | .02 | .02 | .00 | 123. |
| 1.01 | 6.20 | 76 | .06 | .04 | .04 | 40. | 1.01 | 18.20 | 220 | .02 | .02 | .00 | 75. |
| 1.01 | 6.25 | 77 | .06 | .04 | .04 | 45. | 1.01 | 18.25 | 221 | .02 | .02 | .00 | 51. |
| 1.01 | 6.30 | 78 | .06 | .04 | .04 | 49. | 1.01 | 18.30 | 222 | .02 | .02 | .00 | 38. |
| 1.01 | 6.35 | 79 | .06 | .04 | .04 | 51. | 1.01 | 18.35 | 223 | .02 | .02 | .00 | 31. |
| 1.01 | 6.40 | 80 | .06 | .04 | .04 | 53. | 1.01 | 18.40 | 224 | .02 | .02 | .00 | 28. |
| 1.01 | 6.45 | 81 | .06 | .04 | .04 | 55. | 1.01 | 18.45 | 225 | .02 | .02 | .00 | 26. |
| 1.01 | 6.50 | 82 | .06 | .04 | .04 | 57. | 1.01 | 18.50 | 226 | .02 | .02 | .00 | 25. |
| 1.01 | 6.55 | 83 | .06 | .05 | .05 | 58. | 1.01 | 18.55 | 227 | .02 | .02 | .00 | 24. |
| 1.01 | 7.00 | 84 | .06 | .05 | .05 | 60. | 1.01 | 19.00 | 228 | .02 | .02 | .00 | 24. |
| 1.01 | 7.05 | 85 | .06 | .05 | .05 | 61. | 1.01 | 19.05 | 229 | .02 | .02 | .00 | 24. |
| 1.01 | 7.10 | 86 | .06 | .05 | .05 | 62. | 1.01 | 19.10 | 230 | .02 | .02 | .00 | 24. |
| 1.01 | 7.15 | 87 | .06 | .05 | .05 | 63. | 1.01 | 19.15 | 231 | .02 | .02 | .00 | 24. |
| 1.01 | 7.20 | 88 | .06 | .05 | .05 | 64. | 1.01 | 19.20 | 232 | .02 | .02 | .00 | 24. |
| 1.01 | 7.25 | 89 | .06 | .05 | .05 | 65. | 1.01 | 19.25 | 233 | .02 | .02 | .00 | 24. |
| 1.01 | 7.30 | 90 | .06 | .05 | .05 | 66. | 1.01 | 19.30 | 234 | .02 | .02 | .00 | 24. |
| 1.01 | 7.35 | 91 | .06 | .05 | .05 | 67. | 1.01 | 19.35 | 235 | .02 | .02 | .00 | 24. |
| 1.01 | 7.40 | 92 | .06 | .05 | .05 | 67. | 1.01 | 19.40 | 236 | .02 | .02 | .00 | 24. |
| 1.01 | 7.45 | 93 | .06 | .05 | .05 | 68. | 1.01 | 19.45 | 237 | .02 | .02 | .00 | 24. |
| 1.01 | 7.50 | 94 | .06 | .05 | .05 | 69. | 1.01 | 19.50 | 238 | .02 | .02 | .00 | 24. |
| 1.01 | 7.55 | 95 | .06 | .05 | .05 | 69. | 1.01 | 19.55 | 239 | .02 | .02 | .00 | 24. |
| 1.01 | 8.00 | 96 | .06 | .05 | .05 | 70. | 1.01 | 20.00 | 240 | .02 | .02 | .00 | 24. |
| 1.01 | 8.05 | 97 | .06 | .05 | .05 | 70. | 1.01 | 20.05 | 241 | .02 | .02 | .00 | 24. |
| 1.01 | 8.10 | 98 | .06 | .05 | .05 | 71. | 1.01 | 20.10 | 242 | .02 | .02 | .00 | 24. |
| 1.01 | 8.15 | 99 | .06 | .05 | .05 | 71. | 1.01 | 20.15 | 243 | .02 | .02 | .00 | 24. |
| 1.01 | 8.20 | 100 | .06 | .05 | .05 | 72. | 1.01 | 20.20 | 244 | .02 | .02 | .00 | 24. |
| 1.01 | 8.25 | 101 | .06 | .05 | .05 | 72. | 1.01 | 20.25 | 245 | .02 | .02 | .00 | 24. |
| 1.01 | 8.30 | 102 | .06 | .05 | .05 | 73. | 1.01 | 20.30 | 246 | .02 | .02 | .00 | 24. |
| 1.01 | 8.35 | 103 | .06 | .05 | .05 | 73. | 1.01 | 20.35 | 247 | .02 | .02 | .00 | 24. |
| 1.01 | 8.40 | 104 | .06 | .05 | .05 | 74. | 1.01 | 20.40 | 248 | .02 | .02 | .00 | 24. |
| 1.01 | 8.45 | 105 | .06 | .06 | .06 | 74. | 1.01 | 20.45 | 249 | .02 | .02 | .00 | 24. |
| 1.01 | 8.50 | 106 | .06 | .06 | .06 | 74. | 1.01 | 20.50 | 250 | .02 | .02 | .00 | 24. |
| 1.01 | 8.55 | 107 | .06 | .06 | .06 | 75. | 1.01 | 20.55 | 251 | .02 | .02 | .00 | 24. |
| 1.01 | 9.00 | 108 | .06 | .06 | .06 | 75. | 1.01 | 21.00 | 252 | .02 | .02 | .00 | 24. |
| 1.01 | 9.05 | 109 | .06 | .06 | .06 | 75. | 1.01 | 21.05 | 253 | .02 | .02 | .00 | 24. |
| 1.01 | 9.10 | 110 | .06 | .06 | .06 | 76. | 1.01 | 21.10 | 254 | .02 | .02 | .00 | 24. |
| 1.01 | 9.15 | 111 | .06 | .06 | .06 | 76. | 1.01 | 21.15 | 255 | .02 | .02 | .00 | 24. |
| 1.01 | 9.20 | 112 | .06 | .06 | .06 | 76. | 1.01 | 21.20 | 256 | .02 | .02 | .00 | 24. |
| 1.01 | 9.25 | 113 | .06 | .06 | .06 | 76. | 1.01 | 21.25 | 257 | .02 | .02 | .00 | 24. |
| 1.01 | 9.30 | 114 | .06 | .06 | .06 | 77. | 1.01 | 21.30 | 258 | .02 | .02 | .00 | 24. |
| 1.01 | 9.35 | 115 | .06 | .06 | .06 | 77. | 1.01 | 21.35 | 259 | .02 | .02 | .00 | 24. |
| 1.01 | 9.40 | 116 | .06 | .06 | .06 | 77. | 1.01 | 21.40 | 260 | .02 | .02 | .00 | 24. |
| 1.01 | 9.45 | 117 | .06 | .06 | .06 | 77. | 1.01 | 21.45 | 261 | .02 | .02 | .00 | 24. |
| 1.01 | 9.50 | 118 | .06 | .06 | .06 | 77. | 1.01 | 21.50 | 262 | .02 | .02 | .00 | 24. |
| 1.01 | 9.55 | 119 | .06 | .06 | .06 | 78. | 1.01 | 21.55 | 263 | .02 | .02 | .00 | 24. |
| 1.01 | 10.00 | 120 | .06 | .06 | .06 | 78. | 1.01 | 22.00 | 264 | .02 | .02 | .00 | 24. |
| 1.01 | 10.05 | 121 | .06 | .06 | .06 | 78. | 1.01 | 22.05 | 265 | .02 | .02 | .00 | 24. |
| 1.01 | 10.10 | 122 | .06 | .06 | .06 | 78. | 1.01 | 22.10 | 266 | .02 | .02 | .00 | 24. |

