

Agenda Item: 10.

MEMORANDUM

TO: Programs, Projects and Operations Subcommittee

FROM: Martin P. Cleveland, Construction Engineer

SUBJECT: Little Papio Channel (72nd to Dodge Street) Emergency Repair Project

DATE: August 2, 2012

In 1999, the reach of Little Papio Channel (72nd to Dodge Street), from Station 191+50 to 194+00 sloughed after the flood of 1999. This area on the east side is adjacent to the Keystone Trail and Nebraska Furniture Mart (NFM) west warehouse building. The Corps of Engineers determined that the creek bank sloughs were triggered by the flood of 1999 when the channel bottom consisting of clay-confining layer was damaged allowing silty foundation material to be piped under artesian water pressures of over 15 ft. of head into the creek channel. Large voids developed below the creek channel bottom and side slopes resulting in the sloughs. The sloughs were repaired by installing riprap stability trenches coupled with a riprap channel bottom buttress. Riprap drains were installed to relieve the artesian pressure. A double layer of geotextile was used to allow the artesian flows to drain while preventing the piping of fines from the foundation soils. Enclosed is a copy of a chronology of the repairs of 1999.

In 1999, the Corps of Engineers designed the channel repairs at an estimated cost of \$137,000 and hired the contractor who completed the repairs at a cost of \$266,000. The 1999 repairs determined by the Corps to be the result of a flood event and were handled via the Public Law 84-99 cost share program with 100% Corps of Engineers cost for design and repairs. In 2011 and 2012, District staff contacted the Corps about apparent changes in the repair area, such as scour hole formation and trail cracking/settlement near the repair site. During the April 11, 2012 site meeting with the Corps staff they noted the changes and suggested that the area be watched for further settlement.

On August 2, 2012 the writer met with four Corps design staff to look at some significant trail settlement/cracks and a new sandboil in the bottom of the creek. The sandboil is evidence that the repair area has a weak point, such as fabric separation that is allowing silt to flow into the creek and subsequently lead to slope settlement and possible slough activity. During the 1999 slough event, sandboils were visible and evidence of artesian effect. As with levee underseepage, the loss of fine material from

channel slope will eventually lead to slope failure, which in turn will endanger adjacent trail and warehouse building. The Corps design staff, including the levee safety engineer and the 1999 repair geotechnical engineer noted the need for immediate action to protect the channel slope and adjacent facilities. As a result of the channel problem not being tied to a flood event in 2011 or 2012, the Corps will not assist in design or repair construction.

It is Management's recommendation that HDR Engineering be contracted with to provide the professional services needed to design/construct needed repairs, as they are well versed in channel, dam and levee design. As time is of the essence due to the emergency nature of the channel deficiency, so it is further recommended that the Manager have the authority to negotiate a contract with HDR Engineering. Furthermore that an accelerated bid process be used to secure construction bids and that the General Manager be granted the authority to select the lowest and best construction bid.

It is Management's recommendation that the Subcommittee recommend to the Board that the General Manager be authorized to negotiate and execute professional services and construction services for the Little Papio Channel Repair Project near Station 191+50 to 194+00, subject to approval as to form by District legal counsel and that District Policy 15.2 (Purchasing-Professional Services) and Policy 15.6 (Purchasing – Competitive Bidding) be waived.



North

Little Papio Repair Site

NFM

Warehouse

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Imagery Date: 3/7/2012 1993 41°15'28.03"N 96°01'58.07"W elev 1032 ft Eye alt 3018 ft

MEMORANDUM TO THE FILE:

SUBJECT: Little Papio Creek Slope Slide (Dodge Street to 72nd Street)
Nebraska Furniture Mart Warehouse Area (Station 191+90 to 193+90)
PL 84-99 Repair by Corps of Engineers
Status Report

DATE: May 24, 2000

BY: Martin P. Cleveland

The Corps of Engineers has completed the referenced project and the following information is a summary of this project:

