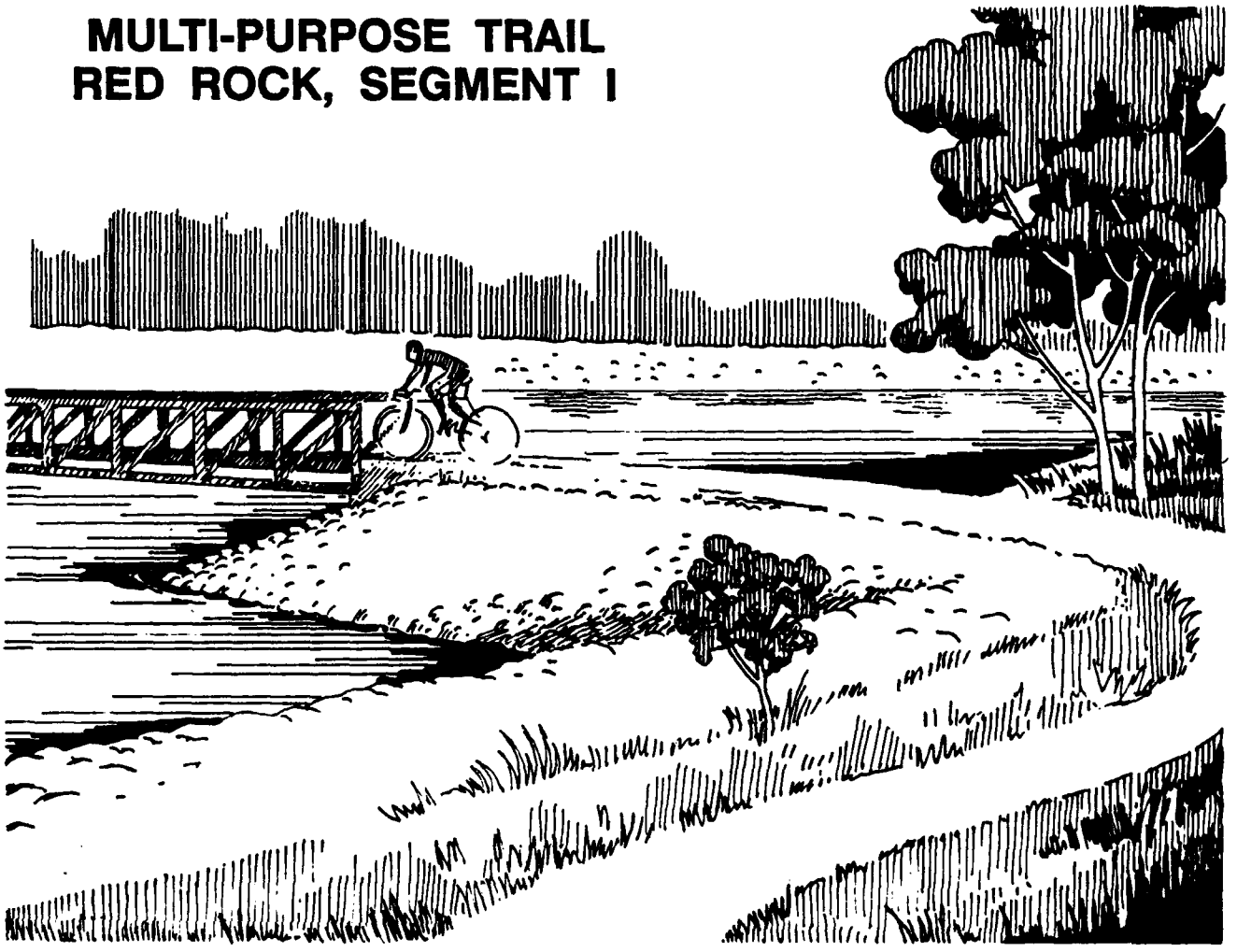
DES MOINES RECREATIONAL RIVER AND GREENBELT

US Army Corps
of Engineers
Rock Island District

FEATURE DESIGN MEMORANDUM #3 WITH ENVIRONMENTAL ASSESSMENT

MULTI-PURPOSE TRAIL
RED ROCK, SEGMENT I



MAY 1989

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING – P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

CENCR-ED-DG

31 May 1989

MEMORANDUM FOR Commander, North Central Division, ATTN: CENCD-PD-PL, 536 South Clark Street, Chicago, Illinois 60605-1592

SUBJECT: Des Moines Recreational River and Greenbelt Project, Multi-Purpose Trail, Red Rock, Segment 1 - Feature Design Memorandum #3 with Environmental Assessment

1. The Feature Design Memorandum for the Des Moines Recreational River and Greenbelt, Multi-Purpose Trail, Red Rock, is forwarded (12 copies) for your review and approval. Also included with the report are copies of the latest PB 2A and a project fact sheet.

2. The Rock Island District is scheduled to award a construction contract for the project in September 1989. This will obligate a large portion of the remaining FY 89 funds for the Des Moines Recreational River, and Greenbelt project. In order to do this, the report must be approved on or before 7 July 1989. In addition, authorization to distribute the Environmental Assessment should be received by 7 June 1989 to allow time for the required 30-day public review.

FOR THE COMMANDER:

for GARY L. LOSS, P.E.
Acting Chief
Engineering Division

3 Encls
1. Feature Design Memorandum (12 cys)
2. PB 2A
3. Project Fact Sheet

Acknowledgements

Project Engineer	Paul A. Kowalczyk
Structural Analysis	Keith Wilson
Hydrology & Hydraulic Analysis	Tom Kirkeeng
Environmental Analysis	Charlene Carmack
Social and Economic Analysis	Patti Risser
Geotechnical Analysis	Sibte Zaide
Cost Estimate	Tom Bales
Lake Red Rock Manager	Gerald Dowell
Technicians	Rene Duyvejonck
	John Kempter
Real Estate	Marty Alford

FEATURE DESIGN MEMORANDUM NO. 3
WITH ENVIRONMENTAL ASSESSMENT
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK - SEGMENT 1

TABLE OF CONTENTS

TABLES

PLATES

Number	Title
1	Bridge Site
2	Bike Trail Bridge Profile
3	Bridge Site Cross Section
4	Bike Trail Bridge Details
5	Borings
6	Bike Trail

APPENDICES

A - Hydrology & Hydraulics
B - Geotechnical
C - Design Analysis
D - Economic & Social Analysis
E - 404(b)(1) Evaluation
F - Correspondence
G - Distribution

FEATURE DESIGN MEMORANDUM NO. 3
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK - SEGMENT 1

I. INTRODUCTION

A. Project Authority

The Des Moines Recreational River and Greenbelt (hereinafter referred to as the Greenbelt) was funded and authorized by Public Law 99-88 as approved on August 15, 1985. The project is for the development, operation, and maintenance of a recreational and greenbelt area on, and along, the Des Moines River from U.S. Highway 20 in Fort Dodge, Iowa, downstream to relocated U.S. Highway 92 in the vicinity of the Red Rock Dam.

B. Purpose and Scope

The purpose of this report is to establish the project requirements and to evaluate the project on the basis of engineering, economic, and environmental viability. The report includes a project description, engineering consideration, economic analysis, and environmental assessment.

C. General Design Memorandum

The General Design Memorandum (GDM) for Greenbelt covers the administration, comprehensive plan, plan for initial development and coordination of the project, and discusses the conditions for federal participation. The comprehensive plan addresses the entire greenbelt. The Multi-Purpose Trail Red Rock, Segment 1 project is one of the projects included in the comprehensive plan.

D. Advisory Committee

An advisory committee was established in accordance with The Conference Report on H.R. 2577, dated July 29, 1985. This committee is composed of local officials from the cities, counties, and state government in the greenbelt project area as well as from the Corps of Engineers. At the 4 September 1987 meeting, the advisory committee recommended 9 separable projects, including the Multi-Purpose Trail Red Rock, Segment 1 project, to the Corps of Engineers for construction.

E. Principles and Guidelines

Principles and Guidelines activities were accomplished by a combination of activities documented in the September 1987 General Design Memorandum (GDM) and Programmatic Environmental Impact Statement (PEIS), in the workings of the Advisory Committee, and in this report. A number of alternatives for the overall project were address in the PEIS and the plans were formulated in the

GDM for each separable element in coordination with the local sponsors and the Advisory Committee. Extensive public involvement activities and public meetings have been conducted on a continuing basis under the guidance of the Advisory Committee.

F. Local Sponsor:

G. Other Reports

FDM #1 Bennington Bridge Access - May 1986
FDM #2 Jester Park Campground Improvements - August 1989
Red Rock Master Plan - December 1976

II. DESCRIPTION OF PROJECT

A. Project Location and Description

1. Location: The project is located in the tailwater area of Lake Red Rock in Marion County, Iowa.

2. Description: The proposed trail involves construction of 1325 feet of an 8 foot wide surfaced bike trail, two dikes extending from the banks of the Des Moines River, and a 3 span 321 foot steel truss trail bridge over the Des Moines River. This project will connect the two existing trails that serve the popular Lake Red Rock tailwater recreation areas. Additional segments of the trail will be designed along the north shore of Lake Red Rock. The first portion of this trail is shown on Plate 6 and its economics are discussed in Appendix D. Future Feature Design Memorandums will address the engineering and environmental aspects of those segments not included in this report.

B. Design and Construction Considerations

1. General Consideration: The proposed location was chosen to minimize the length of the bridge needed to cross the Des Moines River. Alternative locations were considered but rejected as more expensive or functionally undesirable. Various configurations of bridge lengths and types of bridges were investigated. The 3 span steel truss bridge produced an economical design that best met the operational and aesthetic considerations.

2. Hydrology & Hydraulics: Water surface profiles were developed at the selected bridge site. Using these profiles and checking them against the State of Iowa criteria for bridges, the selected plan using 2 pier and 3 ea 107' bridges meets the state requirements. Due to the potential for scour riprap protection is required on the embankments and piers will be founded on bedrock. A detailed analysis is found in Appendix A.

3. Geotechnical: The bedrock is suitable founding the piers and abutmentson. The embankments are to be constructed of compacted sand and gravel obtained from the adjacent streambed. A stability analysis indicates

that the minimum factor of safety of these embankments can bemet with 2H on 1V side slopes. A 6" bedding layer under the 18" riprap will act as a filter to prevent loss of the embankment material. A detail analysis is found in Appendix B.

4. Structural: A design analysis was made for the two center bridge piers. The piers will be founded on bedrock due to the potential of scouring of the riverbed. The pier design is shown on Plate 4 and the design analysis in Appendix C. The truss bridge of this type is available from several manufactures. The performance criteria that will be given to the bridge suppliers is given on Plate 4.

C. Real Estate Requirements: Segment 1 is located entirely on Federal land, therefore no land acquisition is required. There are no utility easements that cross this segment of trail.

D. Operations and Maintenance Consideration:

1. Operation: Operation would include activities for the enforcement of the applicable load limits, vehicle restrictions and closure devices required to maintain the safe operation of this facility.

2. Maintenance: The proposed features have been designed to ensure low annual maintenance requirements. The principle maintenance activities would include applicable bridge and substructure inspections, bridge and substructure repairs, shoulder and pavement repairs, pavement markings, traffic control sign replacements and mowing adjacent grassed areas as required.

E. Cost Estimate:

TABLE 1

Cost Estimate, May 1989 Price Levels

Description	Quantity	Unit	Unit Cost ($)	Cost ($)
Construct Riprap Causeway	1	Job	Sum	34,727.25
Construct 2 Reinforced Concrete Bridge Abutments	1	Job	Sum	11,397.15
Construct 2 Reinforced Concrete Bridge Piers	1	Job	Sum	105,974.55
Construct 321' Long Bridge Preengineered Steel Truss Bridges	1	Job	Sum	138,672.00
Bridge Erection	1	Job	Sum	11,661.25
Construct 2 Dikes (1V on 2H slopes)	1	Job	Sum	179,234.15
Construct Bicycle Path	1	Job	Sum	15,274.50
Seeding				329.50
Mob/Demob	1	Job	Sum	4,000.00
			Subtotal	501,270.35
			Contingencies	50,129.65
			Total Estimated Construction Cost	551,400.00
			Engineering & Design	96,000.00
			Supervision & Administration	32,600.00
			Total Project Cost	680,000.00

F. Economic Analysis: An analysis of the economic benefits was made for the portion of trail extending from the tailwater area to the Wallashuck Recreation Area. This is the first section of trail outlined in the Red Rock Master Plan. The trail will connect the tailwater area up with the Visitor Center, the North Overlook Recreation Area, and the Wallashuck Recreation Area. The trail will also allow for the cities of Pella and Knoxville to construct a proposed trail between their cities. The benefit to cost ratio was computed as 1.13 to 1. A more detailed analysis is presented in Appendix D.

G. Environmental Assessment

Purpose and Alternatives - The purpose of this environmental assessment is to address the effects of construction of the bridge and trail segments as described in Section II of this report. Alternatives to the selected design include the no Federal action alternative, and construction in other locations.

The selected design will be constructed within previously developed or disturbed areas and will minimize trail and bridge lengths required for the project. With no Federal action, no project impacts would occur; however, no long-term benefits to recreation would be expected. Preliminary review of alternative construction locations indicated that these alignments would involve lengthening the bridge span or trail tie-ins, and that such construction would involve tree clearing or other physical alterations in less developed areas. This would result in greater impact to natural resources and would be less economically feasible.

Major Findings and Conclusions - The project is expected to be beneficial to recreation resources with no significant impacts to natural, cultural, economic or social resources. For this reason, an Environmental Impact Statement (EIS) will not be prepared for this action. Because the proposed action is subject to the provisions of the Clean Water Act, a 404 (b)(1) Evaluation has been prepared for the project (see Appendix E). Section 401 certification has been requested from the Iowa Department of Natural Resources in a letter dated 30 May 1989. A copy of this letter is included in Appendix F.

Relationship to Environmental Requirements - The project will comply with Federal environmental laws, Executive orders and policies, and State and local policies including the Clean Air Act, as amended; the Clean Water Act, as amended; the Endangered Species Act of 1973, as amended; the Federal Water Project Recreation Act; the Fish and Wildlife Coordination Act of 1958, as amended; the Land and Water Conservation Fund Act of 1966, as amended; the National Environmental Policy Act of 1969, as amended; and the National Historic Preservation Act of 1966, as amended.

The project is located on Federally owned land and will not result in the conversion of farmland to other uses. This segment of the Des Moines River is not a Federally recognized wild or scenic river. The project will not result in any significant change in floodplain storage, and no loss of wetlands will occur from project construction or operation. Therefore, this action will not

conflict with the provisions of the Farmland Protection Policy Act of 1981, Executive Order 11988, Floodplain Management, Executive Order 11990, Protection of Wetlands, or the Wild and Scenic Rivers Act of 1968.

Affected Environment - The site of proposed bridge construction is located on the main channel of the Des Moines River approximately 2,350 feet downstream of Red Rock Dam (see plate 1). The trail segment is located on an island approximately 13.8 acres in size, and a man-made causeway which connects the west side of the island to the main shoreline. This island was created during construction of the dam by the cutting of a straight outflow channel through a meander of the river. The newer channel borders the eastern side of the island and the original channel, now a slough, borders the island on its remaining sides. A number of intensively developed recreation areas surround the island on both sides of the river. These areas are used for camping, picnicking and fishing.

Vegetation on the island is primarily mature floodplain forest comprised of species such as silver maple (Acer saccharinum), cottonwood (Populus deltoides), willow (Salix sp.), box elder (Acer negundo), and mulberry (Morus sp.). A strip of open, grassy land averaging 120 feet in width bisects the island from the causeway to the eastern shore.

Wildlife species found in the area include small mammals such as mice, shrews, voles, squirrels, rabbits, opossums, raccoons, and skunks. The combination of wooded island and adjacent slough provides habitat for reptiles and amphibians. The mature forest also provides habitat for the northern flicker and other woodpecker species, as well as nesting cavities for owls. The bald eagle is a winter resident and uses large trees on the shoreline of the island as perches. Other birds that utilize shoreline perches include the belted kingfisher and turkey vulture. Wading birds such as great blue herons utilize the slough as a feeding station.

This section of the Des Moines River is a popular fishing spot due to the tendency of migrating fish to concentrate in the tailwaters of the Red Rock Dam. Important game species included walleye, northern pike, crappie, white bass, and channel and flathead catfish.

Environmental Effects - Construction of the bridge will result in the removal of sand and gravel from the river bottom adjacent to the project site, its subsequent replacement in the channel as temporary dikes during construction, and later as jetties supporting the completed bridge. Construction of the trail segment may result in the loss of some herbaceous or sapling-sized woody vegetation. The trail will be aligned to follow existing foot trails and disturbed rights-of-way of previous construction. For this reason, no significant impacts are anticipated.

The long-term effect of the project is expected to be beneficial to man-made resources in the area with no adverse effect on natural resources. Some benefits to existing recreational resources would be expected from improving access between recreation areas on both sides of the river.

Wildlife species which may currently utilize the project area will not be sig..ificantly affected by the action. The placement of riprap below the normal water level and excavation at the toe of each jetty to extend riprapping down to bedrock is expected to benefit aquatic resources by increasing substrate diversity.

There are two federally listed threatened and endangered species listed for Marion County. These are the bald eagle (Haliaeetus leucocephalus) and the Indiana bat (Myotis sodalis). Bald eagles utilize large trees along the shoreline of the island as resting and feeding perches during winter months. No such trees would need to be removed for construction of the bridge and trail segment. Construction will take place during spring to late fall months as weather and water conditions permit, when eagles are not present in the area. Use of the island, trail and bridge is not expected to disrupt eagle feeding habits. If necessary, access to the bridge and island will be restricted at times when eagles are present. For these reasons, no significant impacts to the bald eagle are anticipated at this time.

The Indiana bat uses large trees with cavities or loose bark as summer roosts, and uses caves as winter hibernacula. Because these habitats are not present in the immediate project area, no impacts to the Indiana bat are expected.

Minor, temporary impacts to noise levels and air quality due to construction activity may occur as a result of construction and transportation of materials. This may have temporary adverse effects on users of nearby recreational sites. No long-term significant impacts are anticipated and no air quality standards should be violated.

Minor temporary increases in turbidity and levels of suspended sediments would occur during construction activity. No long-term adverse effects to water quality are anticipated. A Section 404(b)(1) Evaluation has been prepared to address the discharge of 12,600 cubic yards of dredged material and 3,000 cubic yards of riprap into the Des Moines River (see Appendix E and plate 1). Section 401 certification has been requested from the State of Iowa by letter dated 30 May 1989, and will be obtained prior to construction.

District staff archaeologists conducted a reconnaissance survey of the island shoreline and trail alignment in October 1986 and found no cultural remains or evidence of features. Corps staff also performed cultural resource surveys in 1978 for the Howell Station campground and tailwater bank stabilization on the shoreline opposite the island. For these reasons, it was determined that the project will have no effect on cultural resources.

Construction of the bridge and trail segment is expected to have little effect on aesthetic values. No displacement of people or farms will occur and no change in community cohesion is anticipated. No significant impacts to community and regional growth, property values and tax revenues, employment and labor force, or business and industrial development are expected to result from this action. No significant impacts to life, health and safety are anticipated; however, because the completed project is likely to attract increased fishing activity, use of the bridge by fishermen may need to be restricted to avoid conflicts with other trail users.

The project is expected to benefit public recreational facilities and services by increasing the amount of multi-purpose trail available to recreation users, and by providing improved access between developed recreation areas. Alternative locations for the bridge and trail segment would be anticipated to have impacts similar to or greater than the preferred alternative.

Coordination - Coordination has been maintained throughout the planning and design process with the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Iowa Department of Natural Resources, and the State Historic Preservation Officer (SHPO). Copies of coordination letters and telephone conversation records are contained in Appendix F. Development of multi-purpose trails at Lake Red Rock was proposed and coordinated in the Resource Master Plan, Design Memorandum No. 24b for Red Rock Dam and Lake Red Rock (December 1976).

Trail development and bank stabilization on the island below the dam was documented and coordinated in an Environmental Assessment prepared by the District in April 1987. The Greenbelt Multi-Purpose Trail project was documented and coordinated in the programmatic EIS for the Greenbelt General Design Memorandum, dated September 1987. This action was not selected for review by the State of Iowa under Executive Order 12372, State Single Point of Contact; therefore, the project is being coordinated with the Governor's Representative for Civil Works, which is the Department of Natural Resources.

III. PLAN IMPLEMENTATION

A. Schedule for Design and Construction: The project is scheduled to be designed and construction initiated in FY 1989. Construction should be completed in FY 1991.

B. Implementation Responsibilities: The Corps is responsible for design, construction, and operation and maintenance of this project.

C. Coordination Meetings: Close coordination has been maintained between planning, engineering, and operation personnel within the Rock Island District. Government officials from the State of Iowa, Marion County, City of Pella and the City of Knoxville have been kept informed of the projects status through the Greenbelt Advisory Committee meetings and news letters. There is strong local support for the project.

IV. RECOMMENDATION

I recommend the construction of the Multi-Purpose Trail, Red Rock Segment 1, under the authority of the Des Moines Recreational Greenbelt, IA, at a cost of $680,000.

Neil A. Smart
Colonel, U.S. Army
District Engineer

FINDING OF NO SIGNIFICANT IMPACT

DES MOINES RECREATIONAL RIVER AND GREENBELT
FEATURE DESIGN MEMORANDUM NO. 3
MULTI-PURPOSE TRAIL
RED ROCK - SEGMENT 1
POLK COUNTY, IOWA

I have reviewed the information provided by this Environmental Assessment, along with data obtained from cooperating Federal, State and local agencies and from the interested public. Based on this review, I find that construction of the proposed campground improvements will not significantly affect the quality of the environment. Therefore, it is my determination that an Environmental Impact Statement is not required. This determination will be reevaluated if warranted by later developments.

Alternatives considered along with the preferred action was:

- No Federal Action.

- Other site locations.

Factors considered in making a determination that an Environmental Impact Statement was not required are as follows:

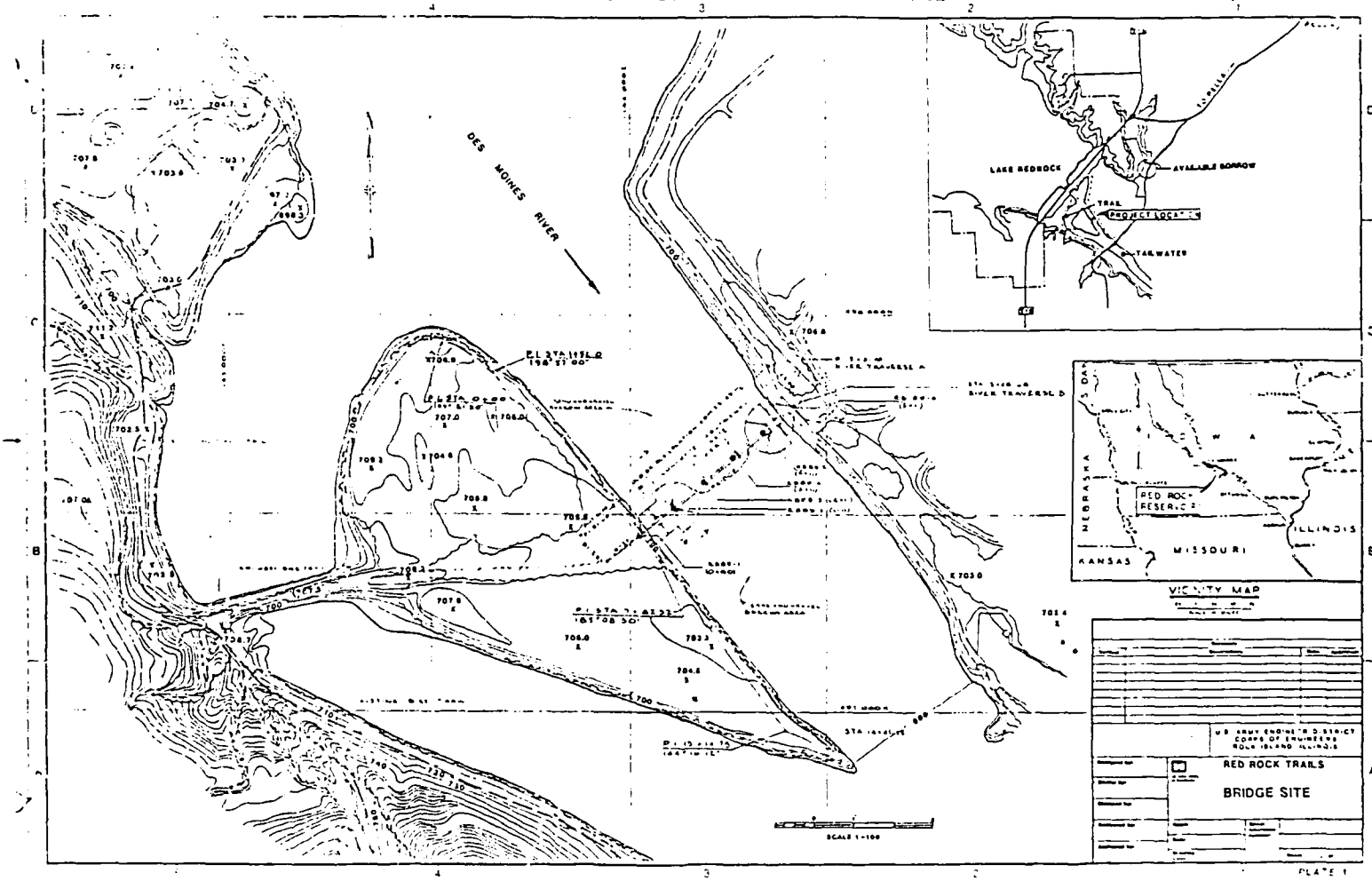
a. The action is expected to enhance low-density recreational use on land zoned for that purpose.

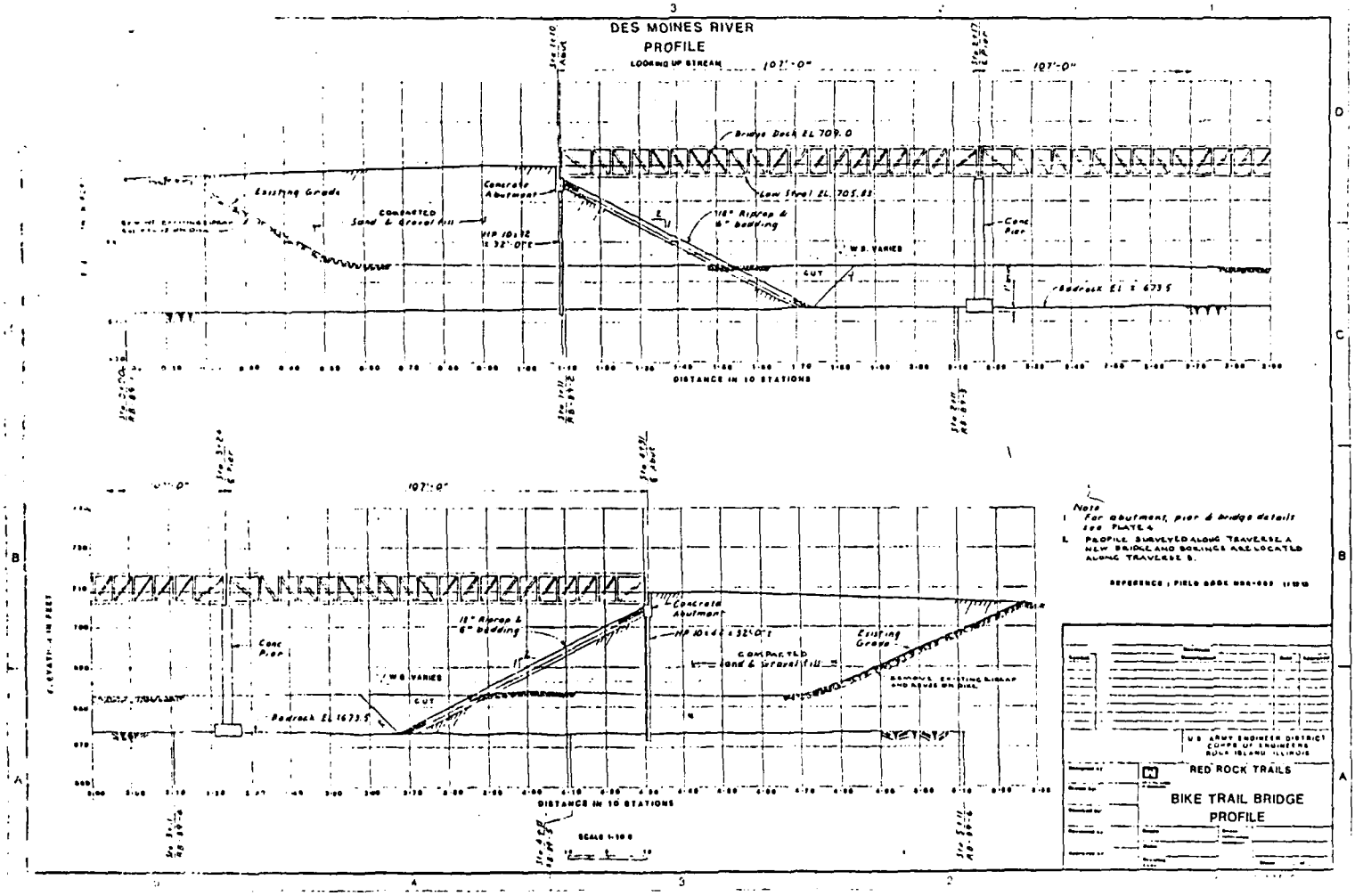
b. Initial loss of and disturbance to aquatic habitat during construction will be offset by increased habitat diversity following project completion.