| | 1.01 | 10.15 | 123 | .06 | .00 | 73. | 1.01 | 22.15 | 267 | .02 | .00 | 24. |
|--|------|-------|-----|-----|-----|-----|------|-------|-----|-----|-----|-----|
| | 1.01 | 10.20 | 124 | .06 | .00 | 78. | 1.01 | 22.20 | 268 | .02 | .00 | 24. |
| | 1.01 | 10.25 | 125 | .06 | .00 | 79. | 1.01 | 22.25 | 269 | .02 | .00 | 24. |
| | 1.01 | 10.30 | 126 | .06 | .00 | 79. | 1.01 | 22.30 | 270 | .02 | .00 | 24. |
| | 1.01 | 10.35 | 127 | .06 | .00 | 79. | 1.01 | 22.35 | 271 | .02 | .00 | 24. |
| | 1.01 | 10.40 | 128 | .06 | .00 | 79. | 1.01 | 22.40 | 272 | .02 | .00 | 24. |
| | 1.01 | 10.45 | 129 | .06 | .00 | 79. | 1.01 | 22.45 | 273 | .02 | .00 | 24. |
| | 1.01 | 10.50 | 130 | .06 | .00 | 79. | 1.01 | 22.50 | 274 | .02 | .00 | 24. |
| | 1.01 | 10.55 | 131 | .06 | .00 | 79. | 1.01 | 22.55 | 275 | .02 | .00 | 24. |
| | 1.01 | 11.00 | 132 | .06 | .00 | 80. | 1.01 | 23.00 | 276 | .02 | .00 | 24. |
| | 1.01 | 11.05 | 133 | .06 | .00 | 80. | 1.01 | 23.05 | 277 | .02 | .00 | 24. |
| | 1.01 | 11.10 | 134 | .06 | .00 | 80. | 1.01 | 23.10 | 278 | .02 | .00 | 24. |
| | 1.01 | 11.15 | 135 | .06 | .00 | 80. | 1.01 | 23.15 | 279 | .02 | .00 | 24. |
| | 1.01 | 11.20 | 136 | .06 | .00 | 80. | 1.01 | 23.20 | 280 | .02 | .00 | 24. |
| | 1.01 | 11.25 | 137 | .06 | .00 | 80. | 1.01 | 23.25 | 281 | .02 | .00 | 24. |
| | 1.01 | 11.30 | 138 | .06 | .00 | 80. | 1.01 | 23.30 | 282 | .02 | .00 | 24. |
| | 1.01 | 11.35 | 139 | .06 | .00 | 80. | 1.01 | 23.35 | 283 | .02 | .00 | 24. |
| | 1.01 | 11.40 | 140 | .06 | .00 | 80. | 1.01 | 23.40 | 284 | .02 | .00 | 24. |
| | 1.01 | 11.45 | 141 | .06 | .00 | 80. | 1.01 | 23.45 | 285 | .02 | .00 | 24. |
| | 1.01 | 11.50 | 142 | .06 | .00 | 81. | 1.01 | 23.50 | 286 | .02 | .00 | 24. |
| | 1.01 | 11.55 | 143 | .06 | .00 | 81. | 1.01 | 23.55 | 287 | .02 | .00 | 24. |
| | 1.01 | 12.00 | 144 | .06 | .00 | 81. | 1.02 | 0.00 | 288 | .02 | .00 | 24. |

