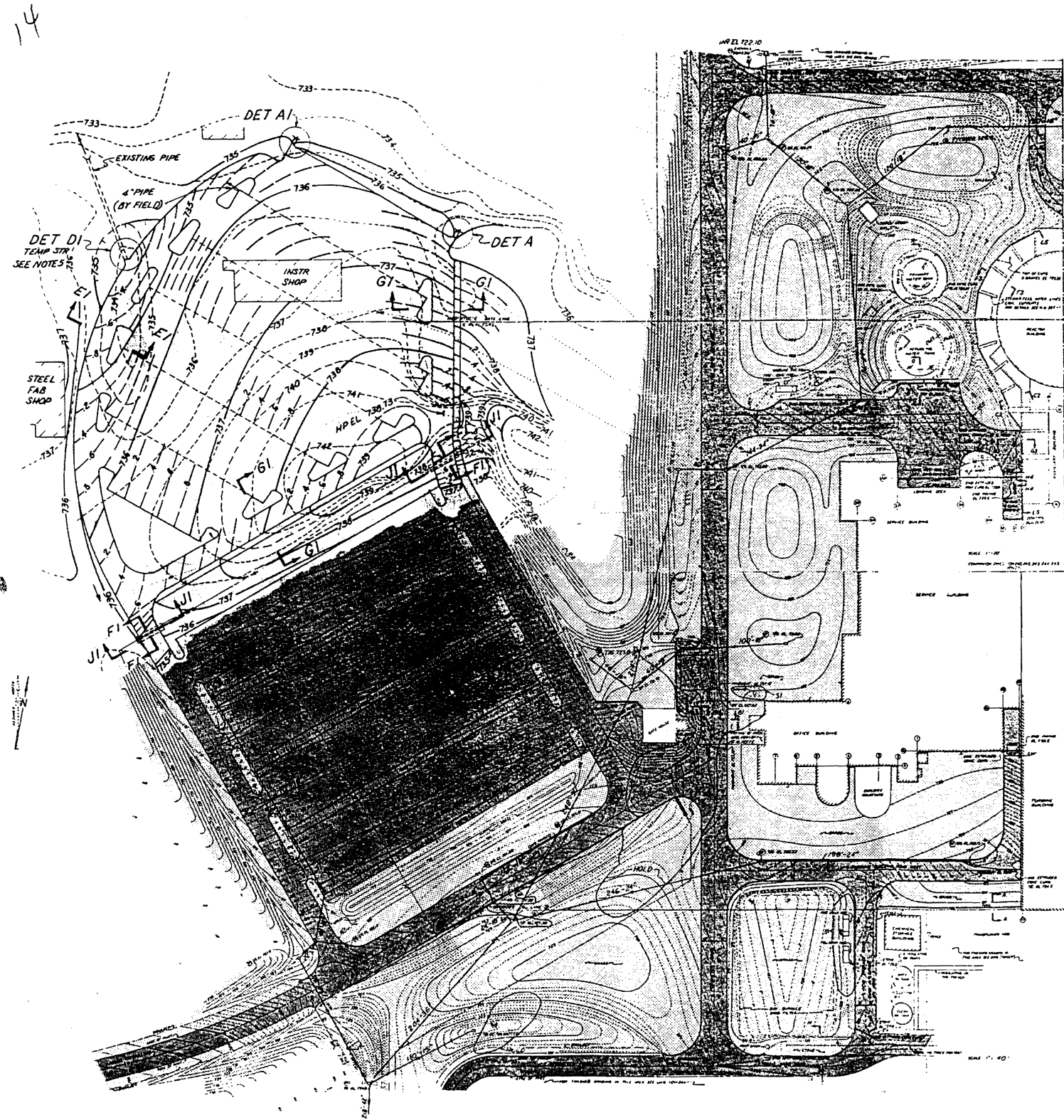


Figure 2.4-30 thru Figure 2.4-40 Are Not Used

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Figure 2.4-40a Main Plant Site Grading And Drainage System For Flood Studies Sheet 1

Figure 2.4-40a Main Plant Site Grading and Drainage System For Flood Studies Sheet 2



Added by Amendment 50

LEGEND
PAVED AREAS
GRASSED AREAS

WATTS BAR NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

MAIN PLANT
SITE GRADING AND DRAINAGE
SYSTEM FOR FLOOD STUDIES
SHEET 3
FIGURE 2.4-40a

Figure 2.4-40a Main Plant Site Grading and Drainage System For Flood Studies Sheet 3

Figure 2.4-40b Main Plant General Plan

Figure 2.4-40c Yard Site Grading and Drainage System For Flood Studies

Figure 2.4-40d-1 Main Plant Plant Perimeter Roads Plan and Profile Sheet 1

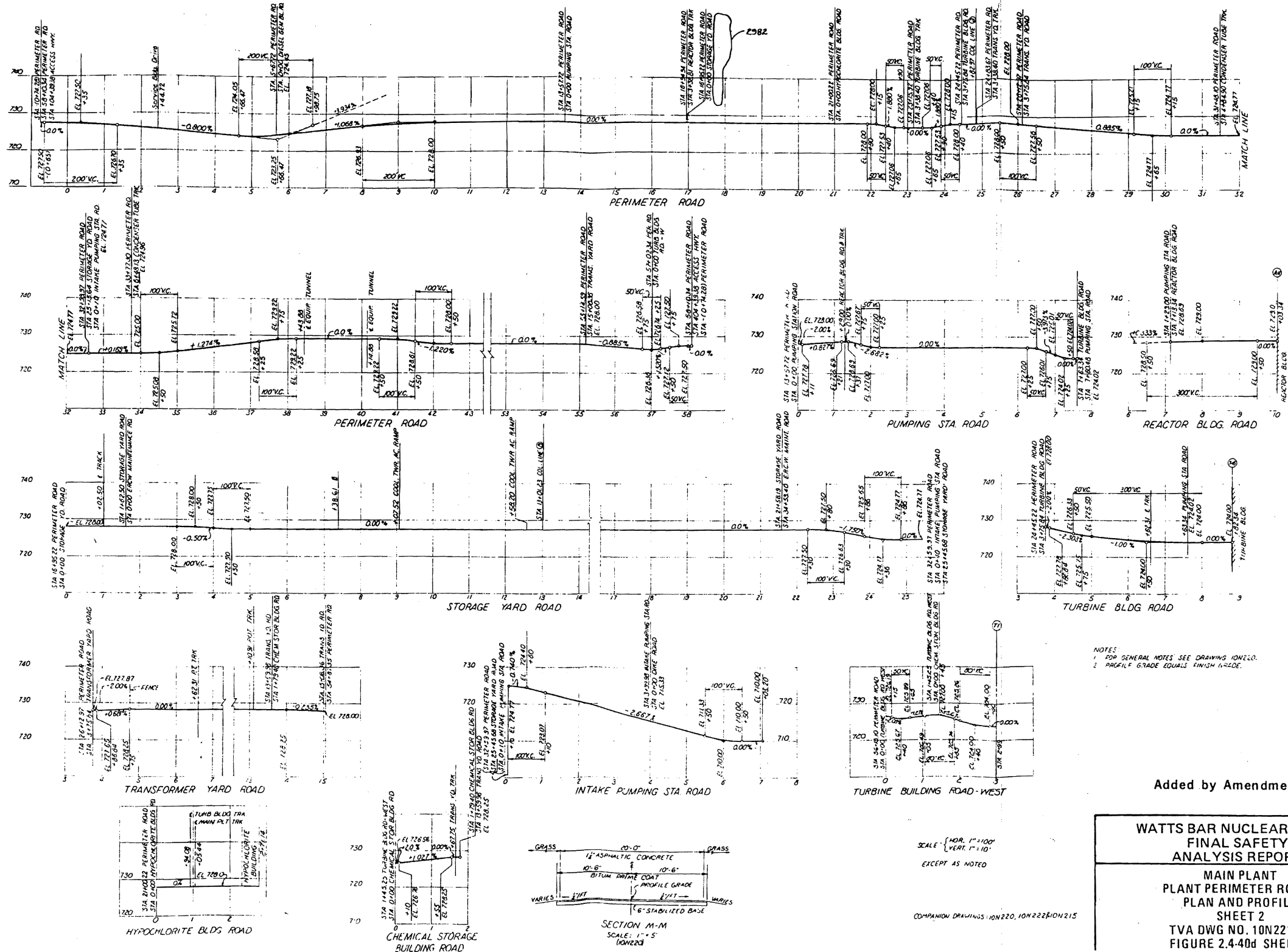
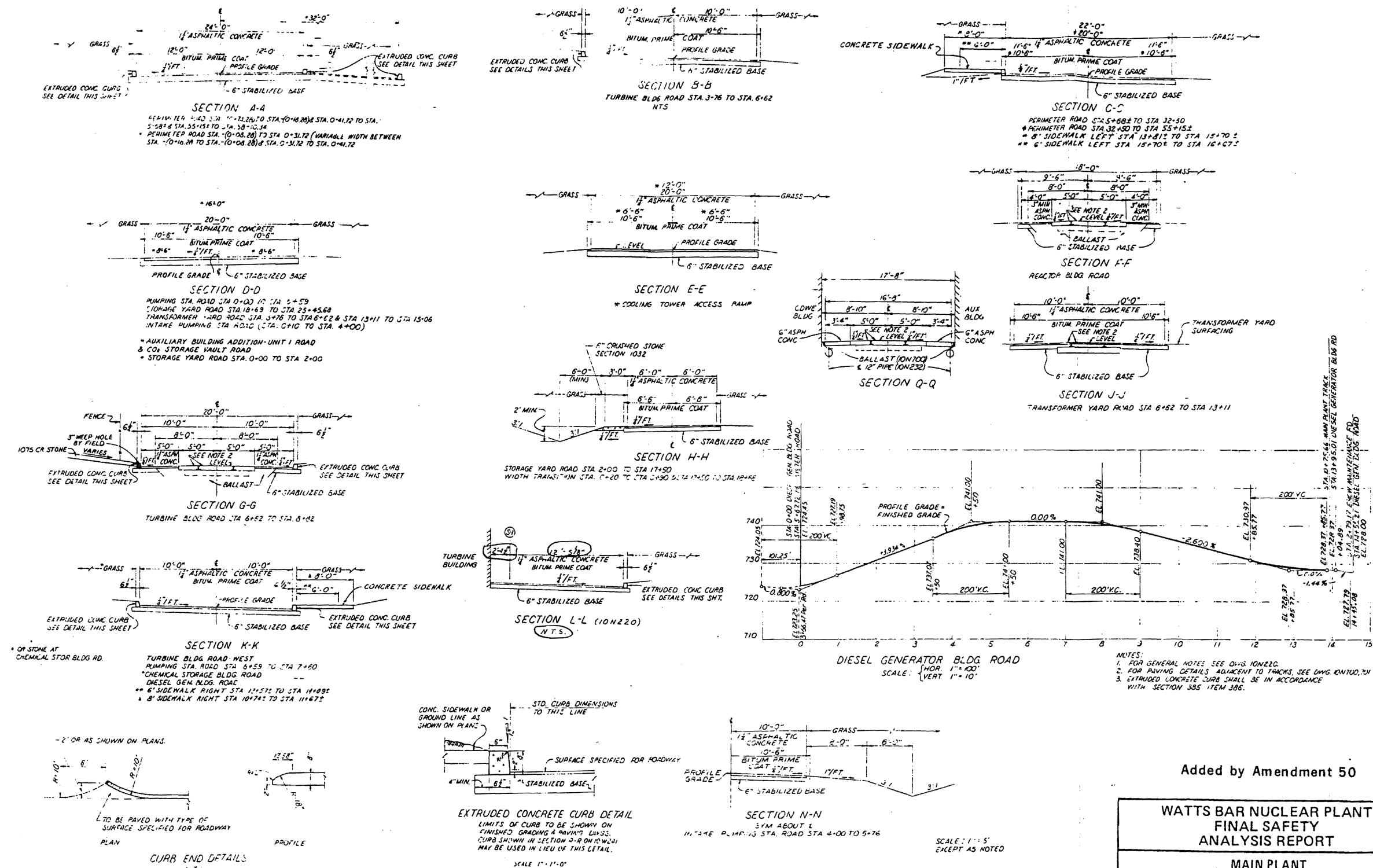