1. Project Chronology:
 - October 14, 1999: NRD staff discovered the slope slide
 - October 20, 1999: NRD retained Jacobson Helgoth Consultants to evaluate slope slide
 - October 25, 1999: NRD's consultant, Geotechnical Services Inc. starts soil borings at site
 - October 25, 1999: NRD submitted a request for assistance to Corps
 - November 17, 1999: Corps approved funding of repair project
 - December 8, 1999: Corps awards project to Niewohner Construction (Contractor)
 - December 17, 1999: NRD starts several times per week surveys of project movement
 - December 20, 1999: Contractor starts work on project
 - February 1, 2000: Contractor completes work on project
 - February 7, 2000: NRD changes to once per week survey of project movement
 - February 15, 2000: Corps installed inclinometer and other markers to check future project movement
 - May 23, 2000: Completion date of Keystone Trail concrete replacement at repair area and repair modifications (modifications started May 16, 2000)
 - May 25, 2000: Anticipated Keystone Trail reopening at project site
2. Project Costs:
 - A. NRD(Jacobson Helgoth Consultants Contract plus staff time): \$50,000
 - B. Corps of Engineers
 - Planning, design and construction supervision: \$137,000
 - Construction contract (Niewohner): \$266,000
 - Total for Corps: \$403,000 (before May 16, 2000 modifications)
 - C. Grand Total (A+B): \$453,000
3. Project Quantities:
 - Crushed rock bedding for riprap: 1,680 tons
 - Limestone rock riprap: 4,161 tons
 - Project length: 170 ft.
 - Project depth: 30 ft.

8/2/12



8/2/12





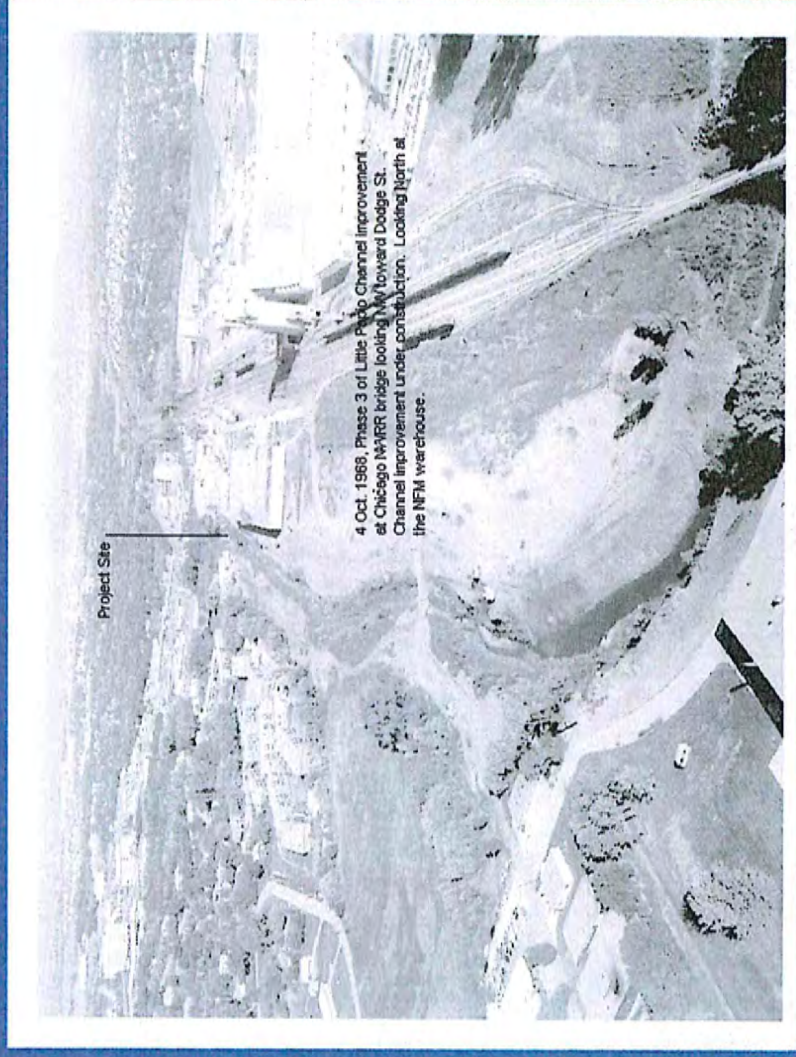
2/2/8

-1999-

Little Papillion Creek Channel Improvements

- City of Omaha

- Federally Constructed/Locally Operated
 - Papio-Missouri River Natural Resource District
- The Project was authorized by the flood control act of 1962.
- Construction Complete Date Oct 71