SUM 30.81 29.23 1.58 39538.
(783.)(742.)(40.)(1119.59)

| | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|------------|-------|--------|---------|---------|-------|--------|
| CFS | 1916. | 446. | 137. | 137. | | 39527. |
| CMS | 54. | 13. | 4. | 4. | | 1119. |
| INCHES | | 23.73 | 29.18 | 29.18 | | 29.18 |
| MM | | 602.67 | 741.23 | 741.23 | | 741.23 |
| AC-FT | | 221. | 272. | 272. | | 272. |
| THOUS CU M | | 273. | 336. | 336. | | 336. |

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 1

| | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|------------|------|--------|---------|---------|-------|--------|
| CFS | 96. | 22. | 7. | 7. | | 1976. |
| CMS | 3. | 1. | 0. | 0. | | 56. |
| INCHES | | 1.19 | 1.46 | 1.46 | | 1.46 |
| MM | | 30.13 | 37.06 | 37.06 | | 37.06 |
| AC-FT | | 11. | 14. | 14. | | 14. |
| THOUS CU M | | 14. | 17. | 17. | | 17. |

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 2

| | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|------------|------|--------|---------|---------|-------|--------|
| CFS | 192. | 45. | 14. | 14. | | 3953. |
| CMS | 5. | 1. | 0. | 0. | | 112. |
| INCHES | | 2.37 | 2.92 | 2.92 | | 2.92 |
| MM | | 60.27 | 74.12 | 74.12 | | 74.12 |
| AC-FT | | 22. | 27. | 27. | | 27. |
| THOUS CU M | | 27. | 34. | 34. | | 34. |

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 3

| | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|--------|---------|---------|--------------|
| PEAK | 207. | 21. | 21. | 5929. |
| CFS | 67. | 1. | 1. | 168. |
| CMS | 2. | 1. | 1. | 4.38 |
| INCHES | 3.56 | 4.38 | 4.38 | 111.18 |
| MM | 90.40 | 111.18 | 111.18 | 41. |
| AC-FT | 33. | 41. | 41. | 50. |
| THOUS CU M | 41. | 50. | 50. | |

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 4

| | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|--------|---------|---------|--------------|
| PEAK | 89. | 27. | 27. | 7905. |
| CFS | 11. | 1. | 1. | 224. |
| CMS | 3. | 1. | 1. | 5.84 |
| INCHES | 4.75 | 5.84 | 5.84 | 148.25 |
| MM | 120.53 | 148.25 | 148.25 | 54. |
| AC-FT | 44. | 54. | 54. | 67. |
| THOUS CU M | 55. | 67. | 67. | |

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 5

| | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|--------|---------|---------|--------------|
| PEAK | 670. | 48. | 48. | 13835. |
| CFS | 19. | 1. | 1. | 392. |
| CMS | 4. | 1. | 1. | 10.21 |
| INCHES | 8.30 | 10.21 | 10.21 | 259.43 |
| MM | 210.93 | 259.43 | 259.43 | 95. |
| AC-FT | 77. | 95. | 95. | 118. |
| THOUS CU M | 96. | 118. | 118. | |

