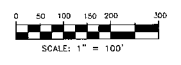


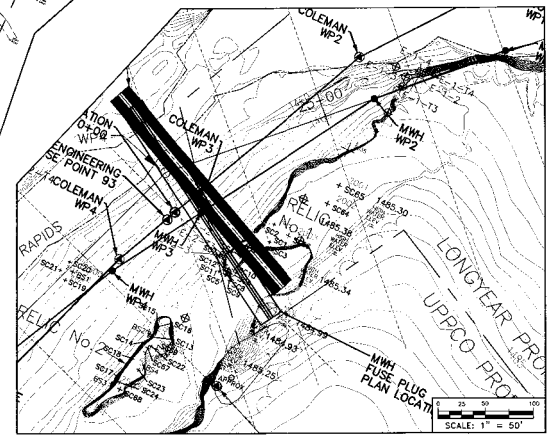
**LIMIT OF CLEARED CHANNEL
AT EL. 1471.0 (1.8 PERCENT SLOPE)
BEGINNING OF TREES**

NOTE:
- BEARINGS BASED UPON STATE PLANE COORDINATE SYSTEM, NAD 83/784 (DARWIN, MICHIGAN NORTH ZONE (211)).
- VERTICAL DATUM: NAD 83 (USGS BENCHMARK ON LEFT ABUTMENT OF CONCRETE SPILLWAY; ELEV. = 1491.75 FT.)
- 1 FOOT CONTOUR INTERVALS BASED ON AERIAL SURVEY CONDUCTED ON MAY 16, 2003.



- LEGEND**
- SOIL BORING LOCATION AND ELEVATION
 - MONITORING WELL LOCATION
 - SURVEYED POINT
 - TEST PIT LOCATION
 - COLEMAN SURVEY POINT
 - REMAINING COLEMAN SURVEY CONTROL MONUMENT

- LEGEND**
- GLACIAL OUTWASH (ZONE 5)
 - GLACIAL TILL (ALL ZONES 1,2,3,4)
 - RIVER CHANNEL DEPOSITS (ZONE 6)



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PROJECT TITLE
ROOT CAUSE EVALUATION
SILVER LAKE BREACH

CLIENT
UPPER PENINSULA
POWER COMPANY
500 W. WASHINGTON ST.
ISHPEMING MI, 49849

SHEET TITLE
SITE PLAN - FIELD SAMPLING
AND TEST PIT LOCATIONS
SILVER LAKE BREACH
SILVER LAKE PROJECT

Issued
Date: Description:

08/20/03 INTERNAL REPORT
05/27/03 INITIAL DRAFT
Designed: MEC 8/20/03
Drawn: JMR 8/20/03
Checked: LWB 8/20/03
Approved: WWR 8/20/03

C.A.D. DRAWING INFO:
Drawing File:
X-Ref Files:

Layer Manager:
JOB NUMBER:
10452
SHEET NUMBER:
3 OF 5

SITE PLAN AND GEOLOGIC ZONES

SILVER LAKE DAM
ROOT CAUSE REPORT



FIGURE NO. III - 1

PROJECT NO.:	
DESIGN:	DATE:
DRAWN:	DATE:
CHECKED:	DATE:
SCALE:	

DWG NO.	REV
	1





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PROJECT TITLE
ROOT CAUSE EVALUATION
SILVER LAKE BREACH

CLIENT
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ISHPEMING MI, 49849

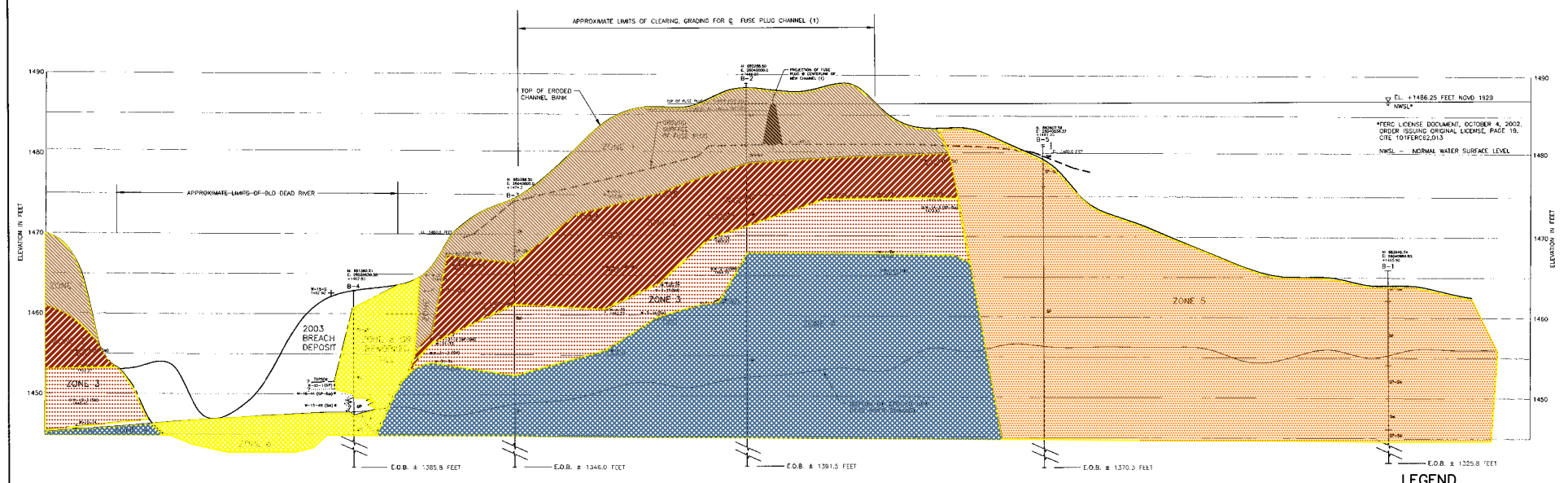
SHEET TITLE
INTERPRETATIVE GEOLOGIC PROFILE
RIGHT (WEST) BANK

Issued
Date: Description:

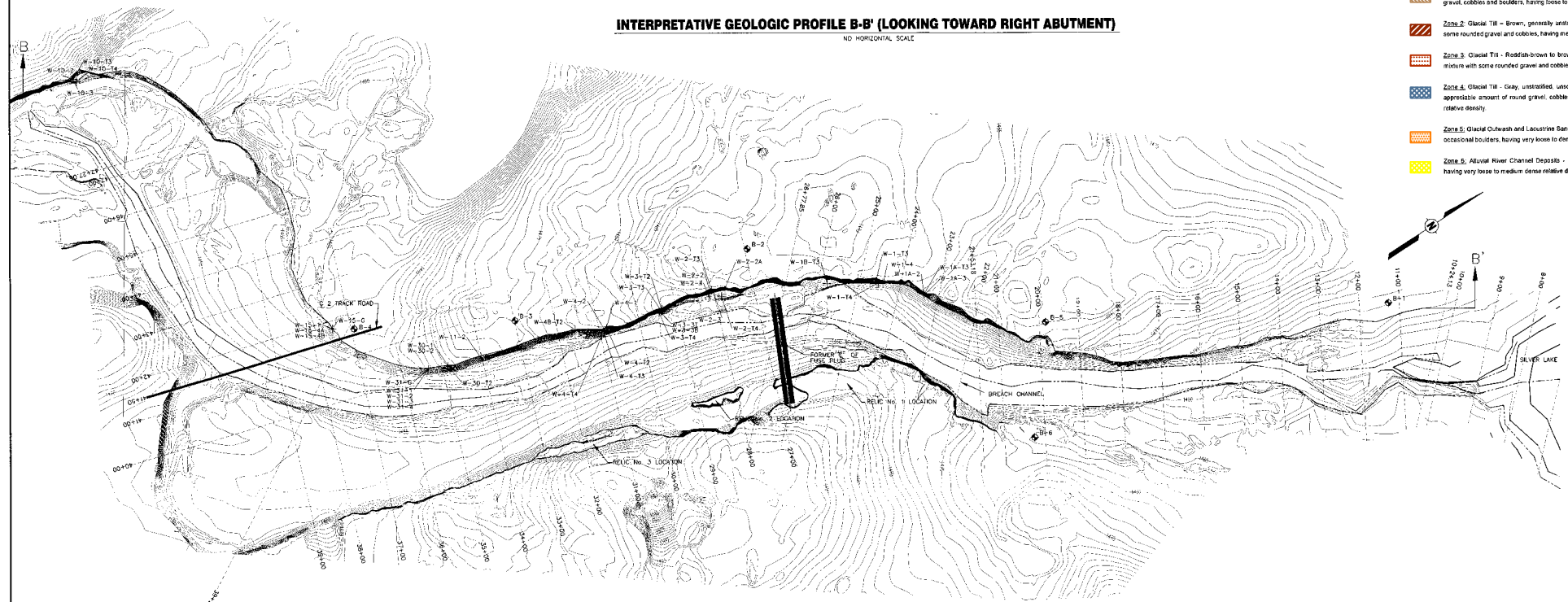
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05/27/03 INITIAL DRAFT
Designed: VW 08/19/03
Drawn: JMR 08/19/03
Checked: LMG 08/19/03
Approved: HWY 08/19/03

C.A.D DRAWING INFO:
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JOB NUMBER:
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SHEET NUMBER:
2 OF 5

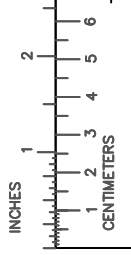


- LEGEND**
- Zone 1: Surficial T8 - Brown, unstratified and unsorted sand and silt mixture with some angular gravel, cobbles and boulders, having loose to dense relative density.
 - Zone 2: Glacial T8 - Brown, poorly unstratified and unsorted mixture of sand and silt with some rounded gravel and cobbles, having medium dense to very dense relative density.
 - Zone 3: Glacial T8 - Reddish-brown to brown, unstratified, unsorted, silty sands and sand-silt mixture with some rounded gravel and cobbles, medium dense to extremely relative density.
 - Zone 4: Glacial T8 - Gray, unstratified, unsorted dense to extremely dense silty sands with an appreciable amount of round gravel, cobbles, and boulders, having dense to extremely dense relative density.
 - Zone 5: Glacial Outwash and Lacustrine Sands - Brown, well-sorted sands with some gravel and occasional boulders, having very loose to dense relative density.
 - Zone 6: Alluvial River Channel Deposits - Brown, well-sorted sands with some small gravel, having very loose to medium dense relative density.



PLAN VIEW
SCALE: 1"=100'
WASHINGTON FIGURE III-2 HTS

- LEGEND:**
- + SURVEYED POINT
 - o MEASURED POINT
 - SURVEYED SOIL SAMPLE LOCATION
 - MEASURED SOIL SAMPLE LOCATION (SW) UNIFIED SOIL CLASSIFICATION
 - W-1-12 TOP OF ZONE 3
 - W-2-12 SAMPLE LOCATION 2
 - W-3-12 SAMPLE LOCATION 3
 - SOIL BORING LOCATION (W) END OF BORING
 - TOP OF CHANNEL FOR FUSE PLUG
 - BOTTOM OF ERODED NEW DEAD RIVER CHANNEL
 - INTERPRETED LIMITS OF ZONES



GEOLOGIC PROFILE RIGHT (WEST) BANK

SILVER LAKE DAM
ROOT CAUSE REPORT



DESIGN:	DATE:
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SCALE:	

DWG NO. FIGURE NO. III -2 REV



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PROJECT TITLE
ROOT CAUSE EVALUATION
SILVER LAKE BREACH

CLIENT
UPPER PENINSULA
POWER COMPANY
500 W. WASHINGTON ST.
ISHPEMING MI, 49849

SHEET TITLE
INTERPRETATIVE GEOLOGIC PROFILE
LEFT (EAST) BANK

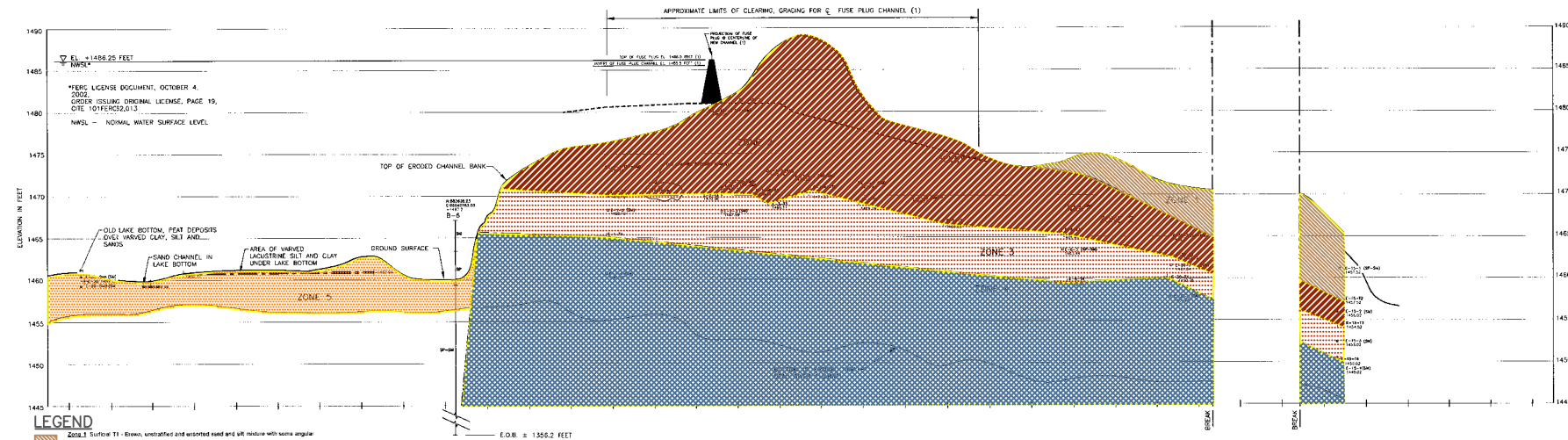
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X-Ref Files:

Layer Manager:

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SHEET NUMBER:
1 OF 5



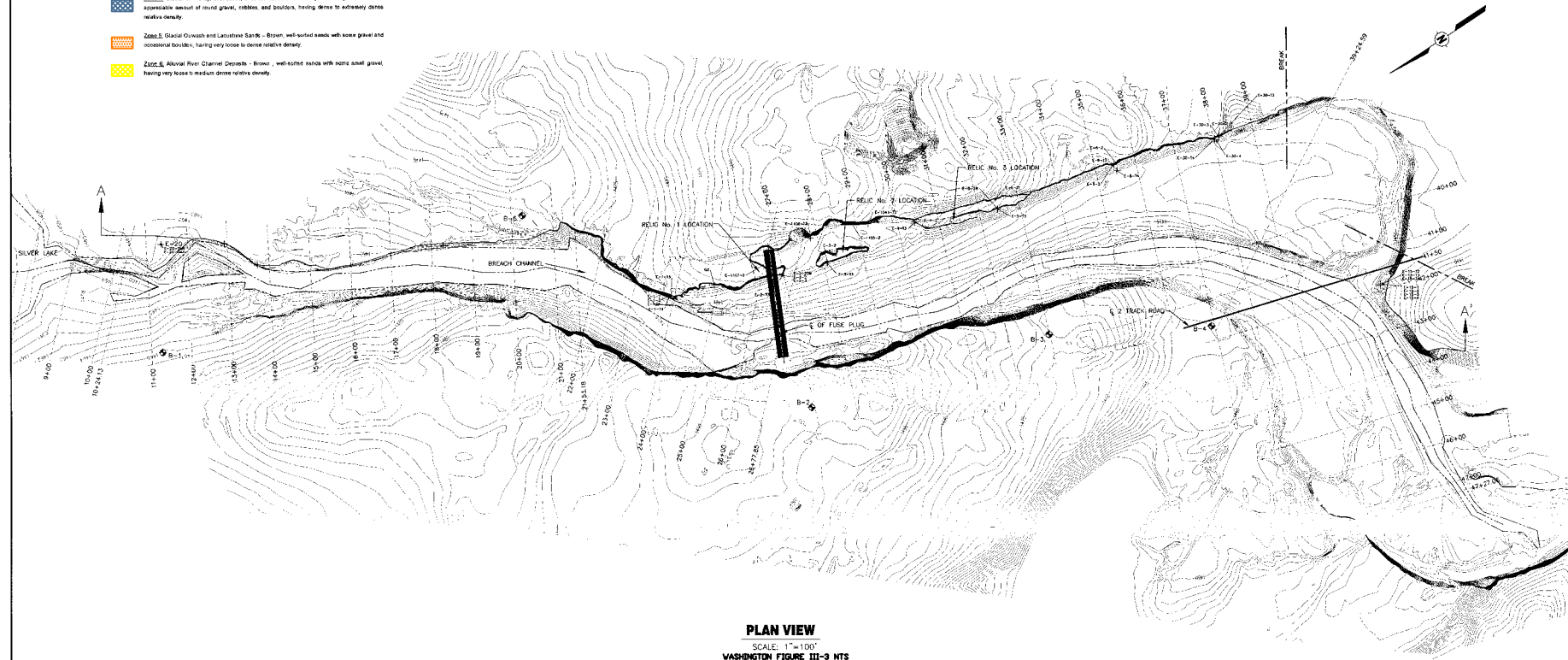
INTERPRETATIVE GEOLOGIC PROFILE A-A' (LOOKING TOWARD LEFT ABUTMENT)
NO HORIZONTAL SCALE

LEGEND

- Zone 1 Surface T1 - Brown, unstratified and unsorted sand and silt matrix with some angular gravel, cobbles and boulders, having loose to dense relative density.
- Zone 2 Gravel T1 - Brown, generally unstratified and unsorted mixture of sand and silt with some rounded gravel and cobbles, having medium dense to very dense relative density.
- Zone 3 Gravel T1 - Reddish-brown to brown, unstratified, unsorted, silty sand and silt matrix with some rounded gravel and cobbles, medium dense to extremely dense relative density.
- Zone 4 Gravel T1 - Gray, unstratified, unsorted dense to extremely dense silty sand with an appreciable amount of round gravel, cobbles and boulders, having dense to extremely dense relative density.
- Zone 5 Gravel Outwash and Lacustrine Sand - Brown, well-sorted sands with some gravel and occasional boulders, having very loose to dense relative density.
- Zone 6 Alluvial River Channel Deposits - Brown, unstratified silts with some small gravel, having very loose to medium dense relative density.

LEGEND:

- + SURVEYED POINT
- MEASURED POINT
- SURVEYED SOIL SAMPLE LOCATION
- MEASURED SOIL SAMPLE LOCATION
- (SM) UNIFIED SOIL CLASSIFICATION
- E-15-13 TOP OF ZONE 3 LOCATION IS
- E-2-2 SAMPLE OF ZONE 2 SAMPLE LOCATION 3
- SOIL BORING LOCATION
- NEW END OF BORING
- TOP OF CHANNEL FOR FUSE PLUG
- BOTTOM OF ERODED NEW DEAD RIVER CHANNEL
- INTERPRETED LIMITS OF ZONES