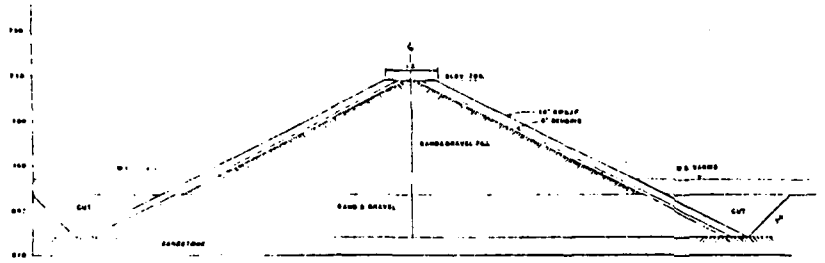
c. No significant social, economic, environmental or cultural impacts are anticipated as a result of this action.

_____
Date

Neil A. Smart
Colonel, Corps of Engineers
District Engineer


DES MOINES RIVER
LAKE REDROCK
AVAILABLE BORROW
TRAIL
PROJECT LOCATION
TAILWATER
NEBRASKA
KANSAS
MISSOURI
ILLINOIS
RED ROCK RESERVOIR
VICINITY MAP
RED ROCK TRAILS
BRIDGE SITE
SCALE 1-100
PLATE 1


DES MOINES RIVER
PROFILE
LOOKING UP STREAM
107'-0"
107'-0"
Bridge Deck EL 709.0
Low Steel EL 705.83
Existing Grade
Concrete Abutment
COMPACTED Sand & Gravel Fill
1'6" Riprap & 6" bedding
Conc Pier
W.S. VARIES
CUT
Bedrock EL ± 673.5
DISTANCE IN 10 STATIONS
107'-0"
Concrete Abutment
18" Riprap & 6" bedding
Conc Pier
W.S. VARIES
CUT
Bedrock EL 673.5
Existing Grade
COMPACTED Sand & Gravel Fill
DISTANCE IN 10 STATIONS
SCALE 1-10 0
Note
1 For abutment, pier & bridge details see PLATE 4.
2 PROFILE SURVEYED ALONG TRAVERSE A. NEW BRIDGE AND BORINGS ARE LOCATED ALONG TRAVERSE B.
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS
RED ROCK TRAILS
BIKE TRAIL BRIDGE
PROFILE



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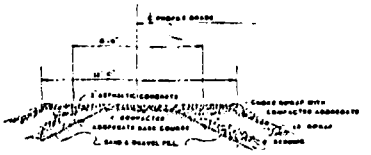

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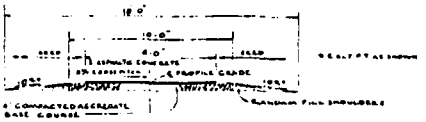

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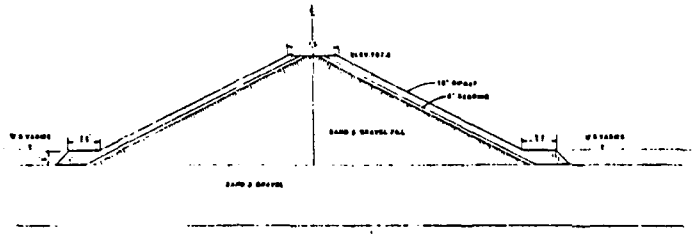
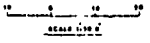


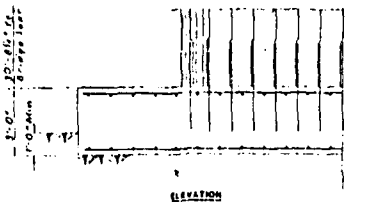
SECTION B-B

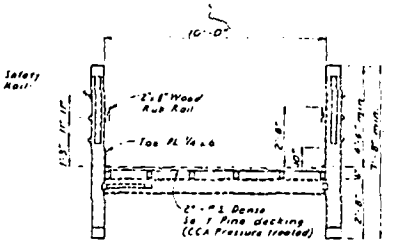


U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND ILLINOIS

RED ROCK TRAILS

BRIDGE SITE
CROSS SECTIONS





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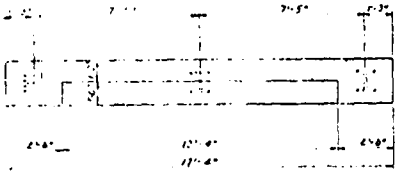
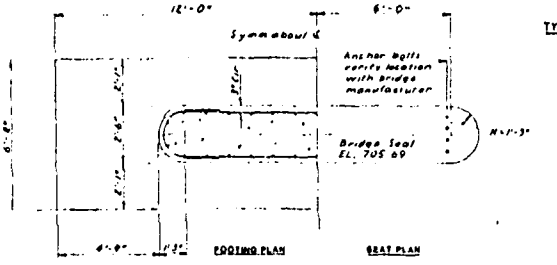
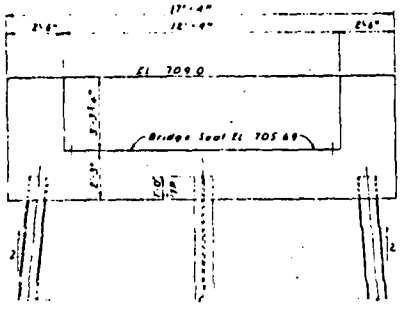
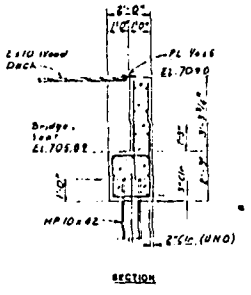




PIER DETAILS





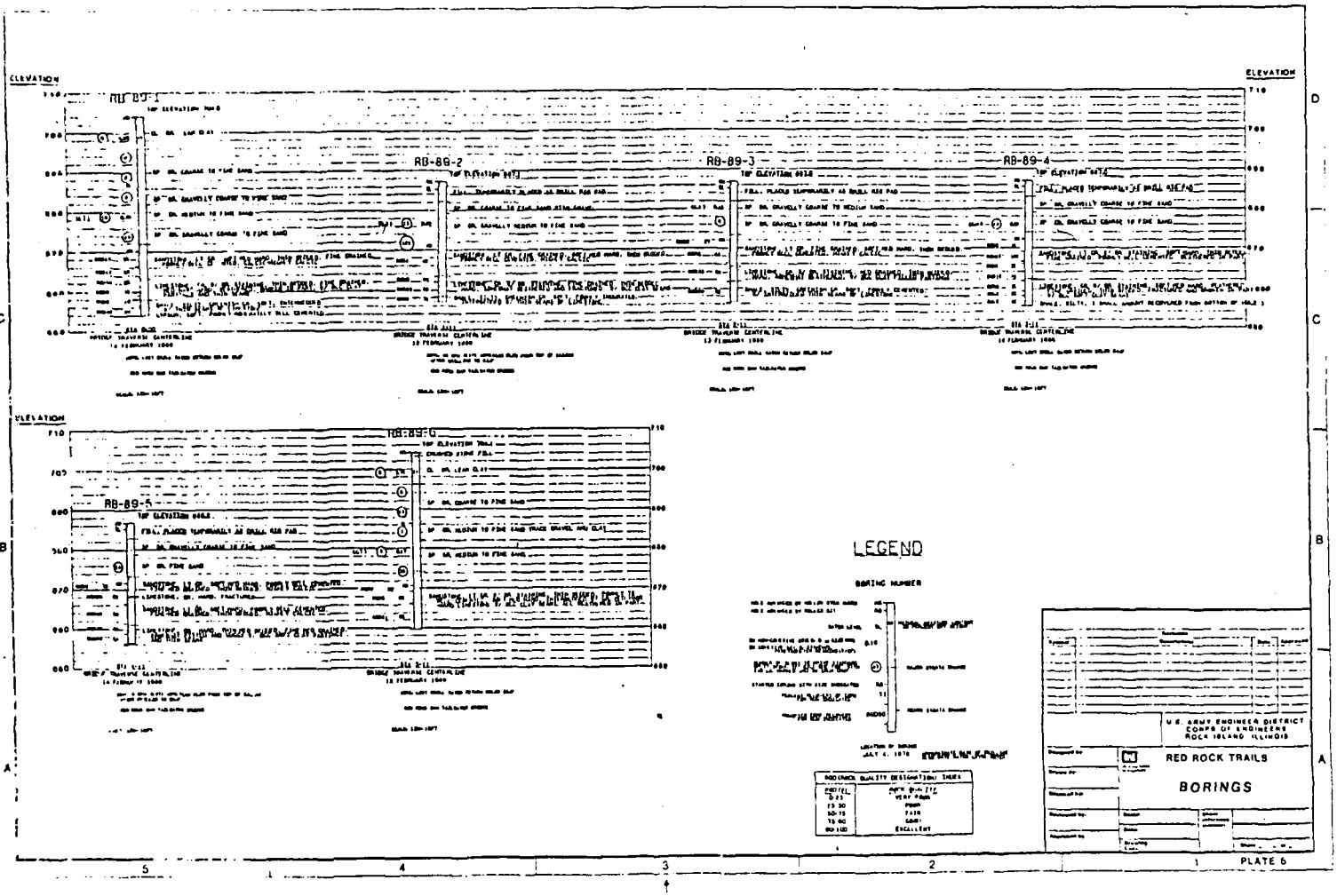
ABUTMENT DETAILS

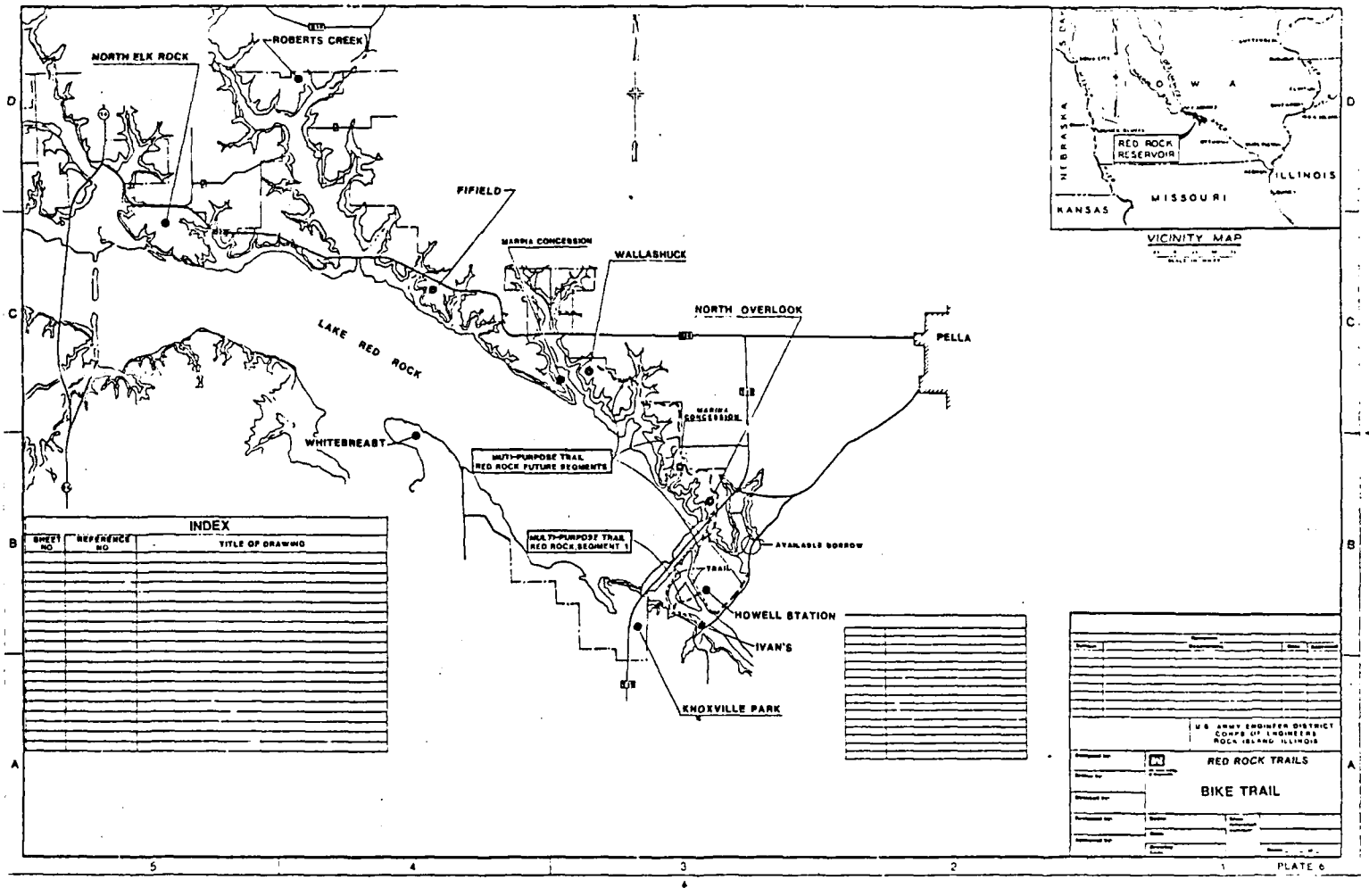
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND ILLINOIS

RED ROCK TRAILS

BIKE TRAIL BRIDGE DETAILS

Scale 1/2"=1'-0"


ELEVATION
RB-89-1
RB-89-2
RB-89-3
RB-89-4
RB-89-5
RB-89-6
LEGEND
BORING NUMBER
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS
RED ROCK TRAILS
BORINGS
PLATE 6


NORTH ELK ROCK
ROBERTS CREEK
FIFIELD
MARINA CONCESSION
WALLASHUCK
NORTH OVERLOOK
PELLA
LAKE RED ROCK
WHITEBREAST
MARINA CONCESSION
MULTI-PURPOSE TRAIL RED ROCK FUTURE SEGMENTS
MULTI-PURPOSE TRAIL RED ROCK SEGMENT 1
AVAILABLE BORROW
TRAIL
HOWELL STATION
IVAN'S
KNOXVILLE PARK
INDEX
SHEET NO.
REFERENCE NO.
TITLE OF DRAWING
IOWA
NEBRASKA
KANSAS
MISSOURI
ILLINOIS
RED ROCK RESERVOIR
VICINITY MAP
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS ROCK ISLAND, ILLINOIS
RED ROCK TRAILS
BIKE TRAIL
PLATE 6

Hydrology & Hydraulics

APPENDIX A

FEATURE DESIGN MEMORANDUM #3
WITH ENVIRONMENTAL ASSESSMENT
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK, SEGMENT 1

HYDROLOGY & HYDRAULICS

Table of Contents

TABLES

PLATES

I. Purpose -
The purpose of this appendix is to present the hydraulic analysis of the proposed bridge installation below Red Rock Dam. Hydraulic concerns include possible backwater effects and velocity increases.

II. Alternatives -
Six cases were analyzed. Case No. 1 consists of a channel with no bridge installed (Plate A-1). Case No. 2 consists of a bridge with four piers, spaced 100 feet apart (Plate A-2). Case No. 3 consists of a bridge with three piers, spaced 100 feet apart, and hard points extending into the channel 50 feet on each side (Plate A-3). Case No. 4 consists of a bridge with three piers, spaced 80 feet apart, and hard points extending into the channel 90 feet on each side (Plate A-4). Case No. 5 consists of a bridge with two piers, spaced 100 feet apart, and hard points extending into the channel 100 feet on each side (Plate A-5). Case No. 6 consists of a bridge with two piers, spaced 107 feet apart, and hard points extending into the channel 90 feet on each side (Plate A-6). The piers were 2.5 feet wide.

III. Hydrology -
The hydrology used for this analysis was the latest flow frequency values for flow exiting Red Rock Dam. The 50-year flow was 41000 cfs and the 100-year flow was 46500 cfs.

State of Iowa Flood Criteria -
Backwater criteria for the State of Iowa allows 0.75 feet of backwater for the 50-year or less flood, 1.5 feet of backwater for the 100-year flood in rural areas, and 1.0 feet of backwater for the 100-year flood in urban areas. Freeboard criteria consists of a minimum of 3 feet of clearance between the 50-year flood elevation and the bridge low steel. The location where the bridge is to be constructed in considered to be a rural area.

IV. Hydraulics -
The determination of whether or not the various bridge configuration meet the above State of Iowa criteria was made using the HEC-2 computer program. Input into the model consists of flows, cross-sectional geometry, starting water surface elevations, and energy loss coefficients. Flows were obtained from the Red Rock Dam flow-frequency curve. Cross-sectional data were obtained from Corps of Engineer surveys. The rating curve at the gage 1800 feet downstream w s used to determine starting water surface elevations. Energy loss coefficients used were an n-value of 0.035, contraction coefficients of 0.1 for the channel and 0.3 for the bridge, and expansion coefficients of 0.3 for the channel and 0.5 for the bridge.

Water surface profiles for each of the alternatives for the 50 and 100-year floods are shown on Plates A-7 through A-12, respectively. Water surface elevations and bridge velocities are shown in tabular form below in Table A-1.

Table A-1
Flood Elevations and Velocities at Bridge Site

Case	Flood Elevation 50-yr	Flood Elevation 100-yr	Velocity (fps) 50-yr	Velocity (fps) 100-yr
No Bridge	702.12	703.52	4.89	5.12
4 Piers 100' Spacing	702.13	703.53	4.98	5.22
3 Piers 100' Spacing	702.38	703.81	6.50	6.80
3 Piers 80' Spacing	702.84	704.30	8.64	9.00
* 2 Piers 100' Spacing	703.02	704.49	9.35	9.76
2 Piers 107' Spacing	702.83	704.29	8.59	8.97

* Does not meet State of Iowa Bridge Criteria.

Velocity and backwater effects versus channel openings are plotted and shown on Plate 13. A normal flow elevation was also determined. The 50% duration flow (or normal flow) was determined from a duration analysis of flows exiting Red Rock Dam to be 2000 cfs. This flow was input into the HEC-2 computer model to determine a corresponding elevation of 687.6.

V. Scour-

Effects of possible scour upon flood elevations and velocities were also analyzed. Constricting the flow by extending dikes into the stream would cause an increase in flow velocities and a subsequent possibility of significant scour. If scour beneath the bridge did occur, flow velocities would decrease due to the increased waterway opening beneath the bridge. The increased waterway opening would also decrease the amount of backwater caused by the bridge/dike construction. The effects of this scour upon flow elevations and velocities were analyzed using Chapter VII of "Hydraulics of Bridge Waterways", a publication of the Federal Highway Administration. Maximum scour was estimated to reach down to the bedrock, which is possible for the 100-year flood. Table A-2 shows the before scour and after scour velocities and elevations for each of the alternatives for the 100-year flood.

Table A-2

Before Scour and After Scour Flood Elevations and Velocities

Case	Velocity (fps) Before	Velocity (fps) After	Elevation Before	Elevation After
No Bridge	5.12	5.12	703.52	703.52
4 Piers, 100' spacing	5.21	5.21	703.53	703.53
3 Piers, 100' spacing	6.79	5.12	703.84	703.64
3 Piers, 80' spacing	9.01	6.43	704.30	703.96
2 Piers, 100' spacing	9.77	6.99	704.49	704.07
2 Piers, 107' spacing	8.97	6.41	704.29	703.96

Velocity and backwater effects versus channel opening are plotted for before scour and after scour conditions and are shown on Plate A-14. A possible consequence of scour is the undermining of bridge piers.

VI. Two-Dimensional Flow Modeling -
As mentioned previously, constricting the flow by dikes causes an increase in flow velocities through the constricted section. To illustrate the impact of dike constriction upon velocity distribution a RMA-2V two-dimensional flow model was developed. This computer model predicts flow velocity magnitudes and directions for a certain flow. The results of this model are shown on Plates A-15 and A-16. Plate A-15 shows the velocity vectors for the 100-year flow and a no bridge condition. Plate A-16 shows the velocity vectors for the 100-year flow and 90 foot dikes extended into the stream on each side. As seen from these plots, flow velocities do increase in the constrictive area while stagnant water exists in the area on the downstream side of the dikes.

VII. Riprap -
Riprap will be required on the bridge abutment dikes. Riprap should extend around the dike to the downstream side of the dike for a distance of approximately 20 feet. Eighteen inches of riprap with bedding layer is required. The appropriate riprap gradation is shown below:

% Lighter by Weight	Limits of Stone Weight (lbs) Upper	Lower
100	292	117
50	86	58
15	43	18

VIII. Conclusion -

The selected plan using 2 piers with 107' bridge sections meets the State of Iowa criteria for construction of bridges. Due to the relatively high velocities expected, riprap will be required. This riprap should extend to bedrock to minimize the possibility of undercutting from scouring of the river bottom. The piers should also be tied into bedrock to ensure their integrity.

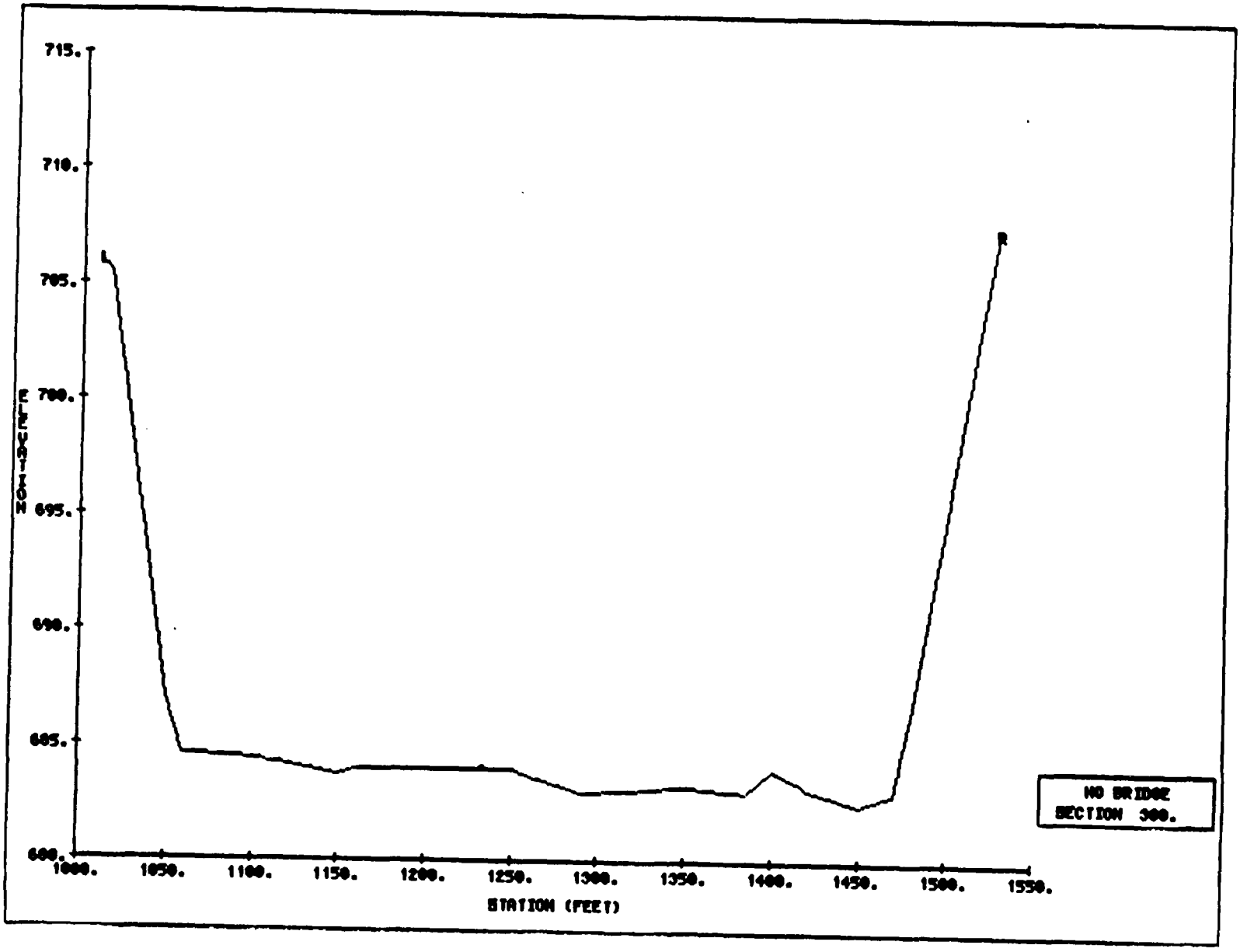

715.
710.
705.
700.
695.
690.
685.
680.
ELEVATION
L
R
1000.
1050.
1100.
1150.
1200.
1250.
1300.
1350.
1400.
1450.
1500.
1550.
STATION (FEET)
NO BRIDGE
SECTION 300.