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 6 1/2 PMF

| | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|--------|---------|---------|--------------|
| PEAK | 958. | 69. | 69. | 19764. |
| CFS | 27. | 2. | 2. | 560. |
| CMS | 6. | 2. | 2. | 14.59 |
| INCHES | 11.86 | 14.59 | 14.59 | 370.62 |
| MM | 301.33 | 370.62 | 370.62 | 136. |
| AC-FT | 111. | 136. | 136. | 168. |
| THOUS CU M | 137. | 168. | 168. | |

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 7

| | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------------|--------|---------|---------|--------------|
| PEAK | 1428. | 117. | 117. | 33598. |
| CFS | 46. | 11. | 3. | 951. |
| CMS | 11. | 3. | 3. | 24.80 |
| INCHES | 20.17 | 24.80 | 24.80 | 630.05 |
| MM | 512.27 | 630.05 | 630.05 | 231. |
| AC-FT | 188. | 231. | 231. | 285. |
| THOUS CU M | 232. | 285. | 285. | |

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 8 PMF

| | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|------|--------|---------|---------|--------------|
| PEAK | 1716. | 137. | 137. | 39527. |
| CFS | | | | |

54. 13. 4. 4. 1119.
 INCHES 23.73 29.18 29.18
 MM 602.67 741.23 741.23
 AC-FT 221. 272. 272.
 THOUS CU M 273. 336. 336.

HYDROGRAPH ROUTING

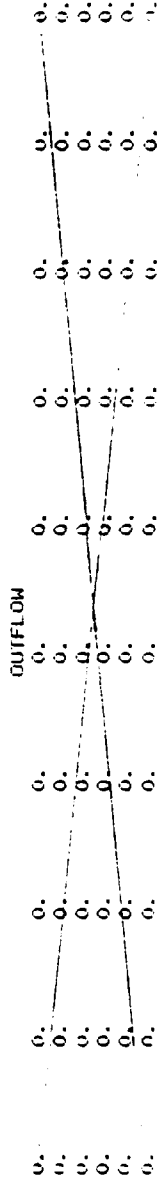
ROUTED FLOWS THRU RESERVOIR 3-B

| STAGE | 120.50 | 121.00 | 121.50 | 122.00 | 123.00 | 124.00 | 125.00 | 126.00 | 128.00 |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| FLOW | 18.00 | 51.00 | 65.00 | 66.00 | 67.00 | 105.00 | 274.00 | 598.00 | 1474.00 |
| SURFACE AREA= | 0. | 1. | 2. | 3. | 3. | 3. | 4. | 4. | |
| CAPACITY= | 0. | 5. | 6. | 6. | 23. | 26. | 33. | 37. | |
| ELEVATION= | 98. | 108. | 112. | 116. | 120. | 122. | 123. | 124. | 125. |
| | 126. | 128. | 130. | | | | | | |

| | DAM DATA | | ROUTING DATA | | IPMP | LSTR | ISPRAT |
|--------|----------|------|--------------|--------|-------|------|--------|
| | TOPEL | COGD | EXPW | ELEVEL | | | |
| CREL | 120.0 | 0.0 | 0.0 | 0.0 | 0.000 | 0 | -1 |
| SPWID | 0.0 | 0.0 | 0.0 | 0.0 | 0.000 | 0 | -120. |
| COGH | 0.0 | 0.0 | 0.0 | 0.0 | 0.000 | 0 | -120. |
| EXPW | 0.0 | 0.0 | 0.0 | 0.0 | 0.000 | 0 | -120. |
| ELEVEL | 0.0 | 0.0 | 0.0 | 0.0 | 0.000 | 0 | -120. |
| CAREA | 0.0 | 0.0 | 0.0 | 0.0 | 0.000 | 0 | -120. |
| EXPL | 0.0 | 0.0 | 0.0 | 0.0 | 0.000 | 0 | -120. |

| CREST LENGTH AT OR BELOW ELEVATION | 0. | 48. | 128. | 145. | 295. | 315. | 335. |
|------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| | 127.1 | 127.4 | 127.6 | 127.8 | 127.9 | 128.5 | 129.8 |