PLAN VIEW
SCALE: 1"=100'
WASHINGTON FIGURE III-3 NTS



GEOLOGIC PROFILE LEFT (EAST) BANK

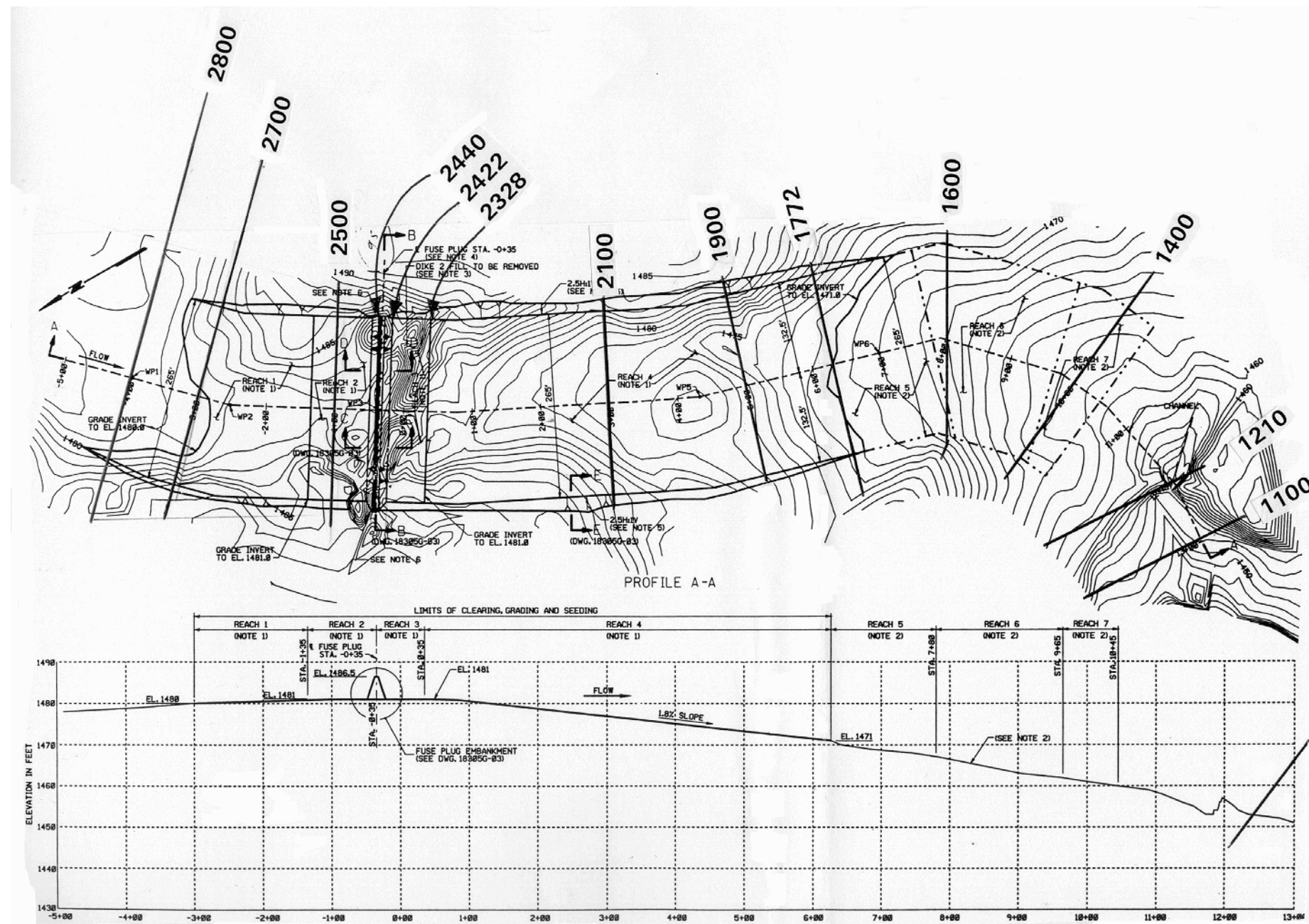
SILVER LAKE DAM
ROOT CAUSE REPORT



DWG NO. FIGURE NO. III - 3

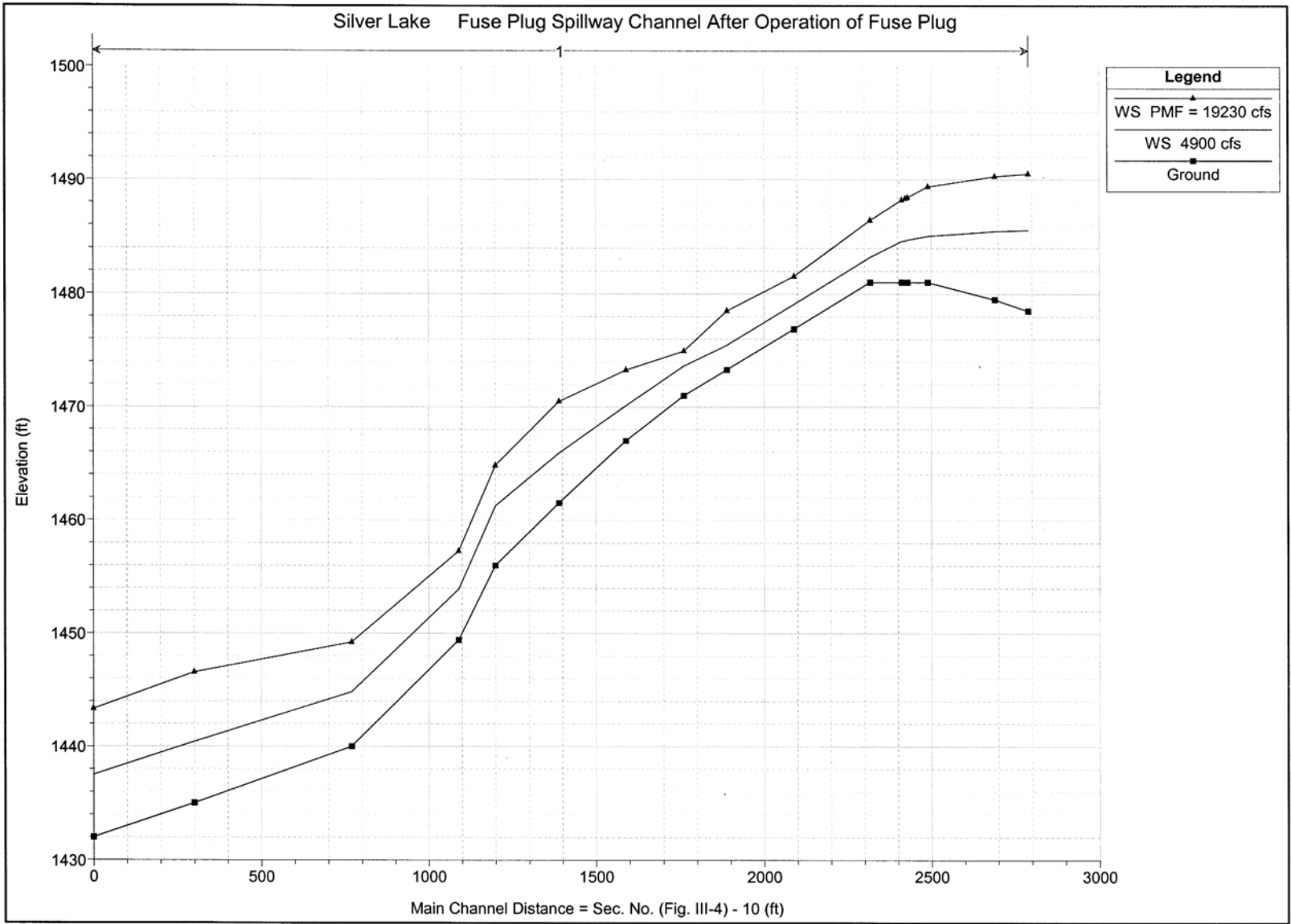
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CHECKED:	DATE:
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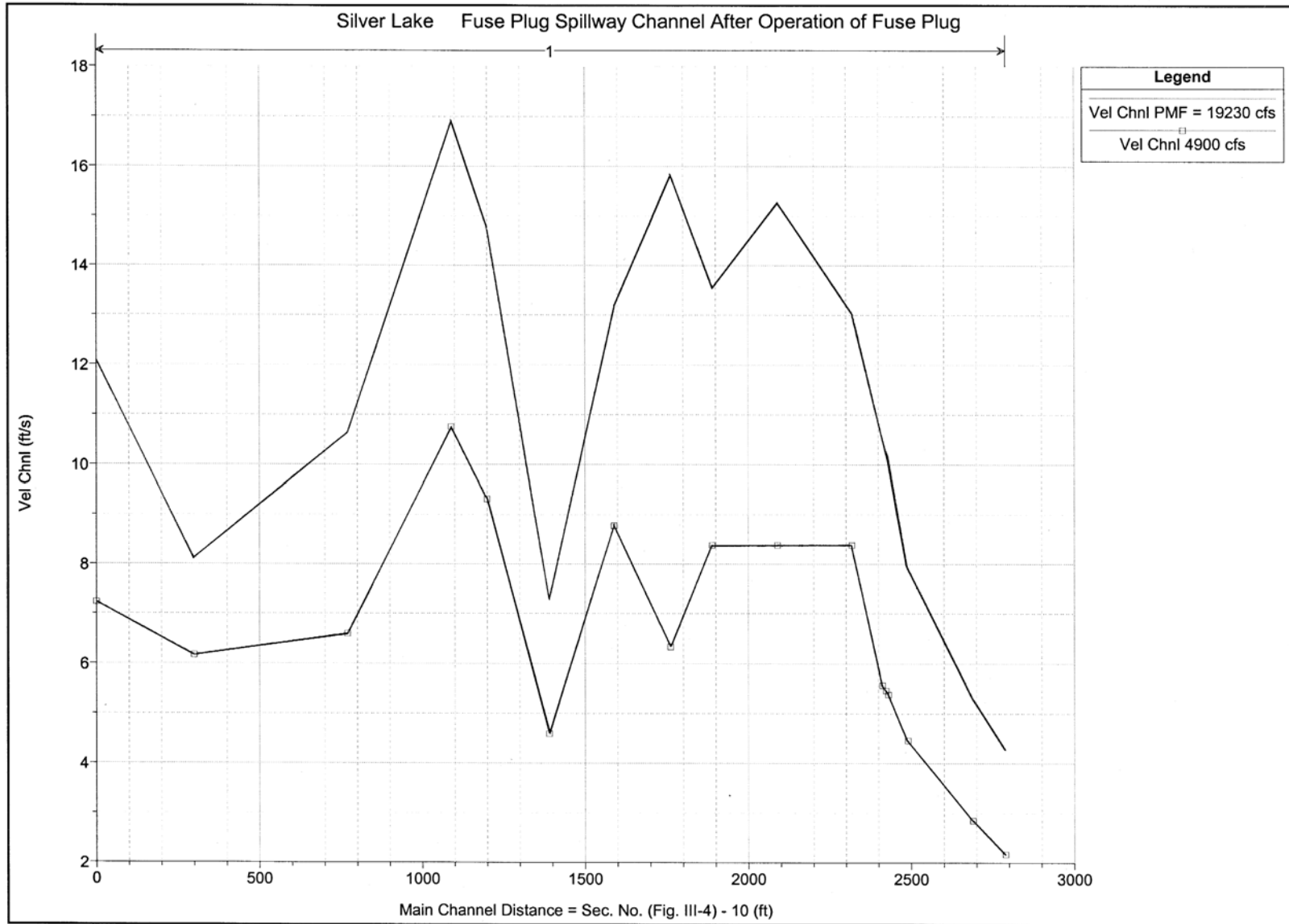