Little Papillion Creek Flood

7 August 1999

- Rainfalls of 6 to over 9 inches fell over Omaha in six hours
- The creek crested in 8 hours 4 feet below bank
- Approached the 100-year event
- Record rise for Lake Cunningham (33 year record) in the upper Little Papillion Creek basin prevented over bank flows

Slough at Station 193+00

- 6" wide and at least 10 feet deep
- Slough threatened
 - Foundation of the Nebraska Furniture Mart Warehouse
 - Keystone Bike Trail





Nebraska Furniture Mart

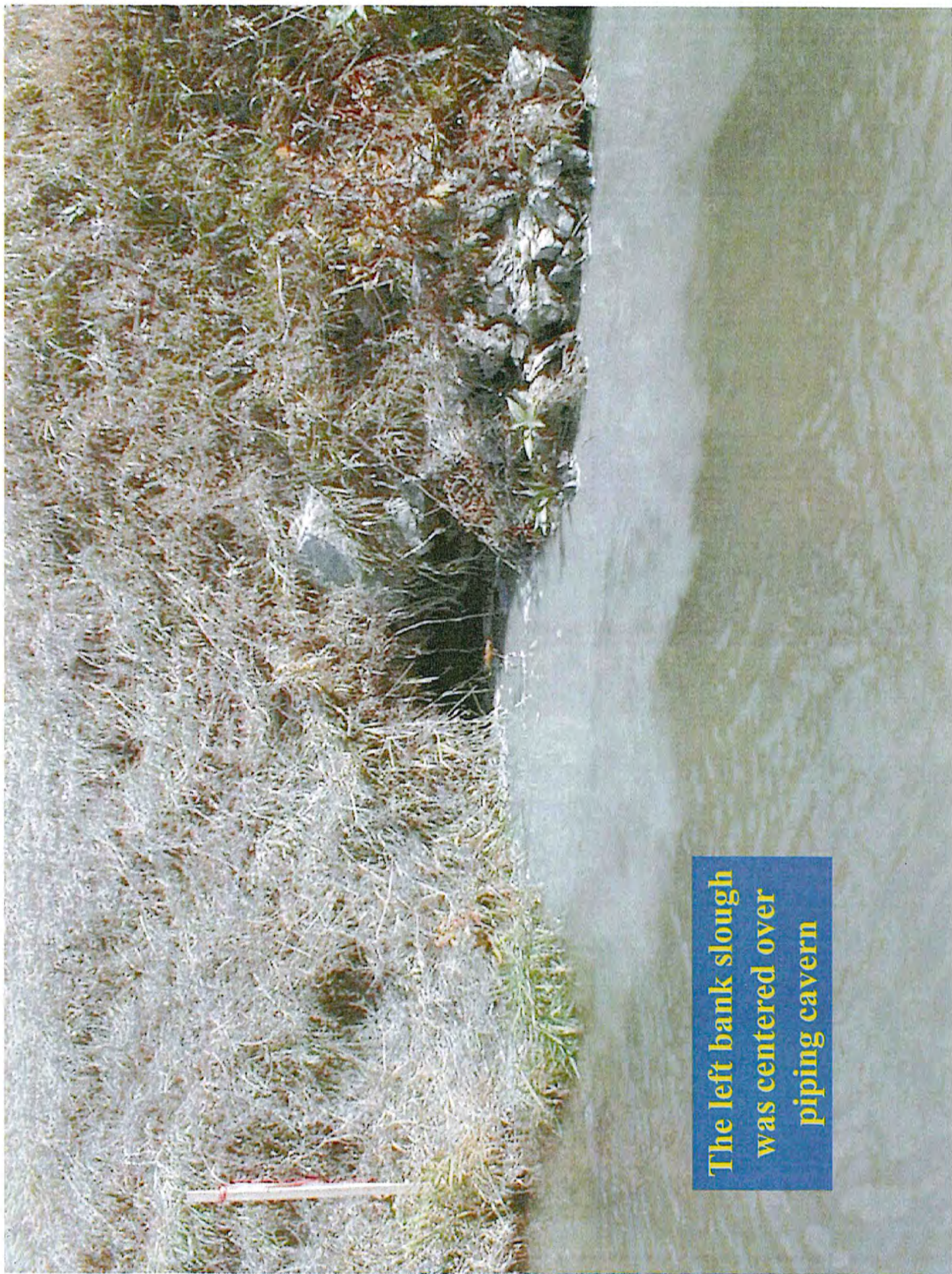
Keystone Trail

Top of Slough

Seepage Boils

Piping of Silts



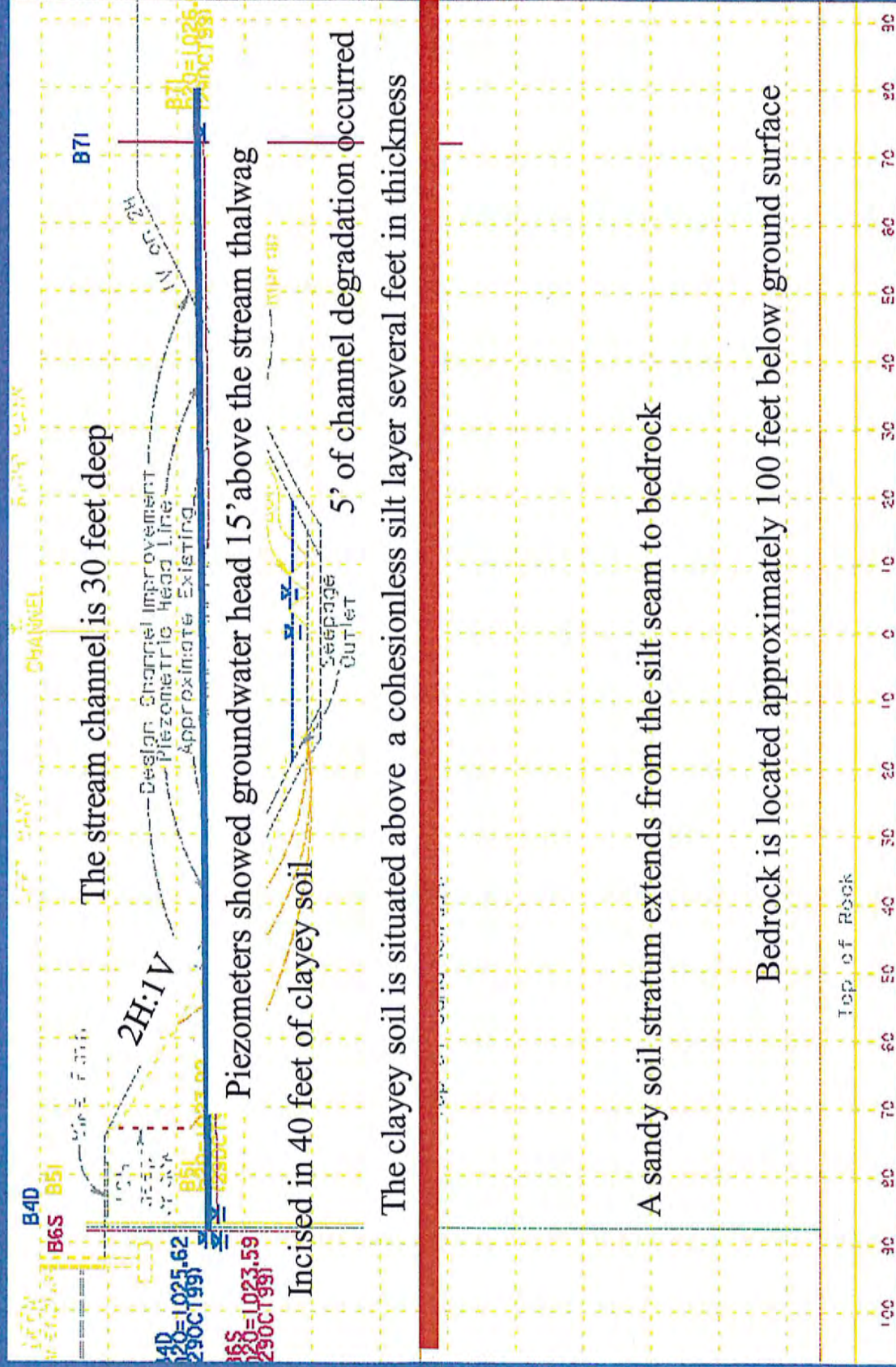


**The left bank slough
was centered over
piping cavern**

Failure Mode Assessment

- Soil borings and piezometers were installed to define the hydrogeology of the site
- Topographic surveys were conducted to assess the channel bed and to define the slide
- These actions were taken within days of discovery – Papio NRD