STATION-000002-PLAN-1-RATIO-1
 END-OF-PERIOD-HYDROGRAPH-ORIGINATES-



STATION 000002, PLAN 1, RATIO ϵ $\left[\frac{1}{2} P_{1-F} \right]$

END-OF-PERIOD HYDROGRAPH ORDINATES

| OUTFLOW | | STORAGE | |
|---------|------|---------|------|
| 0. | 0. | 20. | 20. |
| 0. | 0. | 20. | 20. |
| 0. | 0. | 20. | 20. |
| 0. | 0. | 20. | 20. |
| 1. | 1. | 20. | 20. |
| 2. | 2. | 20. | 20. |
| 3. | 3. | 20. | 20. |
| 4. | 6. | 20. | 20. |
| 15. | 19. | 20. | 21. |
| 29. | 31. | 20. | 22. |
| 35. | 36. | 20. | 22. |
| 37. | 37. | 20. | 22. |
| 39. | 39. | 20. | 22. |
| 40. | 40. | 20. | 22. |
| 40. | 44. | 20. | 23. |
| 66. | 66. | 20. | 23. |
| 89. | 98. | 20. | 27. |
| 170. | 188. | 20. | 32. |
| 200. | 246. | 20. | 35. |
| 440. | 306. | 20. | 36. |
| 205. | 194. | 20. | 37. |
| 158. | 153. | 20. | 38. |
| 89. | 74. | 20. | 39. |
| 66. | 66. | 20. | 40. |
| 54. | 46. | 20. | 40. |
| 21. | 19. | 20. | 41. |
| 15. | 15. | 20. | 41. |
| 13. | 13. | 20. | 42. |
| 13. | 12. | 20. | 43. |
| 20. | 20. | 20. | 43. |
| 20. | 20. | 20. | 44. |
| 20. | 20. | 20. | 45. |
| 20. | 20. | 20. | 45. |
| 20. | 20. | 20. | 46. |
| 20. | 20. | 20. | 46. |
| 20. | 20. | 20. | 47. |
| 20. | 20. | 20. | 47. |
| 20. | 20. | 20. | 48. |
| 20. | 20. | 20. | 48. |
| 20. | 20. | 20. | 49. |
| 20. | 20. | 20. | 49. |
| 20. | 20. | 20. | 50. |
| 20. | 20. | 20. | 50. |
| 20. | 20. | 20. | 51. |
| 20. | 20. | 20. | 51. |
| 20. | 20. | 20. | 52. |
| 20. | 20. | 20. | 52. |
| 20. | 20. | 20. | 53. |
| 20. | 20. | 20. | 53. |
| 20. | 20. | 20. | 54. |
| 20. | 20. | 20. | 54. |
| 20. | 20. | 20. | 55. |
| 20. | 20. | 20. | 55. |
| 20. | 20. | 20. | 56. |
| 20. | 20. | 20. | 56. |
| 20. | 20. | 20. | 57. |
| 20. | 20. | 20. | 57. |
| 20. | 20. | 20. | 58. |
| 20. | 20. | 20. | 58. |
| 20. | 20. | 20. | 59. |
| 20. | 20. | 20. | 59. |
| 20. | 20. | 20. | 60. |
| 20. | 20. | 20. | 60. |
| 20. | 20. | 20. | 61. |
| 20. | 20. | 20. | 61. |
| 20. | 20. | 20. | 62. |
| 20. | 20. | 20. | 62. |
| 20. | 20. | 20. | 63. |
| 20. | 20. | 20. | 63. |
| 20. | 20. | 20. | 64. |
| 20. | 20. | 20. | 64. |
| 20. | 20. | 20. | 65. |
| 20. | 20. | 20. | 65. |
| 20. | 20. | 20. | 66. |
| 20. | 20. | 20. | 66. |
| 20. | 20. | 20. | 67. |
| 20. | 20. | 20. | 67. |
| 20. | 20. | 20. | 68. |
| 20. | 20. | 20. | 68. |
| 20. | 20. | 20. | 69. |
| 20. | 20. | 20. | 69. |
| 20. | 20. | 20. | 70. |
| 20. | 20. | 20. | 70. |
| 20. | 20. | 20. | 71. |
| 20. | 20. | 20. | 71. |
| 20. | 20. | 20. | 72. |
| 20. | 20. | 20. | 72. |
| 20. | 20. | 20. | 73. |
| 20. | 20. | 20. | 73. |
| 20. | 20. | 20. | 74. |
| 20. | 20. | 20. | 74. |
| 20. | 20. | 20. | 75. |
| 20. | 20. | 20. | 75. |
| 20. | 20. | 20. | 76. |
| 20. | 20. | 20. | 76. |
| 20. | 20. | 20. | 77. |
| 20. | 20. | 20. | 77. |
| 20. | 20. | 20. | 78. |
| 20. | 20. | 20. | 78. |
| 20. | 20. | 20. | 79. |
| 20. | 20. | 20. | 79. |
| 20. | 20. | 20. | 80. |
| 20. | 20. | 20. | 80. |
| 20. | 20. | 20. | 81. |
| 20. | 20. | 20. | 81. |
| 20. | 20. | 20. | 82. |
| 20. | 20. | 20. | 82. |
| 20. | 20. | 20. | 83. |
| 20. | 20. | 20. | 83. |
| 20. | 20. | 20. | 84. |
| 20. | 20. | 20. | 84. |
| 20. | 20. | 20. | 85. |
| 20. | 20. | 20. | 85. |
| 20. | 20. | 20. | 86. |
| 20. | 20. | 20. | 86. |
| 20. | 20. | 20. | 87. |
| 20. | 20. | 20. | 87. |
| 20. | 20. | 20. | 88. |
| 20. | 20. | 20. | 88. |
| 20. | 20. | 20. | 89. |
| 20. | 20. | 20. | 89. |
| 20. | 20. | 20. | 90. |
| 20. | 20. | 20. | 90. |
| 20. | 20. | 20. | 91. |
| 20. | 20. | 20. | 91. |
| 20. | 20. | 20. | 92. |
| 20. | 20. | 20. | 92. |
| 20. | 20. | 20. | 93. |
| 20. | 20. | 20. | 93. |
| 20. | 20. | 20. | 94. |
| 20. | 20. | 20. | 94. |
| 20. | 20. | 20. | 95. |
| 20. | 20. | 20. | 95. |
| 20. | 20. | 20. | 96. |
| 20. | 20. | 20. | 96. |
| 20. | 20. | 20. | 97. |
| 20. | 20. | 20. | 97. |
| 20. | 20. | 20. | 98. |
| 20. | 20. | 20. | 98. |
| 20. | 20. | 20. | 99. |
| 20. | 20. | 20. | 99. |
| 20. | 20. | 20. | 100. |
| 20. | 20. | 20. | 100. |