Scale: 1" = 200'

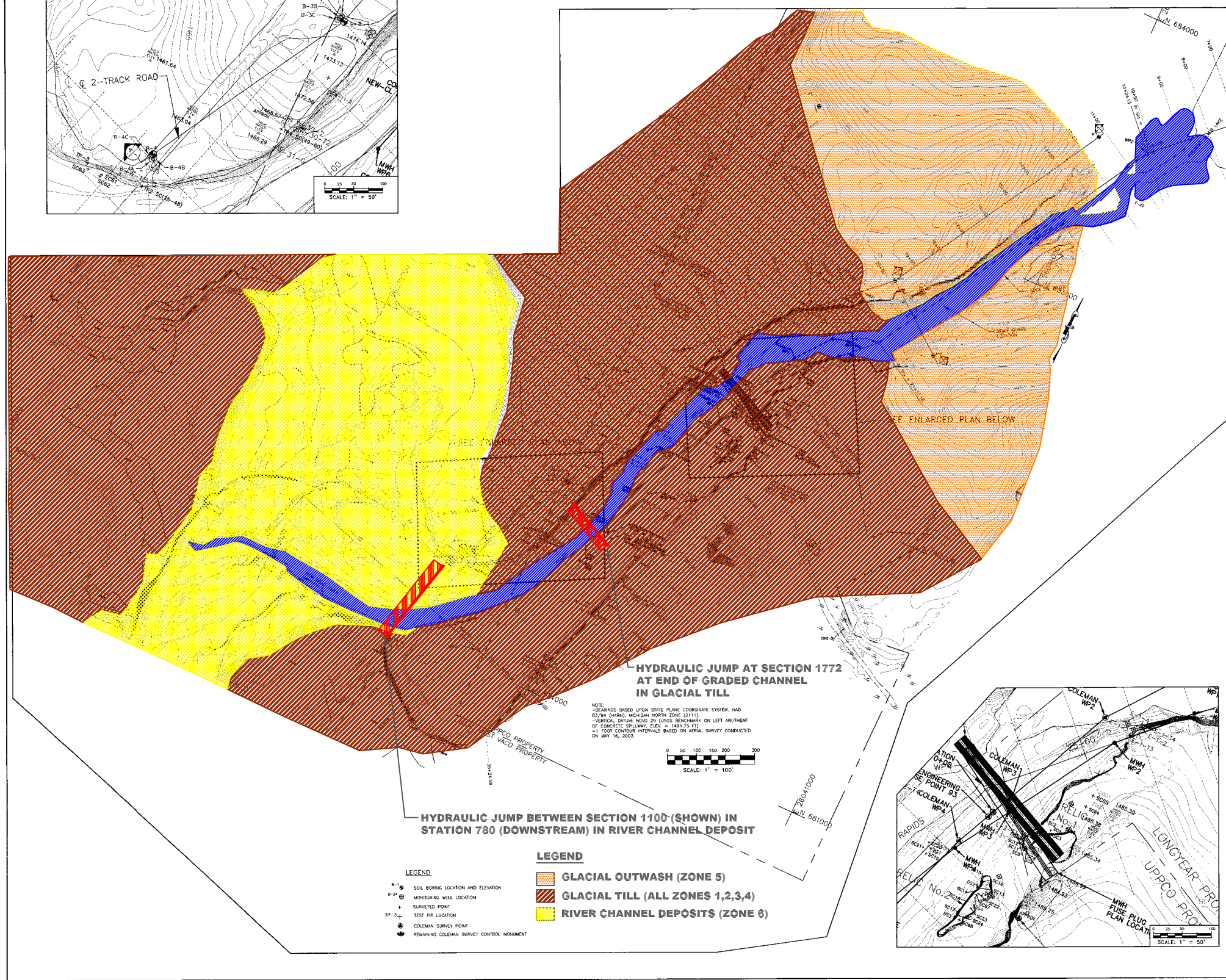
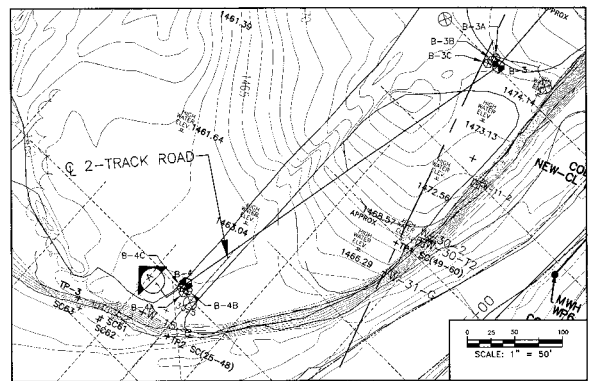
Note: Topography for Sections 10, 310 and 780 was derived from May 2003 survey maps and other information.