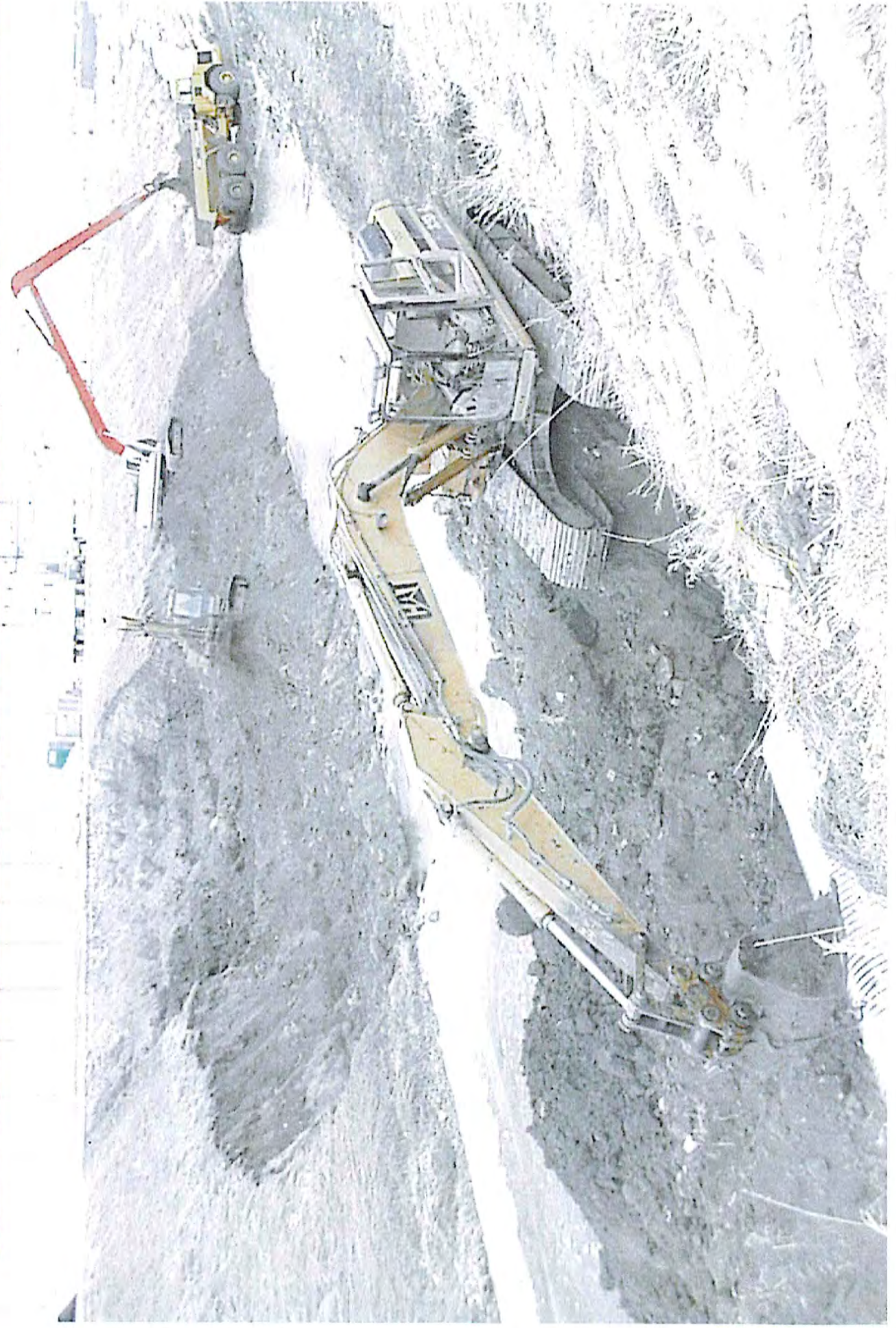
Boring, Piezometer & Topographic Surveys Results