#OVF*

STATION000002

| | 0. | 200. | 400. | 600. | 800. | 1000. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
|----------|----|------|------|------|------|-------|----|----|----|----|----|----|----|----|----|
| .05 11 | | | | | | | | | | | | | | | |
| .10 21 | | | | | | | | | | | | | | | |
| .15 31 | | | | | | | | | | | | | | | |
| .20 41 | | | | | | | | | | | | | | | |
| .25 51 | | | | | | | | | | | | | | | |
| .30 61 | | | | | | | | | | | | | | | |
| .35 71 | | | | | | | | | | | | | | | |
| .40 81 | | | | | | | | | | | | | | | |
| .45 91 | | | | | | | | | | | | | | | |
| .50 101 | | | | | | | | | | | | | | | |
| .55 111 | | | | | | | | | | | | | | | |
| 1.00 121 | | | | | | | | | | | | | | | |
| 1.05 131 | | | | | | | | | | | | | | | |
| 1.10 141 | | | | | | | | | | | | | | | |
| 1.15 151 | | | | | | | | | | | | | | | |
| 1.20 161 | | | | | | | | | | | | | | | |
| 1.25 171 | | | | | | | | | | | | | | | |
| 1.30 181 | | | | | | | | | | | | | | | |
| 1.35 191 | | | | | | | | | | | | | | | |
| 1.40 201 | | | | | | | | | | | | | | | |
| 1.45 211 | | | | | | | | | | | | | | | |
| 1.50 221 | | | | | | | | | | | | | | | |
| 1.55 231 | | | | | | | | | | | | | | | |
| 2.00 241 | | | | | | | | | | | | | | | |
| 2.05 251 | | | | | | | | | | | | | | | |
| 2.10 261 | | | | | | | | | | | | | | | |
| 2.15 271 | | | | | | | | | | | | | | | |
| 2.20 281 | | | | | | | | | | | | | | | |
| 2.25 291 | | | | | | | | | | | | | | | |
| 2.30 301 | | | | | | | | | | | | | | | |
| 2.35 311 | | | | | | | | | | | | | | | |
| 2.40 321 | | | | | | | | | | | | | | | |
| 2.45 331 | | | | | | | | | | | | | | | |
| 2.50 341 | | | | | | | | | | | | | | | |
| 2.55 351 | | | | | | | | | | | | | | | |
| 3.00 361 | | | | | | | | | | | | | | | |
| 3.05 371 | | | | | | | | | | | | | | | |
| 3.10 381 | | | | | | | | | | | | | | | |
| 3.15 391 | | | | | | | | | | | | | | | |
| 3.20 401 | | | | | | | | | | | | | | | |
| 3.25 411 | | | | | | | | | | | | | | | |
| 3.30 421 | | | | | | | | | | | | | | | |
| 3.35 431 | | | | | | | | | | | | | | | |
| 3.40 441 | | | | | | | | | | | | | | | |
| 3.45 451 | | | | | | | | | | | | | | | |
| 3.50 461 | | | | | | | | | | | | | | | |
| 3.55 471 | | | | | | | | | | | | | | | |
| 4.00 481 | | | | | | | | | | | | | | | |
| 4.05 491 | | | | | | | | | | | | | | | |
| 4.10 501 | | | | | | | | | | | | | | | |
| 4.15 511 | | | | | | | | | | | | | | | |
| 4.20 521 | | | | | | | | | | | | | | | |
| 4.25 531 | | | | | | | | | | | | | | | |
| 4.30 541 | | | | | | | | | | | | | | | |
| 4.35 551 | | | | | | | | | | | | | | | |
| 4.40 561 | | | | | | | | | | | | | | | |