PLATE A-1

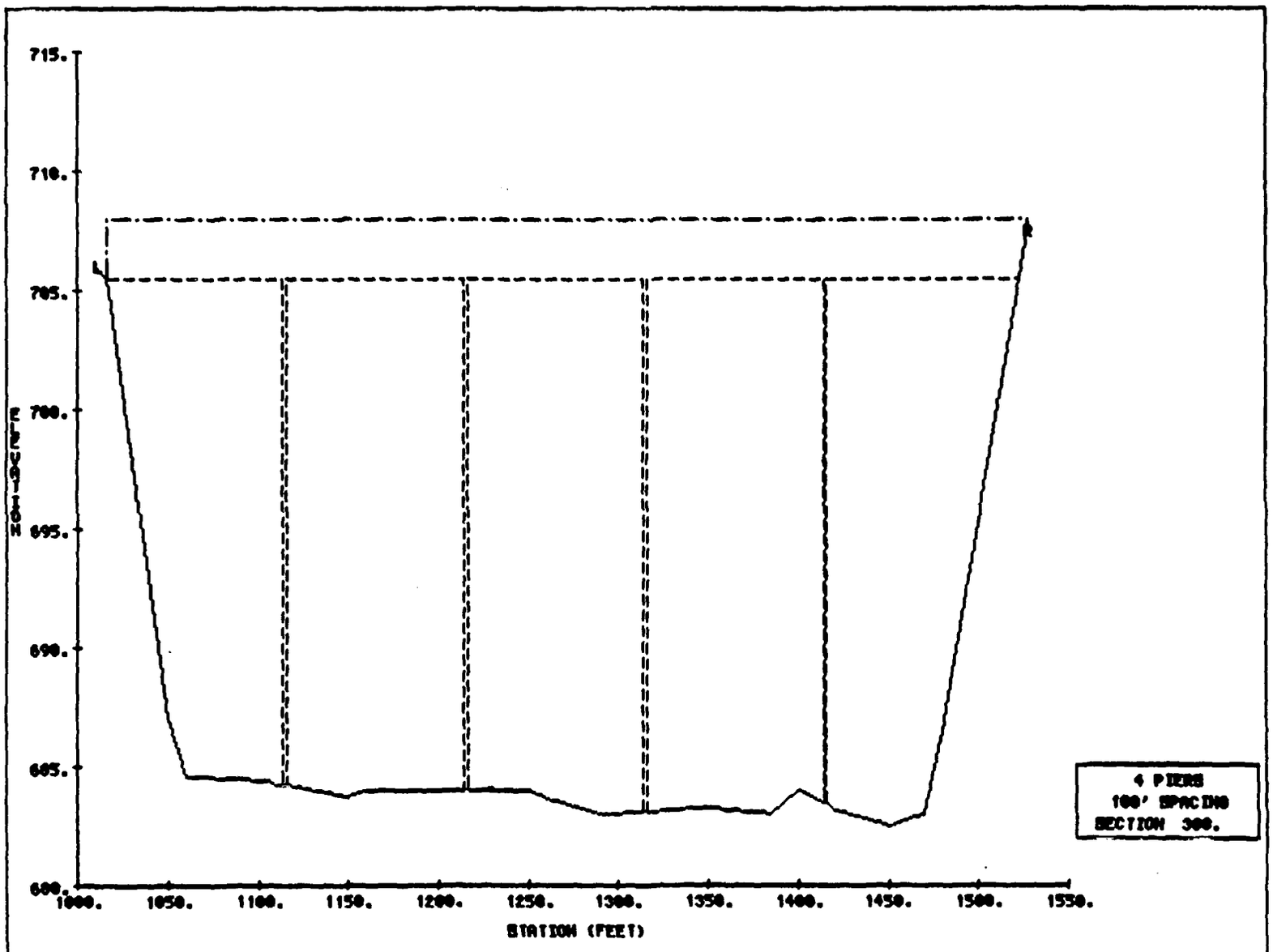

715.
710.
705.
700.
695.
690.
685.
680.
1000.
1050.
1100.
1150.
1200.
1250.
1300.
1350.
1400.
1450.
1500.
1550.
STATION (FEET)
4 PIERS
100' SPACING
SECTION 300.

PLATE A-2

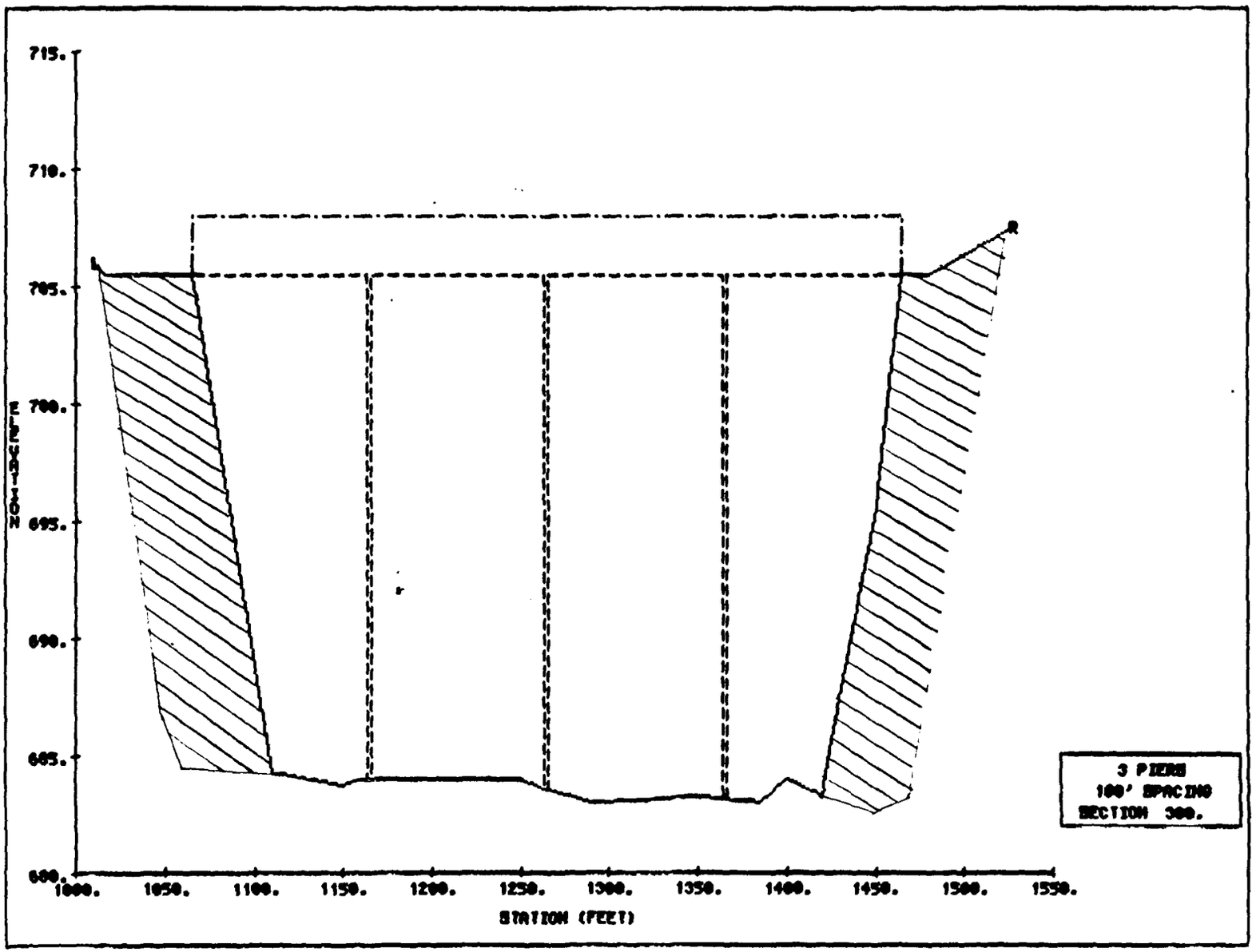
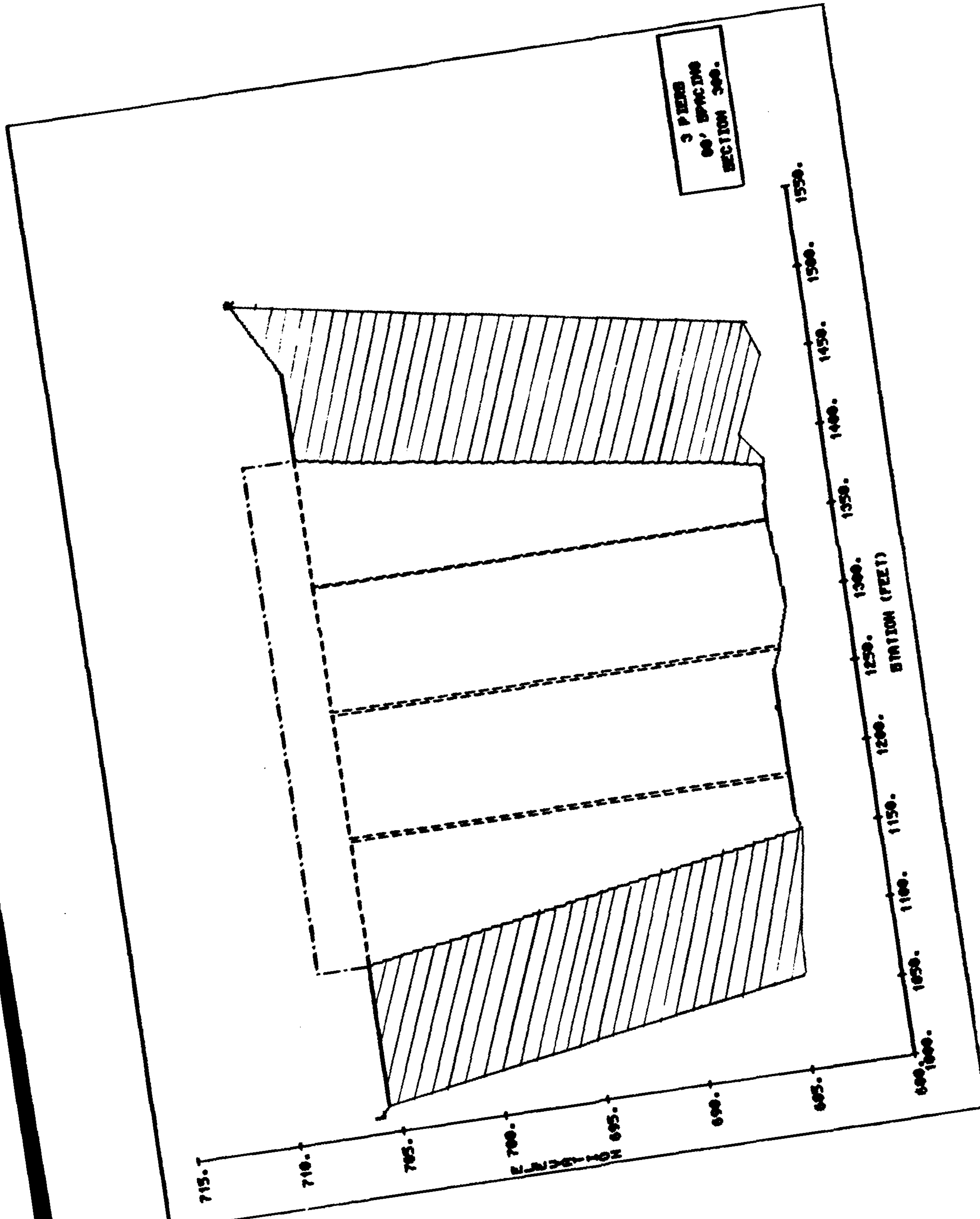

715.
710.
705.
700.
695.
690.
685.
680.
ELEVATION
1000.
1050.
1100.
1150.
1200.
1250.
1300.
1350.
1400.
1450.
1500.
1550.
STATION (FEET)
L
R
3 PIERS
100' SPACING
SECTION 300.

PLATE A-3



3 PIERS
80' SPACING
SECTION 300.
STATION (FEET)
ELEVATION
715.
710.
705.
700.
695.
690.
685.
680.
1000.
1050.
1100.
1150.
1200.
1250.
1300.
1350.
1400.
1450.
1500.
1550.

PLATE A-4

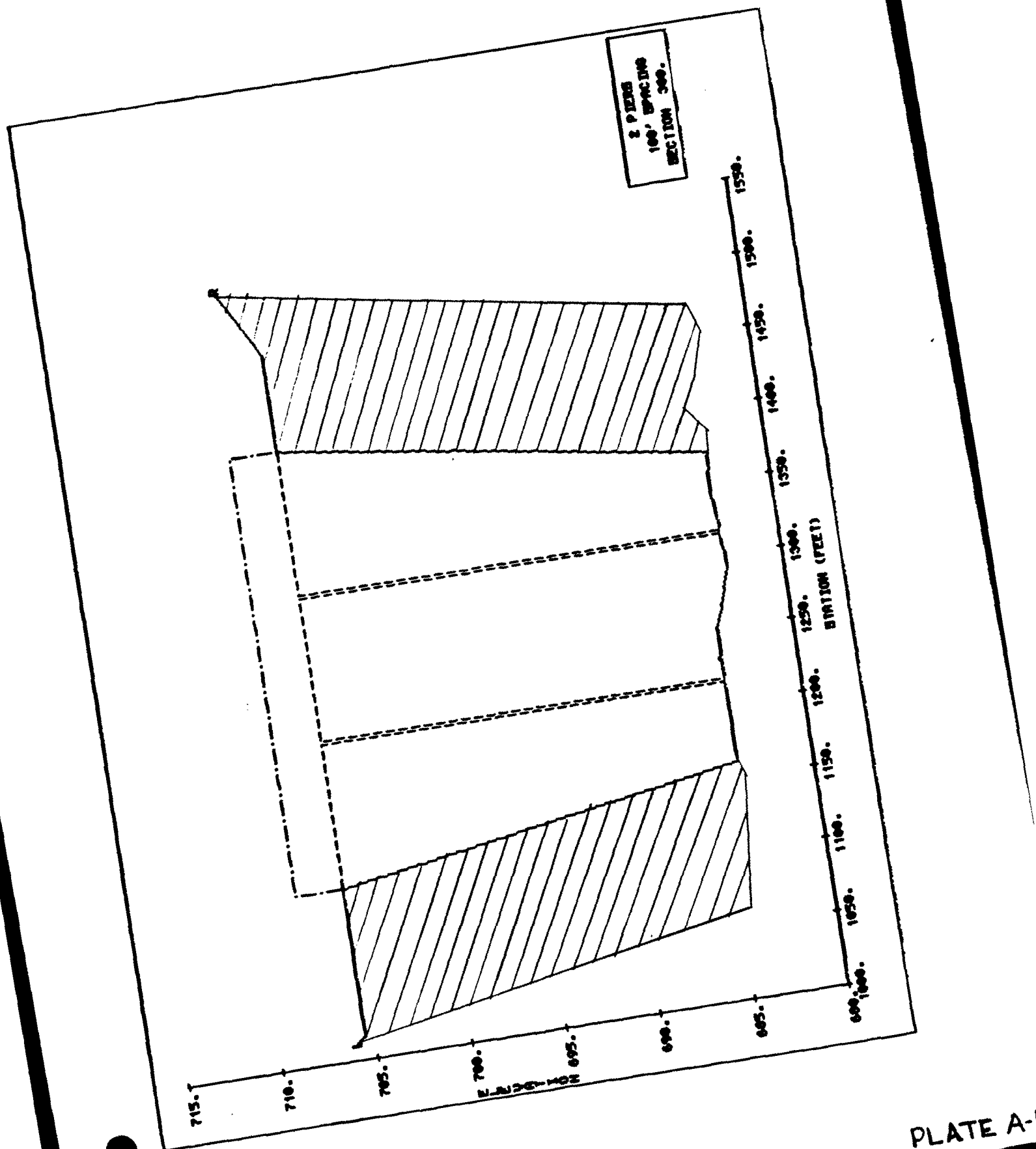

1550.
1500.
1450.
1400.
1350.
1300.
1250.
1200.
1150.
1100.
1050.
1000.
950.
ELEVATION (FEET)
715.
710.
705.
700.
695.
690.
685.
680.

PLATE A-5

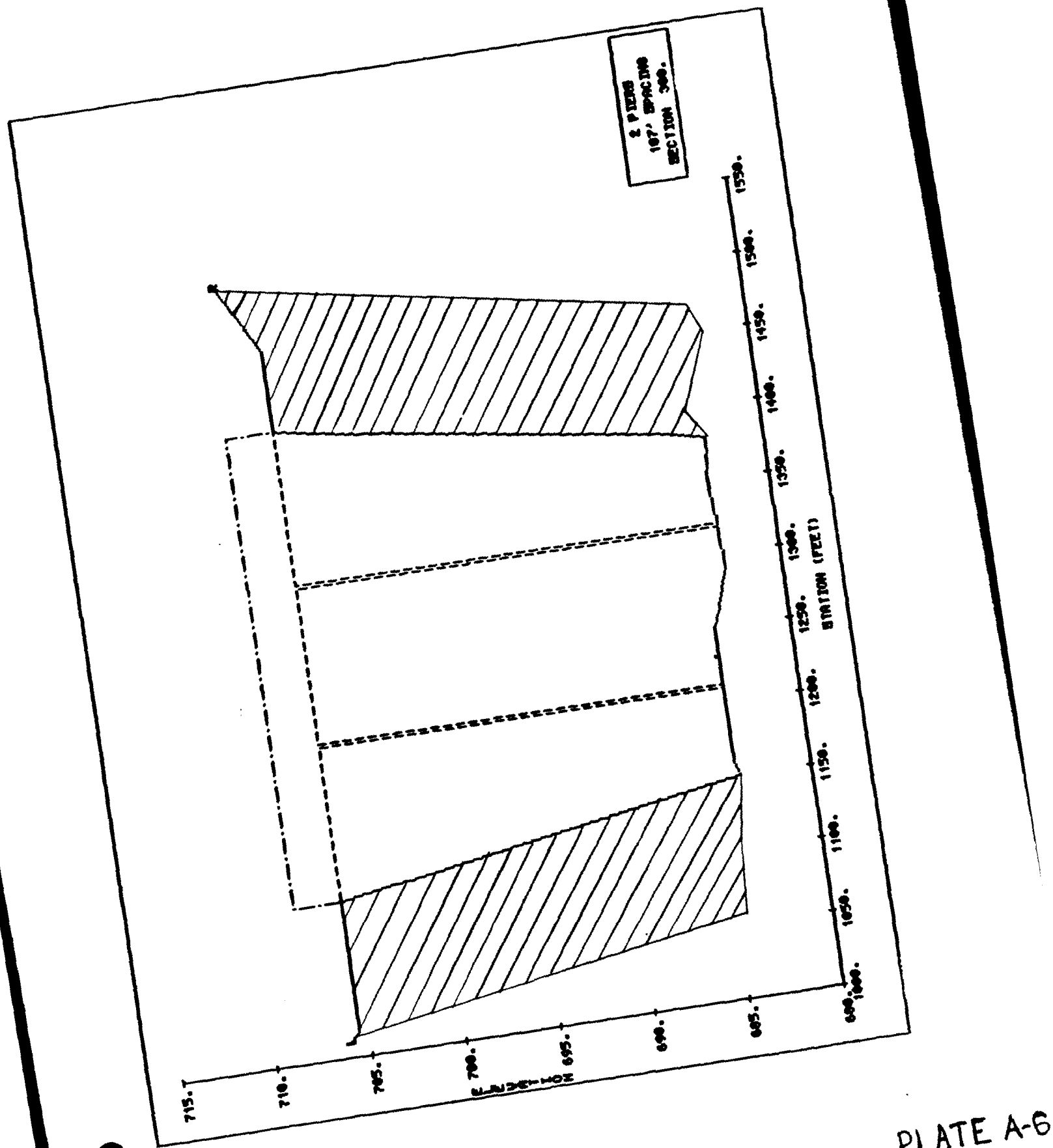

2 PIERS
107' SPACING
SECTION 300'
150'
1500'
1450'
1400'
1350'
1300'
1250'
1200'
1150'
1100'
1050'
1000'
950'
900'
ELEVATION (FEET)
715'
720'
725'
730'
735'
740'
745'
NON-SKEWED

PLATE A-6

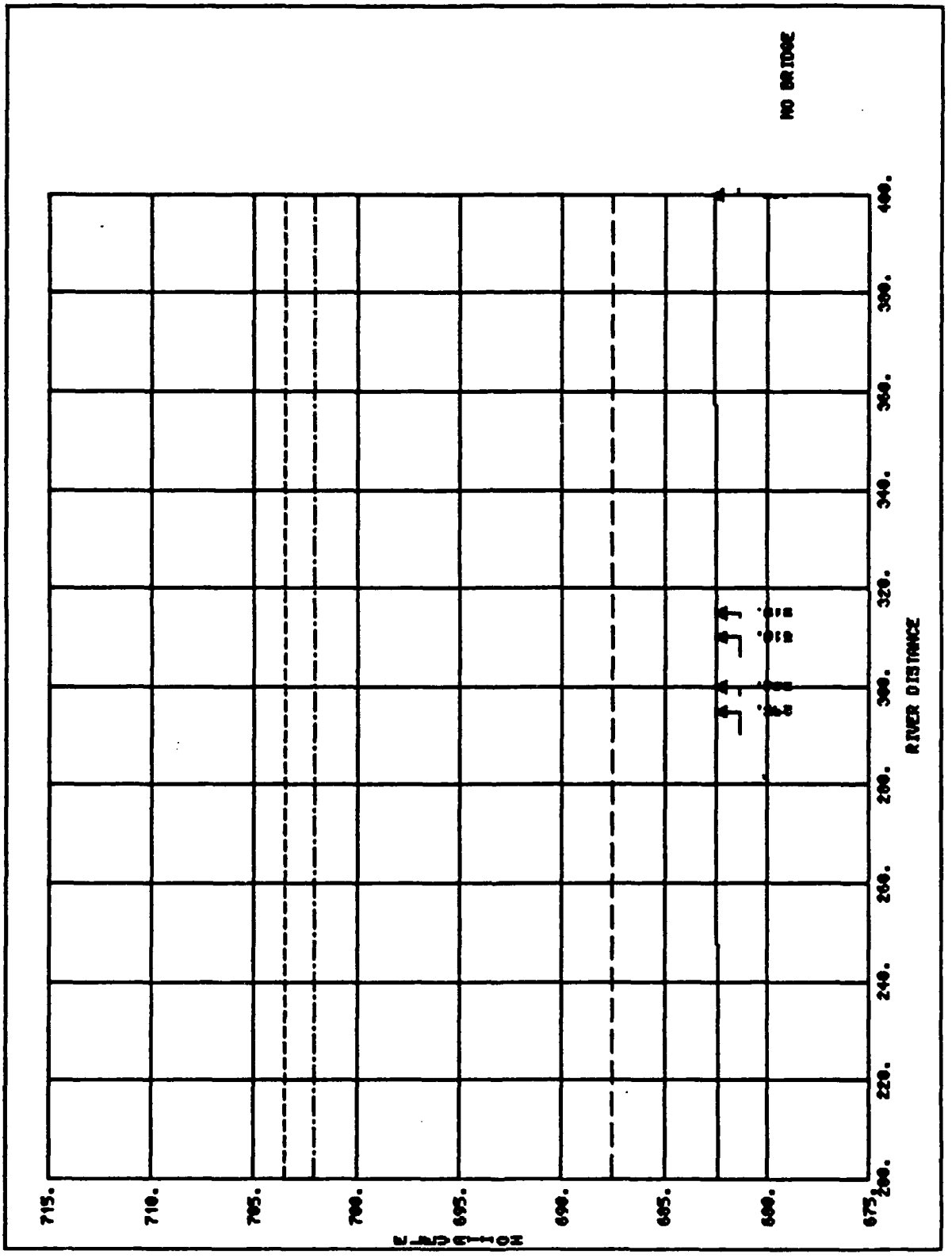

NO BRIDGE
RIVER DISTANCE
715.
710.
705.
700.
695.
690.
685.
680.
675.
200.
220.
240.
260.
280.
300.
320.
340.
360.
380.
400.

PLATE A-7

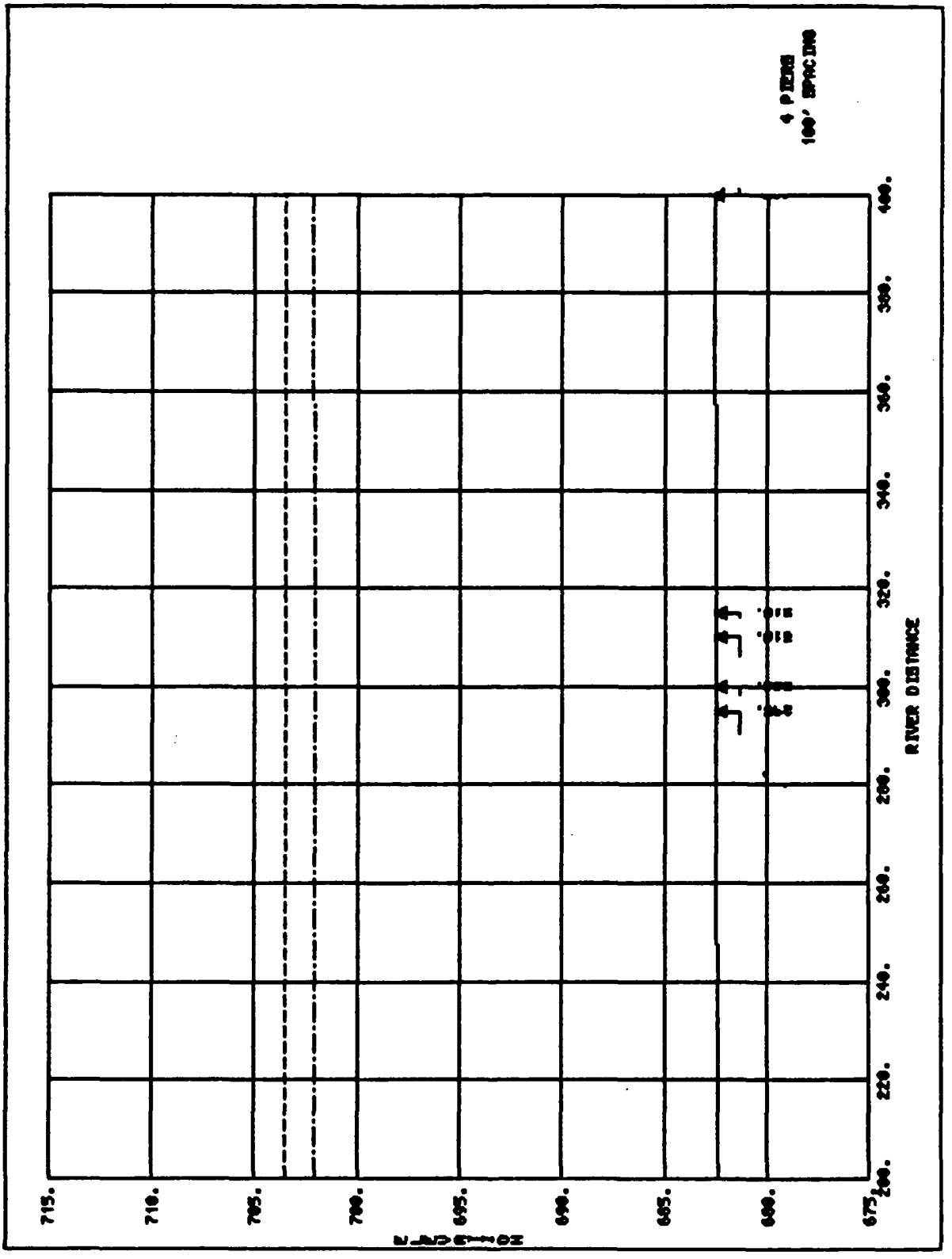

4 PIERS
100' SPACING
RIVER DISTANCE
715.
710.
705.
700.
695.
690.
685.
680.
675.
200.
220.
240.
260.
280.
300.
320.
340.
360.
380.
400.