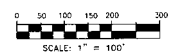
Fuse Plug Outflow Channel, Water Surface Profiles



Fuse Plug Outflow Channel, Velocities as Designed

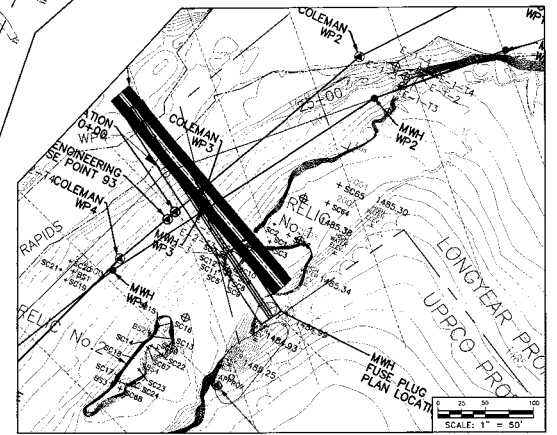


NOTE:
 -ELEVATIONS BASED UPON STATE PLANE COORDINATE SYSTEM, NAD 83/98 (LANSING, MICHIGAN NORTH ZONE (2411)).
 -VERTICAL DATUM: MDD 29 (CLOSE BENCHMARK ON LEFT ABUTMENT OF CONCRETE SPILLWAY; ELEV = 1493.75 FT).
 -1 FOOT CONTOUR INTERVALS BASED ON AERIAL SURVEY CONDUCTED ON MAY 16, 2003.



- LEGEND**
- B-1-1 SOIL BORING LOCATION AND ELEVATION
 - B-2-1 MONITORING WELL LOCATION
 - 4 SURVEYED POINT
 - TP-3-1 TEST PIT LOCATION
 - COLEMAN SURVEY POINT
 - REMAINING COLEMAN SURVEY CONTROL MONUMENT

- LEGEND**
- GLACIAL OUTWASH (ZONE 5)
 - GLACIAL TILL (ALL ZONES 1,2,3,4)
 - RIVER CHANNEL DEPOSITS (ZONE 6)



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PROJECT TITLE
 ROOT CAUSE EVALUATION
 SILVER LAKE BREACH

CLIENT
 UPPER PENINSULA
 POWER COMPANY
 500 W. WASHINGTON ST.
 LANSING, MI, 48249

SHEET TITLE
 SITE PLAN - FIELD SAMPLING
 AND TEST PIT LOCATIONS
 SILVER LAKE BREACH
 SILVER LAKE PROJECT

Issued
 Date: Description:

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Layer Manager:
 JOB NUMBER:
10452
 SHEET NUMBER:
3 OF 5

SITE PLAN, GEOLOGIC ZONES,
 AND LOCATIONS OF HYDRAULIC JUMPS

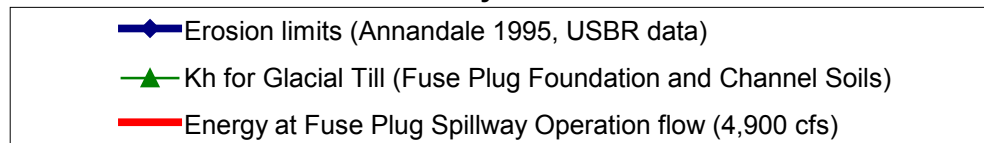
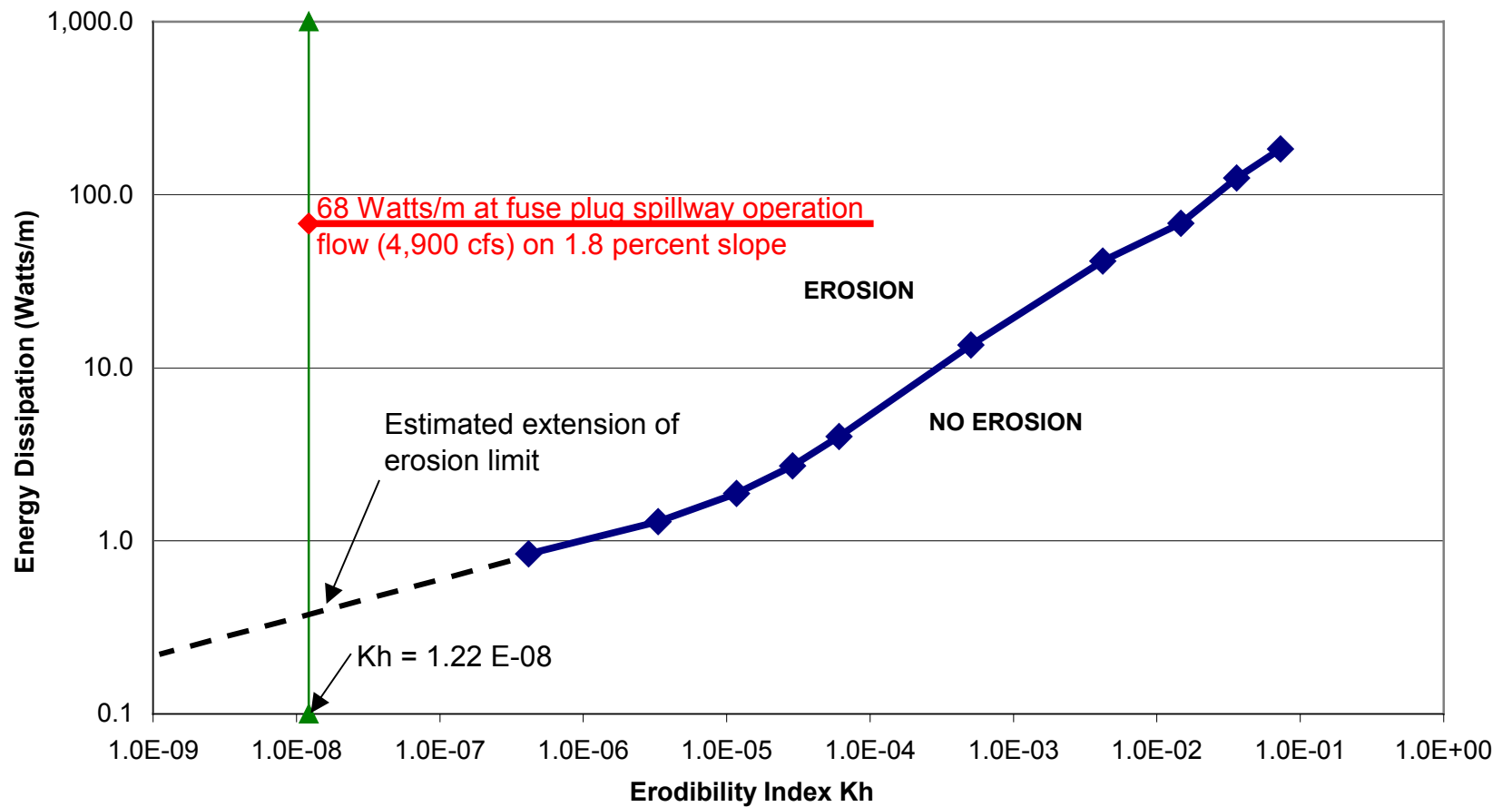
SILVER LAKE DAM
 ROOT CAUSE REPORT