Figure 2.4-40d Main Plant Perimeter Roads Plan and Profile - Sheet 2



Added by Amendment 50

WATTS BAR NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT

MAIN PLANT
PLANT PERIMETER ROADS
PLAN AND PROFILE
SHEET 3
TVA DWG NO. 10N222 R10
FIGURE 2.4-40d SHEET 3

COMPANION DRAWINGS: 10N220, 10N221, 10N215

Figure 2.4-40d Main Plant Perimeter Roads Plan and Profile - Sheet 3

20

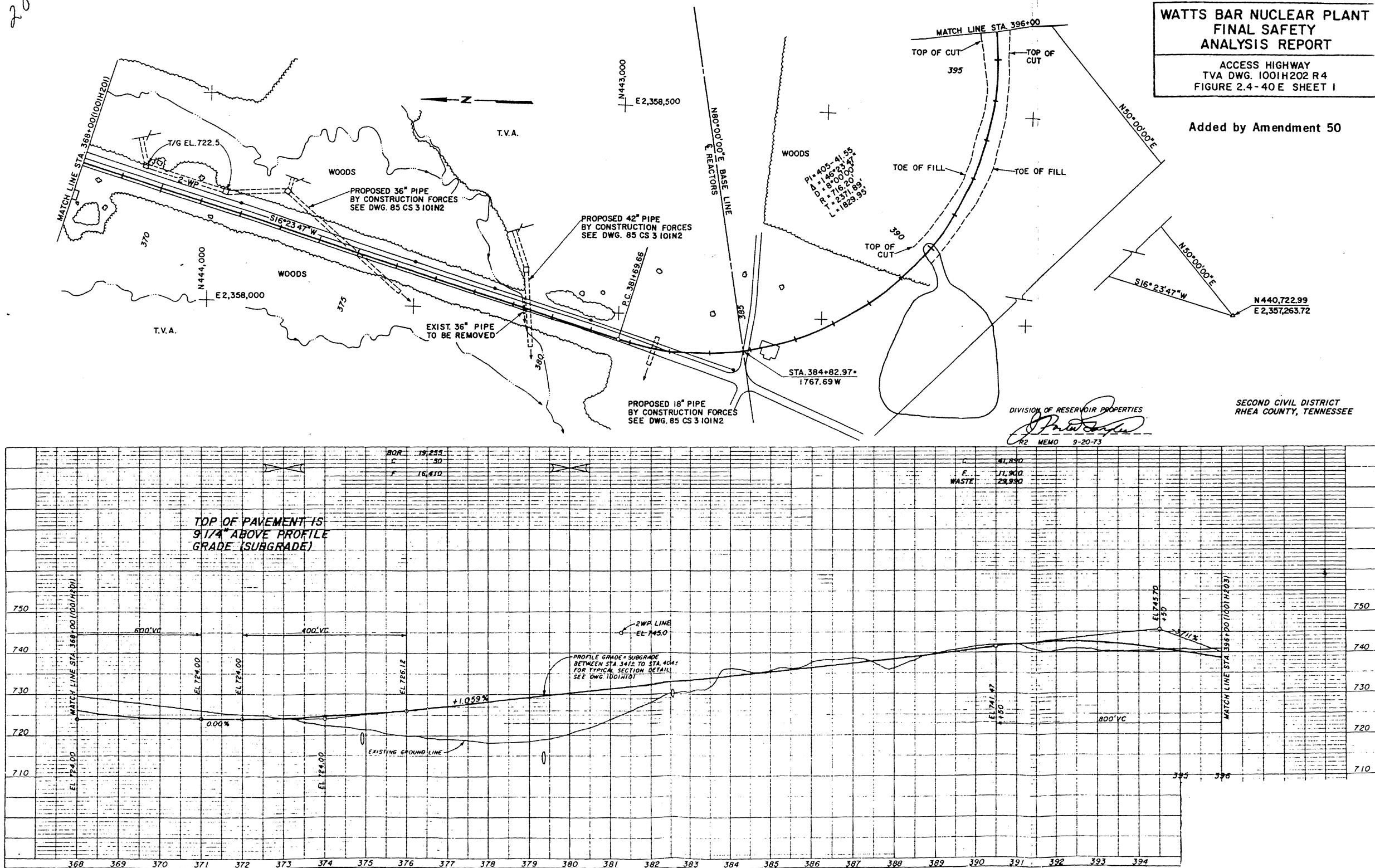
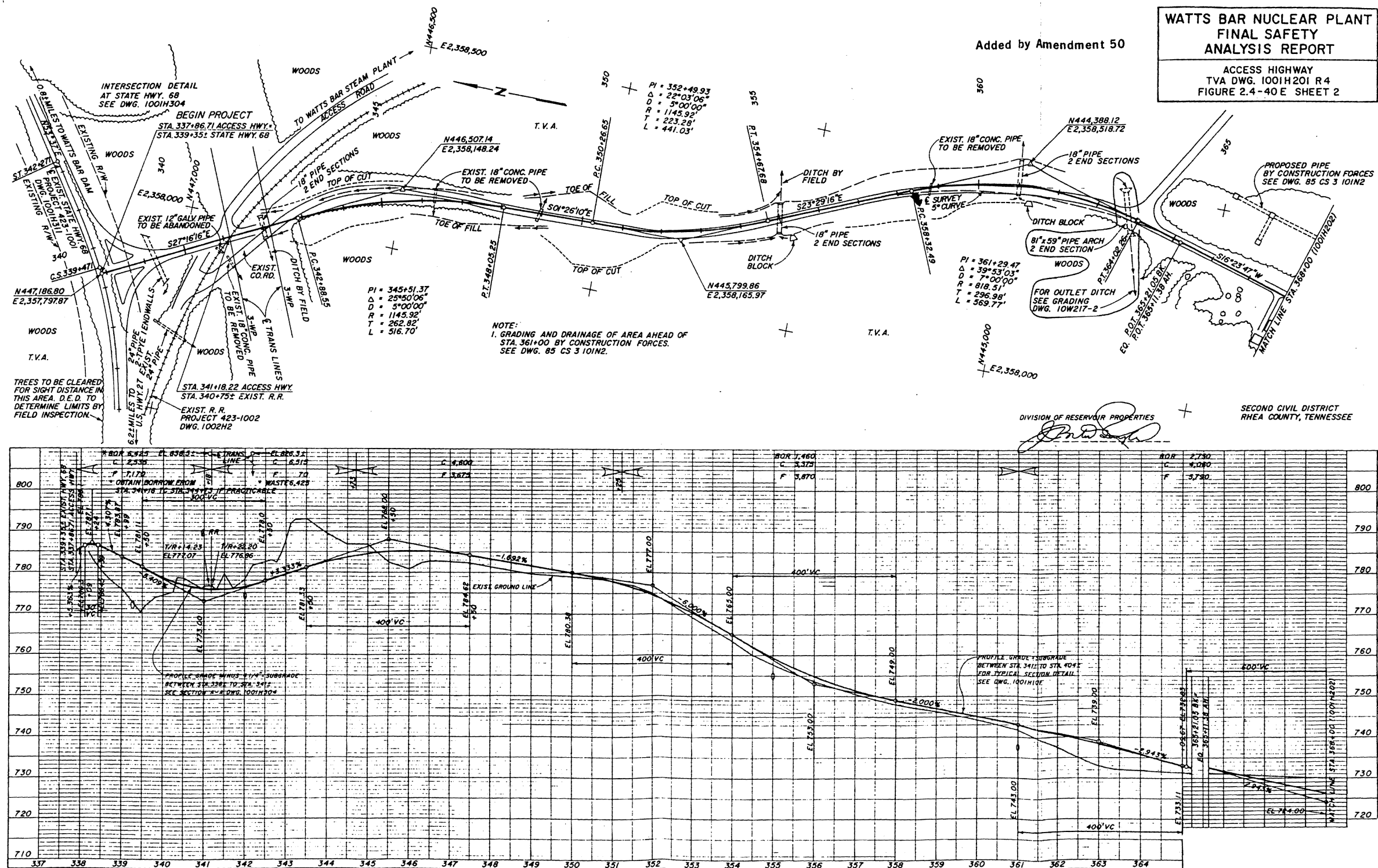


Figure 2.4-40e Access Highway TVA DWG 1001H202 R4 - Sheet 1



WATTS BAR

WBNP-99

Figure 2.4-40f Main Plant Main Plant Tracks Plan - Sheet 1

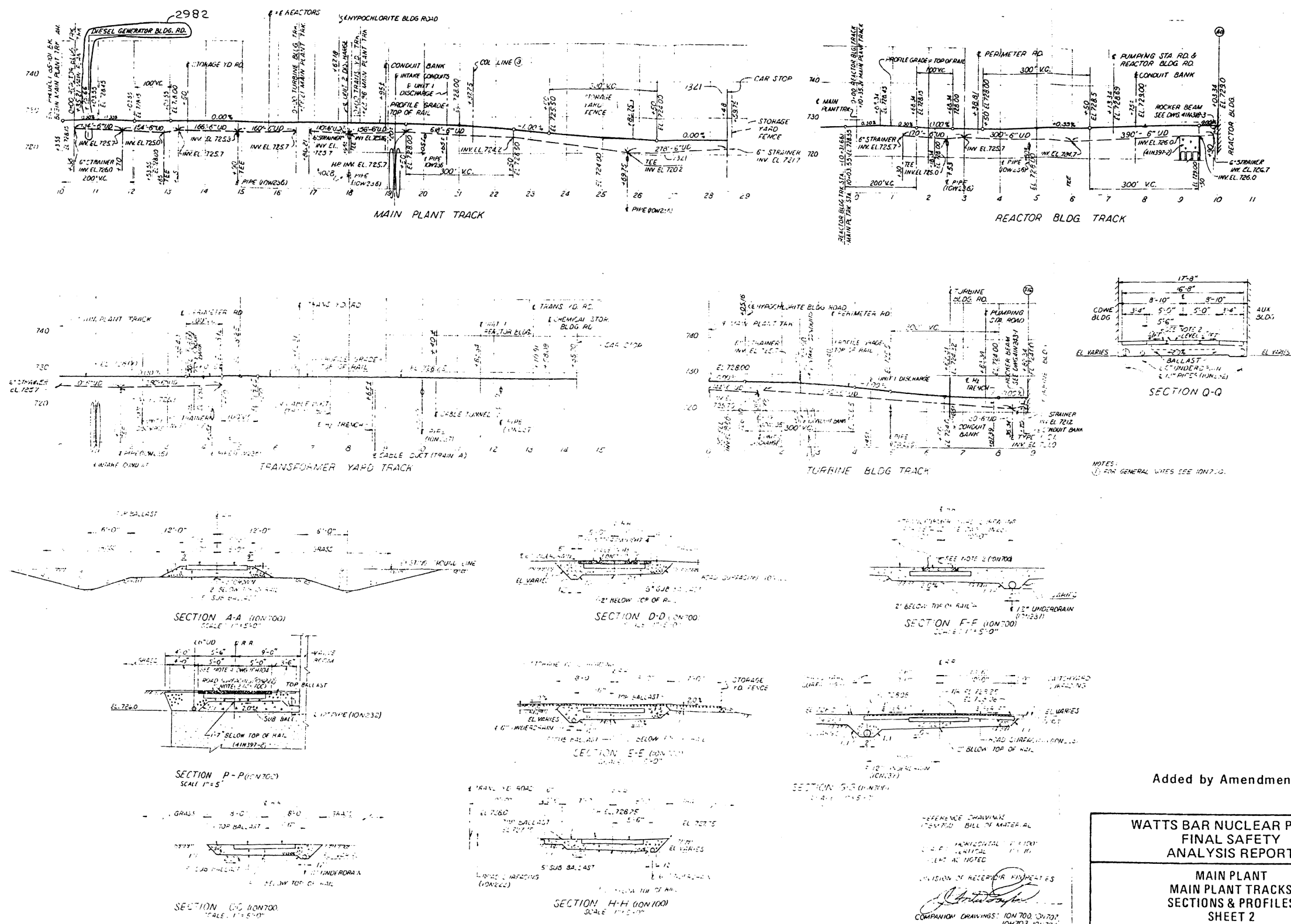


Figure 2.4-40f Main Plant Main Plant Tracks Sections & Profiles - Sheet 2

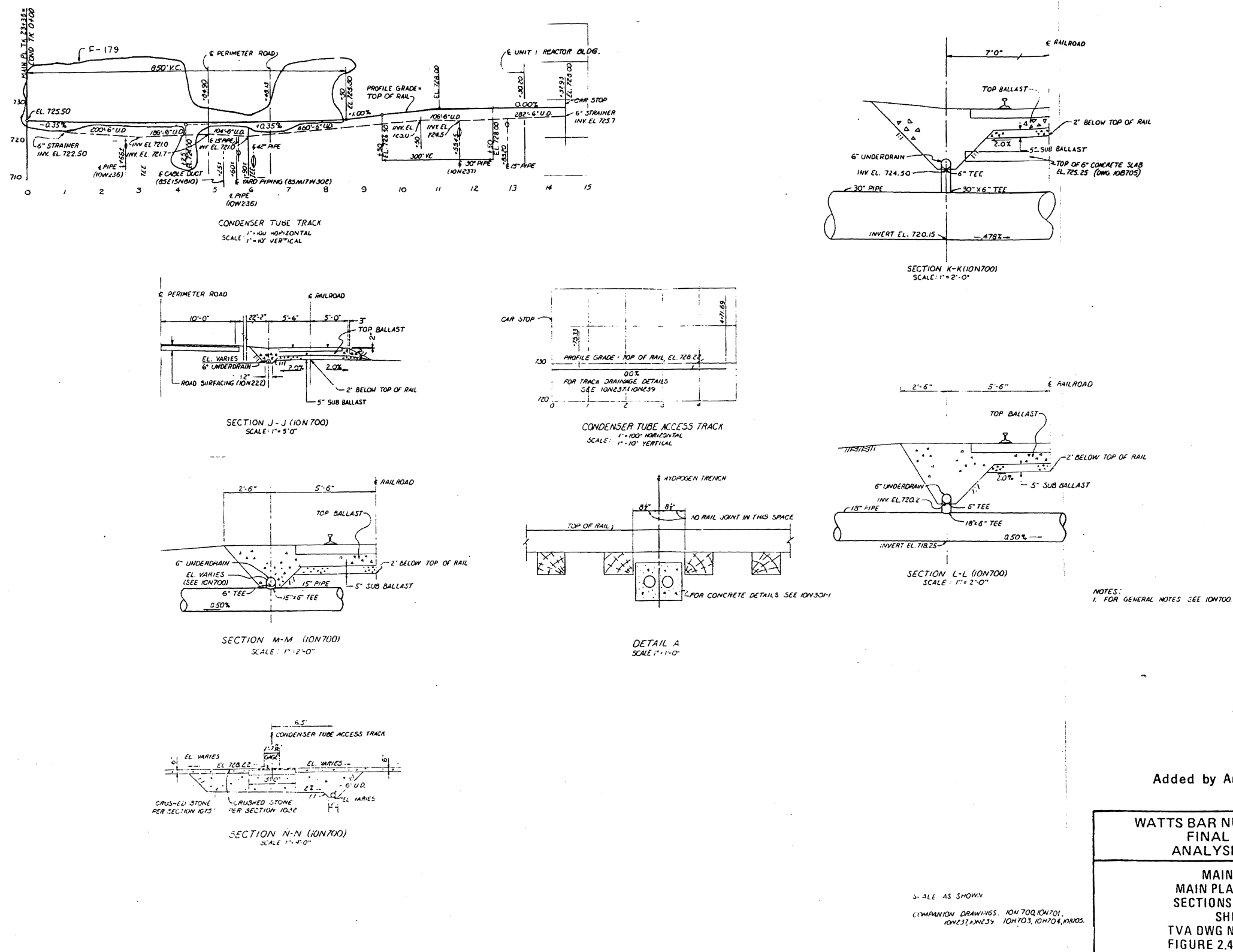


Figure 2.4-40f Main Plant Main Plant Tracks Sections & Profiles - Sheet 3

WATTS BAR

WBNP-99

Figure 2.4-40g Yard, Grading Drainage and Surfacing Transformer & Switchyard - Sheet 1