PLATE A-8

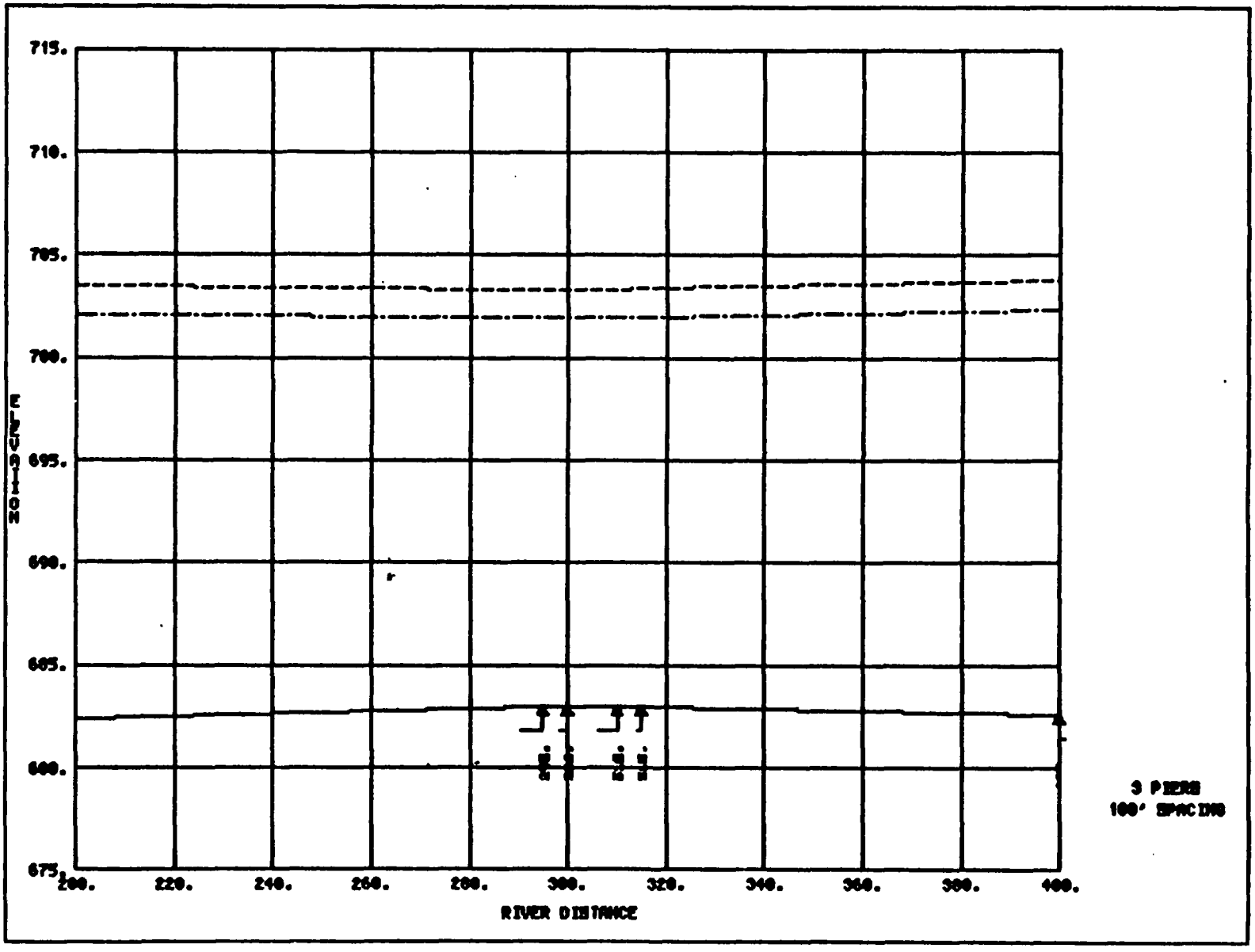

715.
710.
705.
700.
695.
690.
685.
680.
675.
ELEVATION
200.
220.
240.
260.
280.
300.
320.
340.
360.
380.
400.
RIVER DISTANCE
3 PIERS
100' SPACING

PLATE A-9

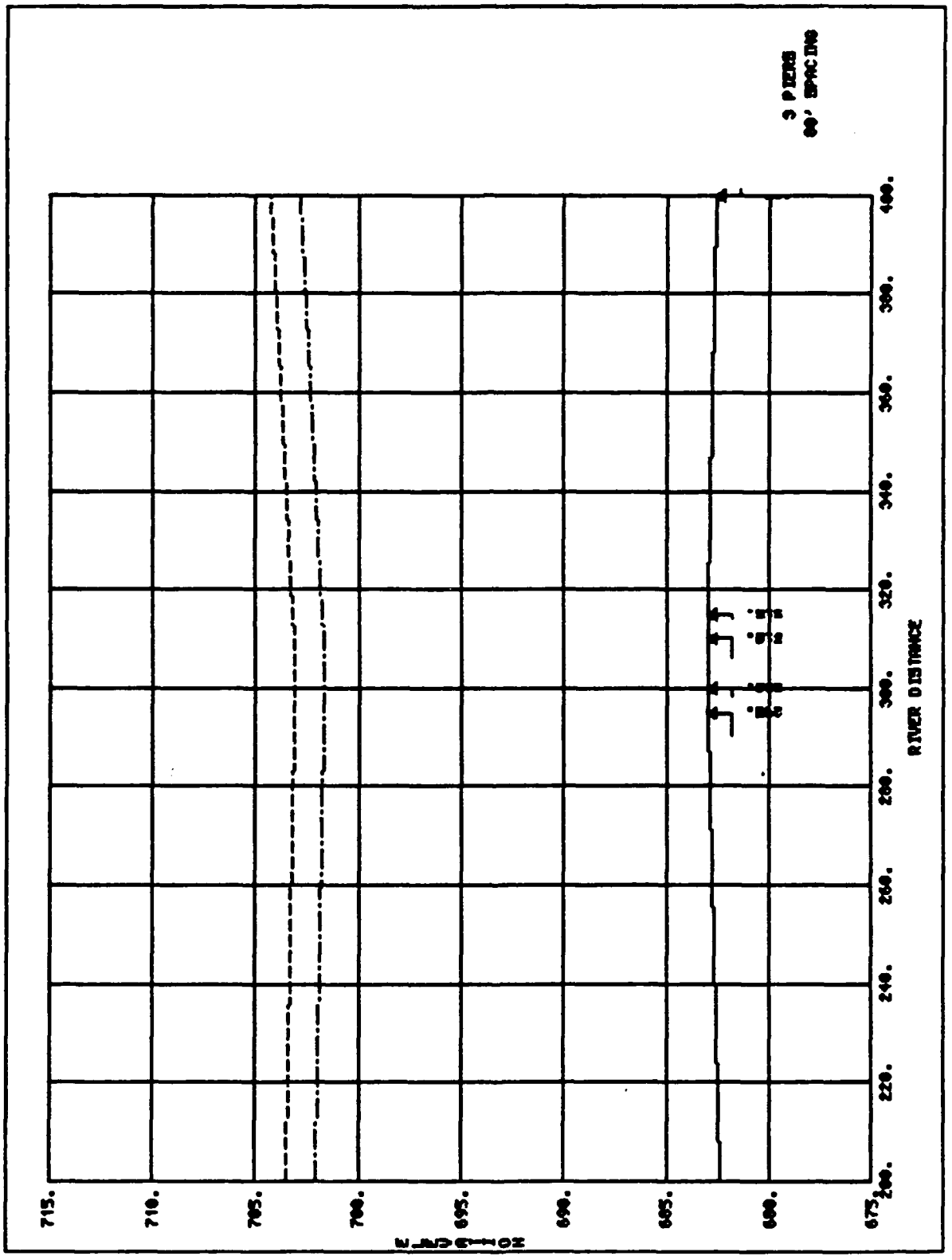

3 PIERS
80' SPACING
RIVER DISTANCE
715.
710.
705.
700.
695.
690.
685.
680.
675.
400.
380.
360.
340.
320.
300.
280.
260.
240.
220.
200.

PLATE A-10

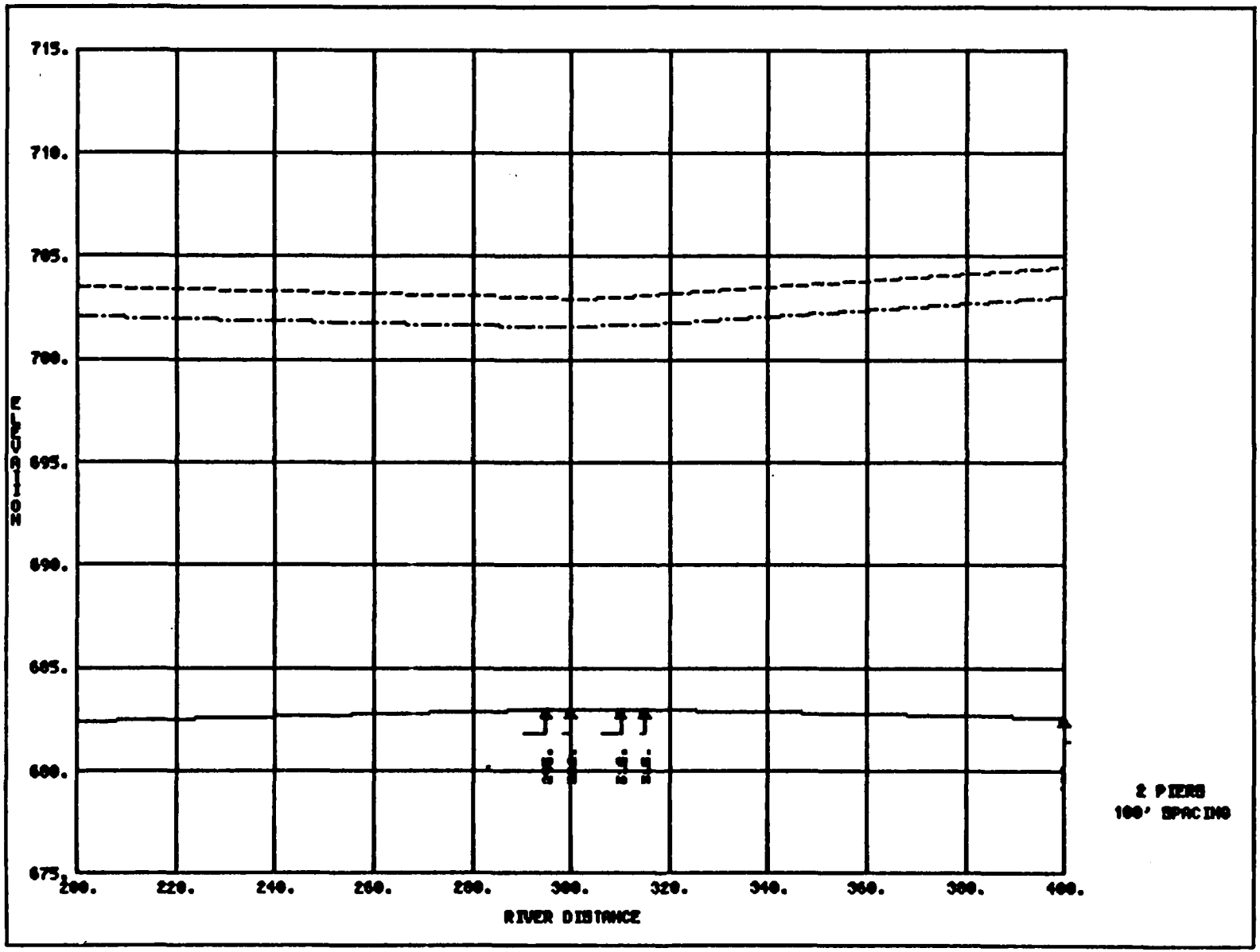

715.
710.
705.
700.
695.
690.
685.
680.
675.
200.
220.
240.
260.
280.
300.
320.
340.
360.
380.
400.
RIVER DISTANCE
2 PIERS
100' SPACING

PLATE A-11

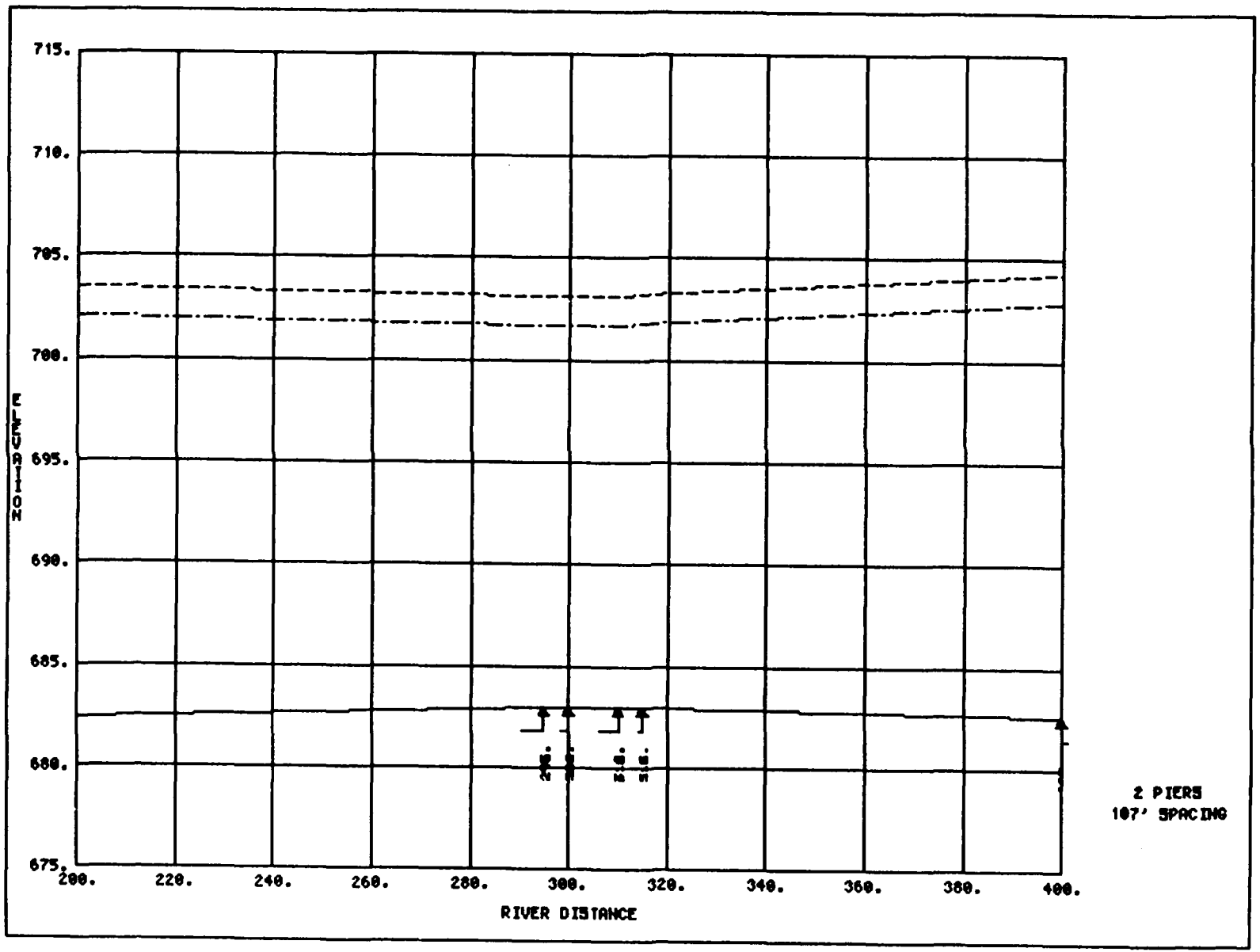
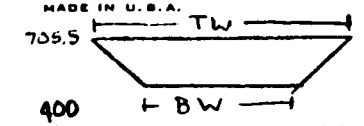

715.
710.
705.
700.
695.
690.
685.
680.
675.
ELEVATION
200.
220.
240.
260.
280.
300.
320.
340.
360.
380.
400.
RIVER DISTANCE
2 PIERS
107' SPACING

PLATE A-12

NO. 340-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.



CHANNEL TOP WIDTH (FT)

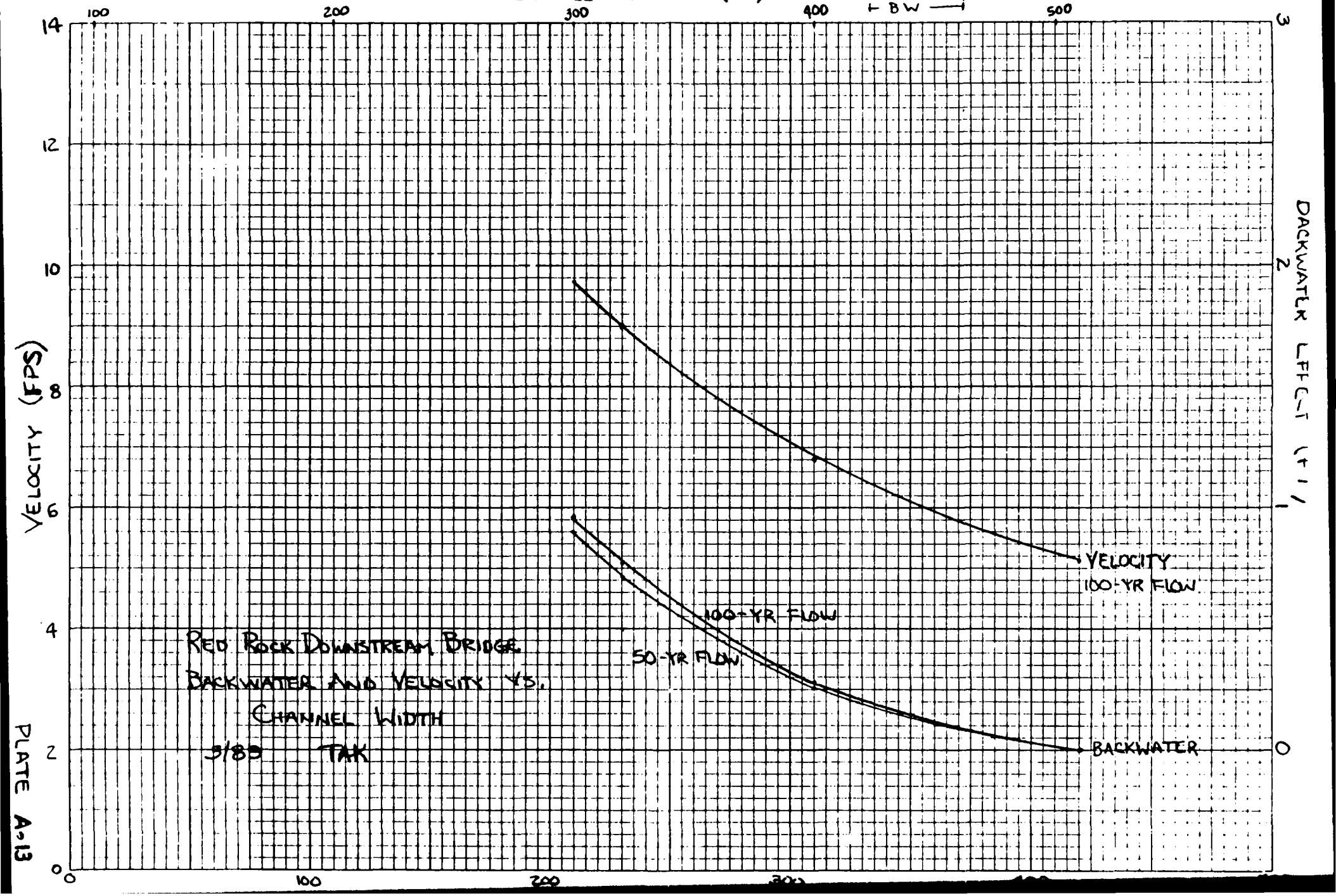
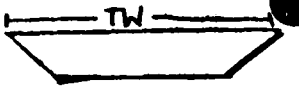
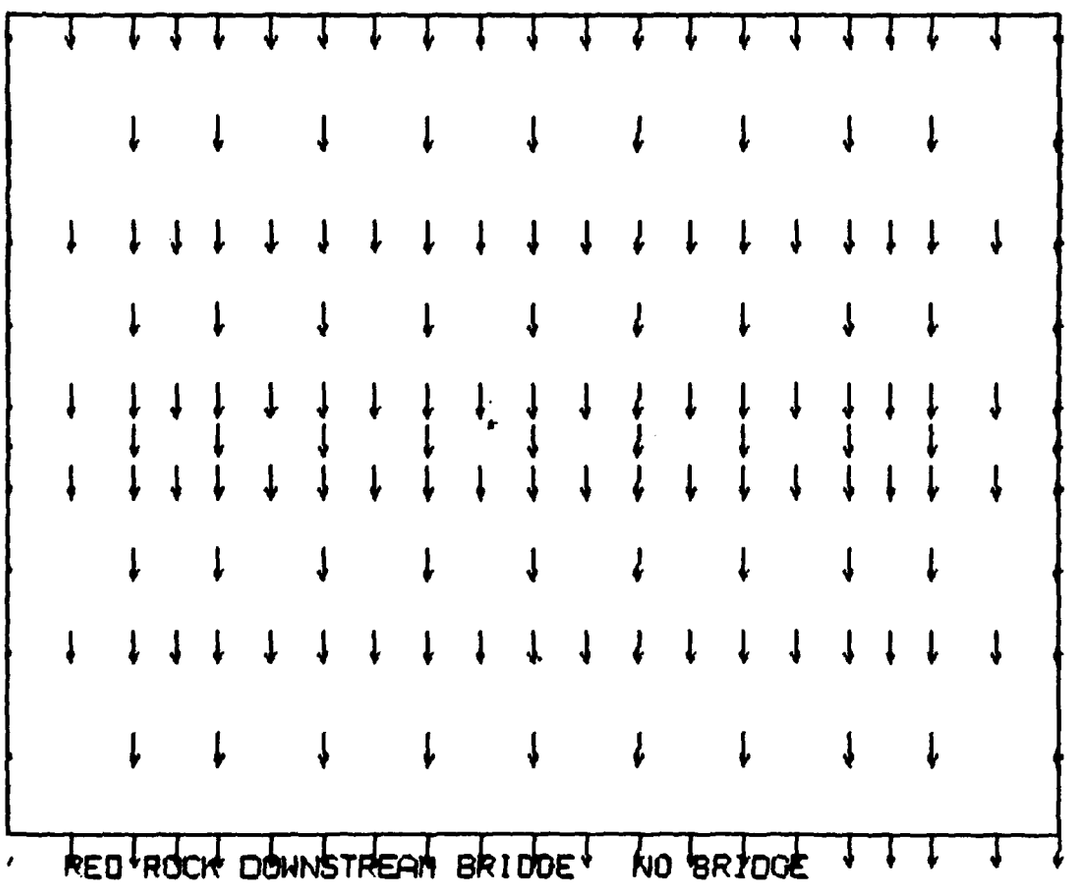


PLATE A-13



CHANNEL TOP WIDTH (FT)

RED ROCK DOWNSTREAM BRIDGE
BACKWATER AND VELOCITY
VS. CHANNEL WIDTH
BEFORE AND AFTER SCOUR
100-YR FLOOD
3/89 TAK



20

20.0 FPS

EXCEEDS PLOT LIMIT

XS = 66.67 FT/IN

YS = 33.33 FT/IN

MODEL TIME = 0.00

23 MAR 88

PLATE A-15

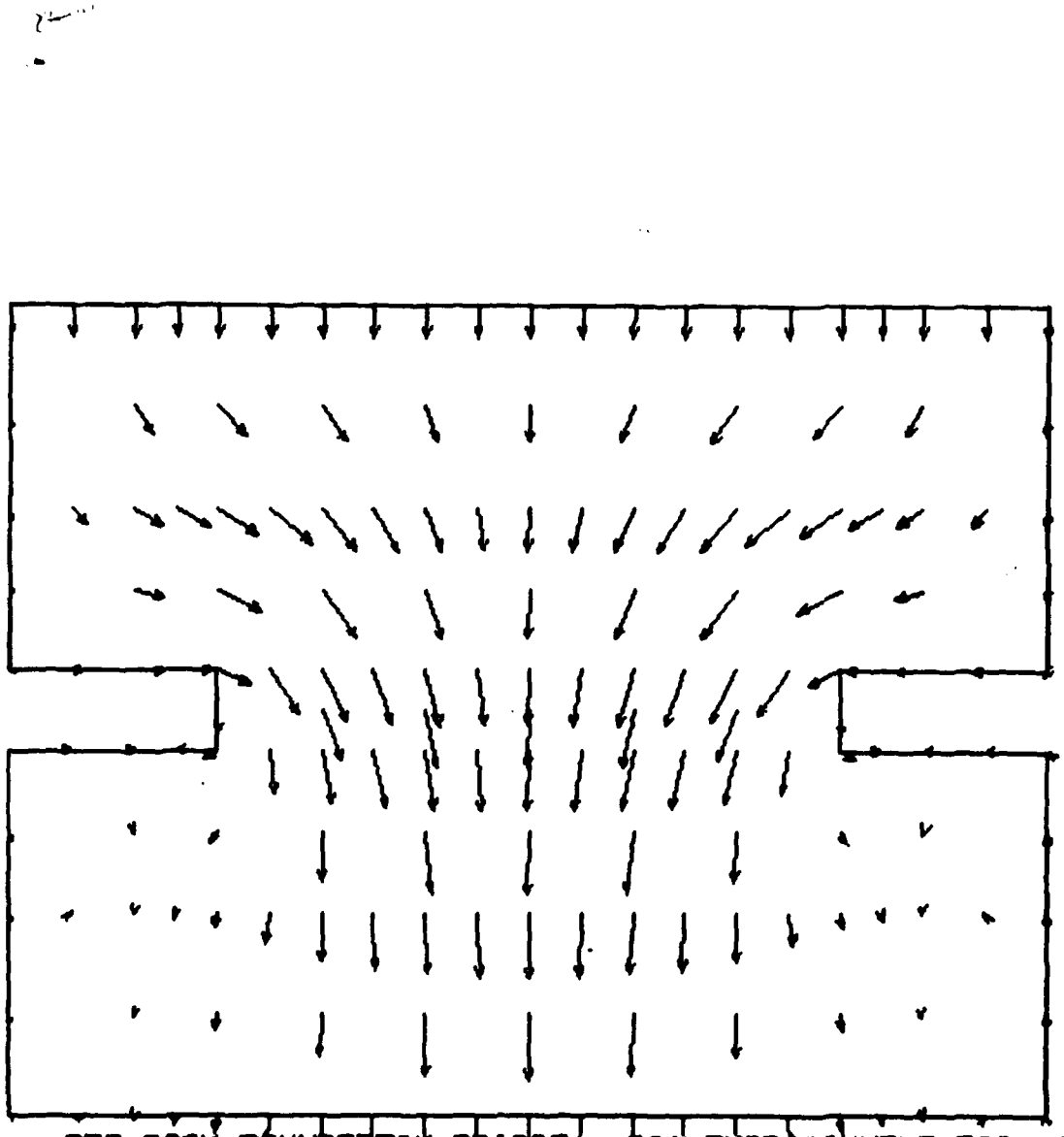

20.0 FPS
EXCEEDS PLOT LIMIT
XS = 66.67 FT/IN
YS = 33.33 FT/IN
MODEL TIME = 0.00
29 MAR 68
RED ROCK DOWNSTREAM BRIDGE 80' ENCROACHMENT EACH SIDE
0

PLATE A-1

APPENDIX D

Geotechnical

APPENDIX B

FEATURE DESIGN MEMORANDUM #3
WITH ENVIRONMENTAL ASSESSMENT
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK, SEGMENT 1

Geotechnical Appendix

Table of Contents

FEATURE DESIGN MEMORANDUM #3
WITH ENVIRONMENTAL ASSESSMENT
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK, SEGMENT 1

Geotechnical Appendix

I. GEOLOGY OF THE AREA

The bedrock in this portion of Iowa consist of consolidated sedimentary rocks of Pennsylvanian and Mississippian age. The uppermost Pennsylvanian strata are composed mainly of shale and interbedded thin layers of sandstone, limestone, and coal. These rocks underlie the uplands and form outcrops along the walls of the Des Moines River Valley and in the reservoir slopes. Just beneath these Pennsylvanian strata are sandstones, limestones, and occasional gypsum beds of Mississippian age. These rocks do not outcrop at the dam site but form the floor of the Des Moines Valley.

The bedrock surface under the uplands and gently sloping valley sides is mantled by glacial drift that ranges in thickness from a few feet to about 100 feet. This material, which is principally a sandy, pebbly clay containing localized sand lenses, is overlain by loess deposits of variable thickness.

The Des Moines Valley, which was carved through the glacial drift and the Pennsylvanian bedrock into rocks of Mississippian age, is partially filled with glacial outwash and alluvium. The thickness of these materials varies considerably because they were deposited on an uneven bedrock floor, which has a relief of about 25 feet. Although the valley is heterogeneous in composition and texture, it can be categorized by two principal textural types. An upper layer of clay, silt, and fine sand, ranging in thickness from a few feet to about 15 feet underlies most of the present valley floor. Beneath this fine-textured material is an uneven blanket of outwash sand and gravel that ranges in thickness from a few feet to about 30 feet. The present pilot channel and the former channel of the Des Moines River are both cut into the sand and gravel deposits.

The bedrock floor of the Des Moines River at the proposed bike path bridge consists of alternate beds of sandstones and limestones with some shales. A boring by boring analysis is considered most appropriate for this work since bridge piers are being considered in the construction.