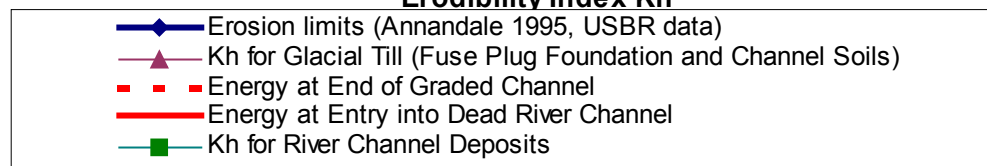
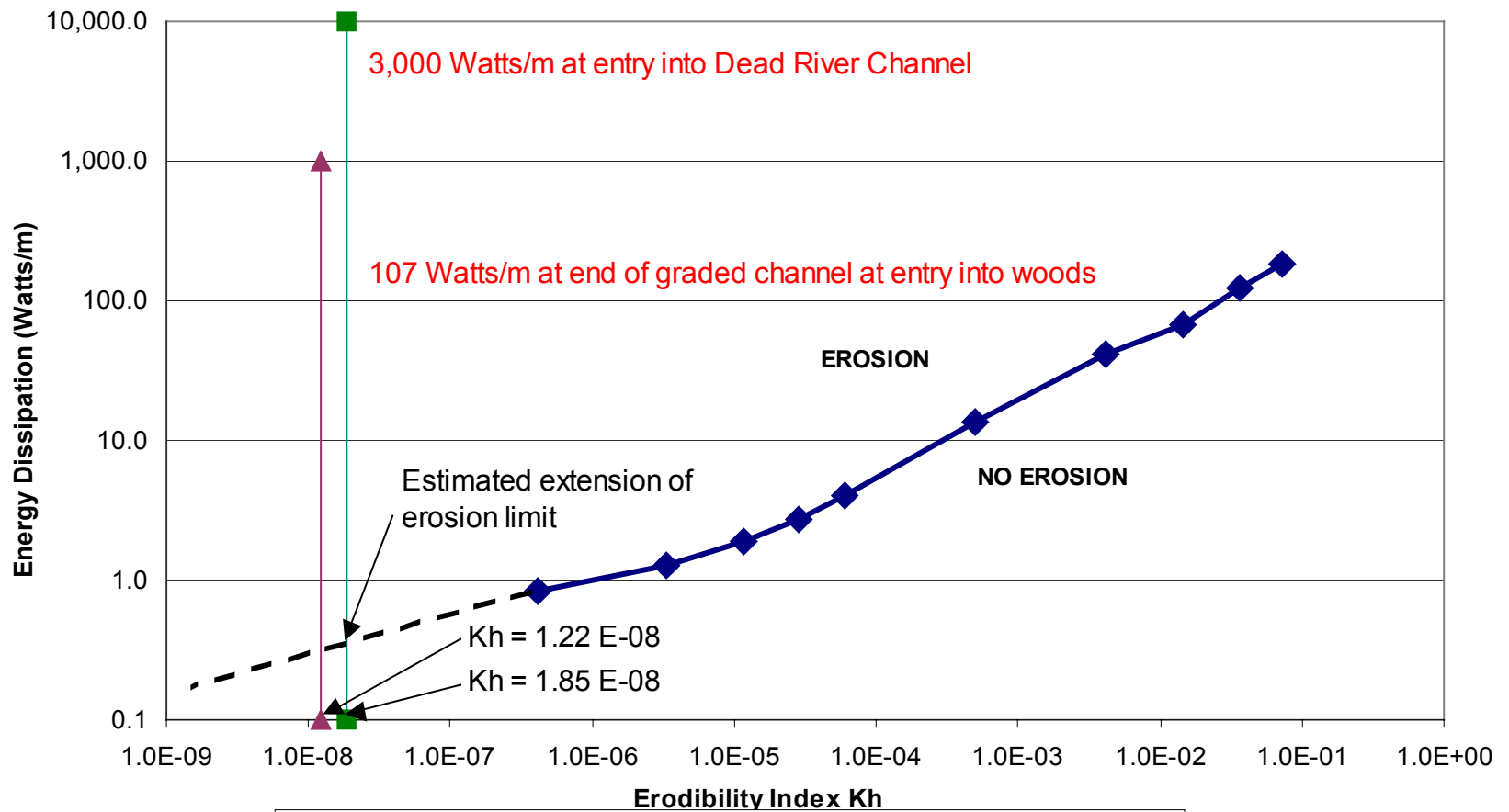
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SCALE:	