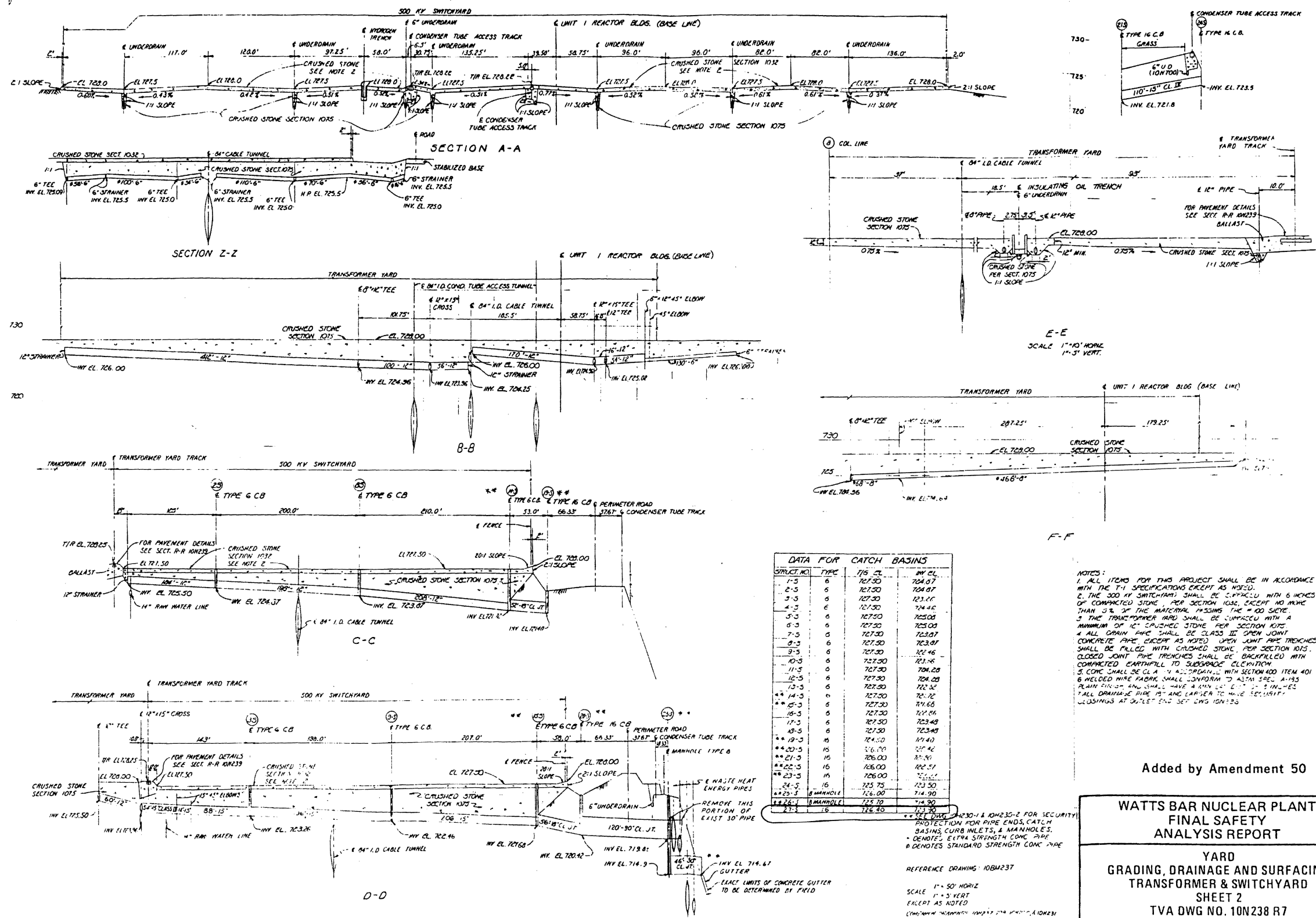


Figure 2.4-40g Yard, Grading Drainage and Surfacing Transformer & Switchyard - Sheet 2

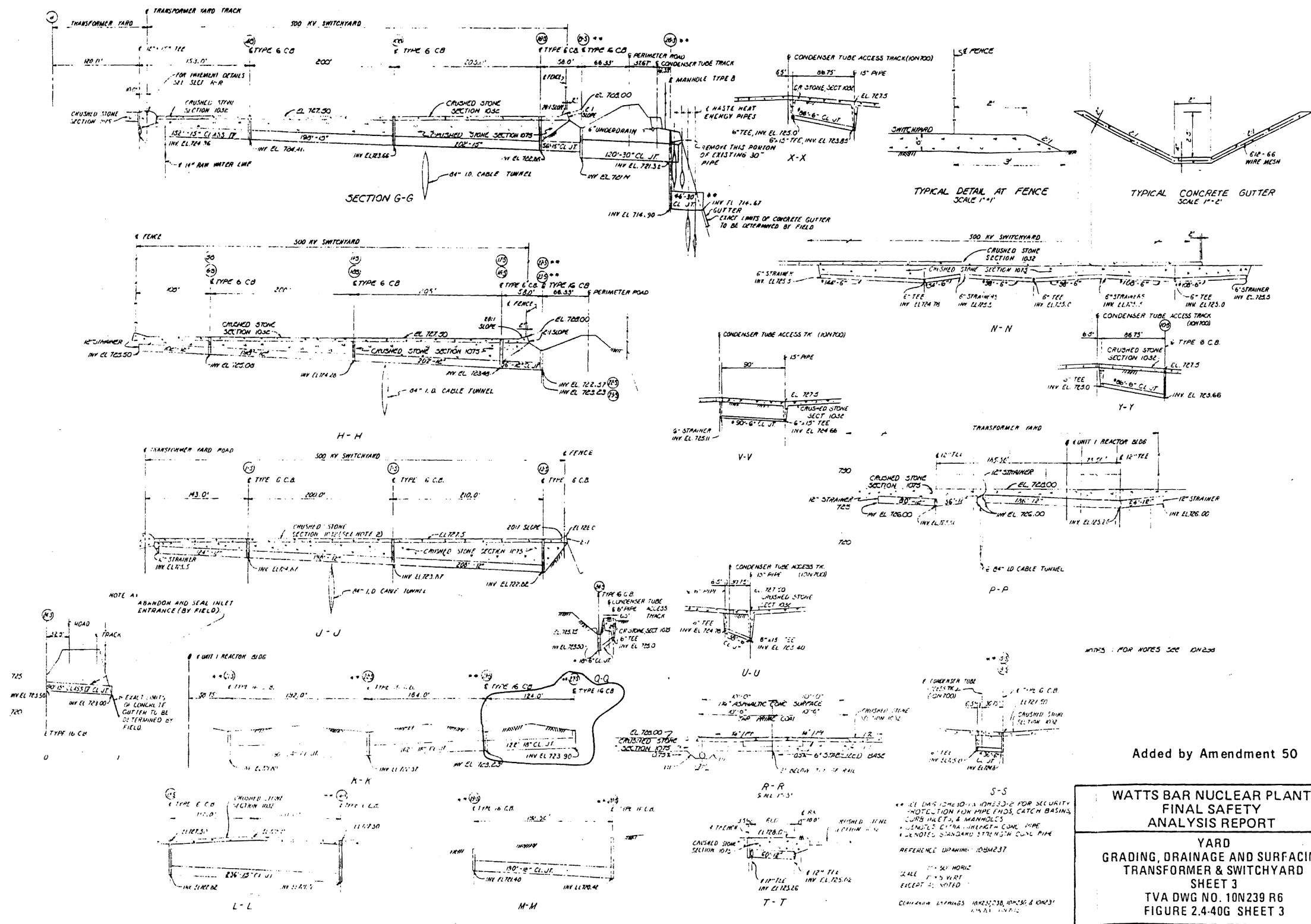
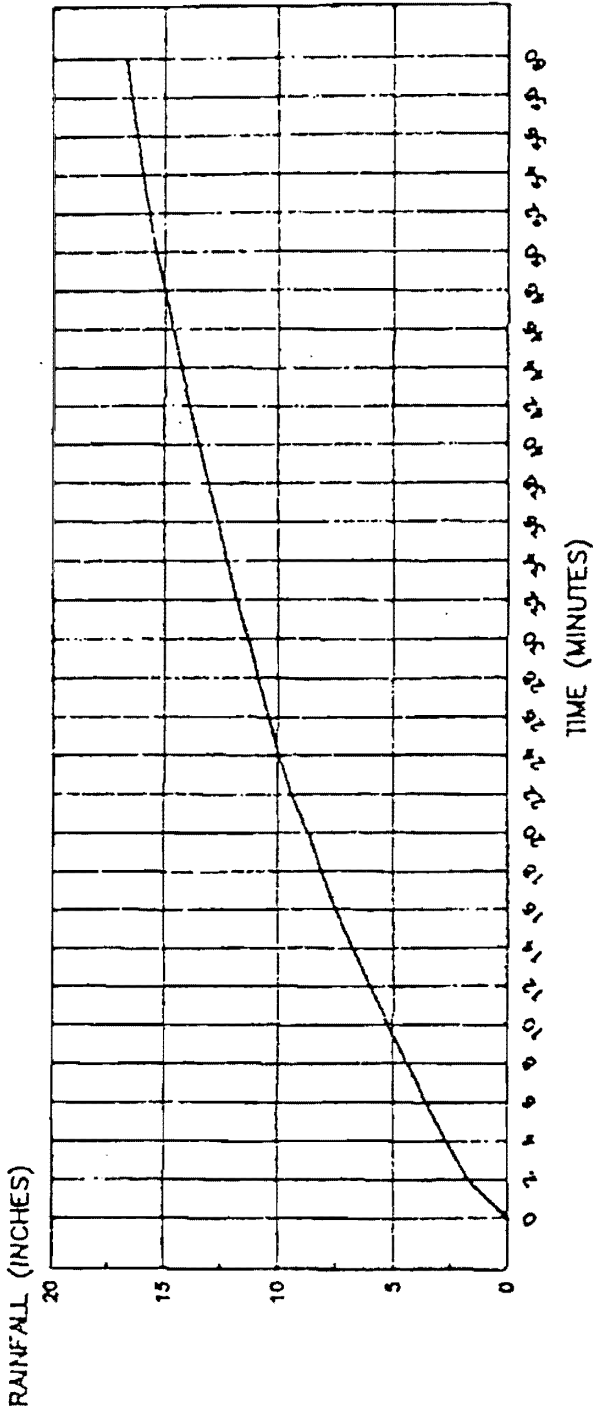


Figure 2.4-40g Yard, Grading Drainage and Surfacing Transformer & Switchyard - Sheet 3

PROBABLE MAXIMUM PRECIPITATION
BASED ON HYDROMETEOROLOGICAL REPORT NO. 56



SCANNED DOCUMENT
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THE WBNP OPTIGRAPHICS SCANNER DATABASE

AMENDMENT 83

WATTS BAR NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

PROBABLE MAXIMUM PRECIPITATION
• POINT RAINFALL
FIGURE 2.4-40h

Figure 2.4-40h Probable Maximum Precipitation Point Rainfall

Figure 2.4-40i Deleted by Amendment 83

Figure 2.4-40j Deleted by Amendment 83

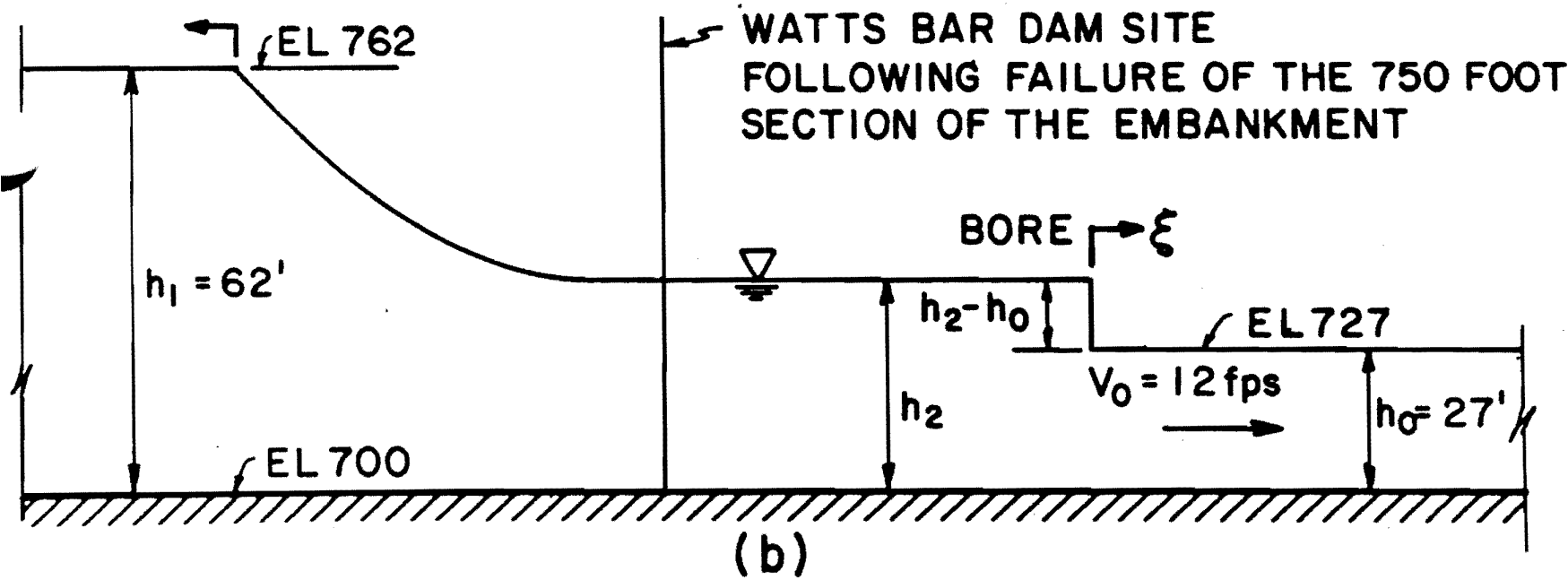
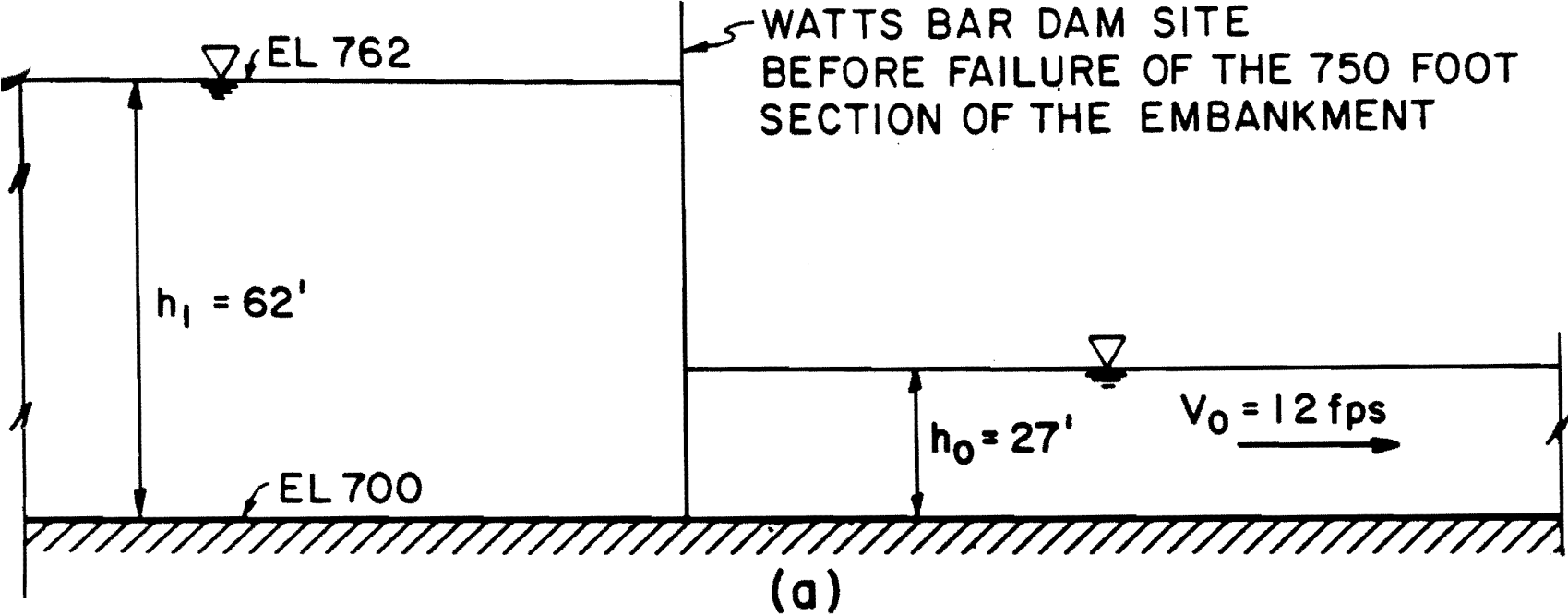
Figure 2.4-40k Deleted by Amendment 83