II. SUBSURFACE EXPLORATIONS

Six (6) borings designated as RB-89-1 through RB-89-6 were taken to determine the various soil profile components, the engineering characteristics of the foundation materials and to provide criteria for foundation design. Four (4) borings RB-89-2 through RB-89-5 were taken in the channel and drilled to depths ranging from 28 feet to 30 feet

below the water surface. Two (2) borings RB-89-1 and RB-89-6 were taken on top of channel banks and drilled to depths ranging from 45 feet to 50 feet below the existing ground surface. Boring locations are shown on plate 1 of the main report.

Work was performed by contract assignment and was supervised by a Corps of Engineers geologist. A Central Mine Equipment (CME-850) ATV drill rig was used and the bore holes were advanced with a 3-1/4-inch hollow-stem auger or NX casing and a 2-7/8-inch rock bit. Samples were collected from the unconsolidated material with a 2-inch split spoon sampler using standard penetration techniques.

The types of foundation materials encountered have been visually classified and are described in detail on the boring logs as shown on plate 5 of the main report. The standard penetration tests "N" values, water level observation, moisture contents, and other laboratory and field tests are presented on the boring logs.

III. BRIDGE ABUTMENTS

The proposed bridge abutments, as shown on plate 1 of the main report, is approximately 25 feet high. The crown of the embankment will be twelve (12) feet wide for ease of the construction and to accommodate the bike path trail. The abutment will be constructed one (1) vertical on two (2) horizontal side slopes from station 0+00 to 1+10 and 4+30 to 5+27. The abutments will be built with the sand (SP) excavated from the river. The typical cross sections of the proposed abutments are shown on plate 3 of the main report.

The bridge abutment slopes will be protected against velocity and current action by an eighteen (18) thick bed of riprap with the following gradation. The design of the riprap is given in Appendix A, Hydrology and Hydraulics.

18-INCH RIPRAP

PERCENT LIGHTER BY WEIGHT	LIMITS OF STONE WEIGHT (LBS)	
	UPPER	LOWER
100	292	117
50	86	58
15	43	18

This riprap will be placed on the 6-inch thickness bedding layer of the following gradation:

U.S. STANDARD SIEVE SIZE	PERCENT PASSING (BY WEIGHT)
1-1/2	85-100
3/4	40-85
3/8	15-45
No. 4	0-20
No. 8	0-5

The material classified as SP with less than five (5) percent by weight passing a U.S. Standard Sieve No. 200 will be used to construct the abutments. Maximum fill density of the sand will be controlled by placement and shaping of the material while still saturated. Vibration and tracking by bull dozers will achieve maximum 75 percent relative density.

IV. FOUNDATION FOR ABUTMENTS

The entire foundation beneath the proposed abutment will be cleared and stripped to remove unsuitable materials.

An extensive field investigation was made to ascertain the proposed abutment foundation conditions. According to borings (RB-89-2 through RB-89-5), the foundation material consists of alluvial sand deposits. The top stratum varies in thickness from 8 to 10 feet, and consists of alluvial sands. According to borings RB-89-1 and RB-89-6, which were taken on the top of channel banks, top stratum consists of brown lean clay (CL) and varies in thickness from 7 to 8 feet. The moisture content ranges from 16 to 37 percent. This material is underlain by the alluvial sand. Standard penetration test for alluvial sand zone ranged from 6 to 15 and indicated a loose to medium relative density. Detailed description of the encountered materials are shown on boring logs, plate 5 of the main report. Gradation tests of sands reveal the effective grain size (D_{10}) of pervious soils to range from .17 mm to .43 mm as shown on gradation curves, plates B-1 through B-5.

Borings were extended into the bedrock to depths ranging from 14 feet to 18 feet. The top elevations at which bedrock was encountered ranged from 674.1 to 672.0. The bedrock was NX cored from each hole to determine the rock top and quality. The bedrock at the bike path bridge consists of alternate beds of sandstones and limestones with some shales. Poor to moderately well cemented, soft-gysum was encountered at the bottom of the hole RB-89-1.

V. FOUNDATION FOR PIERS

Four piers will be built to support the bike path trail. The location of the piers are shown on plate 2 of the main report. One boring was taken at each pier location to determine the engineering characteristic of the foundation materials and to provide criteria for piers foundation design. The piers foundation will be carried into the hard bedrock. Therefore, 13 feet to 18 feet of bedrock was extracted to determine the characteristics and condition of the bedrock. The top elevations at which the bedrock occurs ranges from 674.1 to 672.0. Detail description, of the bedrock are shown on boring log, plate 5 of the main report. The strength data recommended for the piers foundation design and suggested elevation for footings are presented below. The following table also presents the description of rock types and rock quality sandstones and limestones with some shales. Detail descriptions of the bedrock are shown on boring logs plate 5 of the main report.

RED ROCK DAM BIKE PATH BRIDGE FOOTINGS

RECOMMENDED BEDROCK STRENGTH DATA

BORING NO.	ROCK TYPE	BETWEEN ELEV.±.5' (MSL)	ROCK QUALITY	ANGLE OF INTERNAL FRICTION (DEG.)	AVERAGE SHEAR STRENGTH (PSI)	AVERAGE UNCON. COMP. STRENGTH (PSI)	SUGGESTED POSSIBLE ELEV. FOR FOOTING.±1' (MSL)
RB-89-1	SANDSTONE	672.0-663.0	POOR	58	1,000	5,200	670.0
"	LIMESTONE	664.0-660.0	V.POOR	55	1,100	6,000	
RB-89-2	SANDSTONE	673.0-663.0	V.POOR	60	1,300	8,000	670.0
"	LIMESTONE	663.0-558.0	POOR	56	1,000	6,000	
RB-89-3	SANDSTONE	673.5-665.5	V.POOR	64	1,100	8,000	672.0
RB-89-4	SANDSTONE	674.0-662.0	POOR	58	1,000	5,200	672.0
RB-89-5	SANDSTONE WITH INTERLAYERED L.S.	672.5-661.0	V.POOR	56	1,000	6,000	671.0
RB-89-6	SANDSTONE	674.1-659.9	V.POOR	60	1,300	8,000	670.0

Note: Values taken from ASTM STP 984 and judgement.

Note: Values taken from ETL 1110-2-184 and experience.

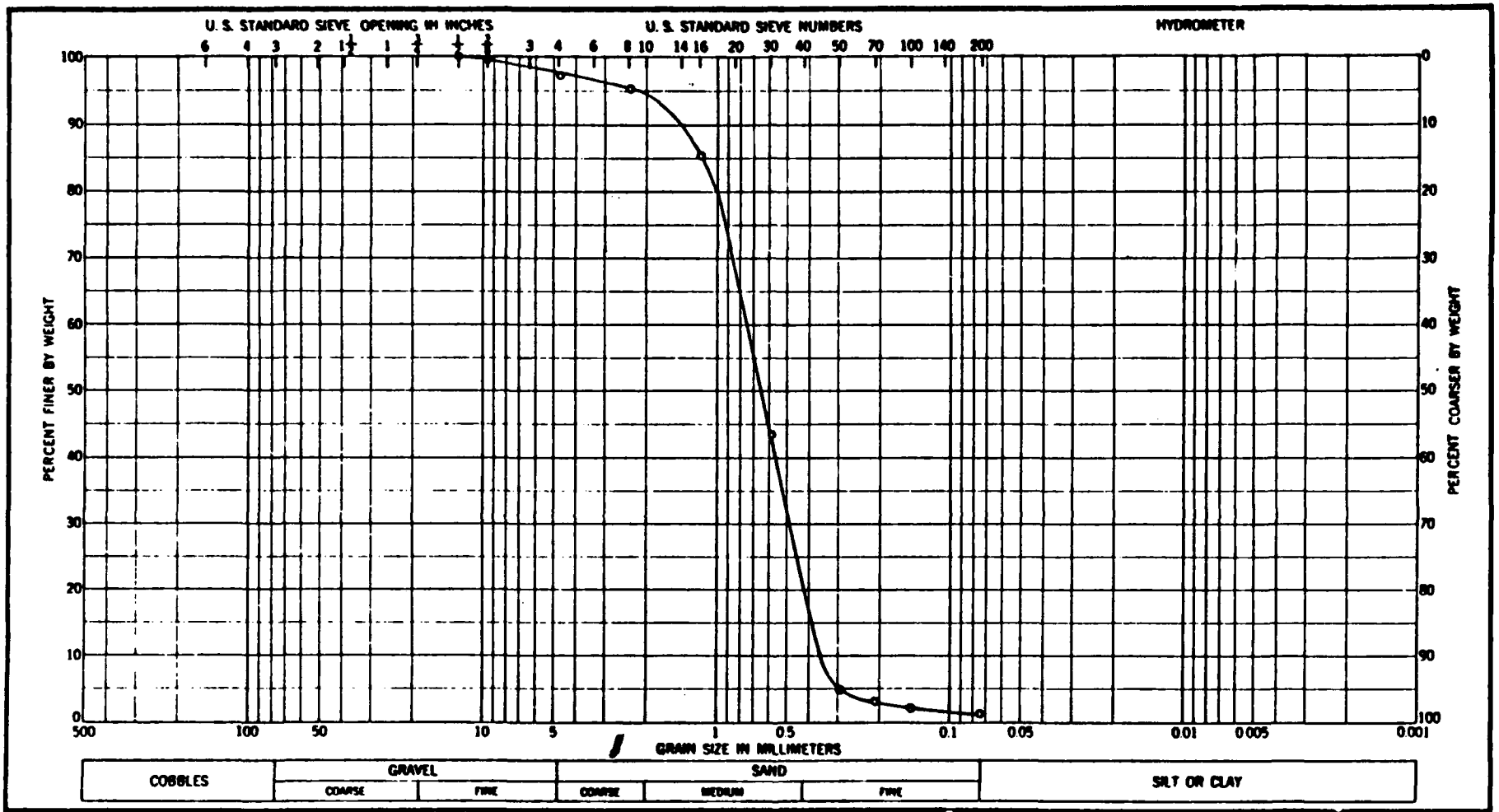
VI. SLOPE STABILITY

The slope stability analysis for the end of construction condition (infinite slope) of a typical cross section of an abutment was based on general soil data. Slope stability was analyzed in accordance with EM 1110-2-1902, "Engineering Design Stability of Earth and Rock fill Dams," dated 1 April 1970.

The maximum height of the compacted pervious abutments are approximately 25 feet. The typical sections are shown on plate 3 of the main report. The foundation consist of alluvial sand (SP) which is underlain by bedrock. Detailed description of the foundation materials are shown on boring logs plate 5 of the main report. The friction angle of the compacted alluvial sand is estimated to be at least 35 degrees. The summary of the slope stability analysis and the solution is shown on plate B-6. The computed minimum safety factor for infinite slope analysis is 1.4 which exceeds the 1.3 required by EM 1110-2-1902 "Engineering and Design Stability of Earth and Rockfill Dam." Therefore, no stability problems are expected. A slope stability analysis for rapid drawn down and steady seepage conditions were not considered necessary, since the pervious abutments will not be subjected to sudden draw down and the water will remain at the same elevation on both sides of the abutments.

VII. BORROW MATERIAL

The borrow material will be dredged from the river. With the close proximity of good source materials, it is apparent a dragline-equipped crane can be used for excavation and placement. Owing to the fact that the abutments stability can be seriously affected by excavation too close, a berm will be left in place between the toe of the abutments and the excavation to ensure abutments stability and to facilitate construction. The borings indicate the sand (SP) ranges from gravelly coarse to medium to fine sand, and coarse to fine sand with gravel, with the majority being gravelly coarse to fine sand. The sand is clean, less than five (5) percent passing the No. 200 sieve. The effective grain size (D_{10}) ranges from 0.17mm to 0.43mm. Borrow material will be required to be saturated, prior to placement. No compaction or shear strength difficulties with this material is anticipated.



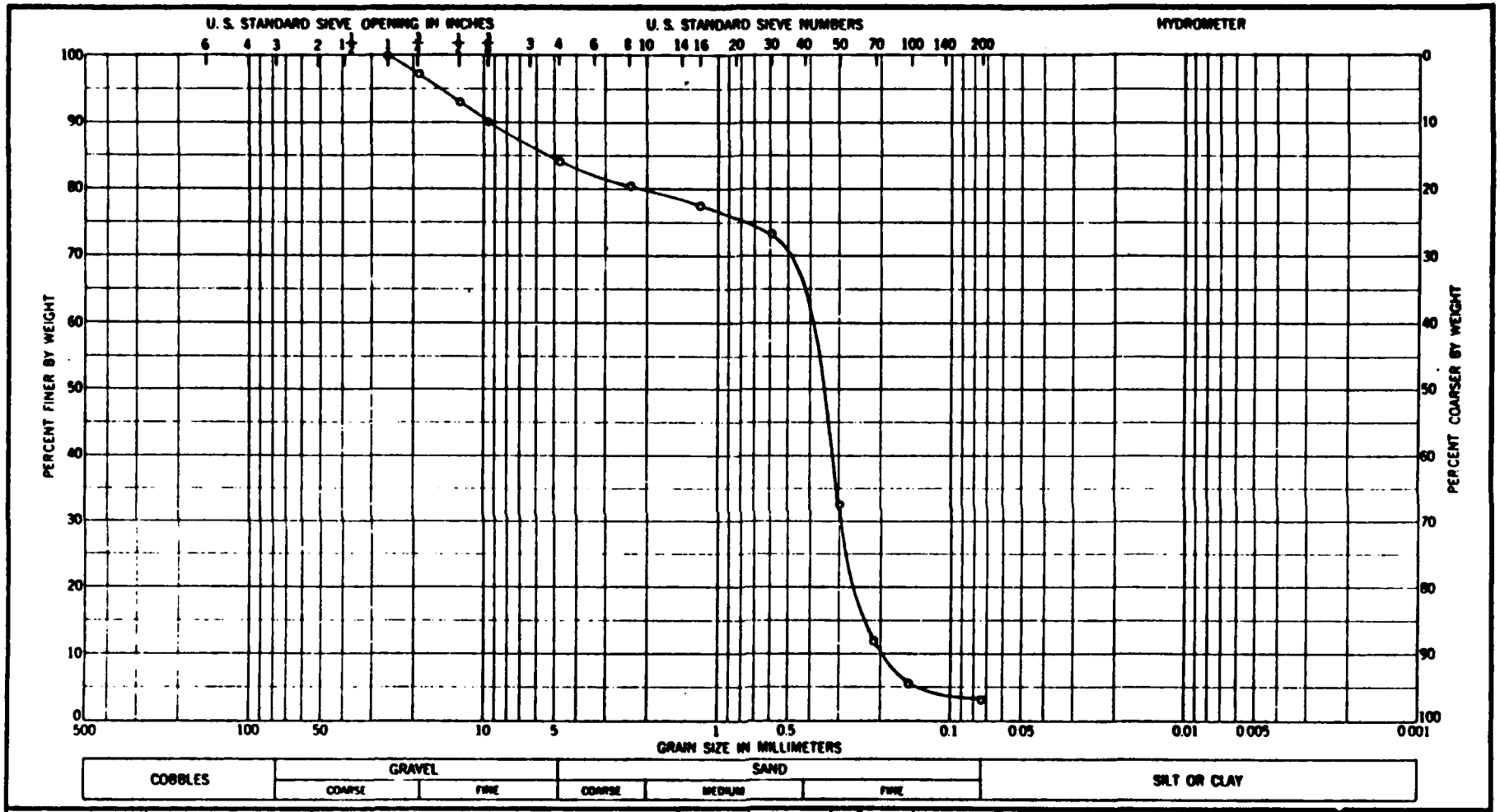
Sample No.	Elev or Depth	Classification	Nat w %	LL	-#200	D10
5	24.5-25.5	SP GRAY MEDIUM TO FINE SAND			1.7%	0.36

GRADATION CURVES

Project: RED ROCK DAM
TAILWATER BRIDGE
Area:
Boring No.: RB-89-1
Date: 14 FEBRUARY 1989

ENG FORM 1 MAY 63 2087

PLATE B-1



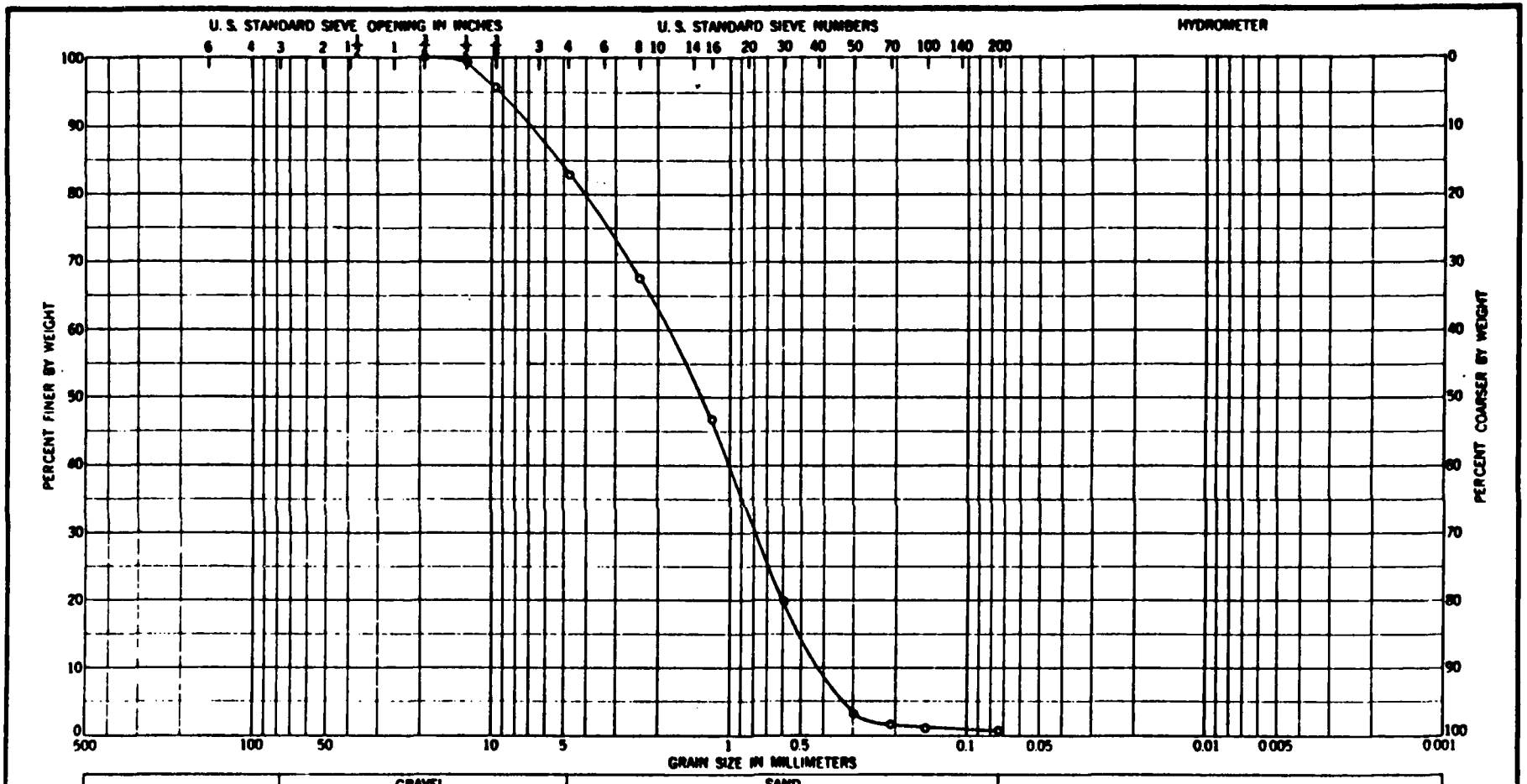
Sample No.	Elev or Depth	Classification	Nat w %	LL	-#200	D10
1	10.0-11.0	SP GRAY GRAVELLY MEDIUM TO FINE SAND			3.3%	0.20

GRADATION CURVES

Project: RED ROCK DAM
TAILWATER BRIDGE
Area:
Boring No.: RB-89-2
Date: 13 FEBRUARY 1989

ENG FORM 1 MAY 63 2087

PLATE B-2



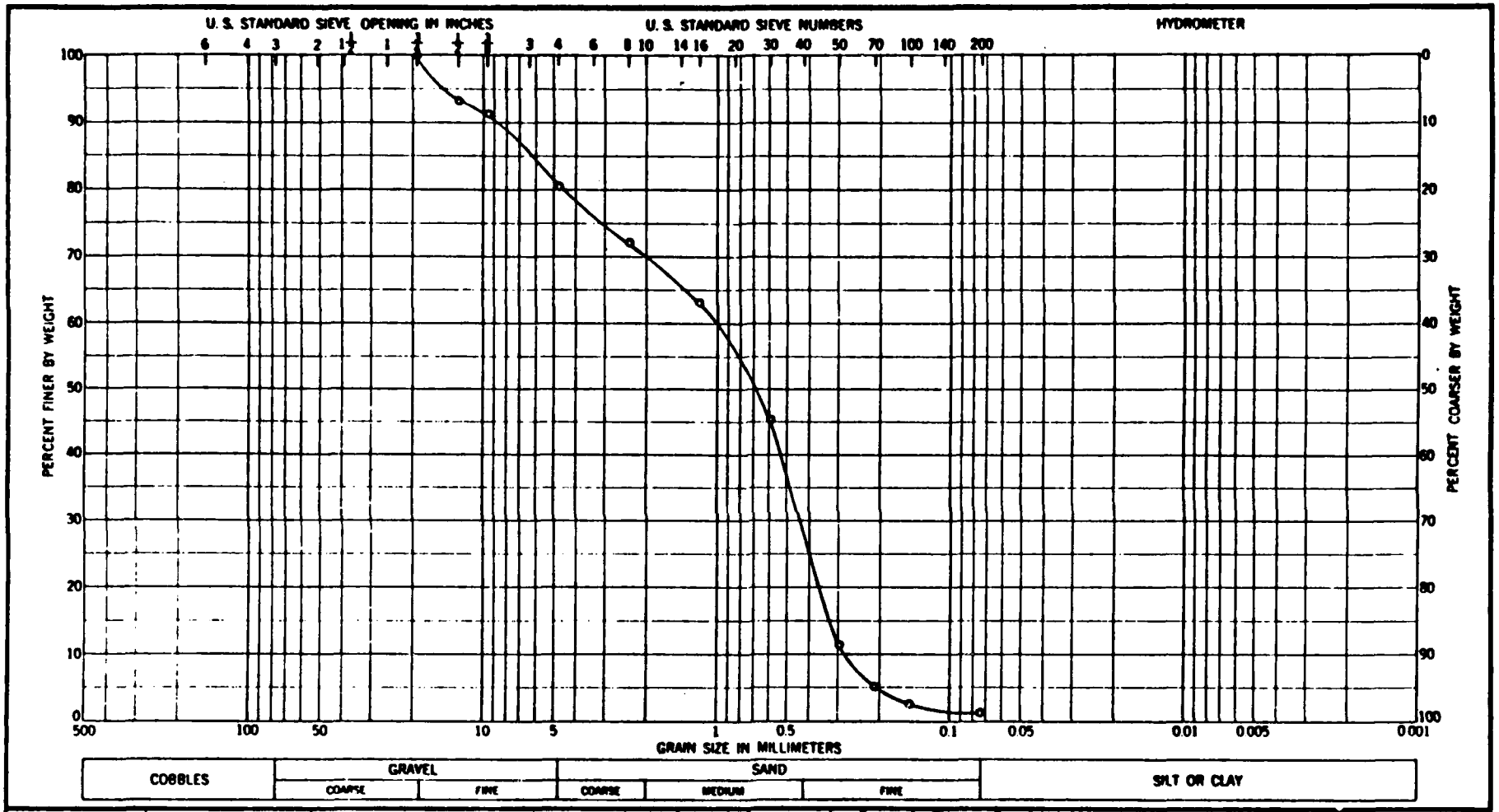
Sample No.	Elev or Depth	Classification	Nat w %	LL	-#200	D10
1	6.5	SP BROWN GRAVELLY COARSE TO MEDIUM SAND			1.1%	0.43

GRADATION CURVES

Project: RED ROCK DAM
TAILWATER BRIDGE
Area:
Boring No.: RB-89-3
Date: 13 FEBRUARY 1989

ENG FORM 1 MAY 63 2087

PLATE B-3



Sample No.	Elev or Depth	Classification	Nat w %	LL	-#200	D10
2	10.5-11.5	SP GRAY GRAVELLY COARSE TO FINE SAND			1.4%	0.28

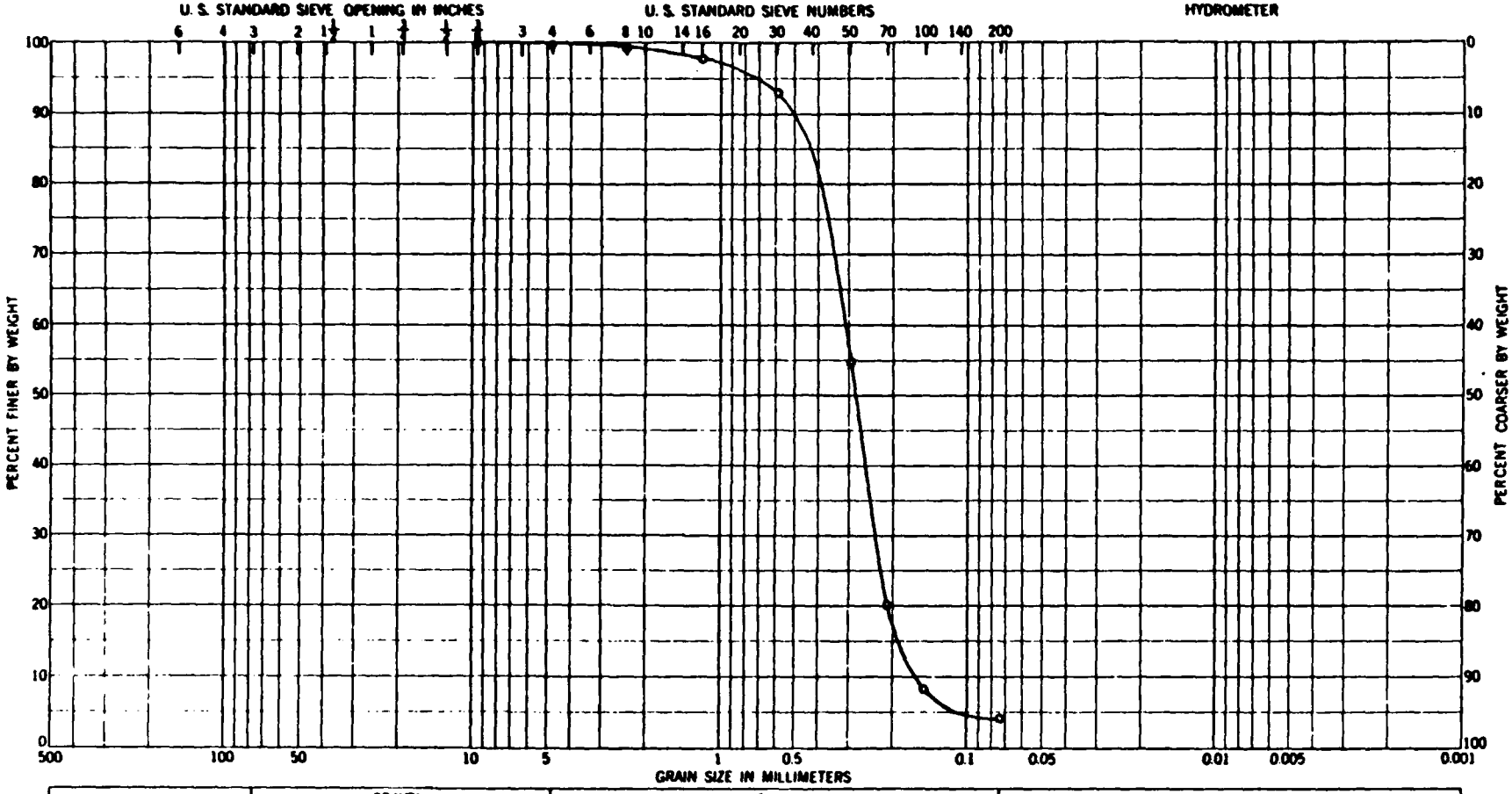
GRADATION CURVES

Project: RED ROCK DAM
TAILWATER BRIDGE
Area:
Boring No.: RB-89-4
Date: 14 FEBRUARY 1989