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| 11.50142. | I |
| 11.55143. | I |
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| 12.15147. | 0 I |
| 12.20148. | 0 I |
| 12.25149. | 0 I |
| 12.30150. | 0 I |
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| 12.40152. | 0 I |
| 12.45153. | 0 I |
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| 13.10158. | 0 I |
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| 14.00168. | 0 I |
| 14.05169. | 0 I |
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| 14.20172. | 0 I |
| 14.25173. | 0 I |
| 14.30174. | 0 I |
| 14.35175. | 0 I |
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AD-A105 150

HOSKINS-WESTERN-SONDEREGGER INC LINCOLN NE F/6 13/13
NATIONAL DAM SAFETY PROGRAM. PLATTE RIVER TRIBUTARIES DAM 3-B (--ETC(U)
JUN 80 R S DECKER, G JAMISON, G ULMER DACW43-80-C-0071

UNCLASSIFIED

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8



NL

END
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81
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26. 26. 26. 25. 24. 24.
 24. 23. 23. 23. 22. 22.
 22. 22. 22. 22. 22. 22.
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| STAGE | 26. | 25. | 24. | 23. | 22. | 21. |
|-------|-------|-------|-------|-------|-------|-------|
| 120.0 | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 |
| 120.0 | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 |
| 120.0 | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 | 120.0 |
| 120.0 | 120.1 | 120.1 | 120.1 | 120.1 | 120.1 | 120.1 |
| 120.1 | 120.1 | 120.2 | 120.2 | 120.2 | 120.2 | 120.2 |
| 120.2 | 120.2 | 120.2 | 120.2 | 120.2 | 120.2 | 120.2 |
| 120.7 | 120.7 | 120.8 | 120.8 | 120.9 | 120.9 | 120.5 |
| 121.1 | 121.1 | 121.2 | 121.2 | 121.3 | 121.3 | 121.0 |
| 121.4 | 121.4 | 121.4 | 121.5 | 121.5 | 121.3 | 121.3 |
| 121.6 | 121.6 | 121.7 | 121.7 | 121.8 | 121.8 | 121.6 |
| 121.9 | 121.9 | 121.9 | 122.0 | 122.0 | 122.1 | 121.8 |
| 122.2 | 122.2 | 122.2 | 122.3 | 122.3 | 122.4 | 122.1 |
| 122.4 | 122.5 | 122.5 | 122.6 | 122.7 | 122.7 | 122.4 |
| 124.1 | 124.3 | 124.5 | 124.6 | 124.7 | 124.8 | 123.2 |
| 125.0 | 125.1 | 125.1 | 125.1 | 125.1 | 125.1 | 123.5 |
| 125.2 | 125.3 | 125.3 | 125.4 | 125.4 | 125.4 | 124.9 |
| 125.4 | 125.4 | 125.4 | 125.4 | 125.4 | 125.4 | 125.0 |
| 127.7 | 127.3 | 126.9 | 126.5 | 126.2 | 125.9 | 125.4 |
| 125.4 | 125.4 | 125.4 | 125.3 | 125.3 | 125.3 | 125.4 |
| 125.1 | 125.1 | 125.1 | 125.1 | 125.1 | 125.1 | 128.0 |
| 124.2 | 124.0 | 123.9 | 123.7 | 123.6 | 123.4 | 125.2 |
| 123.1 | 123.0 | 122.9 | 122.8 | 122.7 | 122.5 | 125.4 |
| 122.2 | 122.0 | 121.9 | 121.8 | 121.7 | 121.6 | 125.1 |
| 121.3 | 121.2 | 121.1 | 121.0 | 120.9 | 120.9 | 124.6 |
| 120.7 | 120.7 | 120.7 | 120.7 | 120.7 | 120.7 | 123.2 |
| 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 122.4 |
| 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 121.3 |
| 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 121.3 |
| 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.8 |
| 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.8 |
| 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 |
| 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 | 120.6 |

PEAK OUTFLOW IS 1723. AT TIME 15.83 HOURS

| CFS | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|-------|--------|---------|---------|-------|--------|
| 1723. | 437. | 136. | 136. | | 39290. |
| 49. | 12. | 4. | 4. | | 1113. |
| | 23.22 | 29.01 | 29.01 | | 29.01 |
| | 589.76 | 736.78 | 736.78 | | 736.78 |
| | 217. | 271. | 271. | | 271. |
| | 267. | 334. | 334. | | 334. |