Figure 2.4-40L Deleted by Amendment 83

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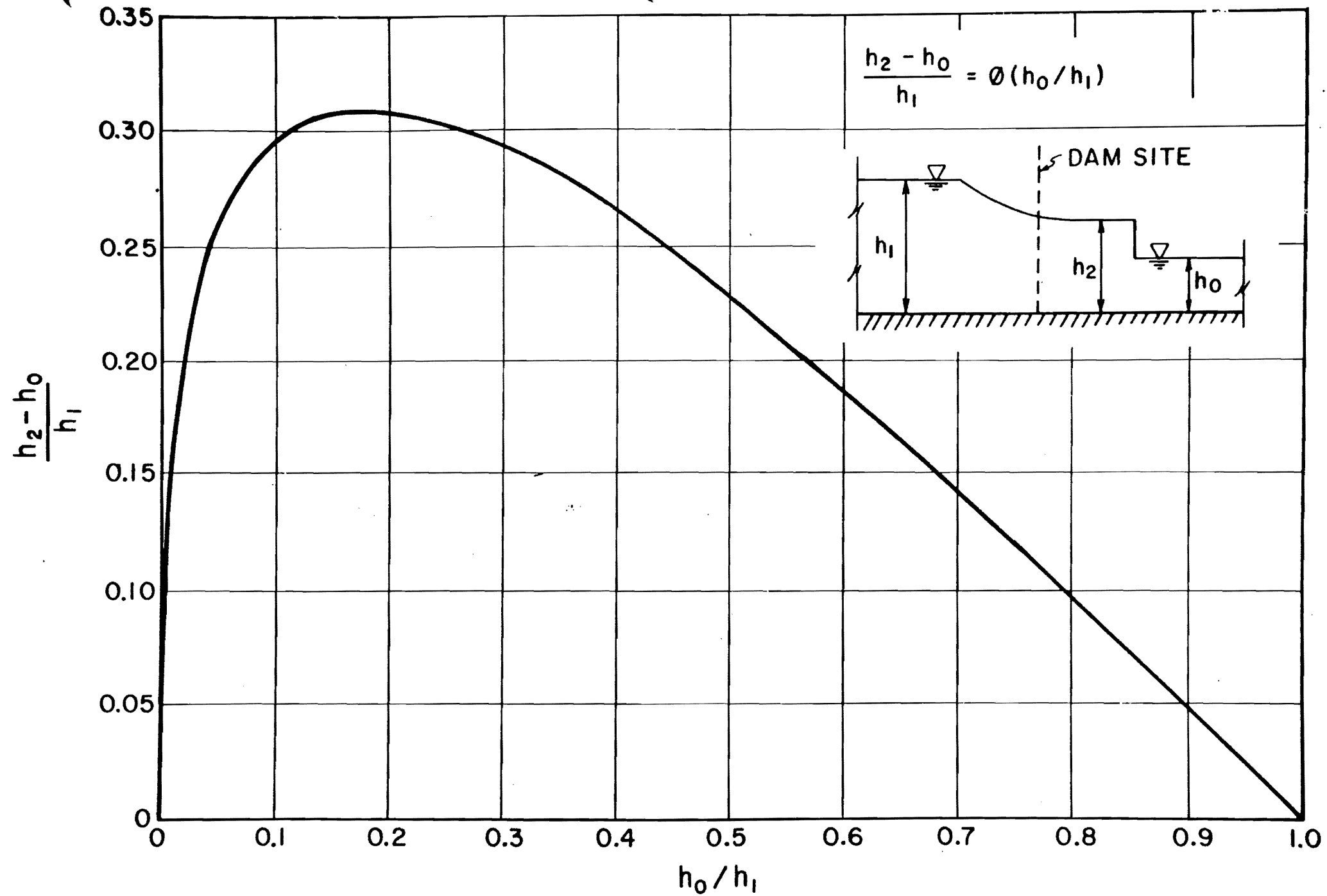
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WATTS BAR PROBABLE MAXIMUM FLOOD
WATER LEVELS BEFORE & AFTER EMBANKMENT FAILURE
FIGURE 2.4-61

Revised by Amendment 39

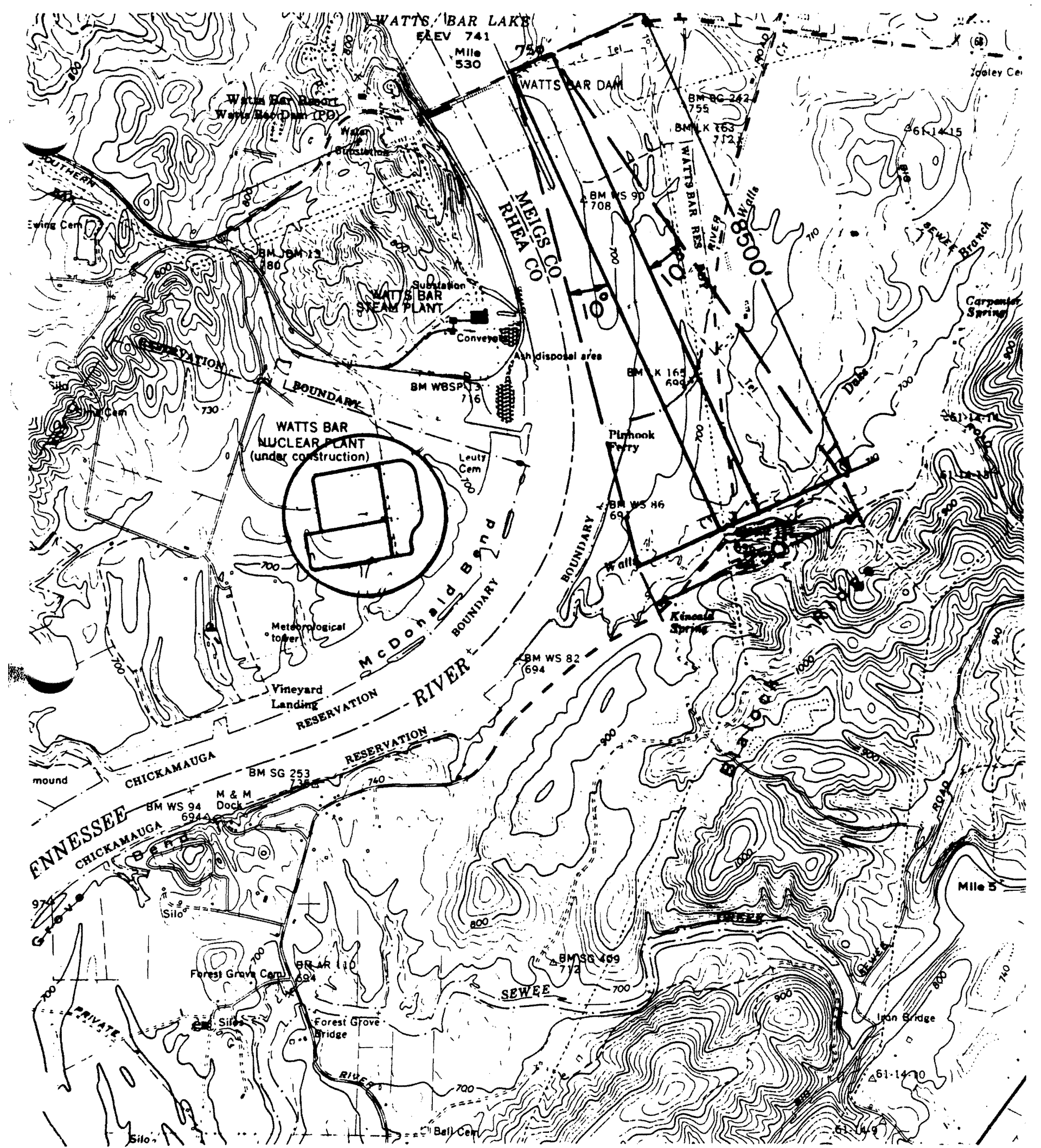
Figure 2.4-61 Watts Bar Probable Maximum Flood Water Levels Before and After Embankment Failure



RELATIVE BORE HEIGHT (AFTER J. J. STROKER, REF. 31)
FIGURE 2.4-62

Revised by Amendment 39

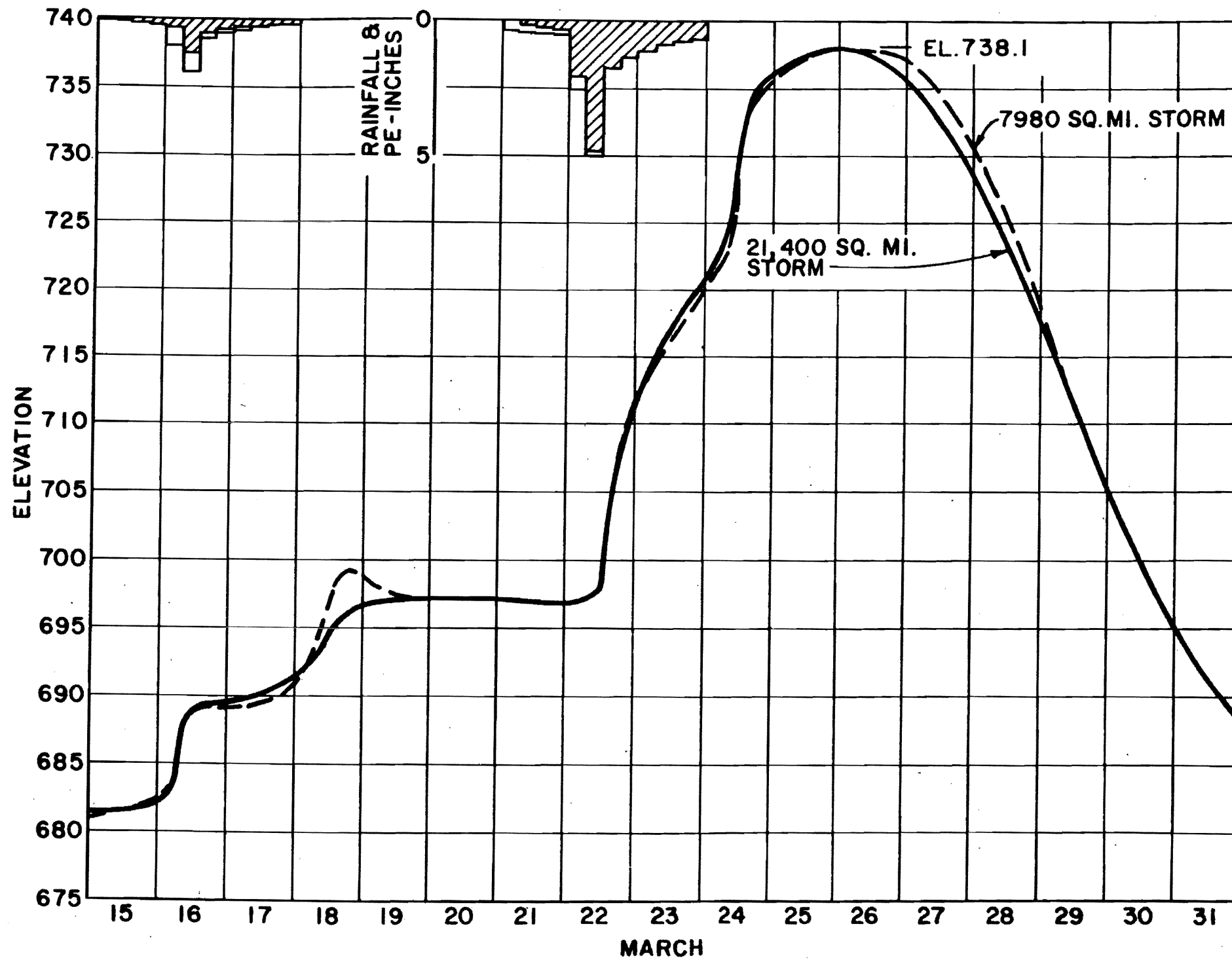
Figure 2.4-62 Relative Bore Height (After J. J. Stroker, REF. 31)



ASSUMED LIMITS OF EMBANKMENT FAILURE
WAVE EXPANSION
FIGURE 2.4-63

Revised by Amendment 39

Figure 2.4-63 Assumed Limits of Embankment Failure Wave Expansion



WATTS BAR NUCLEAR PLANT PROBABLE MAXIMUM FLOOD ELEVATION
FIGURE 2.4-64

Revised by Amendment 32

Figure 2.4-64 Watts Bar Nuclear Plant Probable Maximum Flood Elevation

Figure 2.4-65 thru Figure 2.4-67 Are Not Used

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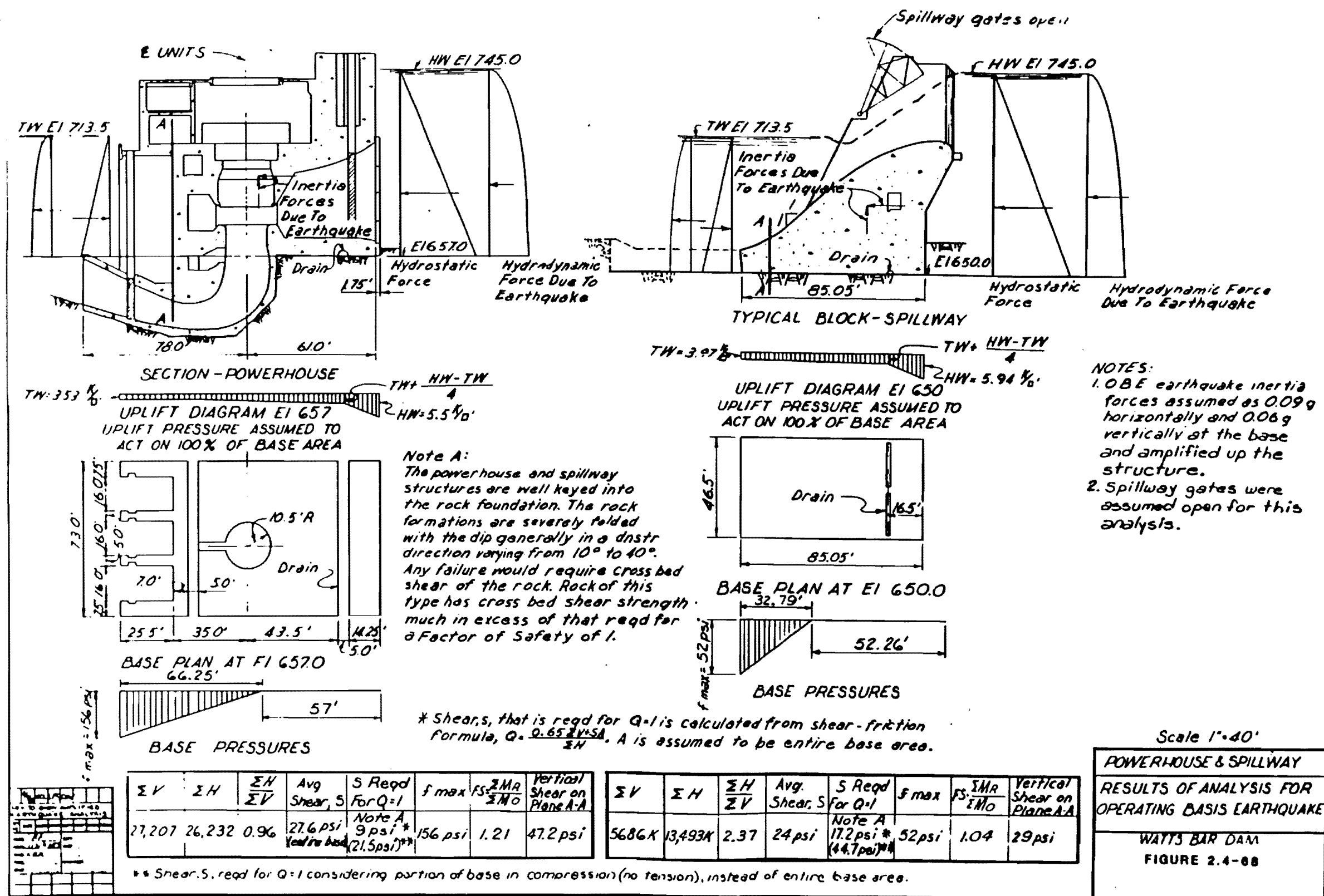