ENG FORM 1 MAY 63 2087

PLATE B-4

PLATE B-5



Sample No	Elev or Depth	Classification	Nat w %	LL	-#200	D10
5	24.5-25.5	SP GRAY MEDIUM TO FINE SAND			4.7%	0.17

GRADATION CURVES

Project: RED ROCK DAM
TAILWATER BRIDGE
Area:
Boring No. RB-89-6
Date: 15 FEBRUARY 1989

ENG FORM 1 MAY 63 2087

RED ROCK TRAILS
BRIDGE ABUTMENT

SLOPE STABILITY ANALYSIS

INFINITE SLOPE ANALYSIS
TYPICAL SLOPE

END OF CONSTRUCTION

F.S. = Factor of Safety

$$F.S. = \frac{\tan \phi}{\tan B} \quad \text{(No Seepage)}$$

1V on 2.ØH SLOPE

ϕ = 35 degrees, tan ϕ = 0.70

B = 26.6 degrees (1V on 2H) tan B = .5

$$F.S. = \frac{.70}{.5} = 1.4 > 1.3 \quad OK$$

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FEATURE DESIGN MEMORANDUM #3
WITH ENVIRONMENTAL ASSESSMENT
DES MOINES RECREATIONAL RIVER & GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK, SEGMENT 1

Structural

Table of Contents

Subject		Date
RED ROCK BIKE BRIDGE		15 MAR 82
Computed by K. WILSON	Checked by DAP	Sheet 1 of

PIER DESIGN

LOADING CONDITIONS REF (1)

GROUP		% ALLOWABLE STRESS
I	DL + (LL+I) + B + SF	100 %
II	DL + B + SF + W	125 %
III	DL + (LL+I) + B + SF + 0.3W + WL + LF	125 %
VIII	DL + (LL+I) + B + SF + I	140 %
IX	DL + B + SF + W + I	150 %

WHERE:

DL = DEAD LOAD
LL = LIVE LOAD
I = IMPACT
B = BOUYANCY
SF = STREAM FLOW
W = WIND
WL = WIND ON LL
LF = LONGIT. FORCE FROM LL
I = ICE

REFERENCES:

(1) "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES", AASHTO
(2) DATA FROM CONTINENTAL BRIDGE CO.
(3) DATA FROM ED-HW (TOM KIRKEENG)
(4) ILL. BRIDGE STANDARDS

Subject		Date
RED ROCK BIKE BRIDGE		16 MAY 89
Computed by K. WILSON	Checked by DAP	Sheet 2 of

TRUSS BRIDGE (100'-0")

DEAD LOAD TO PIER REF. (2)

BRIDGE 35,000#
2" NOMINAL DECKING 4,376#
} ÷ 2 = 19,688# PER SIDE

LIVE LOAD TO PIER

$60\left(\frac{10}{2}\right)(100) = 30{,}000^{\#}$ PER SIDE

WIND LOAD TO PIER (ON FULL VERT. PROJECTED AREA OF BRIDGE)

$30(7.667)(100) = 23{,}000^{\#}$ APPLIED 4.50' ABOVE TOP OF PIER

RIVER FLOW REF. (1), (3)

$P = K V^2$ $K = 0.667$ FOR CIRCULAR PIERS

$V = 9.35$ FT/SEC

$P = 0.667(9.35)^2 = 58.3$ psf

$= 146^{\#}$ PER FT. HEIGHT FROM RIVER LEL

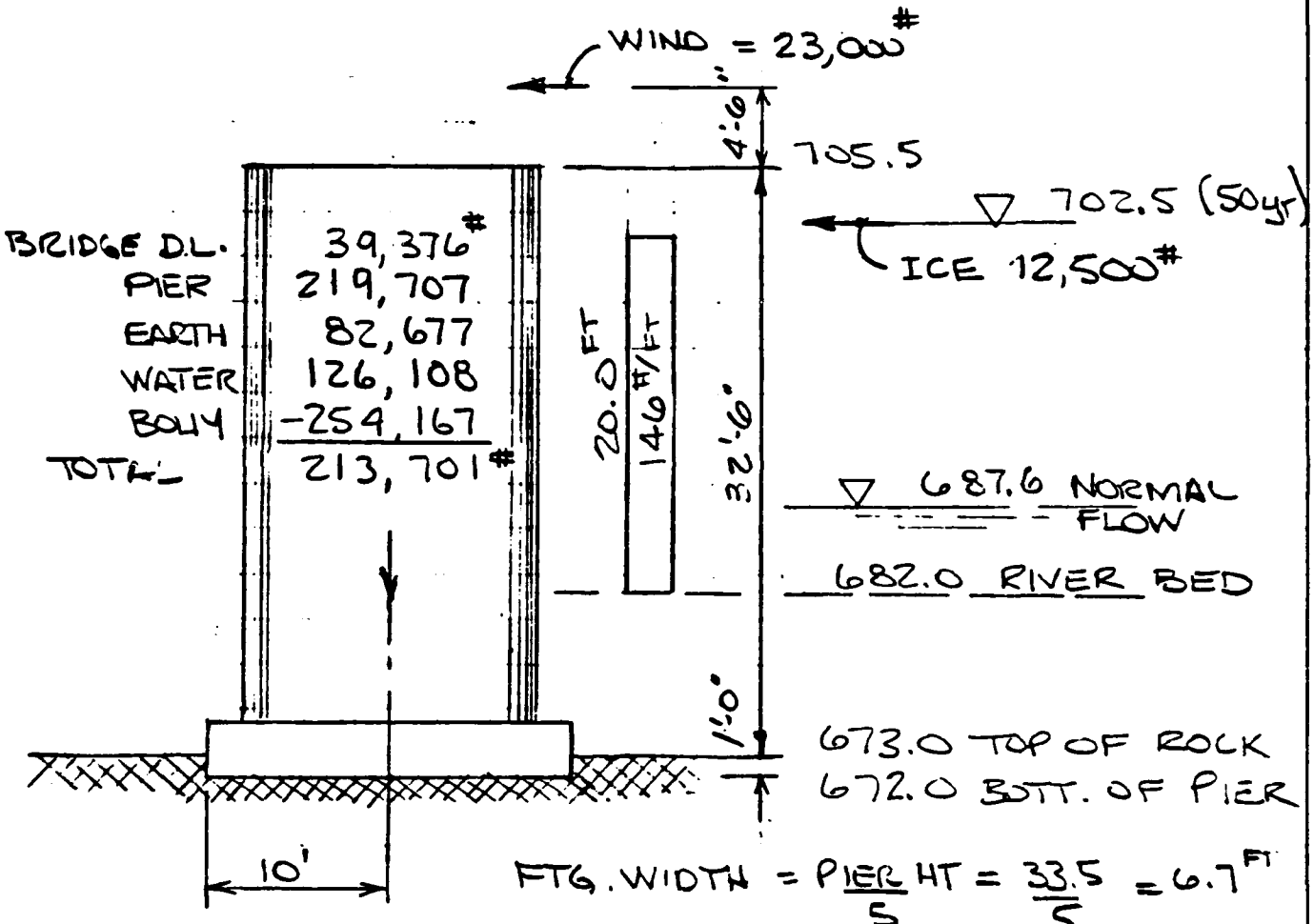
ICE

BECAUSE THE BRIDGE IS DOWNSTREAM FROM SPILLWAY OF RED ROCK DAM, NO LARGE ICE FLOWS ARE ANTICIPATED. ∴ 5,000 #/FT OF PIER IS USED AT 50 yr. LEVEL.

Subject		Date
RED ROCK BIKE BRIDGE		16 MAR. 89
Computed by K. WILSON	Checked by DAP	Sheet 3 of

TRUSS BRIDGE PIER

FOR VERTICAL LOADS SEE NEXT SHEET.



FTG. WIDTH = $\frac{\text{PIER HT}}{5} = \frac{33.5}{5} = 6.7^{FT}$

$M_o = 23,000(38.00) + 12,500(30.50) + 146(20.0)(20.0)$

$= 1,313,650^{FT-\#}$

$\frac{M_R}{M_o} = 1.62 > 1.50$

$M_R = 2,137,010^{FT-\#}$

$\bar{Y} = \frac{1,313,650}{213,701} = 6.14^{FT}$

Subject		Date
RED ROCK BIKE BRIDGE		16 MAR. 89
Computed by K. WILSON	Checked by DAP	Sheet 4 of

TRUSS BRIDGE PIER
VERTICAL LOADS

PTG.	$150(6.67)(20.0)(3.0)$	$= 60,000^{\#}$	$219,707^{\#}$
PIER	$150(2.5)(12.0)(30.5)$	$= 137,250$	
	$150(1.25)^2\pi(30.5)$	$= 22,457$	
EARTH	$120(6.67)(20.0)(7.0)$	$= 112,000$	$82,677^{\#}$
	$-120(2.5)(12.0)(7.0)$	$= -25,200$	
	$-120(1.25)^2\pi(7.0)$	$= -4,123$	
5' H_2O	$62.5(6.67)(20.0)(5.0)$	$= 41,667^{\#}$	$30,758^{\#}$
	$-62.5(2.5)(12.0)(5.0)$	$= -9,375$	
	$-62.5(1.25)^2\pi(5.0)$	$= -1,534$	
UPLIFT	$-62.5(6.67)(20.0)(15.0)$	$= 125,000^{\#}$	
20.5' H_2O	$30,758\left(\frac{20.5}{5.0}\right)$	$= 126,108^{\#}$	
UPLIFT	$125,000\left(\frac{30.5}{15.0}\right)$	$= -254,167^{\#}$	
12.75 H_2O	$30,758\left(\frac{12.75}{5.0}\right)$	$= 78,433^{\#}$	
UPLIFT	$125,000\left(\frac{22.75}{15.0}\right)$	$= 189,583^{\#}$	

Subject		Date
RED ROCK BIKE BRIDGE		17 MAR. 89
Computed by K. WILSON	Checked by DAP	Sheet 5 of

TRUSS BRIDGE PIER

KEEP RESULTANT IN CENTER 1/2 OF FTG.

∴ FTG LENGTH = 4(6.14) = 24.56 FT

SAY 24'-0"

ADDED VERT. LOAD

150 (6.67)(4.0)(3.0) = 12,006
120 (6.67)(4.0)(7.0) = 22,411
62.5 (6.67)(4.0)(20.5) = 34,184
− 62.5 (6.67)(4.0)(30.5) = −50,859
17,742 #

TOTAL VERT. LOAD = 17,742 + 213,701

= 231,443 #

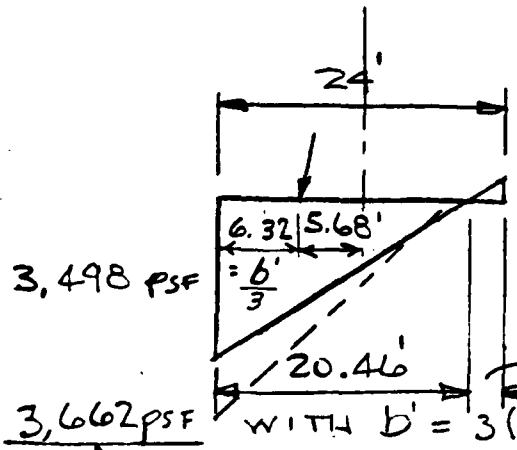
PRESSURES

$$\frac{P}{A} \pm \frac{Mc}{I} = \frac{231,443}{6.67(24.0)} \pm \frac{1,313,650(12.0)}{7,684}$$

$$= 1,446 \pm 2,052 = 3,498 \text{ PSF}$$

OR

− 606 PSF



$$\bar{Y} = \frac{1,313,650}{231,443} = 5.68 \text{ FT} \quad \wedge \quad \frac{24.0}{4}$$

Subject		Date
REL ROCK BIKE BRIDGE		30 MAR 89
Computed by: L WILSON	Checked by: DAP	Sheet 6 of

TRUSS BRIDGE FEL.

DUE TO HIGH FLOW VELOCITY THE RIVER BED WILL SCOUR TO BED ROCK. WHEN THIS HAPPENS THE FLOW VELOCITY DECREASES TO 6.99 FT/SEC.

$$P = 0.667(6.99)^2 = 32.6 \text{ psf}$$

$$= 81^{\#} \text{ PER FT. HEIGHT FROM BED ROCK}$$

$$M_{10} = 23,000(38.00) + 12,500(30.50) + 81(29)(15.5)$$

$$= 1,291,660 \text{ FT-}\# < 1,313,650 \text{ FT-}\# \text{ (SEE SHT. 4)}$$

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Economic and Social Analysis

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DESIGN MEMORANDUM #3
WITH ENVIRONMENTAL ASSESSMENT
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK, SEGMENT 1

Economic and Social Analysis

Table of Contents

TABLES

FIGURES

I. Introduction

This analysis examines the economic feasibility of constructing an additional 2.5 miles of multi-purpose trail to connect existing recreation facilities at Lake Red Rock in Marion County, Iowa. The proposed trail would enhance the recreation experience afforded at the federally owned and managed park complex. In addition, the new segment of trail would help fulfill current and future demand for trail facilities.

II. Existing Conditions

The existing trail system consists of two separate short segments of trail in the tailwater of Lake Red Rock Dam. The trail north of the Des Moines River is approximately 0.65 miles long and is located along the river's edge. It provides access to the water for campers at the Howell Station Campground and to visitors from the North Tailwater day use are. The trail south of the Des Moines River is approximately 0.35 miles long and is also located along the river's edge. It provides a scenic trail along the old channel of the Des Moines River for campers at Ivan's Campground and to visitors from the South Tailwater day use area. Both trails are heavily used by fishermen, walkers, campers, sightseers, and cyclists. The tailwater area is the most intensely used recreation area at Lake Red Rock.

III. Trail System Improvements

The project calls for the construction of 2.5 miles of new multi-purpose trail at Lake Red Rock. The proposed segments of trail would connect four existing recreation areas, enhancing the recreation experience of those using these facilities. In addition, the bridge would connect existing trails, increasing the length of trail available to bikers, hikers, and other recreationist at the park (see Plate 6 of the main report for a map of the proposed trail).

Construction of the new trail would help fulfill the current and projected public demand for recreation trails suitable for hiking, walking, biking, and cross country skiing. The need for additional miles of trail is supported by the market analysis of the Des Moines Recreational River and Greenbelt General Design Memorandum (GDM). The GDM reported that over 500 additional miles of trail would be required to fulfill the Greenbelt market area demand through 1995, due to the high popularity of these forms of recreation. Construction of the proposed segment of trail offers a unique opportunity to link existing trails and lengthen the overall trail network with the Lake Red Rock complex and the Des Moines Recreational River and Greenbelt.

IV. Benefit Computation

The criteria to be used for selecting an appropriate procedure for evaluating recreation projects is detailed in Figure 2.8.2 of the Principles and Guidelines, p. 69 (ER 105-2-40). The steps indicated in

this decision diagram result in selection of the Unit Day Value Method for determining the benefits associated with the proposed trail at Lake Red Rock (see Figure D-1).

Figure D-1
Criteria for Selecting an Appropriate Procedure
for Evaluating Recreation Improvements at Lake Red Rock

Criterion	Answer
Is a regional model available?	No
If "No", do uses affected involve specialized recreation activities?	No
If "No", do estimated annual visits affected exceed 750,000?	No
If "No", do expected recreation costs exceed 25 percent of expended total project costs?	Yes
If "Yes", do specific annual Federal recreation costs exceed $1,600,000 FY89 ($1,000,000 FY82)	No
If "No", then use Unit Day Values for Evaluating Recreation Benefits resulting from the proposed campground improvements	

The selection criterion in Figure D-1 allow for consideration of the size of the recreation benefit created and the nature of the activities affected. Selection of a specific evaluation procedure is based on these components as well as the relative importance of any specialized recreation activity, the advantages of the respective methods, and cost considerations. Following the Principles and Guidelines decision criteria and considering the small scale of the proposed project, the Unit Day Value Method was the preferred evaluation procedure for this analysis.

The proposed trail improvements would result in an enhanced recreation experience, increased opportunity for use of a longer multi-purpose trail, increased trail carrying capacity, improved accessibility to and between Lake Red Rock recreation amenities and increased opportunity to view environmental features of the area. These benefits are detailed in the Principle and Guidelines, Appendix 3 to Section VIII - Unit Day Value Method. A summary of the Unit Day Value Method Assessment is provided in table D-1.

Based on October 1988 price levels, the Unit Day Value of a recreationist using the affected trail segments at Lake Red Rock is currently $ 2.65. Following completion of the proposed 2.5 miles of additional connecting trails, this value would increase by 76 cents to $3.41 per recreationist.

Table D-1
Unit Day Value Assessment for Recreation
Experience on Proposed Multi-Purpose
Trail at Lake Red Rock

Judgement Factor Points

Criteria	Without Project	With Project	Comments
Recreation Experience for Multi-Purpose trail	5	10	New trail would provide a more enjoyable recreation experience for bikers and other trail users, by linking recreation areas and providing a longer, continuous trail recreation experience.
Availability of Opportunity for Multi-Purpose Trail	4	5	New trail would provide a unique experience for recreationists in south central Iowa, based on length of total trail network, connections to unique recreation areas, and safety afforded by trail versus highway biking, walking, etc.
Carrying Capacity for Multi-Purpose Trail	4	8	Proposed construction would provide 2.5 miles of additional trail, allowing increased use of existing recreation amenities and fulfilling a small portion of latent demands. The new length of trail may reduce congestion in existing trails, as well.
Accessibility between and to affected recreation areas and trails	7	12	New trail would connect and link several existing recreation attractions at the lake, and would join existing trails near the dam. In addition, the new trail would provide a vital link for planned trail constructions by Knoxville and Pella, Iowa.
Environmental Quality of affected recreation areas and trails	6	7	New trail would afford viewing of more aesthetic areas, including overview of river from trail bridge.
Total Points	25	43	
Point Value	$ 2.68	$ 3.44	

Net increase in value per recreationist using trail $ 0.76.

Anticipated Use of New Trail

The Greenbelt General Design Memorandum (GDM) reported that a minimum of 500 additional miles of multi-purpose trail within the Greenbelt boundaries would be required to fulfill demand through 1995. Based on the GDM market analysis, it was assumed that the proposed 2.5 mile segment of trail at Lake Red Rock would be fully utilized during the peak summer months of the recreation season. Using the design criteria detailed in the GDM and assuming only bikers and hikers/walkers would use the trail, a total of 3,388 recreationists could use the trail on a peak day without overcrowding.

Survey data for Rock Island District managed recreation areas indicate that 80 percent of all recreation takes place on weekends. Following the methodology in the GDM, the peak daily recreation use of the proposed trail segments was converted to peak monthly use (see computation below):

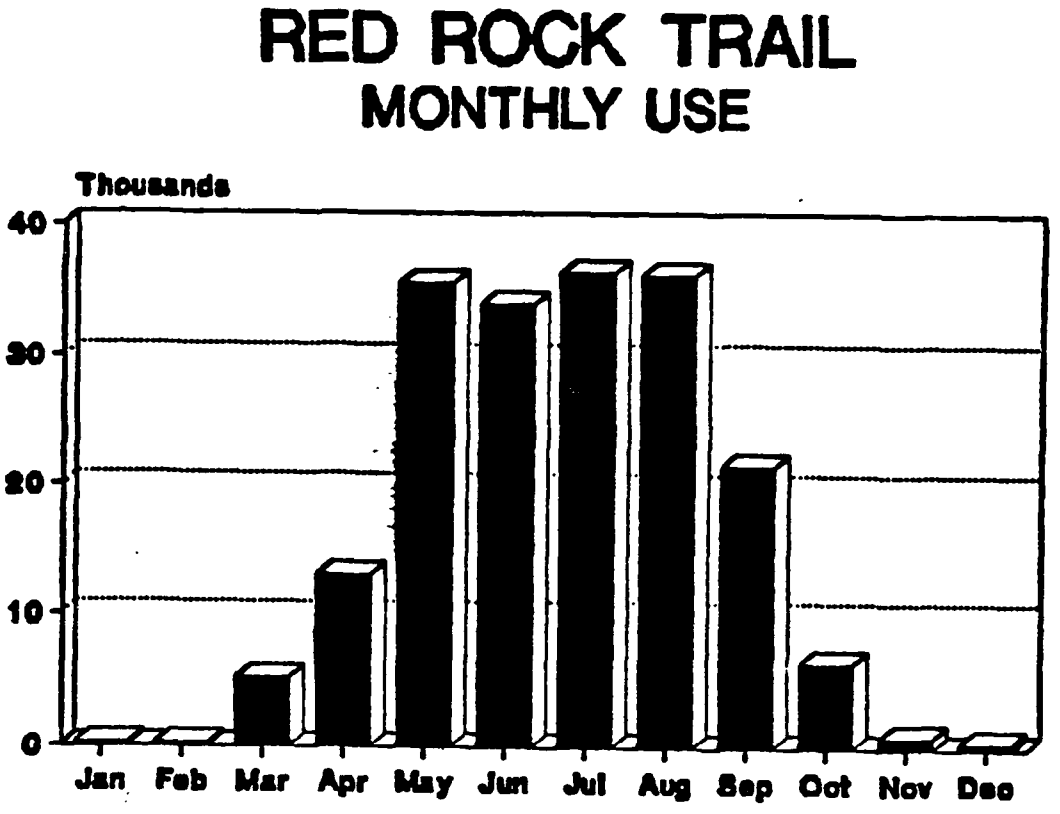
3,388	peak daily use of proposed trail	-	40%	recreation occurring on one weekend day	x	4.29	weeks per month	= 36,337	peaks monthly use of proposed trail (July)

Peak monthly use was converted to estimated annual new trail use by applying monthly recreation attendance trends at the Lake Red Rock complex. As indicated by the resulting anticipated monthly recreation days, use of the new trail would be greatest during the summer months (see figure D-2). Based on this data, the annual recreation days of use of the proposed 2.5 miles of new trail would total approximately 190,200. This figure represents a conservative estimate of annual use, as it assumes no overcrowding of facilities.

Average Annual Benefit

Assuming no change in annual visitation or use of the new trail, 190,200 visitors would benefit from the improvements to the affected trail system for the life of the project (50 years). Therefore, the average annual benefits for the park improvements would amount to $ 144,600 (190,200 x $ 0.76 = $ 144,600).

Figure D-2


RED ROCK TRAIL
MONTHLY USE
Thousands
40
30
20
10
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

V. Average Annual Cost

Construction, operation and maintenance costs detailed in this report are in October 1988 price levels. Interest during construction was not calculated as project benefits accrue as each segments is completed. A 50-year project life was used for the period of analysis. A detailed cost estimate and average annual costs computed at an 8-7/8 percent discount rate are shown in tables D-1 and D-2.

VI. Economic Summary

Table D-3 presents a summary economic analysis for the proposed recreation enhancement project. As indicated, the project is economically justified, with net annual benefits of $ 17,000 and a benefit-to-cost ratio of 1.13.

Table D-2
Summary of Annual Costs
(8-7/8 Percent Discount Rate, October 1988 Price Levels,
50-Year Project Life)

Description	Cost in $1000s	Cost in $1000s
Estimated Project Cost *	1,345.0	
Annualized First Cost		121.1
Annual Operation & Maintenance		6.5
Total Annual Cost		127.6

* Segment 1 - $680,000

Table D-3
Benefits and Cost Summary
(8-7/8 Percent Discount Rate, October 1988 Price Levels,
50-Year Project Life)

	$ 1000
Annual Benefits - Total	144.6
Cost Estimate - Total	1,345.0
Annual Cost - Total	127.6
Annualized First Cost (1,491.6 x 0.09003 CRF)	(121.1)
Annual Operation & Maintenance	(6.5)
Net Annual Benefit	17.0
Benefit-to-Cost Ratio	1.13

VII. Sensitivity Analysis

This assessment measures only those benefits realized by current recreationist traveling the proposed additional 2.5 miles of connecting multi-purpose trail. These benefits were based on recreationists pursuing biking, hiking, walking, and jogging. Additional benefits would be realized by cross-country skiiers during the winter months.

Other benefits would be realized as well. The new segments trail would likely result in increased use of affected camping, picnic, and other recreation amenities. By connecting existing recreation areas, the new trail results in greatly improved safety conditions for pedestrians and bikers who previously utilized the busy roadways and highways at Lake Red Rock to travel from one site to another or from one side of the Lake to the other. Provisions of a trail connecting the opposite sides of the lake also reduces the travel distance and inconvenience associated with going to recreation sites by the existing road and trail system. These benefits and others were not included in this analysis in order to simply the calculations; however, with their inclusion, the resulting project benefits would be even greater.

In addition, the new trail will help the communities of Knoxville and Pella, Iowa meet their goal of connecting the multi-purpose trail. Residents of these communities have united to raise funds for their proposed trail construction. Due to the large public support & monetary donations, construction of both of these trail segments is anticipated during the next five years. The proposed new Red Rock trail segments will greatly reduce the length of trail required by these cities, by providing an existing north-south system to link to.

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404(b)(1) Evaluation

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FEATURE DESIGN MEMORANDUM NO. 3
WITH ENVIRONMENTAL ASSESSMENT
FOR
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK - SEGMENT 1
LAKE RED ROCK, IOWA

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

TABLE OF CONTENTS

FEATURE DESIGN MEMORANDUM NO. 3
WITH ENVIRONMENTAL ASSESSMENT
FOR
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK - SEGMENT 1
LAKE RED ROCK, IOWA

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

1. PROJECT DESCRIPTION

A. Location. The proposed site is located approximately 2,350 feet downstream of Red Rock Dam, about 4 miles southwest of the town of Pella in Marion County, Iowa.

B. General Description. The proposed bridge construction will involve dredging of sand and gravel from the river bottom immediately adjacent to the project site (see plate 1). This material will be shaped into temporary dikes to allow construction equipment access for placement of bridge piers and spans. Following completion of these actions, the material will be reshaped into jetties to support and tie in the ends of the bridge to the existing riverbanks.

C. Authority and Purpose. The Des Moines Recreational River and Greenbelt was funded and authorized by Public Law 99-88 as approved on August 15, 1985. The project is for the development, operation and maintenance of a recreational and greenbelt area on and along the Des Moines River in Iowa from U.S. Highway 20 in Fort Dodge, downstream to relocated U.S. Highway 92 in the vicinity of the Red Rock Dam. Development of mult-purpose trails is one of the projects included in the comprehensive plan for the Greenbelt.

D. General Description of Dredged and Fill Material. Approximately 12,600 cubic yards of sand and gravel will be dredged from the river for construction of the temporary dikes and the permanent jetties. In addition, approximately 3,000 cubic yards of riprap will be placed on the jetties to protect against erosion. This riprap will be composed of boulders or quarried rock.

E. Description of the Proposed Discharge Site. The placement of fill for the jetties will be along 80 linear feet of both the left and right descending banks of the river. Placement of riprap on the jetties will extend up to the top of bank. Approximately 5300 cubic yards of fill will be placed below the Ordinary High Water elevation of 695.0. Aquatic habitat at the site is unvegetated sand and gravel.

F. Description of Disposal Method. The fill material will be dredged from the channel bottom immediately adjacent to the project ares, and placed at the construction site by mechanical means. Riprap may extend as far as 100 feet out from the existing banks into the river on each side.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations. The substrate of the Des Moines River at the project site is generally composed of sand and gravel. The riverbank under the riprapping contains varying layers of modern alluvium of mixed sand and silt layers.

B. Water Circulation, Fluctuation, and Salinity Determinations. Water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients, and euthrophication will not be affected by the project. Salinity determinations are not applicable to the area. Circulation, flow, velocity, stratification and hydrologic regime will not be significantly affected. Water level fluctuations are influenced by Red Rock Reservoir which both stores and releases water in conduction with its flood control purpose. The proposed project would cause no noticeable change in water level fluctuations. Current pattern will be slightly altered near the jetty structure.