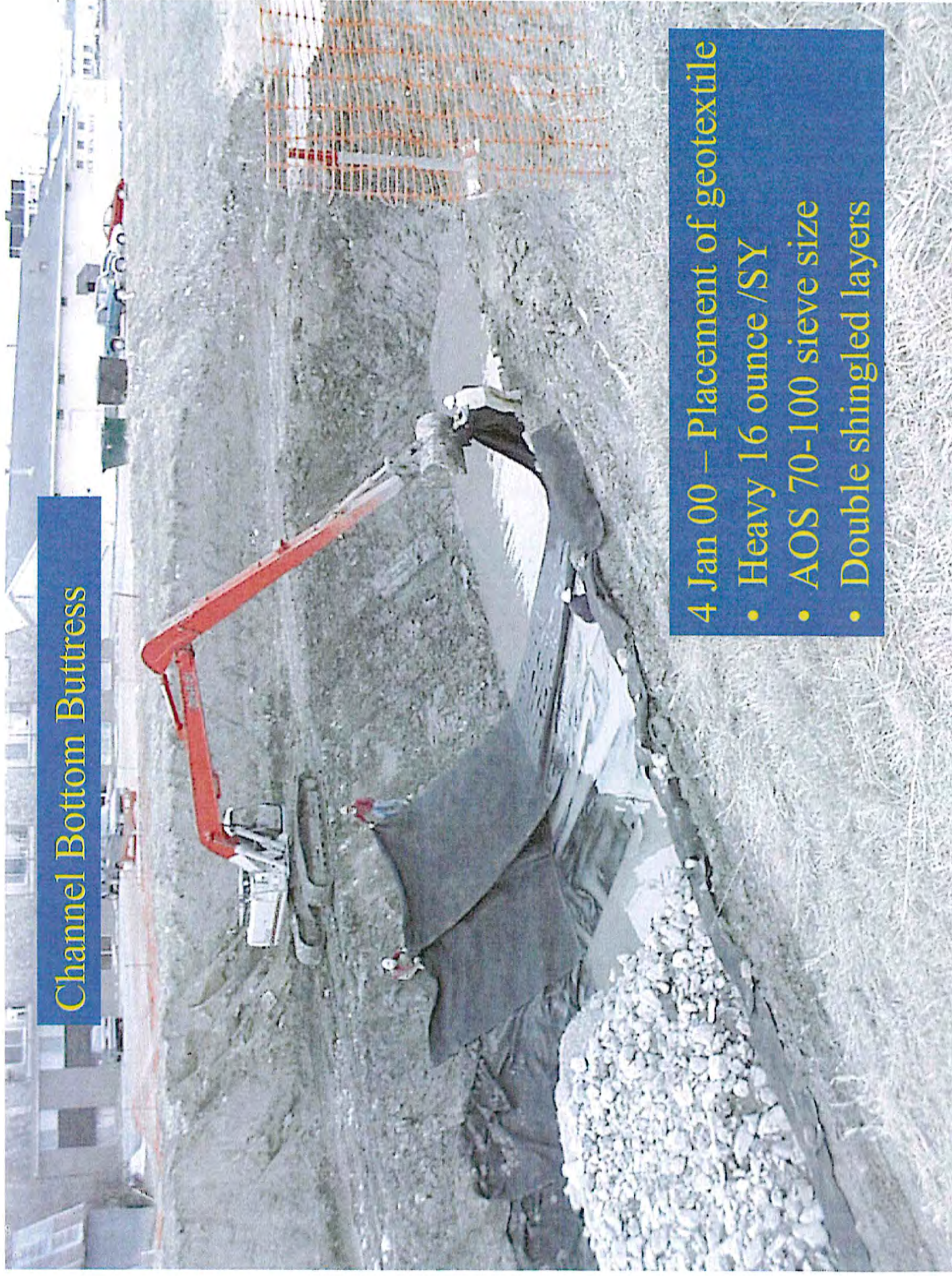
Failure Mode

- Flood scoured channel bed
- Erosion reduced the aquitard thickness from 10 to 5 feet
- Confined water pressure head of 15 feet cracked the aquitard
- Piping of cohesionless silts created voids under the channel bottom and banks
- Slough occurred when the voids collapsed

27 Dec 99 – Diversion pipe installation and unloading NFM slope



Channel Bottom Buttress



- 4 Jan 00 – Placement of geotextile
- Heavy 16 ounce /SY
 - AOS 70-100 sieve size
 - Double shingled layers