Figure 2.4-68 Powerhouse & Spillway Results of Analysis For Operating Basis Earthquake - Watts Bar Dam

Amendment 63

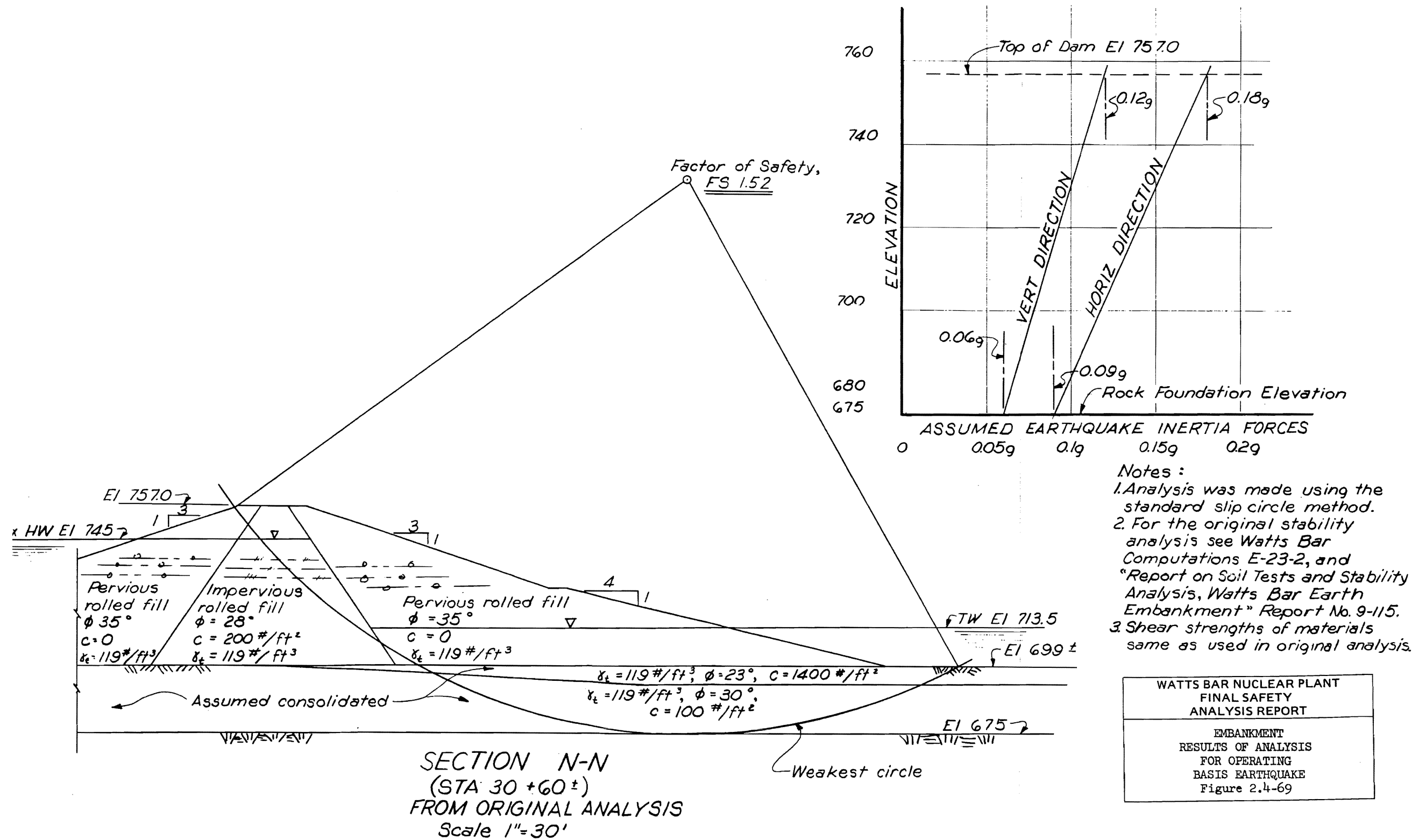


Figure 2.4-69 Embankment Results of Analysis For Operating Basis Earthquake

Figure 2.4-70 Deleted by Amendment 83

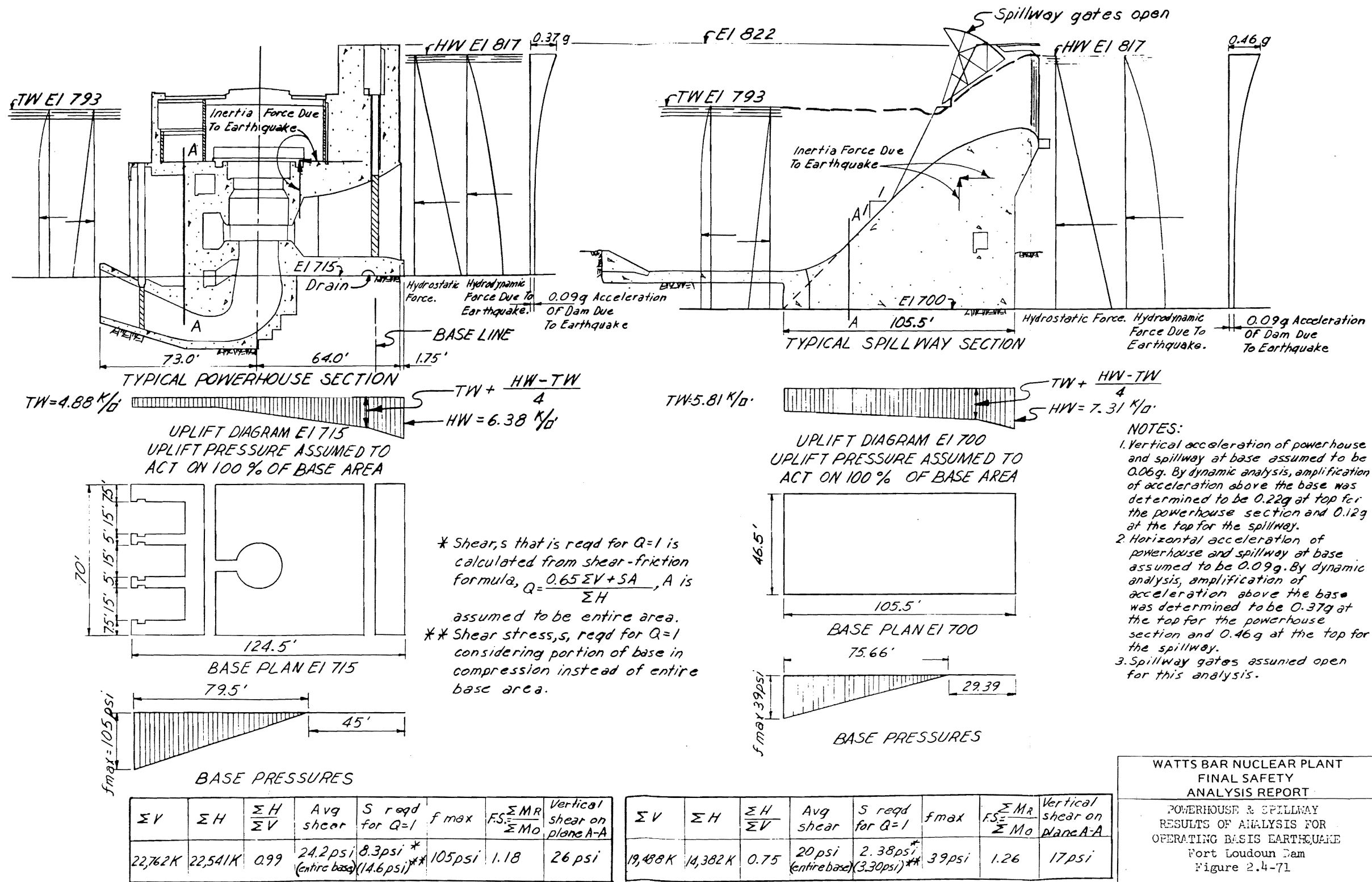


Figure 2.4-71 Powerhouse & Spillway Results of Analysis For Operating Basis Earthquake - Fort Loudoun Dam

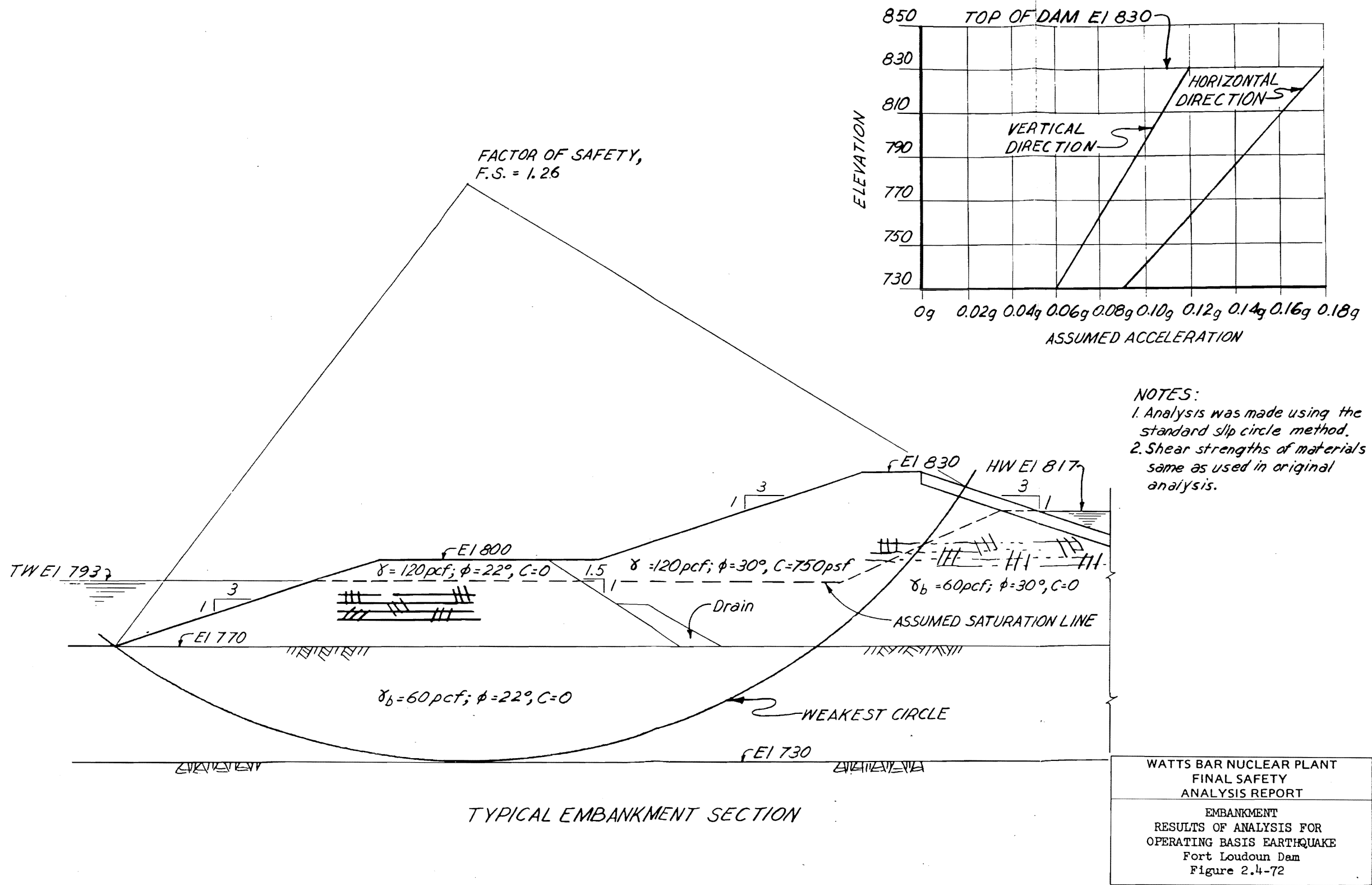


Figure 2.4-72 Embankment Results Of Analysis For Operating Basis Earthquake - Fort Loudoun Dam