C. Suspended Particulate/Turbudity Determinations. There will be a minor temporary increase in suspended particulates and turbidity during construction. Following project completion, these factors should return to pre-construction levels.

D. Contaminant Determinations. Construction materials will be chemically stable and noncontaminating. Construction will take place in a non-industrial, non-commerical area where the soil is unlikely to be contaminated. Neither the fill nor its placement will cause relocation or increases of contaminants in the aquatic system. Certification of the project under Section 401 of the Clean Water Act has been requested from the Iowa Department of Natural Resources in a letter dated 30 May 1989 (see Pertinent Correspondence), and all requirements will be met prior to construction.

E. Aquatic Ecosystem and Organism Determinations. The proposed action should have no noticeable effect on the aquatic ecosystem. No significant impacts to benthos, plankton, or neckton are anticipated. Two Federally listed endangered or threatened species, the bald eagle (Haliaeetus leucocephalus), and the Indian bat (Myotis sodalis) are listed for Marion County. Threatened and endangered species are discussed in the preceding Environmental Assessment. It was determined that there would be no significant impacts to either species. No State-listed threatened or endangered species are known to occur within the project area, and no impacts are anticipated.

F. Proposed Disposal Site Determinations. The proposed project may cause minor, temporary increases in turbidity during construction; however, no violations to water quality standards should occur. Riprap will be obtained from an approved quarry site near the project area. The proposed actions will have no adverse effect on municipal or private water supplies; recreational or commercial fisheries; or water-related recreation, aesthetics, parks, national historic monuments, or similar preserves.

G. Determination of Cumulative Effects on the Aquatic Ecosystem. Impacts from construction would be temporary. The riprap which would be permanent would be composed of chemically stable, noncontaminating material. Therefore, no detrimental cumulative or secondary impacts are expected to occur. Implementation of the project could increase fisheries habitat through the placement of riprap.

H. Determination of Secondary Effects on the Aquatic Ecosystem. No adverse secondary effects are expected. Implementation of the project could increase fisheries habitat due to the placement of riprap.

III. FINDINGS OF COMPLIANCE WITH THE RESTRICTION ON DISCHARGE.

1. No significant adaptations to the guidelines were made relating to this evaluation.

2. The alternative of No Federal Action was not feasible because it did not provide access to surrounding recreational areas.

3. Certification under Section 401 of the Clean Water Act has been applied for from the Iowa Department of Natural Resources. Certification will be obtained before construction begins.

4. The project would not introduce toxic substances into hereby waters or result in appreciable increases in existing levels of toxic materials.

5. No significant impacts to Federal or State-listed endangered or threatened species will result from the project.

6. The project is located in an inland freshwater system. No marine sanctuaries are involved.

7. No municipal or private water supplies would be affected. Minor impacts would result from construction. No sensitive or critical habitats would be affected, and no long-term adverse impacts would occur.

8. Project construction materials will be physically and chemically stable.

9. The proposed actions will not significantly affect water quality or the aquatic ecosystem and are in compliance with the requirements of guidelines for Section 404(b)(1) of the Clean Water Act, as amended.

_____

Date

Neil A. Smart
Colonel, Corps of Engineers
District Engineer

APPENDIX F

Correspondence

FEATURE DESIGN MEMORANDUM NO.3
WITH ENVIRONMENTAL ASSESSMENT
DES MOINES RECREATIONAL RIVER AND GREENBELT
MULTI-PURPOSE TRAIL
RED ROCK, SEGMENT 1

Correspondence

TABLE OF CONTENTS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ROCK ISLAND FIELD OFFICE (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

IN REPLY REFER TO:
COM: 309/793-5800
FTS: 386-5800

June 15, 1989

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

This letter provides our comments on the proposed construction of trail bridge and paved trail segment below Red Rock Dam, Marion County, Iowa. We have reviewed the information provided. No significant impacts to fish and wildlife resources will result from construction of this project.

To facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, Federal Agencies are required to obtain from the Fish and Wildlife Service information concerning any species, listed or proposed to be listed, which may be present in the area of a proposed action. Therefore, we are furnishing you the following list of species which may be present in the concerned area:

Classif_cation	Common Name	Scientific Name	Habitat
Endangered	Bald Eagle	Haliaeetus leucocephalus	Wintering
Endangered	Indiana Bat	Myotis sodalis	Caves and Riparian Habitat

The trail bridge and paved trail segment will not require any significant tree clearing. Therefore, the proposed project will not affect the endangered species provided no construction takes place from December 1 to March 1. Construction shut-down during this period will minimize disturbance to bald eagles feeding in the tailwaters in winter.

This precludes the need for further action on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Should this project be modified or new information indicate endangered species may be affected, consultation should be initiated.

This letter provides comment under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); the National Environmental Policy Act of 1969, as amended; and the Endangered Species Act of 1973, as amended.

Sincerely,

Richard C. Nelson
Field Supervisor

cc: Hayes (IADNR)

JM:hw

+

TELEPHONE OR VERBAL CONVERSATION RECORD
For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

DATE: 5/2/89

SUBJECT OF CONVERSATION: Greenbelt — Red Rock Trail and Bridge Project

INCOMING CALL

PERSON CALLING	ADDRESS	PHONE NUMBER AND EXTENSION
Charlene Carmack	PD-E	x 570
PERSON CALLED	**OFFICE**	**PHONE NUMBER AND EXTENSION**
Chuck Davis	USFWS - Rock Island	793-5800

OUTGOING CALL

PERSON CALLING	OFFICE	PHONE NUMBER AND EXTENSION
PERSON CALLED	**ADDRESS**	**PHONE NUMBER AND EXTENSION**

SUMMARY OF CONVERSATION:

I spoke to Chuck in PD-E office this afternoon regarding the above referenced project. I explained that this is being developed as a separate action from the Red Rock Trails project for which we negotiated a TFA agreement in January 1989. I showed Chuck a map of the project area and explained that the bridge would be built on riprapped hard points extending from each bank, that sand and gravel from the riverbank would be used to construct the hard points and that riprap armoring of the hard points would extend down to bedrock to prevent erosion of the toe. Chuck indicated that he foresaw no significant impacts to fish and wildlife and that no separate Coordination Act Report should be required for this action. He did request that we send him a copy of the design drawing and noted that the area would likely become attractive to fishermen, and expressed interest in continuing coordination with our office during plans & specs preparation.

CHARLENE CARMACK
Community Planner

DA FORM 1 APR 66 751 — REPLACES EDITION OF 1 FEB 58 WHICH WILL BE USED. ☆U.S.GPO.1981-0-765-042/1036

+

TELEPHONE OR VERBAL CONVERSATION RECORD For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.	DATE 5/4/89

SUBJECT OF CONVERSATION

Greenbelt - Red Rock Bridge and Trail Segment

	INCOMING CALL	
PERSON CALLING Mike Bronoski	ADDRESS USEPA Region 7 Kansas City	PHONE NUMBER AND EXTENSION 913/236-2823
PERSON CALLED C. Carmack	OFFICE PD-E	PHONE NUMBER AND EXTENSION x 570
	OUTGOING CALL	
PERSON CALLING	OFFICE	PHONE NUMBER AND EXTENSION
PERSON CALLED	ADDRESS	PHONE NUMBER AND EXTENSION

SUMMARY OF CONVERSATION:

Mike was returning my call to him regarding the above referenced project. I described the proposed actions and informed him that I had coordinated by telephone with U.S. Fish and Wildlife and Iowa DNR staffs. I also reminded Mike that the site of the trail segment had been evaluated in an EA prepared by our office in April 1987. Mike indicated that his agency would likely have no objections to the project as described. I told him that I would write a record of our conversation and include it in the Environmental Assessment for the project.

CHARLENE CARMACK
Community Planner

DA FORM 1 APR 66 751 REPLACES EDITION OF 1 FEB 58 WHICH WILL BE USED. ☆U.S.GPO:1981-0-765-042/1036

TELEPHONE OR VERBAL CONVERSATION RECORD

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

DATE: 5/4/89

SUBJECT OF CONVERSATION: Greenbelt - Red Rock Bridge and Trail Segment

INCOMING CALL		
PERSON CALLING	ADDRESS	PHONE NUMBER AND EXTENSION
PERSON CALLED	**OFFICE**	**PHONE NUMBER AND EXTENSION**

OUTGOING CALL		
PERSON CALLING	OFFICE	PHONE NUMBER AND EXTENSION
C. Carmack	PD-E	x570
PERSON CALLED	ADDRESS	PHONE NUMBER AND EXTENSION
Tom Putnam	Iowa Dept. of Nat. Resources Fisheries Biologist	515/432-2823

SUMMARY OF CONVERSATION:

I called Tom to discuss the above project. I described the proposed action (bridge and trail construction) and explained that riprapped jetties would be constructed to tie the bridge in to the banks on either side of the river. Tom inquired if the bridge would have sufficient clearance for boats and I indicated that low steel on the bridge should be at least 15 feet above water during normal flow conditions. Tom indicated that he saw no major problems with the project as proposed. He did note that the bridge area would likely be attractive to fishermen.

CHARLENE CARMACK
Community Planner

DA FORM 1 APR 66 751 REPLACES EDITION OF 1 FEB 58 WHICH WILL BE USED. ☆U.S.GPO:1981-0-765-042/1036

TELEPHONE OR VERBAL CONVERSATION RECORD

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

DATE: 5/5/89

SUBJECT OF CONVERSATION: Greenbelt - Red Rock Bridge and Trail Segment

INCOMING CALL		
PERSON CALLING	ADDRESS	PHONE NUMBER AND EXTENSION
PERSON CALLED	**OFFICE**	**PHONE NUMBER AND EXTENSION**

OUTGOING CALL		
PERSON CALLING	OFFICE	PHONE NUMBER AND EXTENSION
C. Carmack	PD-E	x570
PERSON CALLED	**ADDRESS**	**PHONE NUMBER AND EXTENSION**
Chuck Rakac	IDNR Wildlife Biologist	515/961-0716

SUMMARY OF CONVERSATION:

I called Chuck to discuss the above referenced project. I described the proposed actions and reminded him that the area of the trail segment had been evaluated and coordinated in an Environmental Assessment prepared by our office in April 1987. Chuck indicated that no significant effects to fish and wildlife would be likely to result from the project. He did note that bald eagles feed in the tailwater areas during winter months, but indicated that preferred roosting sites are located several miles further downstream. I told him I would prepare a written record of our conversation and include it in the EA for the project.

CHARLENE CARMACK
Community Planner

DA FORM 1 APR 66 751 REPLACES EDITION OF 1 FEB 58 WHICH WILL BE USED. ☆U.S.GPO.1981-0-765-042/1036

State Historical Society of Iowa

The Historical Division of the Department of Cultural Affairs

June 5, 1989

James H. Blanchar, P.E.
Chief, Operations Division
Rock Island Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, IL 61203-2004

RE: COE - MARION COUNTY - CONSTRUCT TRAIL BRIDGE DOWNSTREAM OF RED ROCK DAM, SEC. 19 AND 30, T76N-R18W

Dear Mr. Blanchar:

Based on the information you provided, we find that there are no historic properties which might be affected by the proposed undertaking. Therefore, we recommend project approval.

However, if the proposed project work uncovers an item or items which might be of archeological, historical or architectural interest, or if important new archeological, historical or architectural data come to light in the project area, you should make reasonable efforts to avoid or minimize harm to the property until the significance of the discovery can be determined.

Should you have any questions or if the office can be of further assistance to you, please contact the Review & Compliance program at 515-281-8743.

Sincerely,

Kay Simpson

Kay Simpson
Archeologist, Review and Compliance Program
Bureau of Historic Preservation

/mtm

cc: Dudley M. Hanson, COE

PD	✓
PD-C	
PD-E	✓
PD-F	
PD-P	
PD-R	

☐ 402 Iowa Avenue
Iowa City, Iowa 52240
(319) 335-3916

☑ Capitol Complex
Des Moines, Iowa 50319
(515) 281-5111

☐ Montauk
Box 372
Clermont, Iowa 52135
(319) 423-7173

DG

CARMACK/dmd/570

May 23, 1989

Planning Division (11-2-240a)

Dr. Lowell Soike
Deputy State Historic
Preservation Officer
Historical Building
East 12th and Grand Avenue
Des Moines, Iowa 50319

Dear Dr. Soike:

The Rock Island District, Corps of Engineers, is currently preparing plans to construct a trail bridge and pave a segment of trail immediately downstream of the Red Rock Dam in sections 19 and 30, T. 76 N., R. 18 W., Marion County, Iowa (see attached map).

This action represents one component of the Des Moines Recreational River and Greenbelt, Multi-Purpose Trail project. The Multi-Purpose Trail project was included in the Greenbelt General Design Memorandum and programmatic Environmental Impact Statement (GDM/-EIS), prepared by Rock Island District in September 1987.

The proposed action involves construction of a bridge across the Des Moines River approximately 2,350 feet downstream of the Red Rock Dam. The bridge will span the main river channel between the Howell Station campground and an island located on the west side of the channel. In addition to the bridge construction, an existing foot trail which bisects the island would be tied into the bridge and paved to allow non-motorized use (biking, hiking, etc.). The completed bridge and trail segment would allow foot and bicycle access between Howell Station and recreation areas on the opposite side of the river.

The bridge would be supported by two concrete piers set into the bedrock of the channel and anchored into riprapped hard points extending approximately 100 feet into the channel from each bank. Approximately 12,600 cubic yards of sand and gravel would be dredged from the channel bottom adjacent to the project area. This material would be used to construct temporary dikes in the channel to allow access by construction equipment.

Following placement of the piers and bridge span, the temporary dikes would be removed and the material used to construct the hard point jetties. Riprap stone would be obtained from a local quarry.

District staff archeologists conducted a reconnaissance survey of the island shoreline and trail alignment in October 1986 and found no cultural artifacts or evidence of features. By letter dated October 30, 1986, your office concurred with our determination that trail development on the island would have no effect on significant cultural resources. Corps staff also performed cultural resources surveys in 1978 for the Howell Station campground and coordinated the results with your staff.

Based on the nature and location of the proposed actions, previous disturbances at the project site, and the results of past cultural surveys, it is our opinion that the proposed action will have No Effect on significant cultural resources. We request your comments on this action within 30 days.

A Feature Design Memorandum with Environmental Assessment is being prepared and when completed, will be provided to your office for review. If you have any questions, please call Ms. Charlene Carmack or Mr. Kenneth Barr at 309/788-6361, Ext. 570 or 349, or you may write to the following address:

District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

ORIGINAL SIGNED BY
CHARLES R. SMITH

Dudley M. Hanson, P.E.
Chief, Planning Division

Attachment

CF:
Dist File (PD)
PD (Hanson)
PD-E
PD-P
ED-DG

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING - P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF

May 30, 1989

Engineering Division
General Engineering Section

Ralph Turkle, Chief
Water Quality Planning Section
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, Iowa 50319

Dear Mr. Turkle:

The Corps of Engineers, Rock Island District, is completing a "Des Moines Recreational River and Greenbelt" project called "Multi-Purpose Trail, Red Rock - Segment I." this project will connect existing federal trails on each side of the Des Moines River.

The trail in this project is located approximately 1/2 mile downstream from the Red Rock Dam. The trail includes a 320 foot long 3 span steel truss bridge with a 10 foot wide deck as well as 95 foot long dikes extending into the river from each bank. Approximately 12,600 cubic yards of sand and gravel will be excavated from the river for construction of the dikes. In addition, approximately 3,000 cubic yards of riprap will be placed on the dikes to protect against erosion. This riprap will be composed of quarried rock. The connecting trail is 1,100 feet long and is located primarily on the right bank of the Des Moines River.

The hydraulic effects of this bridge have been computed. The results show that the bridge meets Iowa's criteria for a bridge in a rural area [IAC 12/3/86 Environmental Protection 567-72.1(1)]. A detail hydraulic analysis will be furnished with the Environmental Assessment that will be forwarded separately.

The total estimated volume of materials to be placed below the calculated Ordinary High Water (O.H.W.) elevation of 695 is 5,300 cubic yards.

An Environmental Assessment (EA) will be part of our report. Aspects requiring processing under Section 404 of the Clean Water Act are in progress. A copy of this report will be forwarded to

your office for review. We are requesting your expedient review and issuance of 401 Water Quality Certification for the proposed project. Attached is an application packet containing the forms and project information.

If you have any questions regarding the project, please call Mr. Paul Kowalczyk of my staff at 309/788-6361, extension 210, or you may write to the following address:

District Engineer
US Army Engineer District, Rock Island
ATTN: Engineering Division (Paul Kowalczyk)
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Sincerely,

Gary L. Loss, P.E.
Acting Chief
Engineering Division

Enclosure

A

P

P

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N

Distribution

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G

DISTRIBUTION LIST FOR
FEATURE DESIGN MEMORANDUM NO. 3
DES MOINES RECREATIONAL RIAVER AND GREENBELT
DES MOINES RIVER, IOWA

LAST NAME	FIRST NAME	ADDRESS	CITY, STATE	ZIP CODE	REPORT	NOTICE
FEDERAL						
GRASSLEY	HONORABLE CHARLES E.	116 FEDERAL BUILDING	DAVENPORT, IA.	52801	1	0
HARKIN	HONORABLE TOM	733 FEDERAL BUILDING	DES MOINES, IA.	50309	1	0
LEACH	HONORABLE JIM	1010 STATE ST.	BETTENDORF, IA.	52722	1	0
LIGHTFOOT	HONORABLE JAMES ROSS	105 S. BUXTON	INDIANOLA, IA.	50125	1	0
SMITH	HONORABLE NEAL	544 INSURANCE BUILDING	DES MOINES, IA.	50309	1	0
BUREAU OF LAND MANAGEMENT	ATTN: LEON KABAT	P.O. BOX 631	MILWAUKEE, WI.	53201	1	0
CNTR. FOR DISEASE CON.	ENV. HEALTH & INJURY CONTROL	ATTN: DAVID CLAPP	ATLANTA, GA.	30333	1	0
CORPS OF ENGINEERS	ATTN: R.J. KAIGHN	DIR. OF CIVIL WORKS	WASHINGTON, D.C.	20314	1	0
FARMERS HOME ADMIN.	US DEPT. OF AGRICULTURE	FED. BLDG., ROOM 873	DES MOINES, IA.	50309	1	0
FEDERAL HWY. ADMIN.	DIV. ADMINISTRATOR	P.O. BOX 627	AMES, IA.	50010	1	0
INTRMT. FLD. OPNS. CNTR.	BUREAU OF MINES	FEDERAL CENTER, BLDG. 20	DENVER, CO.	80225	1	0
NATIONAL PARK SERVICE	ATTN: JOHN KAWAMOTO	1709 JACKSON ST.	OMAHA, NE.	68102	1	0
NATIONAL PARK SERVICE	ATTN: JACK RUDY	P.O. BOX 25287	DENVER, CO.	80225	1	0
OFC. ENV. PROJ. REV.	DEPT. OF INTERIOR	ROOM 4241	WASHINGTON, D.C.	20240	1	0
REGIONAL ADMIN.	FED. INSURANCE ADMIN.	P.O. BOX 19715	KANSAS CITY, MO.	64141	1	0
REGIONAL DIRECTOR	FEDERAL RR. ADMIN.	2903 FEDERAL BUILDING	KANSAS CITY, MO.	64106	1	0
REGIONAL DIRECTOR	US FISH & WILDLIFE SERVICE	FORT SNELLING	TWIN CITIES, MN.	55111	1	0
REGIONAL FORESTER	US DEPT. OF AGR.	310 W. WISCONSIN AVE.	MILWAUKEE, WI.	53203	2	0
REGIONAL HYDROLOGIST	GEOLOGICAL SURVEY	12201 SUNRISE VALLEY DR.	RESTON, VA.	22092	1	0
RED ROCK DAM	OFFICE & VISITOR CENTER	ROUTE 3, BOX 149A	KNOXVILLE, IA.	50138	1	0
SAYLORVILLE DAM	OFFICE & VISITOR CENTER	P.O. BOX 36	JOHNSTON, IA.	50131	1	0
US FISH & WILDLIFE SERVICE	ATTN: RICHARD NELSON	1830 2ND AVE. - 2ND FLOOR	ROCK ISLAND, IL.	61201	1	0
US ENV. PROTECTION AGENCY	ATTN: LARRY CAVIN, CHIEF	726 MINNESOTA AVE.	KANSAS CITY, MO.	66101	1	0
US ENV. PROTECTION AGENCY	ATTN: LYNN KRING	726 MINNESOTA AVE.	KANSAS CITY, MO.	56101	1	0
US GEOLOGICAL SURVEY	REGIONAL HYDROLOGIST	BOX 25046	LAKEWOOD, CO.	80225	1	0
US GEOLOGICAL SURVEY	WATER RESOURCE DIV.	P.O. BOX 1230	IOWA CITY, IA.	52240	1	0
USDA SOIL CONS. SERVICE	ATTN: JAMES REEL	210 WALNUT ST.	DES MOINES, IA.	50309	1	0
ADVISORY COMMITTEE						
BOARD OF SUPERVISORS	CHAIRMAN	JASPER COUNTY COURTHOUSE	NEWTON, IA.	50208	1	0
BRANNAN	RICHARD	2ND & COURT AVE.	DES MOINES, IA.	50309	0	1
BUCKNER	ALICE	CITY HALL	SWAN, IA.	50252	1	0
BURCH	WILLIAM	1201 BROADWAY	POLK CITY, IA.	50226	0	1
DALLAGER	LEE	1915 GRAND AVE., BOX 1844	DES MOINES, IA.	50306	0	1
DANIELS	TOM	126 COLLEGE OF DESIGN	AMES, IA.	50011	0	1
DRAKE	STEVE	3226 UNIVERSITY AVE.	DES MOINES, IA.	50311	0	1
EHLEY	AL	UNIVERSITY OF NORTHERN IA.	CEDAR FALLS, IA.	50614	0	1
ELSE	J.W.	COURTHOUSE	OSKALOOSA, IA.	52577	1	0
FORBES	HONORABLE KENT M.	4450 OAKWOOD DR.	DES MOINES, IA.	50317	0	1
FOSTER	TOM	ROUTE 2, BOX 89	OGDEN, IA.	50212	0	1
GILBERT	DR. WILLIAM H.	701 N. C	INDIANOLA, IA.	50125	0	1

DISTRIBUTION LIST FOR
FEATURE DESIGN MEMORANDUM NO. 3
DES MOINES RECREATIONAL RIAVER AND GREENBELT
DES MOINES RIVER, IOWA

LAST NAME	FIRST NAME	ADDRESS	CITY, STATE	ZIP CODE	REPORT	NOTICE
GOODHUE	JIM	RURAL ROUTE 2	CARLISLE, IA.	50047	0	1
GROAT	MYRON	2735 20TH AVE. N.	FORT DODGE, IA.	50501	0	1
HAMILTON	BOB	JESTER PARK	GRANGER, IA.	50109	0	1
HERRING	JACK	304 PERSON ST.	RUNNELLS, IA.	50237	1	0
HEUSINKVELD	DR. HARRIET	221 E. 1ST ST.	PELLA, IA.	50219	1	0
HISLER	HONORABLE VICTOR A.	CITY HALL	WEBSTER CITY, IA.	50595	0	1
HOLT	BRIAN	ROUTE 1, BOX 7	WEBSTER CITY, IA.	50595	0	1
HOOVER	RUTH	1403 W. 13TH ST.	NEWTON, IA.	50208	0	1
IOWA DEPT. OF TRANSPORTATION	ATTN: NANCY BURNS	826 LINCOLN WAY	AMES, IA.	50010	1	0
IOWA WILDLIFE FEDERATION	ATTN: JAMES BEYER	917 CARROLL AVE.	AMES, IA.	50010	0	1
JOHNSTON	DWIGHT	RURAL ROUTE 1	KNOXVILLE, IA.	50138	1	0
JORGENSEN	RIC	E. 1ST & LOCUST	DES MOINES, IA.	50307	0	1
KNOPF	GARY	CITY HALL	DAYTON, IA.	50530	0	1
LANDESS	NANCY	200 E. GRAND	DES MOINES, IA.	50309	0	1
LARSON	LARRY	425 E. HILL ST.	LEHIGH, IA.	50557	0	1
LECROY	DICK	2500 HOLCOMB AVE.	DES MOINES, IA.	50310	0	1
LEEDS	LAVERNE	919 BURNS ST.	STRATFORD, IA.	50249	0	1
MAYOR	CITY OF CARLISLE	CITY HALL	CARLISLE, IA.	50047	0	1
MAYOR	CITY OF MADRID	CITY HALL	MADRID, IA.	50156	0	1
MC COY	DARLENE	2110 STORY STREET	BOONE, IA.	50036	0	1
MIDAS COUNCIL OF GOVRMT.	ATTN: STEVE HOESEL	908 1ST AVE. S.	FORT DODGE, IA.	50501	0	1
MILLER	HONORABLE MARK W.	4450 OAKWOOD DR.	DES MOINES, IA.	50317	0	1
MOTT	THOMAS	2409 N. 6TH AVE. E.	NEWTON, IA.	50208	1	0
NORRIS	MIKE	819 1ST AVE. S.	FORT DODGE, IA.	50501	0	1
O'BRIEN	MICHAEL	RURAL ROUTE 4	BOONE, IA.	50036	0	1
OHLMANN	HONORABLE ELMER H.	MUNICIPAL BUILDING	BOONE, IA.	50036	0	1
OHMART	TED	1026 31ST ST.	WEST DES MOINES, IA.	50036	0	1
PAEZ	MARY JANE	6165 CRABAPPLE LANE	JOHNSTON, IA.	50131	0	1
PARIS	MIKE	ROUTE 4	BOONE, IA.	50036	0	1
PRATHER	WILL	MARION COUNTY COURTHOUSE	KNOXVILLE, IA.	50138	1	0
RICHARDS	IVAN	349-220TH AVE.	HARTFORD, IA.	50118	1	0
RUNYAN	HONORABLE LARRY	MAYOR	STRATFORD, IA.	50249	0	1
SANDHOLM	SID	23 S. MAIN	DAYTON, IA.	50530	1	0
SCHEUERMAN	LINDA	RURAL ROUTE	STRATFORD, IA.	50249	0	1
SCHLENKER	RALPH	BOX 657	DES MOINES, IA.	50303	0	1
SCOTT	GARY	318 5TH ST.	WEST DES MOINES, IA.	50265	0	1
SIERRA CLUB	ATTN: DEBORAH NEUSTADT	1261 E. 23RD	DES MOINES, IA.	50317	0	1
SIMERSON	HONORABLE FOREST	MAYOR	HARTFORD, IA.	50118	1	0
SMITH	DOUGLAS	699 WALNUT #1900 HUB TOWER	DES MOINES, IA.	50309	0	1
STARK	HONORABLE ANN H.	MAYOR	PILOT MOUND, IA.	50223	0	1
SZCODRONSKI	KEVIN	WALLACE STATE OFFICE BLDG.	DES MOINES, IA.	50319	0	1
UITERMARKT	KENNETH	608 E. 1ST ST.	PELLA, IA.	50219	1	0
WEARMOUTH	JACK	4026 72ND ST.	DES MOINES, IA.	50322	0	1
WEHR	TOM	MARION COUNTY COURTHOUSE	KNOXVILLE, IA.	50138	1	0
WILCOX	DENNIS	1300 S. 12TH AVE.	NEWTON, IA.	50208	1	0