4.45 571
4.50 581
4.55 591
5.00 601
5.05 611
5.10 621
5.15 631
5.20 641
5.25 651
5.30 661
5.35 671
5.40 681
5.45 691
5.50 701
5.55 711
6.00 721
6.05 731
6.10 7401
6.15 7501
6.20 7601
6.25 7701
6.30 7801
6.35 79.1
6.40 80.1
6.45 81.1
6.50 82.1
6.55 83.1
7.00 84.1
7.05 85.01
7.10 86.01
7.15 87.01
7.20 88.01
7.25 89.01
7.30 90.01
7.35 91.01
7.40 92.01
7.45 93.01
7.50 94.01
7.55 95.01
8.00 96.01
8.05 97.01
8.10 98.01
8.15 99. 1
8.20100. 1
8.25101. 1
8.30102. 1
8.35103. 1
8.40104. 1
8.45105. 1
8.50106. 1
8.55107. 1
9.00108. 1
9.05109. 1
9.10110. 1
9.15111. 1
9.20112. 1
9.25113. 1
9.30114. 1
9.35115. 1
9.40116. 1
9.45117. 1
9.50118. 1

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| 9.55119. | I |
| 10.00120. | I |
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| 10.20124. | I |
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| 11.30138. | I |
| 11.35139. | I |
| 11.40140. | I |
| 11.45141. | I |
| 11.50142. | I |
| 11.55143. | I |
| 12.00144. | I |
| 12.05145. | I |
| 12.10146. | O I |
| 12.15147. | O I |
| 12.20148. | O I |
| 12.25149. | O I |
| 12.30150. | O I |
| 12.35151. | O I |
| 12.40152. | O I |
| 12.45153. | O I |
| 12.50154. | O I |
| 12.55155. | O I |
| 13.00156. | O I |
| 13.05157. | O I |
| 13.10158. | O I |
| 13.15159. | O I |
| 13.20160. | O I |
| 13.25161. | O I |
| 13.30162. | I |
| 13.35163. | I |
| 13.40164. | I |
| 13.45165. | I |
| 13.50166. | I |
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| 14.15171. | I |
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| 14.45177. | I |
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| 14.55179. | I |
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20.15243.10
 20.20244.10
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 20.35247.10
 20.40248.10
 20.45249.10
 20.50250.10
 20.55251.1
 21.00252.1
 21.05253.1
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 21.15255.1
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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

| OPERATION | STATION | AREA | PLAN | RATIOS APPLIED TO FLOWS | | | | | | | |
|---------------|---------|--------------|------|-------------------------|-----------------|-----------------|------------------|------------------|------------------|-------------------|-------------------|
| | | | | RATIO 1 | RATIO 2 | RATIO 3 | RATIO 4 | RATIO 5 | RATIO 6 | RATIO 7 | RATIO 8 |
| | | | | .05 | .10 | .15 | .20 | .35 | .50 | .85 | 1.00 |
| HYDROGRAPH AT | 000001 | .18 (.45) | 1 | 96. (2.71) | 192. (5.42) | 287. (8.14) | 383. (10.85) | 670. (18.99) | 958. (27.12) | 1628. (46.11) | 1916. (54.24) |
| ROUTED TO | 000002 | .18 (.45) | 1 | 52. (1.46) | 66. (1.87) | 81. (2.29) | 159. (4.50) | 529. (14.98) | 801. (22.69) | 1419. (40.18) | 1723. (48.80) |

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

| RATIO OF PMF | MAXIMUM RESERVOIR M.S.ELEV | MAXIMUM DEPTH OVER DAM | MAXIMUM STORAGE AC-FT | MAXIMUM OUTFLOW CFS | DURATION OVER TOP HOURS | TIME OF MAX OUTFLOW HOURS | TIME OF FAILURE HOURS | ELEVATION | | TOP OF DAM |
|--------------------|----------------------------------|------------------------------|-----------------------------|---------------------------|-------------------------------|---------------------------------|-----------------------------|-----------|---------|------------|
| | | | | | | | | STORAGE | OUTFLOW | |
| .05 | 121.02 | 0.00 | 23. | 52. | 0.00 | 15.92 | 0.00 | 120.00 | 120.00 | 127.10 |
| .10 | 122.10 | 0.00 | 26. | 66. | 0.00 | 16.08 | 0.00 | 20. | 20. | 46. |
| .15 | 123.37 | 0.00 | 30. | 81. | 0.00 | 16.17 | 0.00 | 0. | 0. | 1080. |
| .20 | 124.32 | 0.00 | 34. | 159. | 0.00 | 16.08 | 0.00 | | | |
| .35 | 125.79 | 0.00 | 40. | 529. | 0.00 | 15.83 | 0.00 | | | |
| .50 | 126.46 | 0.00 | 43. | 801. | 0.00 | 15.83 | 0.00 | | | |
| .85 | 127.71 | .61 | 49. | 1419. | .25 | 15.83 | 0.00 | | | |
| 1.00 | 128.02 | .92 | 51. | 1723. | .42 | 15.83 | 0.00 | | | |