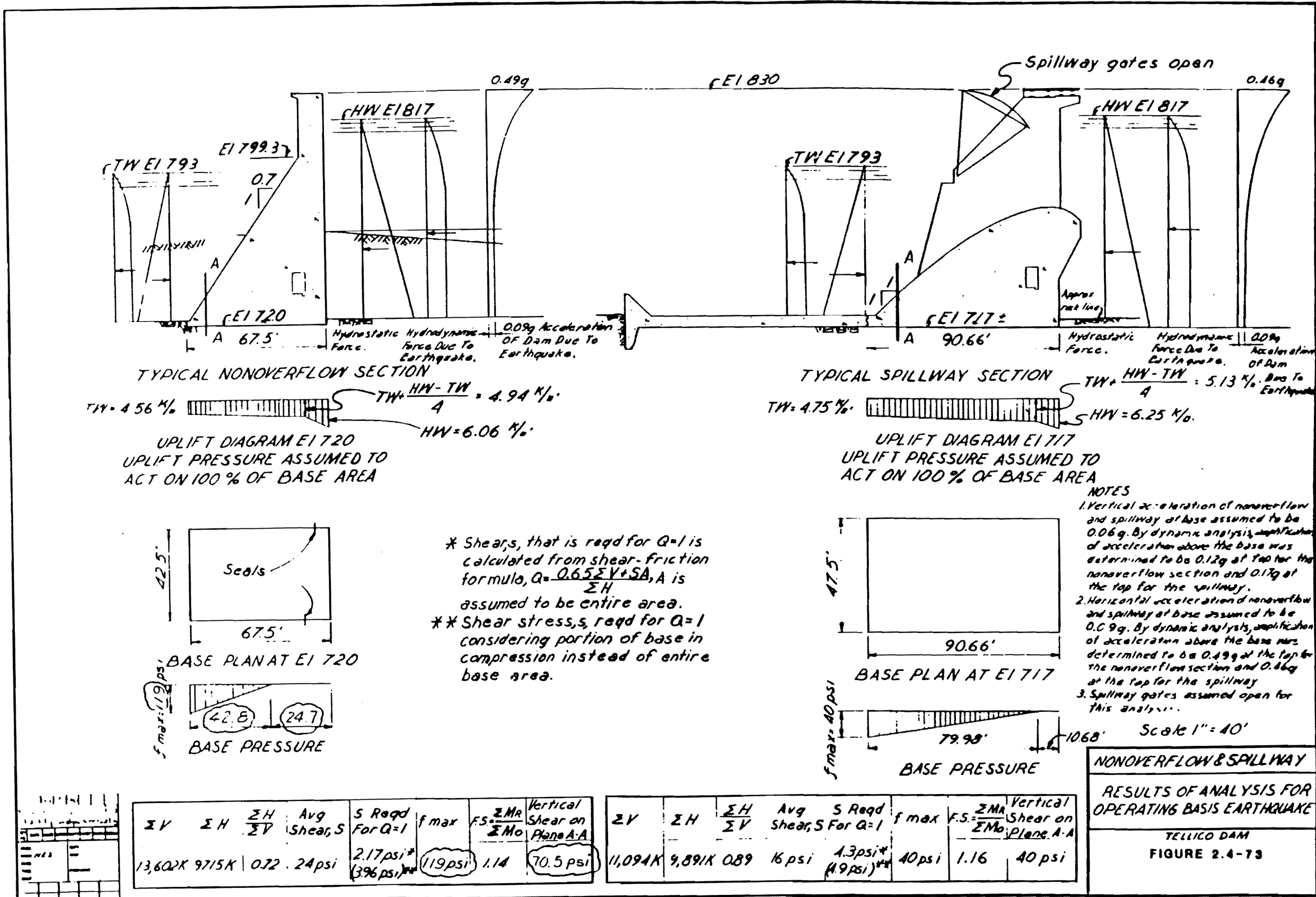


Figure 2.4-73 Nonoverflow & Spillway Results of Analysis For Operating Basis Earthquake - Tellico Dam

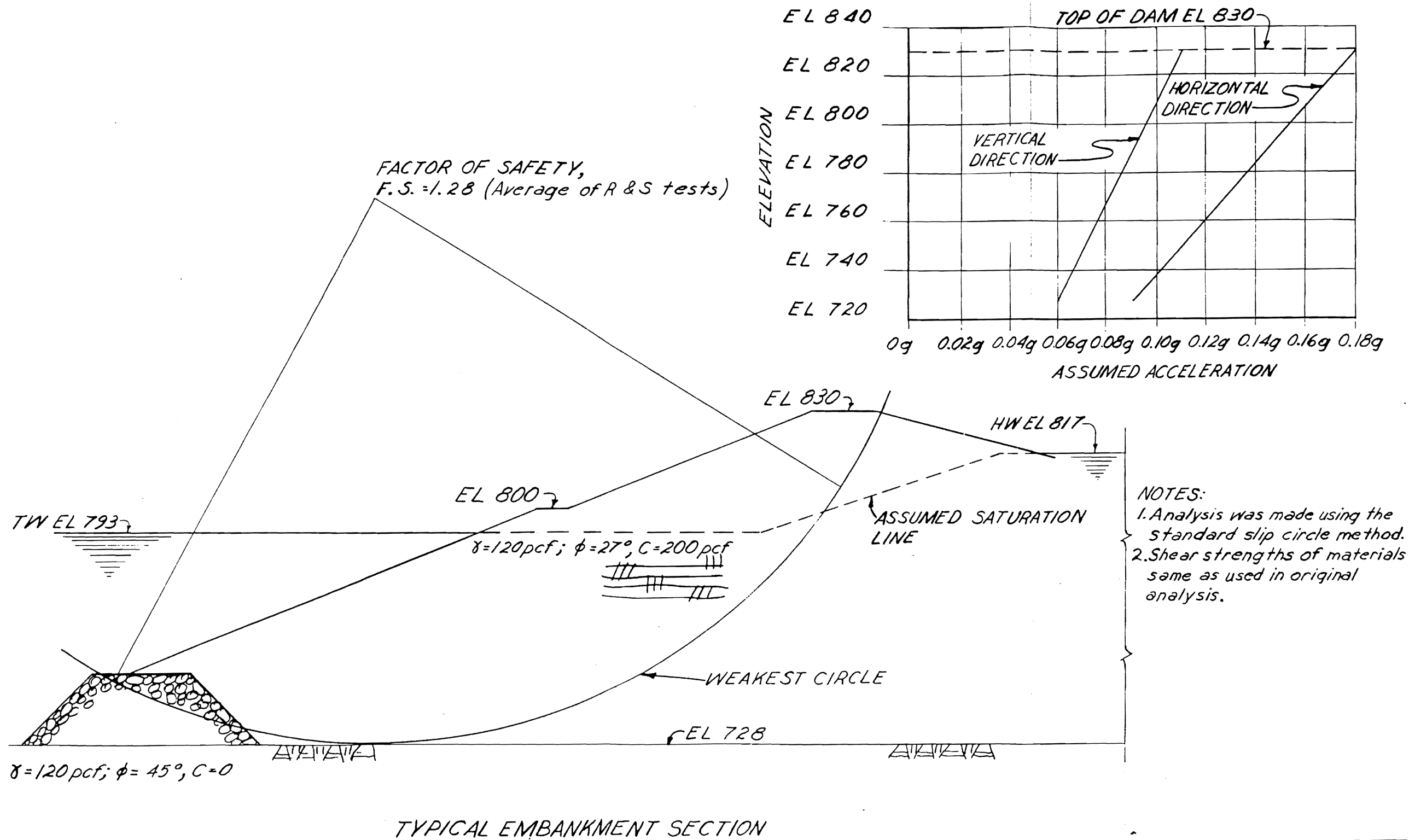
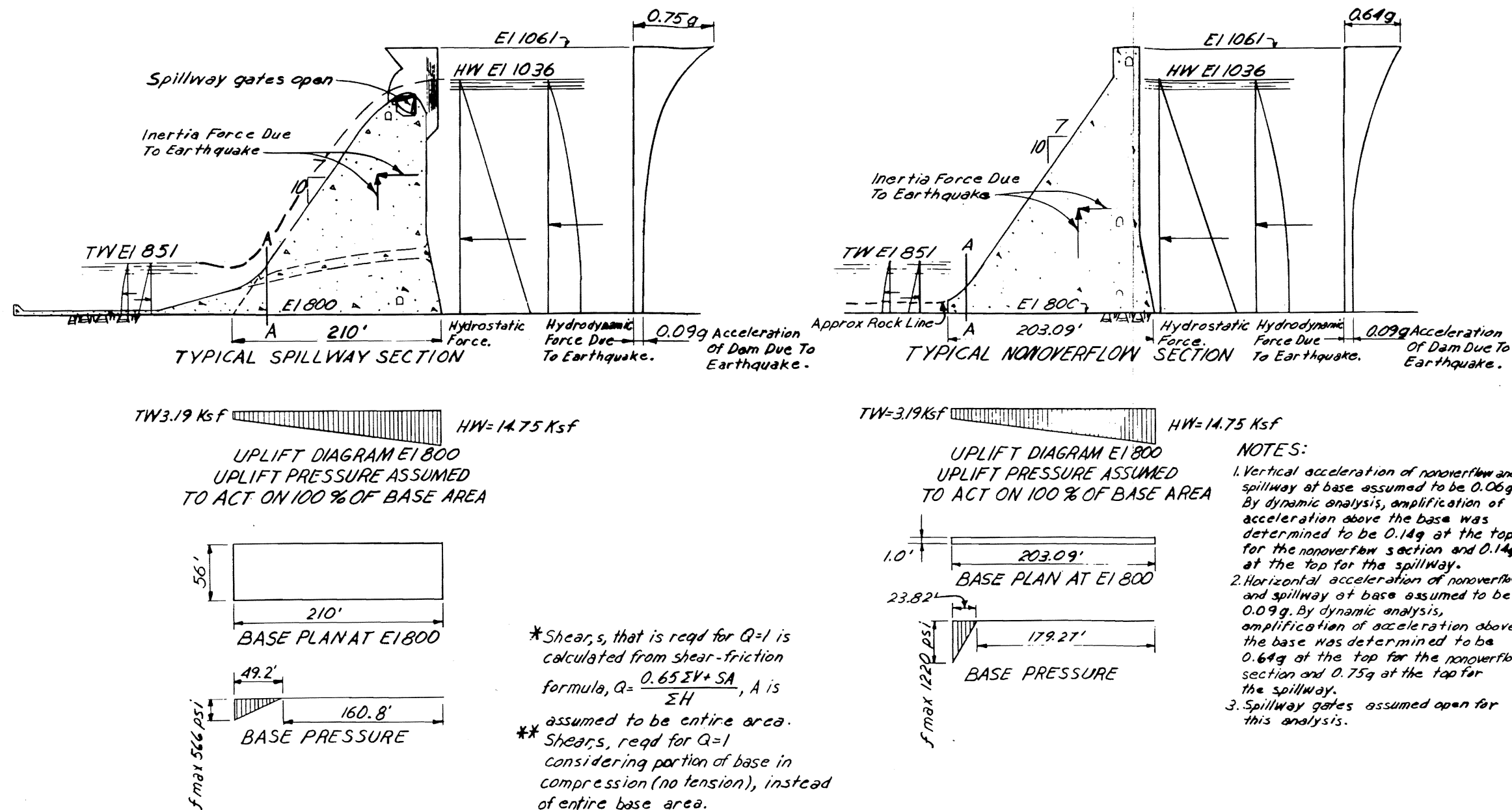


Figure 2.4-74 Embankment Results For Analysis For Operating Basis Earthquake - Tellico Dam

WATTS BAR NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT
EMBANKMENT RESULTS FOR ANALYSIS FOR OPERATING BASIS EARTHQUAKE Tellico Dam Figure 2.4-74



ΣV	ΣH	$\frac{\Sigma H}{\Sigma V}$	Avg Shear, s	S Reqd For Q=1	f max	$\frac{\Sigma M_R}{\Sigma M_O}$	Vertical Shear on plane A-A
112,616 K	14,358 K	1.28	85 psi (entire base)	42 psi* (171 psi)**	566 psi	1.25	247 psi

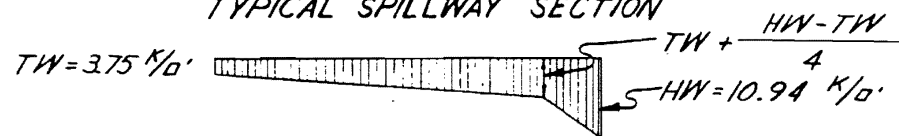
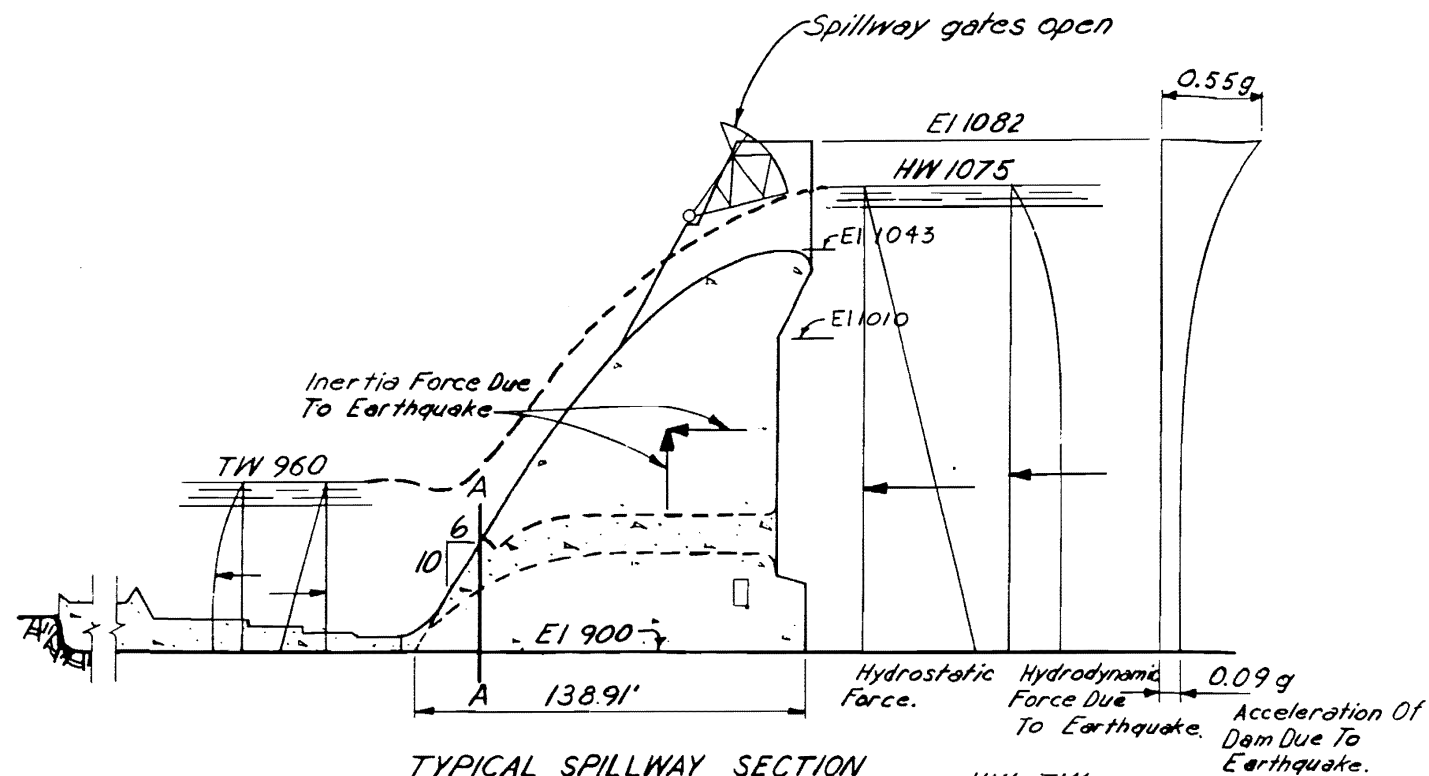
ΣV	ΣH	$\frac{\Sigma H}{\Sigma V}$	Avg Shear, s	S Reqd For Q=1	f max	$\frac{\Sigma M_R}{\Sigma M_O}$	Vertical Shear on plane A-A
2101 K	2786 K	1.33	95 psi (entire base)	49 psi* (415 psi)**	1220 psi	1.03	535 psi

WATTS BAR NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

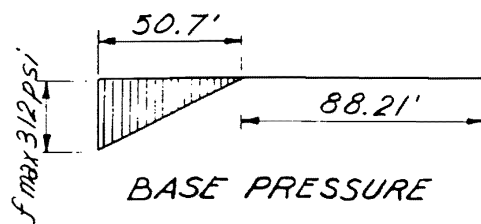
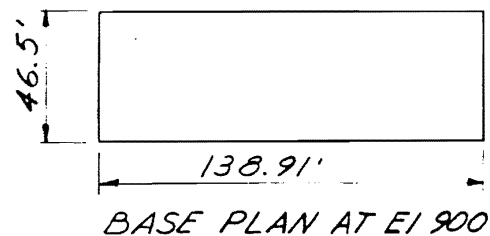
SPILLWAY & NONOVERFLOW
RESULTS OF ANALYSIS FOR
OBE + 1/2 P.F.
Norris Dam
Figure 2.4-75

Figure 2.4-75 Spillway & Nonoverflow Results of Analysis For OBE & 1/2 PMF-Norris Dam

Figure 2.4-76 Analysis For OBE & 1/2 PMF Assumed Condition of Dam After Failure Norris Dam



UPLIFT DIAGRAM EI 900
UPLIFT PRESSURE ASSUMED TO
ACT ON 100 % OF BASE AREA



* Shear, s , that is reqd for $Q=1$ is calculated from shear-friction formula, $Q = \frac{0.65 \sum V + SA}{\sum H}$, A is assumed to be entire area.
** Shear stress, s , reqd for $Q=1$ considering portion of base in compression instead of entire base area.