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DES MOINES RECREATIONAL RIAVER AND GREENBELT
DES MOINES RIVER, IOWA

LAST NAME	FIRST NAME	ADDRESS	CITY, STATE	ZIP CODE	REPORT	NOTICE
WILDLIFE SOCIETY	IOWA CHAPTER	IOWA STATE UNIVERSITY	AMES, IA.	50011	0	1
WILSON	LARRY J.	WALLACE STATE OFFICE BLDG.	DES MOINES, IA.	50319	0	1
WOODARD	RICHARD	RURAL ROUTE 5	BOONE, IA.	50036	0	1
ZINGSHEIM	PATRICIA	E. 1ST & DES MOINES ST.	DES MOINES, IA.	50307	0	1
STATE						
BRANSTAD	HONORABLE TERRY	STATE CAPITOL	DES MOINES, IA.	50139	1	0
DIELEMAN	HONORABLE WILLIAM W.	518 WOODLAWN DRIVE	PELLA, IA.	50219	0	1
GENTLEMAN	HONORABLE JULIA B.	2814 FOREST DR.	DES MOINES, IA.	50312	0	1
HALL	HONORABLE HURLEY	2865 MOGOWAN BLVD.	MARION, IA.	52302	0	1
KINLEY	HONORABLE GEORGE R.	5006 SW. 18TH ST.	DES MOINES, IA.	50315	0	1
MANN	HONORABLE THOMAS, JR.	4049 LOWER BEAVER RD.	DES MOINES, IA.	50315	0	1
NYSTROM	HONORABLE JACK N.	115 CLINTON	BOONE, IA.	50036	0	1
PALMER	HONORABLE WILLIAM C.	1340 E. 330 ST.	DES MOINES, IA.	50317	0	1
RIORDAN	HONORABLE JAMES R.	BOX 11	WAUKEE, IA.	50263	0	1
READINGER	HONORABLE DAVID M.	5417 AURORA #139	DES MOINES, IA.	50310	0	1
SCHWENGELS	HONORABLE FORREST V.	ROUTE 2, BOX 408	FAIRFIELD, IA.	52556	0	1
SOORHOLTZ	HONORABLE JOHN E.	RURAL ROUTE	MELBOURNE, IA.	50162	0	1
BLACK	HONORABLE DENNIS	ROUTE 1, BOX 77	GRINNELL, IA.	50112	1	0
BLANSHAN	HONORABLE GENE	RURAL ROUTE, BOX 137	SCRANTON, IA.	51462	0	1
BUHR	HONORABLE FLORENCE D.	127 30TH ST.	DES MOINES, IA.	50310	0	1
CONNORS	HONORABLE JOHN H.	316 E 22ND ST.	DES MOINES, IA.	50317	0	1
GRANDIA	HONORABLE ROBERT J.	840 18TH ST.	PELLA, IA.	50314	1	0
HATCH	HONORABLE JACK	840 18TH ST.	DES MOINES, IA.	50314	0	1
HAVERLAND	HONORABLE MARK A.	852 NW. 90TH PLACE	POLK CITY, IA.	50226	0	1
HOLVECK	HONORABLE JACK	2203 34TH ST.	DES MOINES, IA.	50310	0	1
LUNDBY	HONORABLE MARY A.	1240 14TH ST.	MARION, IA.	52302	0	1
METCALF	HONORABLE JANET	1803 79TH ST.	DES MOINES, IA.	50310	0	1
PARKER	HONORABLE EDWARD G.	ROUTE 1, BOX 128	MINGO, IA.	50168	1	0
SHERZAN	HONORABLE GARY	4004 15TH ST.	DES MOINES, IA.	50313	0	1
SKOW	HONORABLE BOB	604 DIVISION ST.	GUTHRIE CENTER, IA.	50115	0	1
VAN MAANEN	HONORABLE HAROLD	RURAL ROUTE 5	OSKALOOSA, IA.	52577	1	0
ZIMMERMAN	HONORABLE JOANN	P.O. BOX 326	WAUKEE, IA.	50263	0	1
IOWA DEPT. ECON. DEV.	DIV. OF COMMUNITY PROG.	200 E. GRAND AVE.	DES MOINES, IA.	50309	0	1
IOWA DEPT. OF NAT. RES.	ATTN: MICHAEL CARRIER	WALLACE STATE OFC. BLDG.	DES MOINES, IA.	50319	0	1
IOWA DEPT. OF NAT. RES.	ATTN: WILDLIFE BUREAU	WALLACE STATE OFFICE BLDG.	DES MOINES, IA.	50319	1	0
IOWA DEPT. OF TRANS.	ATTN: JAMES COBB	826 LINCOLN WAY	AMES, IA.	50010	1	0
IOWA DEPT. OF TRANS.	ATTN: THOMAS M. WELCH, P.E.	800 LINCOLN WAY	AMES, IA.	50010	1	0
IOWA DEVELOPMENT COMM.	ATTN: JUDY GILBERT	600 E. COURT AVE.	DES MOINES, IA.	50319	1	0
IOWA NATL. HERITAGE FOUND.	ATTN: BEN VAN GUNDY	605TH AVE., SUITE 1005	DES MOINES, IA.	50509	1	0
SECRETARY OF AGRICULTURE	ATTN: ROBERT LOUNSBERRY	CAPITOL BUILDING	DES MOINES, IA.	50319	1	0
SOIL CONS. SERVICE	STATE CONSERVATIONIST	210 WALNUT ST.	DES MOINES, IA.	50319	2	0
STATE ECOLOGIST	ATTN: DEAN ROOSA	WALLACE STATE OFC. BLDG.	DES MOINES, IA.	50319	1	0
STATE HIST. PRES. OFFICER	HISTORICAL BUILDING	E. 12TH & GRAND AVE.	DES MOINES, IA.	50319	1	0

DISTRIBUTION LIST FOR
FEATURE DESIGN MEMORANDUM NO. 3
DES MOINES RECREATIONAL RIAVER AND GREENBELT
DES MOINES RIVER, IOWA

LAST NAME	FIRST NAME	ADDRESS	CITY, STATE	ZIP CODE	REPORT	NOTICE
WILDLIFE RESEARCH STATION	ATTN: TOM PUTNAM		BOONE, IA.	50036	1	0
LOCAL						
BOARD OF SUPERVISORS		BOONE COUNTY COURTHOUSE	BOONE, IA.	50036	1	0
BOARD OF SUPERVISORS		DALLAS COUNTY COURTHOUSE	ADEL, IA.	50003	1	0
BOARD OF SUPERVISORS		HAMILTON COUNTY COURTHOUSE	WEBSTER CITY, IA.	50595	1	0
BOARD OF SUPERVISORS		JASPER COUNTY COURTHOUSE	NEWTON, IA.	50208	1	0
BOARD OF SUPERVISORS		MAHASKA COUNTY COURTHOUSE	OSKALOOSA, IA.	52577	1	0
BOARD OF SUPERVISORS		MARION COUNTY COURTHOUSE	KNOXVILLE, IA.	50138	1	0
BOARD OF SUPERVISORS		POLK COUNTY COURTHOUSE	DES MOINES, IA.	50307	1	0
BOARD OF SUPERVISORS		WARREN COUNTY COURTHOUSE	INDIANOLA, IA.	50125	1	0
BOARD OF SUPERVISORS		WEBSTER COUNTY COURTHOUSE	FORT DODGE, IA.	50501	1	0
BOARD OF SUPERVISORS	ATTN: RUTH HARDIN	BOX 237	INDIANOLA, IA.	50125	0	1
BOONE CO. CONS. BOARD	DIRECTOR	602 5TH ST.	BOONE, IA.	50220	1	0
COUNTY ATTORNEY		BOONE COUNTY COURTHOUSE	BOONE, IA.	50036	0	1
COUNTY ATTORNEY		DALLAS COUNTY COURTHOUSE	ADEL, IA.	50003	0	1
COUNTY ATTORNEY		HAMILTON COUNTY COURTHOUSE	WEBSTER CITY, IA.	50595	0	1
COUNTY ATTORNEY		JASPER COUNTY COURTHOUSE	NEWTON, IA.	50208	0	1
COUNTY ATTORNEY		MAHASKA COUNTY COURTHOUSE	OSKALOOSA, IA.	52577	0	1
COUNTY ATTORNEY		MARION COUNTY COURTHOUSE	KNOXVILLE, IA.	50138	0	1
COUNTY ATTORNEY		POLK COUNTY COURTHOUSE	DES MOINES, IA.	50307	0	1
COUNTY ATTORNEY		WARREN COUNTY COURTHOUSE	INDIANOLA, IA.	50125	0	1
COUNTY ATTORNEY		WEBSTER COUNTY COURTHOUSE	FORT DODGE, IA.	50501	0	1
COUNTY CLERK		BOONE COUNTY COURTHOUSE	BOONE, IA.	50036	0	1
COUNTY CLERK		DALLAS COUNTY COURTHOUSE	ADEL, IA.	50003	0	1
COUNTY CLERK		HAMILTON COUNTY COURTHOUSE	WEBSTER CITY, IA.	50595	0	1
COUNTY CLERK		JASPER COUNTY COURTHOUSE	NEWTON, IA.	50208	0	1
COUNTY CLERK		MAHASKA COUNTY COURTHOUSE	OSKALOOSA, IA.	52577	0	1
COUNTY CLERK		MARION COUNTY COURTHOUSE	KNOXVILLE, IA.	50138	0	1
COUNTY CLERK		POLK COUNTY COURTHOUSE	DES MOINES, IA.	50307	0	1
COUNTY CLERK		WARREN COUNTY COURTHOUSE	INDIANOLA, IA.	50125	0	1
COUNTY CLERK		WEBSTER COUNTY COURTHOUSE	FORT DODGE, IA.	50501	0	1
COUNTY ENGINEER		BOONE COUNTY COURTHOUSE	BOONE, IA.	50003	0	1
COUNTY ENGINEER		DALLAS COUNTY COURTHOUSE	ADEL, IA.	50003	0	1
COUNTY ENGINEER		HAMILTON COUNTY COURTHOUSE	WEBSTER CITY, IA.	50595	0	1
COUNTY ENGINEER		JASPER COUNTY COURTHOUSE	NEWTON, IA.	50208	0	1
COUNTY ENGINEER		MAHASKA COUNTY COURTHOUSE	OSKALOOSA, IA.	52577	1	0
COUNTY ENGINEER		MARION COUNTY COURTHOUSE	KNOXVILLE, IA.	50138	1	0
COUNTY ENGINEER		POLK COUNTY COURTHOUSE	DES MOINES, IA.	50307	1	0
COUNTY ENGINEER		WARREN COUNTY COURTHOUSE	INDIANOLA, IA.	50125	1	0
COUNTY ENGINEER		WEBSTER COUNTY COURTHOUSE	FORT DODGE, IA.	50501	1	0
DALLAS CO. CONS. BOARD	DIRECTOR	COURTHOUSE	ADEL, IA.	50595	1	0
HAMILTON CO. CONS. BOARD	ATTN: DEANE BERGLUND	ROUTE 1, BOX 79	STANHOPE, IA.	50246	1	0
HAMILTON COUNTY COURTHOUSE	ATTN: MARVIN D. JOHNSON	COURTHOUSE	STRATFORD, IA.	50249	1	0

DISTRIBUTION LIST FOR
FEATURE DESIGN MEMORANDUM NO. 3
DES MOINES RECREATIONAL RIAVER AND GREENBELT
DES MOINES RIVER, IOWA

LAST NAME	FIRST NAME	ADDRESS	CITY, STATE	ZIP CODE	REPORT	NOTICE
JASPER CO. CONS. BOARD	DIRECTOR	COURTHOUSE	NEWTON, IA.	50208	1	0
MAHASKA CO. CONS. BOARD	DIRECTOR	ROUTE 3, BOX 136A	NEW SHARON, IA.	50207	1	0
MARION CO. CONS. BOARD	DIRECTOR	BOX 108	PELLA, IA.	50219	1	0
WARREN CO. CONS. BOARD		1565 118TH AVE.	INDIANOLA, IA.	50125	1	0
WEBSTER CO. CONS. BOARD	DIRECTOR	COURTHOUSE	FORT DODGE, IA.	50501	1	0
AREA XV REG. PLAN. COMM.	ATTN: AL HUESTON, DIR.	P.O. BOX 1110	OTTUMWA, IA.	52501	1	0
DES MOINES RIVER CONSERVANCY		WALLACE STATE OFC BLDG.	DES MOINES, IA.	50303	1	0
IA ASSOC. SOIL CONS. DIS.	ATTN: GLENN BURROWS	RURAL ROUTE 1	BRANDON, IA.	52210	1	0
WATER RESOURCE CENTER	ATTN: AL AUSTIN	355 TOWN ENGR. BLDG.	AMES, IA.	50010	1	0
DIRECTOR	COLFAX LIBRARY	WALNUT & LOCUST	COLFAX, IA.	50045	1	0
DIRECTOR	EDDYVILLE PUBLIC LIBRARY	BOX 348	EDDYVILLE, IA.	52553	1	0
DIRECTOR	GEISLER LRC	CENTRAL COLLEGE	PELLA, IA.	50219	2	0
DIRECTOR	KNOXVILLE PUBLIC LIBRARY	213 E. MONTGOMERY	KNOXVILLE, IA.	50138	1	0
DIRECTOR	NEW SHARON LIBRARY	107 W. MAPLE	NEW SHARON, IA.	50207	1	0
DIRECTOR	NEWTON PUBLIC LIBRARY	400 AVE. W.	NEWTON, IA.	50211	1	0
DIRECTOR	OSKALOOSA LIBRARY	S. MARKET & 2ND AVE. W.	OSKALOOSA, IA.	52577	1	0
DIRECTOR	VIERSEN PUBLIC LIBRARY	823 BROADWAY	PELLA, IA.	50219	1	0
DES MOINES REGISTER	DATEBOOK MANAGING EDITOR	715 LOCUST ST.	DES MOINES, IA.	50304	0	1
KNOXVILLE EXPRESS	ATTN: BILL CALLAHAN	P.O. BOX 458	KNOXVILLE, IA.	50138	0	1
KNOXVILLE JOURNAL	MANAGING EDITOR	122 E. N. MARKET	OSKALOOSA, IA.	52577	0	1
MARION COUNTY NEWS	MANAGING EDITOR	114 E. MONROE	PLEASANTVILLE, IA.	50225	0	1
OSKALOOSA HERALD	ATTN: YVONNE SADLER	123 N. MARKET	OSKALOOSA, IA.	52577	0	1
THE CHRONICLE		739 FRANKLIN ST.	PELLA, IA.	50219	0	1
THE TRIBUNE			COLFAX, IA.	50054	0	1
IPBN PUBLIC SERV. DIR.		P.O. BOX 6450	JOHNSTON, IA.	50131	0	1
KCCI-TV	ATTN: KENT PETERSON	888 9TH, BOX 10305	DES MOINES, IA.	50306	0	1
NEWSROOM KBOE	PUBLIC SERVICE DIRECTOR	P.O. BOX 380	OSKALOOSA, IA.	52577	0	1
WHO-TV 13		1801 GRAND AVE.	DES MOINES, IA.	50313	0	1
KDPS RADIO STATION		1800 GRAND AVE.	DES MOINES, IA.	50307	0	1
KMFD-FM RADIO STATION	ATTN: MICHAEL CAIN	100 COURT AVE. #103	DES MOINES, IA.	50309	0	1
KNIA RADIO STATION		P.O. BOX 31	KNOXVILLE, IA.	50138	0	1
KRNT RADIO STATION		BOX 1350	DES MOINES, IA.	50319	0	1
KTAV RADIO STATION		812-1/2 MAIN ST.	PELLA, IA.	50219	0	1
KWDM-FM RADIO STATION		1101 5TH ST.	WEST DES MOINES, IA.	50265	0	1
KWKY RADIO STATION		BOX 662	DES MOINES, IA.	50303	0	1
PRIVATE GROUPS/INDIVIDUALS						
BAR "G" RANCH	ATTN: FEROLD GRANT	2376 FILLMORE ST.	SWAN, IA.	50252	0	1
BOONE & SCENIC RAILROAD	ATTN: HANS GOERGINGEN	ROUTE 4, BOX 154 1/2	BOONE, IA.	50036	0	1
HIGHLAND PARK BUS. CLUB	ATTN: DR. RAY	700 W. EUCLID AVE.	DES MOINES, IA.	50313	0	1
IZAAK WALTON LEAGUE	ATTN: BRUCE HAGEMEYER	ROUTE 1, BOX 62	PELLA, IA.	50219	0	1
NORTH MW. REPRESENTATIVE	NATIONAL AUDUBON SOCIETY	1314 5 ST. SE. #312	MINNEAPOLIS, MN.	55414	0	1
PELLA VOLKSWEG	ATTN: FRED KREYKES	707 MAIN ST.	PELLA, IA.	50219	0	1
PINE KNOLLS COUNTRY CLUB		P.O. BOX 6	KNOXVILLE, IA.	50138	0	1

DISTRIBUTION LIST FOR
FEATURE DESIGN MEMORANDUM NO. 3
DES MOINES RECREATIONAL RIAVER AND GREENBELT
DES MOINES RIVER, IOWA

LAST NAME	FIRST NAME	ADDRESS	CITY, STATE	ZIP CODE	REPORT	NOTICE
RED ROCK LAKE ASSOCIATION		P.O. BOX 558	KNOXVILLE, IA.	50138	0	1
SIERRA CLUB	ATTN; BILL SCHAUDT	3908 WAVELAND DR.	DES MOINES, IA.	50311	0	1
SIERRA CLUB	ATTN: JANE ELDER	214 N. HENRY ST.-SUITE 203	MADISON, WI.	53703	0	1
THE NATURE CONSERVANCY		1800 N. KENT ST.-SUITE 800	ARLINGTON, VA.	22209	0	1
TRI-COUNTY VETS		RURAL ROUTE 2	PELLA, IA.	50219	0	1
WEBBS COUNTRY CAMPING	ATTN: DALE WEBB	RURAL ROUTE 1	HARTFORD, IA.	50118	0	1
BARTELMA	MR. & MRS. JAMES	RURAL ROUTE 1	RUNNELLS, IA.	50237	0	1
BEATTIE	JACK	3560 SE. 96TH	RUNNELLS, IA.	50237	0	1
BEATTLE	VERN	RURAL ROUTE 2	RUNNELLS, IA.	50237	0	1
BECKER	DAVID	808 N. 2ND	PELLA, IA.	50219	0	1
BELL	PERRY	P.O. BOX 458	KNOXVILLE, IA.	50138	0	1
BELT	DEB	1901 A AVE. W., BOX 530	OSKALOOSA, IA.	52577	0	1
BENNETT	LARRY	RURAL ROUTE 2	RUNNELLS, IA.	50237	0	1
BILLINGSLEY	MIKE	RURAL ROUTE 3	KNOXVILLE, IA.	50138	0	1
BIRKENHOLZ	IRVIN	110 W. DOUGLAS	KNOXVILLE, IA.	50138	0	1
BLACK	GLADYS B.	108 E. DEWITT	PLEASANTVILLE, IA.	50225	0	1
BOEYINK	GARY	RURAL ROUTE 3	PELLA, IA.	50219	0	1
BOMERS	MR. & MRS. B.D.	401 W. PARK	RUNNELLS, IA.	50237	0	1
BUNK	REV. CHARLES	ROUTE 4, BOX 214	KNOXVILLE, IA.	50138	0	1
BURNS	RICHARD E.	107 W. MC MURRAY, BOX 291	PRAIRIE CITY, IA.	50228	0	1
CAPPS	HAROLD, JR.	309 PERSON	RUNNELLS, IA.	50237	0	1
CECIL	MARVIN	ROUTE 3, BOX 60	KNOXVILLE, IA.	50138	0	1
CHOATE	ROBERT E.	124 W., BOX 25	GRINNELL, IA.	50112	0	1
CONROY	SUE	122 E. ROBINSON	KNOXVILLE, IA.	50138	0	1
CHRISMAN	ROGER	ROUTE 1, BOX 63	PELLA, IA.	50219	0	1
DE BOEF	EARL	RURAL ROUTE 3	NEW SHARON, IA.	50207	0	1
DE BRUNN	STEVE	RURAL ROUTE 1	PRAIRIE CITY, IA.	50237	0	1
DEBYE	P.	RURAL ROUTE 1	OTLEY, IA.	50214	0	1
EDWARDS	BOB W.	1409 W. HOWARD	KNOXVILLE, IA.	50138	0	1
EVERLY	STEVE	RURAL ROUTE 3	KNOXVILLE, IA.	50138	0	1
FENTON	WILLIAM	RURAL ROUTE 1	RUNNELLS, IA.	50237	0	1
FLODEN	LOUIS	ROUTE 3, BOX 471A	PELLA, IA.	50219	0	1
FREEMAN	KENNETH G.	106 E. MONTGOMERY	KNOXVILLE, IA.	50138	0	1
GALVIN	C.R.	218 S. 2ND ST.	KNOXVILLE, IA.	50138	0	1
GARRARD	DONALD L.	1106 H. PRAIRE	PELLA, IA.	50219	0	1
GILBERT	ALLEN L.	RURAL ROUTE 2	PRAIRIE CITY, IA.	50228	0	1
GROVE	LARRY	301 GARFIELD	RUNNELLS, IA.	50237	0	1
HAGEN	HAROLD	RURAL ROUTE 1	MONROE, IA.	50170	0	1
HOOVER	KURT	904 UNION	PELLA, IA.	50219	0	1
HUGHES	DALE	510 W. ROBINSON	KNOXVILLE, IA.	50138	0	1
HUNT	LARRY	RURAL ROUTE 1	HARTFORD, IA.	50118	0	1
HUYCK	RICHARD	1804 DOLORES #7	KNOXVILLE, IA.	50138	0	1
JOHNSON	MYRON	RURAL ROUTE 5	ALBIA, IA.	52531	0	1
KAIN	DONALD E.	RURAL ROUTE 1	RUNNELLS, IA.	50237	0	1
KAMERICK	MURRAY	RURAL ROUTE 3	PELLA, IA.	50219	0	1

DISTRIBUTION LIST FOR
FEATURE DESIGN MEMORANDUM NO. 3
DES MOINES RECREATIONAL RIAVER AND GREENBELT
DES MOINES RIVER, IOWA

LAST NAME	FIRST NAME	ADDRESS	CITY, STATE	ZIP CODE	REPORT	NOTICE
KANE	BERYL	RURAL ROUTE 5	KNOXVILLE, IA.	50138	0	1
KEUNING	MR. & MRS. ALBERT	RURAL ROUTE 2	PRAIRIE CITY, IA.	50228	0	1
KRICHOU	LOREN	ROUTE 1, BOX 134	PLEASANTVILLE, IA.	50225	0	1
MC COY	ARNOLD	RURAL ROUTE 1	DALLAS, IA.	50062	0	1
MC CUMBER	MR. & MRS. MARION	216 E. 12TH ST. N.	NEWTON, IA.	50208	0	1
MIKESELL	HOUGH	BOX 12	KNOXVILLE, IA.	50138	0	1
MILLER	RONALD E.	ROUTE 2, BOX 56	KNOXVILLE, IA.	50138	0	1
MILLER	THOMAS A.	RURAL ROUTE 1	RUNNELLS, IA.	50237	0	1
MOORE	NANCY	104 MCKINNEY	RUNNELLS, IA.	50237	0	1
MOTT	CLYDE DUANE	102 W. MCKINNEY	RUNNELLS, IA.	50237	0	1
MOTT	JOYCE	104 W. PARK	RUNNELLS, IA.	50237	0	1
NEIL	RON	215 E. 8TH	PELLA, IA.	50219	0	1
NICHOLS	ARTHUR	RURAL ROUTE 3	KNOXVILLE, IA.	50138	0	1
NORTHWAY	ERIC	12020 SE. 36TH AVE.	RUNNELLS, IA.	50237	0	1
NORTHWAY	MR. & MRS. LANCE	2264 SE. 116TH	RUNNELLS, IA.	50237	0	1
PALMER	MARY E.	411 S. 1ST ST.	OSKALOOSA, IA.	52577	0	1
PARRISH	GAYLARD E.	306 PERSON ST.	RUNNELLS, IA.	50237	0	1
PEAK	FRANK	MARION COUNTY COURTHOUSE	KNOXVILLE, IA.	50138	0	1
PENDRY	DALE	2288 DAKOTA ST.	HARTFORD, IA.	50118	0	1
PERSON	DEAN	6392 SE. 104TH ST.	RUNNELLS, IA.	50237	0	1
PRATHER	MR. & MRS. WILL	RURAL ROUTE 3	KNOXVILLE, IA.	50138	0	1
PRICHARD	CLYDE	1102 PARK VIEW DR.	KNOXVILLE, IA.	50138	0	1
RALSTON	F. PAUL, JR.	706 S. PATRICK ST.	KNOXVILLE, IA.	50138	0	1
RICHARDS	MR. & MRS. JAMES	424 228TH	HARTFORD, IA.	50118	0	1
ROBINSON	JAMES K.	4506 SE. POWERS DR.	RUNNELLS, IA.	50237	0	1
ROBUCK	DWIGHT T.	BOX 672	KNOXVILLE, IA.	50138	0	1
SCHRADER	DAVID	RURAL ROUTE 2	MONROE, IA.	50170	0	1
SCHUMACHER	LEROY	RURAL ROUTE 2	PLEASANTVILLE, IA.	50138	0	1
SHAW	JERRY D.	RURAL ROUTE 1	HARVEY, IA.	50119	0	1
SHEEHEY	GARY	ROUTE 1, BOX 137	PLEASANTVILLE, IA.	50225	0	1
SMITH	REED	ROUTE 2, BOX 43	KNOXVILLE, IA.	50138	0	1
SONKSEN	DANNIE	RURAL ROUTE 2	HARTFORD, IA.	50249	0	1
SPARKS	ROGER L.	ROUTE 3, BOX 340	NEWTON, IA.	50208	0	1
SPEECE	ROSS L.	ROUTE 3, BOX 182	KNOXVILLE, IA.	50138	0	1
STAHL	JERRY J.	P.O. BOX 65	KNOXVILLE, IA.	50138	0	1
STEVENS	LARRY J.	P.O. BOX 1010	OSKALOOSA, IA.	52577	0	1
TAGGART	ROBERT	506 S. 1ST	KNOXVILLE, IA.	50138	0	1
THOMAS	EDWARD L.	405 W. PARK ST.	RUNNELLS, IA.	50237	0	1
THOMPSON	WILLIAM	ROUTE 3, BOX 144	KNOXVILLE, IA.	50138	0	1
THORTON	GERTRUDE M.	RURAL ROUTE 1	RUNNELLS, IA.	50237	0	1
TOLLENAERE	PETER A.	ROUTE 2, BOX 103	FAIRFIELD, IA.	52556	0	1
TOMSHECK	R.L.	609 PATTY DR.	KNOXVILLE, IA.	50138	0	1
TONDA	DONNA	RURAL ROUTE 5	KNOXVILLE, IA.	50138	0	1
TRINE	RICK	RURAL ROUTE 2	PLEASANTVILLE, IA.	50225	0	1
VAN DUSSELDORF	MELVIN	901 N. LEAGUE RD.	COLFAX, IA.	50054	0	1

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FEATURE DESIGN MEMORANDUM NO. 3
DES MOINES RECREATIONAL RIAVER AND GREENBELT
DES MOINES RIVER, IOWA

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VAN HERMET	J.B.	P.O. BOX 86	PELLA, IA.	50219	0	1
VANDERMEELE	JIM	1505 BROADWAY	PELLA, IA.	50219	0	1
VER STEEHG	DICK	RURAL ROUTE 5	OSKALOOSA, IA.	52577	0	1
VERROS	MARV	RURAL ROUTE 1	OTLEY, IA.	50214	0	1
WEHR	TIM	ROUTE 3, BOX 380	KNOXVILLE, IA.	50138	0	1
WEIGEL	TOM	RURAL ROUTE 1	OTLEY, IA.	50214	0	1
WESTRA	GREG L.	ROUTE 3, BOX 143	KNOXVILLE, IA.	50138	0	1
WHITE	ANNA	ROUTE 1, BOX 94	PLEASANTVILLE, IA.	50237	0	1
WHITE	EDWARD	BOX 434	MONROE, IA.	50170	0	1
WILCOX	LEIGH	DIAMOND TRAIL S.S.	MONTEZUMA, IA.	50171	0	1
WILLIAMS	CLYDE	409 E. MAIN	KNOXVILLE, IA.	50138	0	1
WILLIAMS	GEORGE E.	RURAL ROUTE 1	LOVILIA, IA.	50150	0	1
WILSON	HARRY	12235 SE. 56TH AVE.	RUNNELLS, IA.	50237	0	1
WINFIELD	LEROY	406 W. JEFFERSON	KNOXVILLE, IA.	50138	0	1
*** Total ***					95	222