DWG NO. FIGURE NO. III - 7 REV

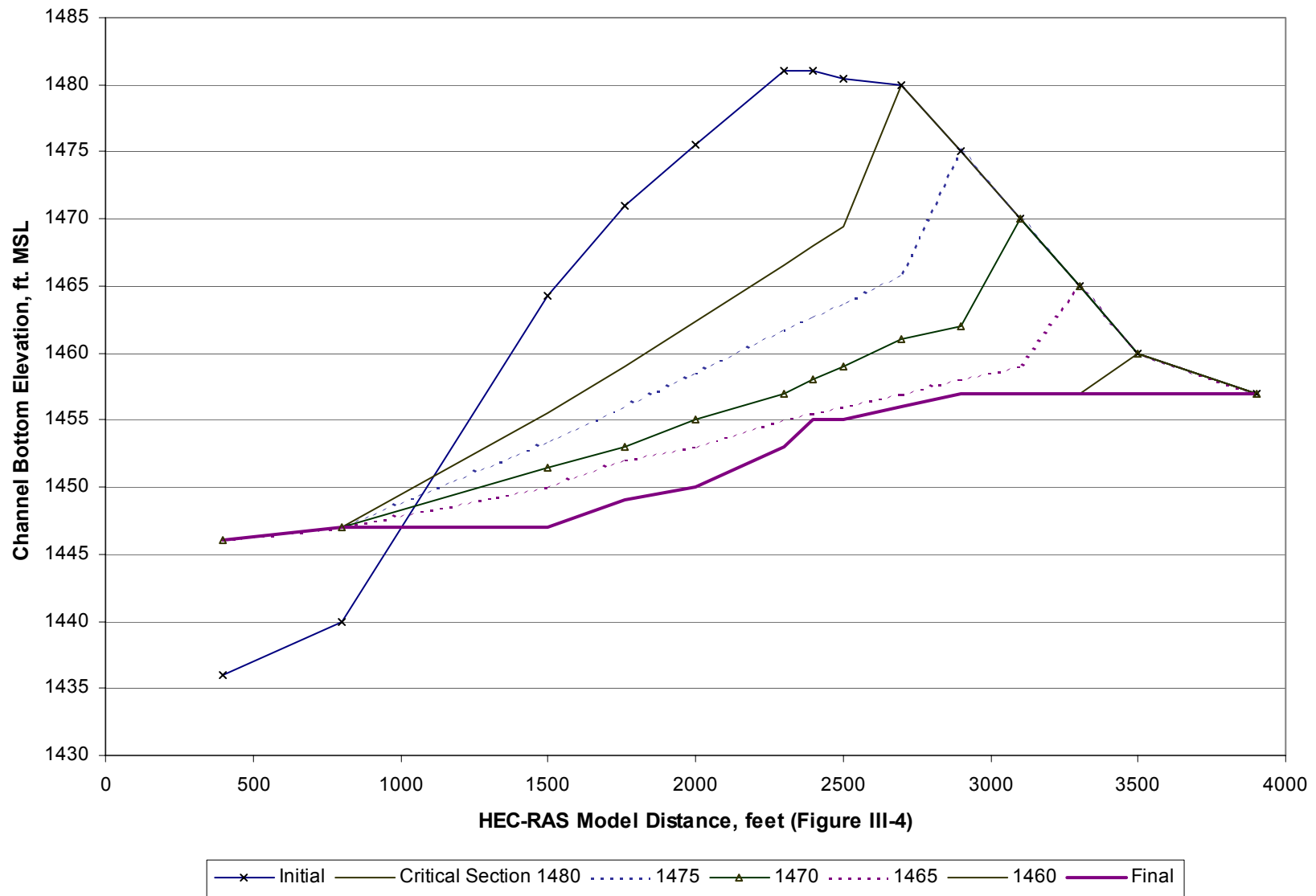




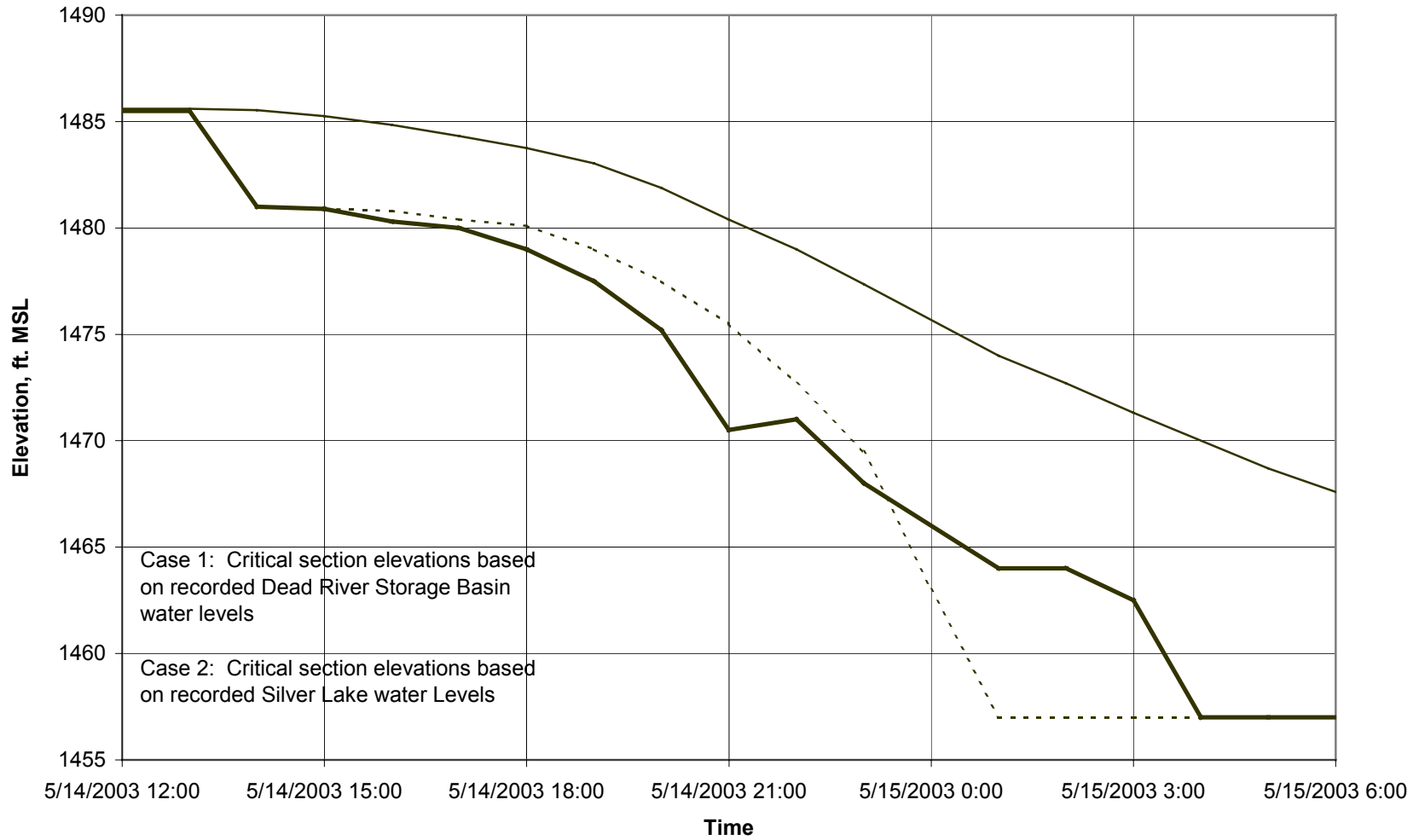
Annandale Erodibility Evaluation on Graded Channel



Annandale Erodibility Evaluation at Hydraulic Jump Locations



Ground Profile of Assumed Eroded Channel



— Lake Elevation - - - - Section El. Case 1 — Section El. Case 2

Estimated Elevation of Breach Critical Section