$\sum V$	$\sum H$	$\frac{\sum H}{\sum V}$	Avg Shear, s	S Reqd For $Q=1$	f_{max}	$f.s. = \frac{\sum MR}{\sum Mo}$	Vertical Shear on Plane A-A
53,007K	57,276K	1.08	61 psi (entire base)	25 psi * (67 psi) **	312 psi	1.13	173 psi

- NOTES:
1. Vertical acceleration of the spillway at the base assumed to be 0.06g. By dynamic analysis, amplification of acceleration above the base was determined to be 0.11g at the top.
 2. Horizontal acceleration of the spillway at the base assumed to be 0.09g. By dynamic analysis, amplification of acceleration above the base was determined to be 0.55g at the top.
 3. Spillway gates assumed open for this analysis.

WATTS BAR NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT
REVIEWED BY: [Signature] CHECKED BY: [Signature] DATE: [Date] Cherokee Dam Figure 2.4-77

Figure 2.4-77 Spillway & Nonoverflow Results of Analysis For Operating Basis Earthquake -Cherokee Dam

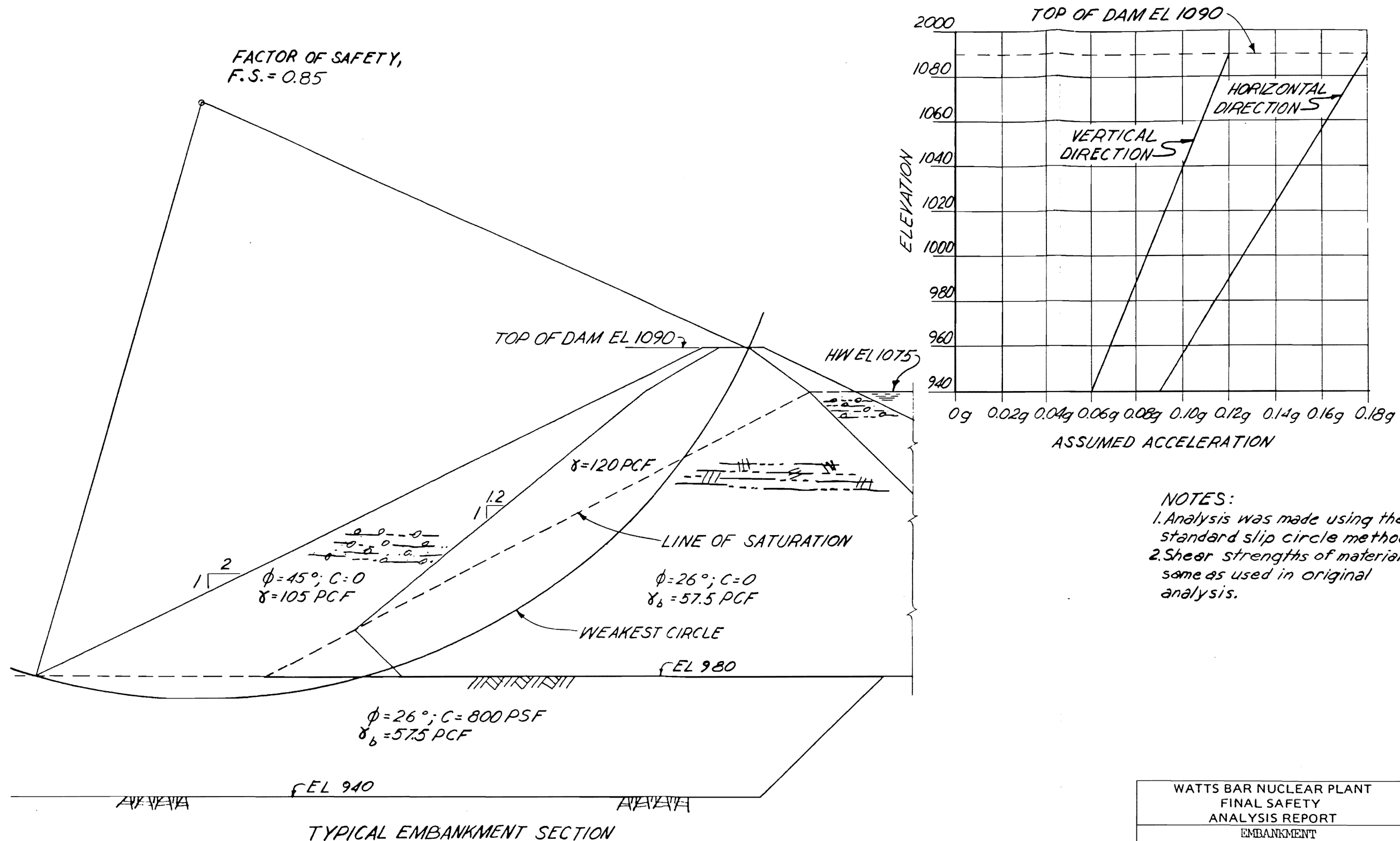
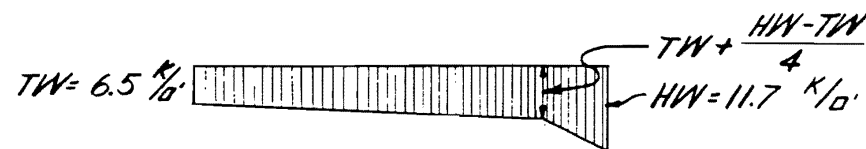
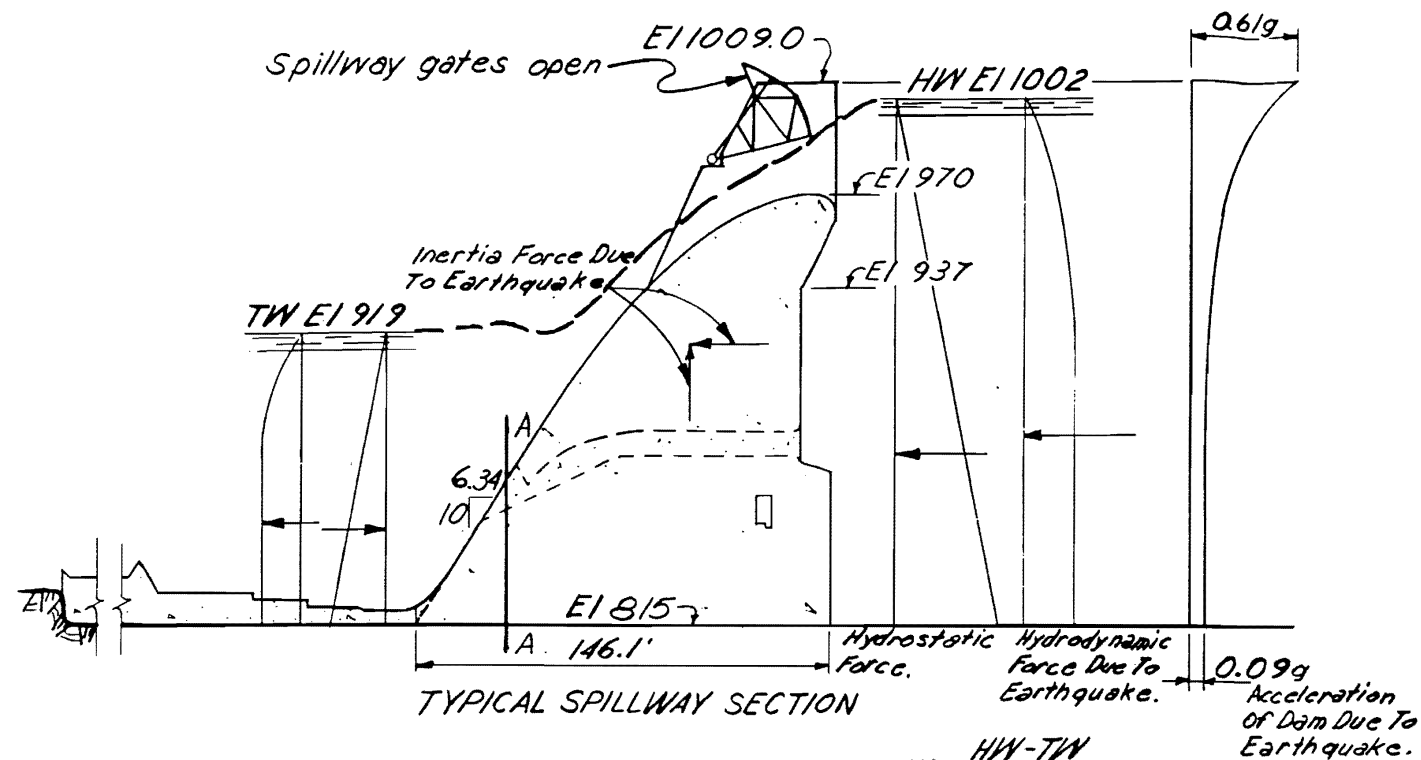
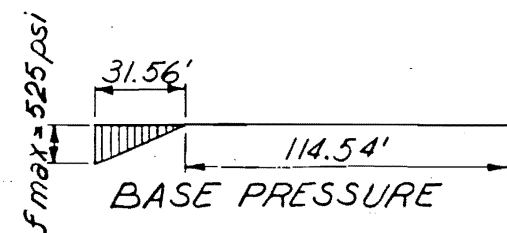
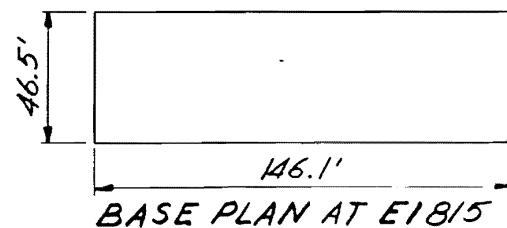


Figure 2.4-78 Embankment Results of Analysis For Operating Basis Earthquake - Cherokee Dam

Figure 2.4-79 Assumed Condition of Dam After Failure PBE And 1/2 Probable Max Flood - Cherokee Dam



UPLIFT DIAGRAM E1815
UPLIFT PRESSURES ASSUMED
TO ACT ON 100 % OF BASE AREA



* Shear, s, that is reqd for Q=1 is calculated from shear-friction formula, $Q = \frac{0.65 \Sigma V + SA}{\Sigma H}$, A is

assumed to be entire area.

** Shear stress, s, reqd for Q=1 considering portion of base in compression instead of entire base area.

ΣV	ΣH	$\frac{\Sigma H}{\Sigma V}$	Avg Shear, s	S Reqd For Q=1	f max	$FS = \frac{\Sigma MR}{\Sigma MO}$	Vertical Shear on Plane AA
55,483K	60,245K	1.09	61.6 psi (entire base)	25 psi* (170 psi)**	525 psi	1.06	156 psi

NOTES:

1. Vertical acceleration of the spillway at the base assumed to be 0.06 g. By dynamic analysis, amplification of acceleration above the base was determined to be 0.13 g at the top.
2. Horizontal acceleration of the spillway at the base assumed to be 0.09 g. By dynamic analysis, amplification of acceleration above the base was determined to be 0.61 g at the top.
3. Spillway gates assumed open for this analysis.

WATTS BAR NUCLEAR PLANT
FINAL SAFETY
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SPILLWAY & NONOVERFLOW
RESULTS OF ANALYSIS FOR
OPERATING BASIS EARTHQUAKE
Douglas Dam
Figure 2.4-80

Figure 2.4-80 Spillway & Nonoverflow Results of Analysis For Operating Basis Earthquake - Douglas Dam

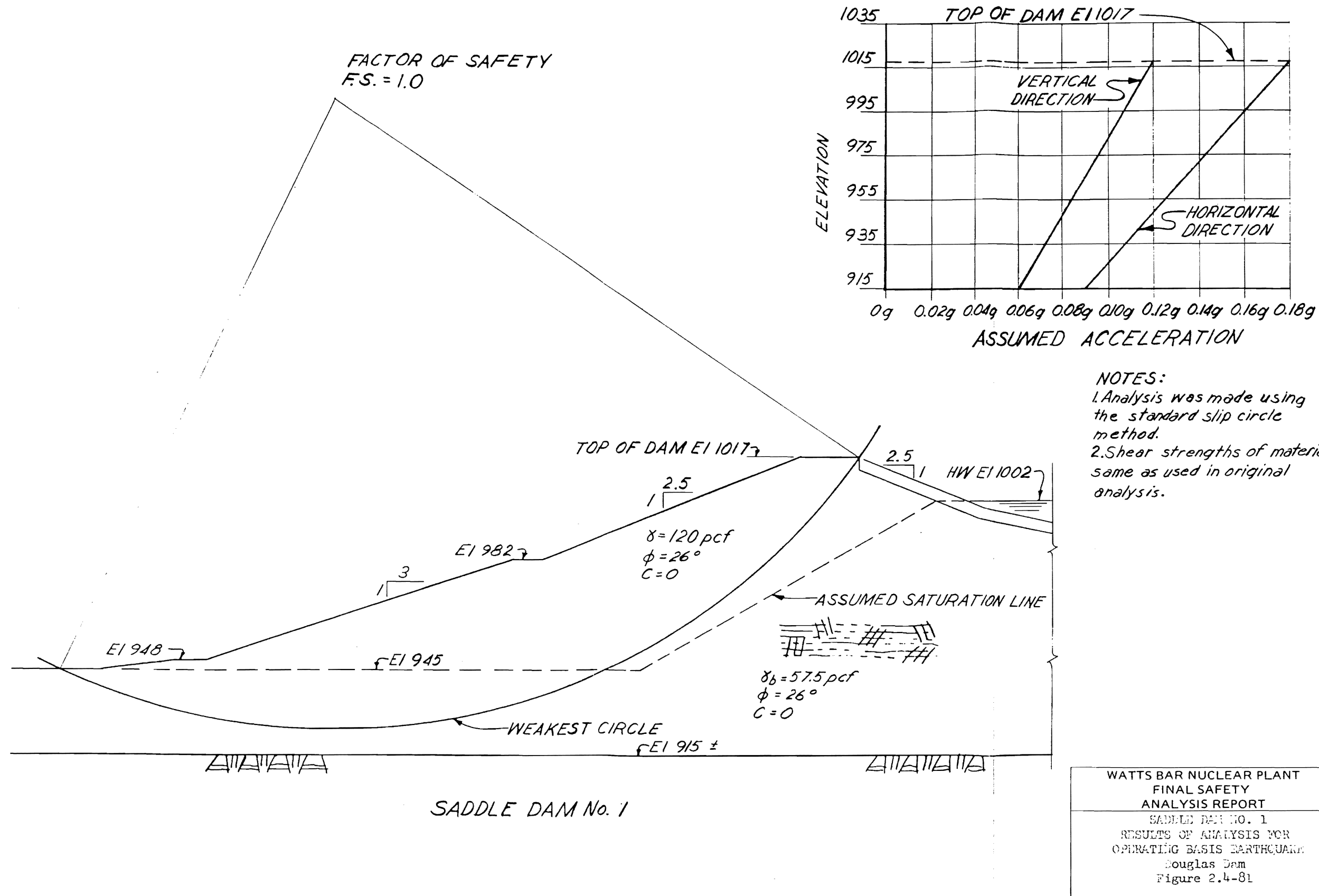


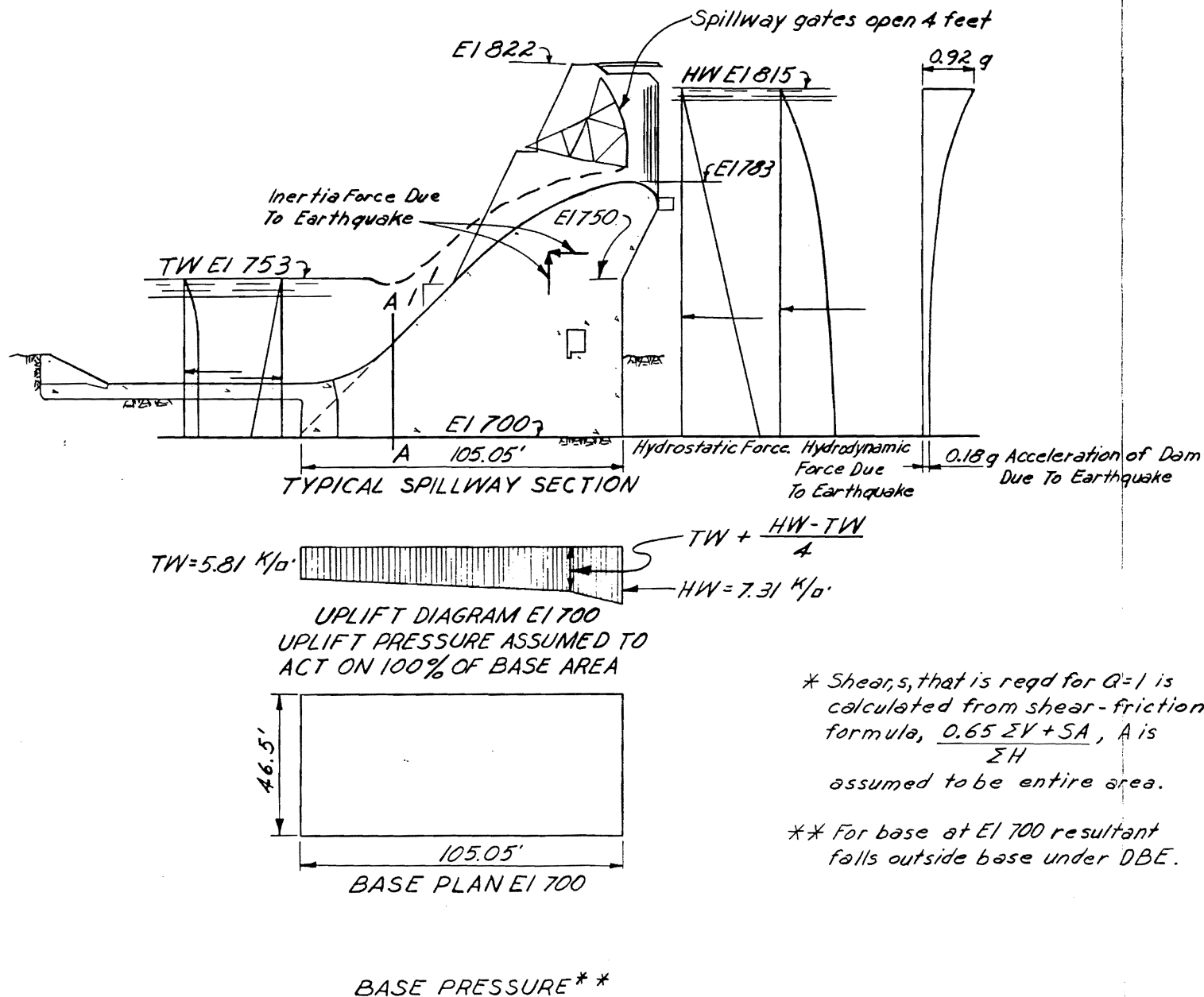
Figure 2.4-81 Saddle Dam No. 1 Results of Analysis For Operating Basis Earthquake - Douglas Dam

Figure 2.4-82 Douglas Dam Assumed Condition of Dam After Failure aBE And 1/2 Probable Maximum Flood - Douglas Project

Figure 2.4-83 Fontana Dam Assumed Condition of Dam after Failure aBE And 1/2 Probable Maximum Flood - Fontana Dam

Figure 2.4-84 Deleted by Amendment 63

Figure 2.4-85 Deleted by Amendment 63



- NOTES:
1. Vertical acceleration of spillway at base assumed to be 0.12g. By dynamic analysis, amplification of acceleration above the base was determined to be 0.24g at top.
 2. Horizontal acceleration of spillway at base assumed to be 0.18g. By dynamic analysis, amplification of acceleration above the base was determined to be 0.92g at top.
 3. Spillway gates assumed open 4 feet for this analysis.

WATTS BAR NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT
SPILLWAY RESULTS OF ANALYSIS FOR SSE EARTHQUAKE Fort Loudoun Dam Figure 2.4-86

Figure 2.4-86 Spillway Results of Analysis For SSE Earthquake Fort Loudoun Dam

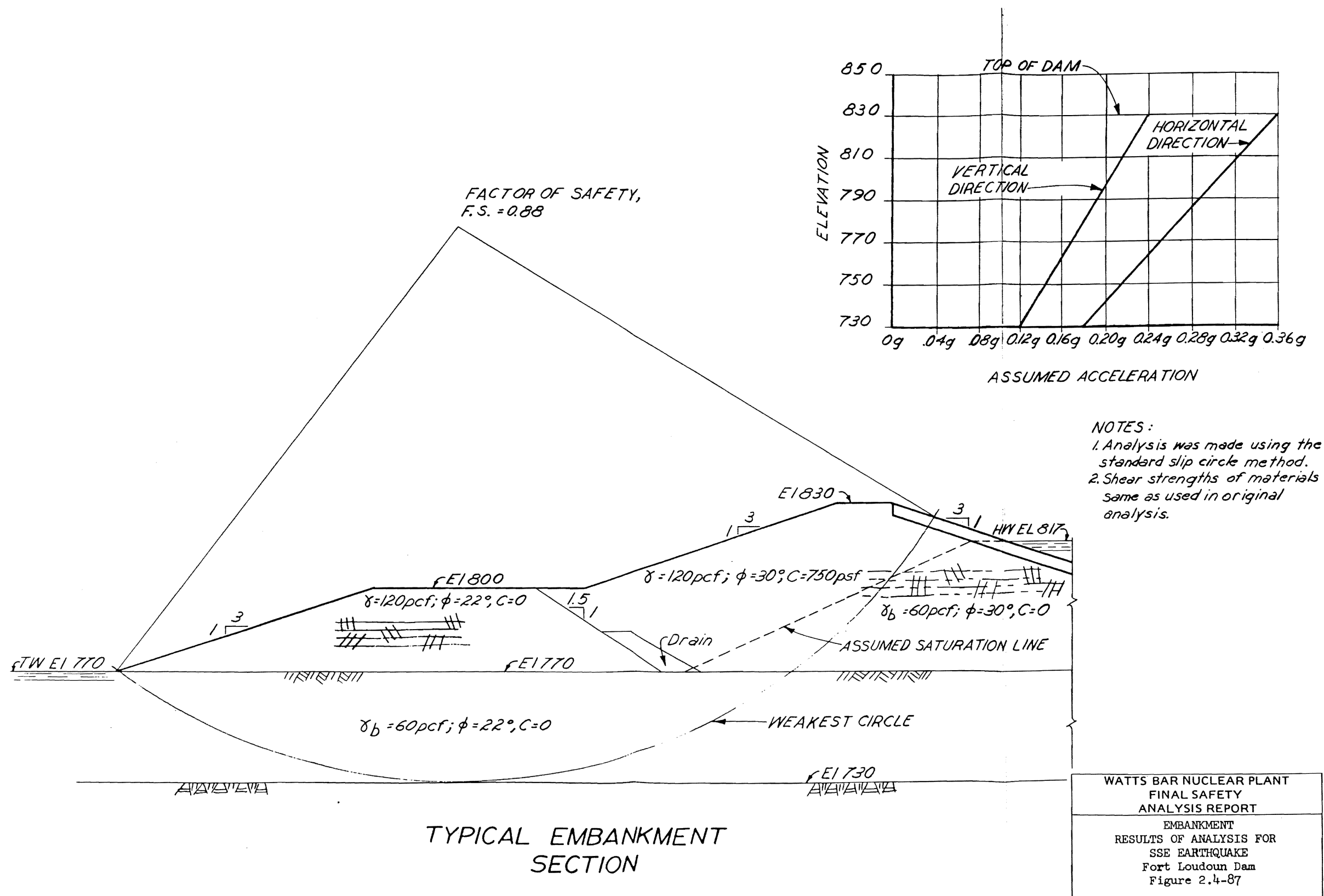


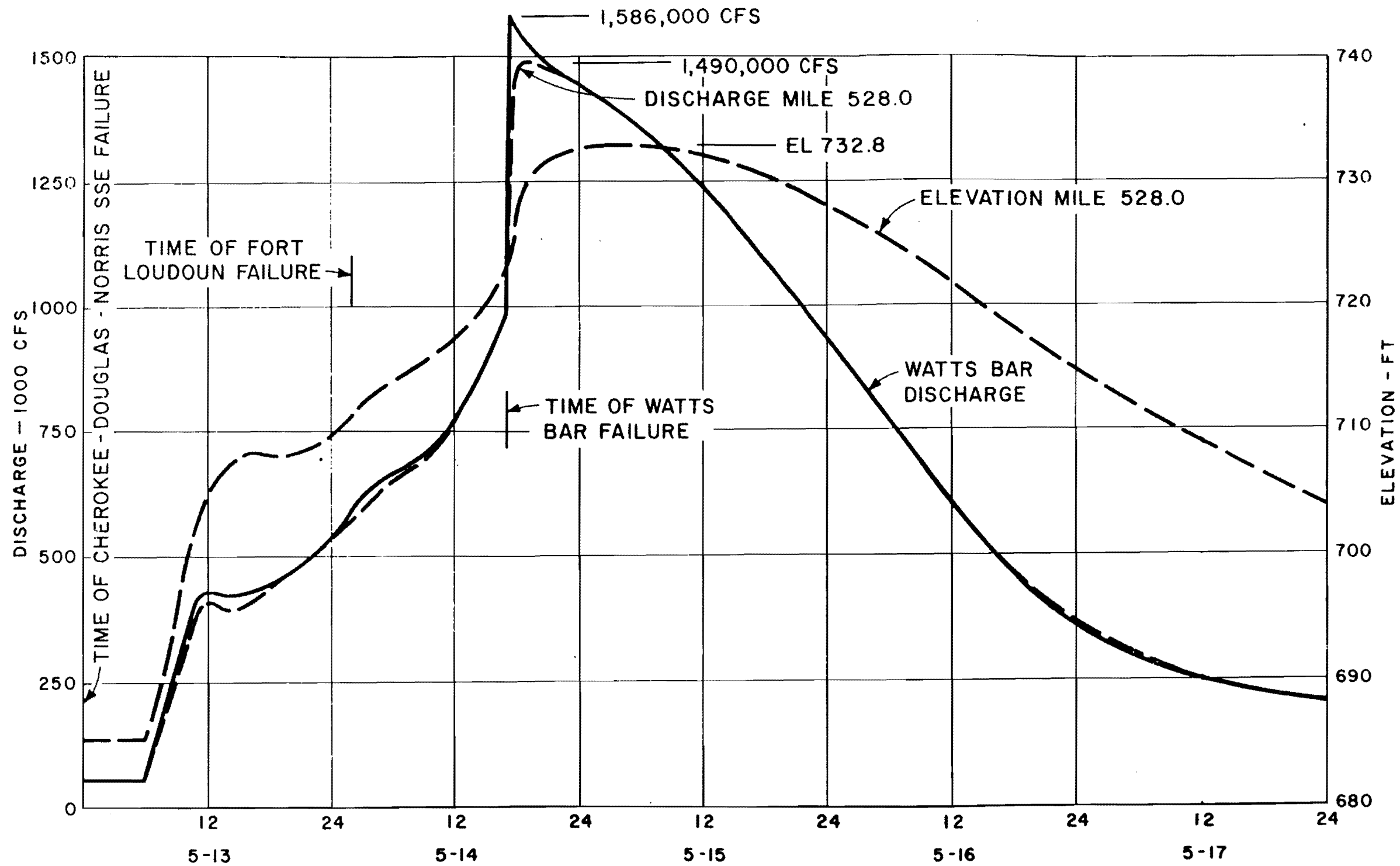
Figure 2.4-88 Fort Loudoun Dam Assumed Condition of Dam After Failure SSE Combined With a 25 Year Flood - Fort Loudoun Dam

Figure 2.4-89 Tellico Dam Assumed Condition of Dam After Failure SSE Combined With a 25 Year Flood Tellico Project

Figure 2.4-90 Norris Dam SSE + 25 Year Flood Judged Condition of Dam After Failure - Norris Dam



Figure 2.4-91 SSE With Epicenter In North Knoxville Vicinity



TIME AND DATE
FLOOD HYDROGRAPHS

Figure 2.4 - 92

Revised by
Amendment 35

Figure 2.4-92 Time and Date Flood Hydrographs

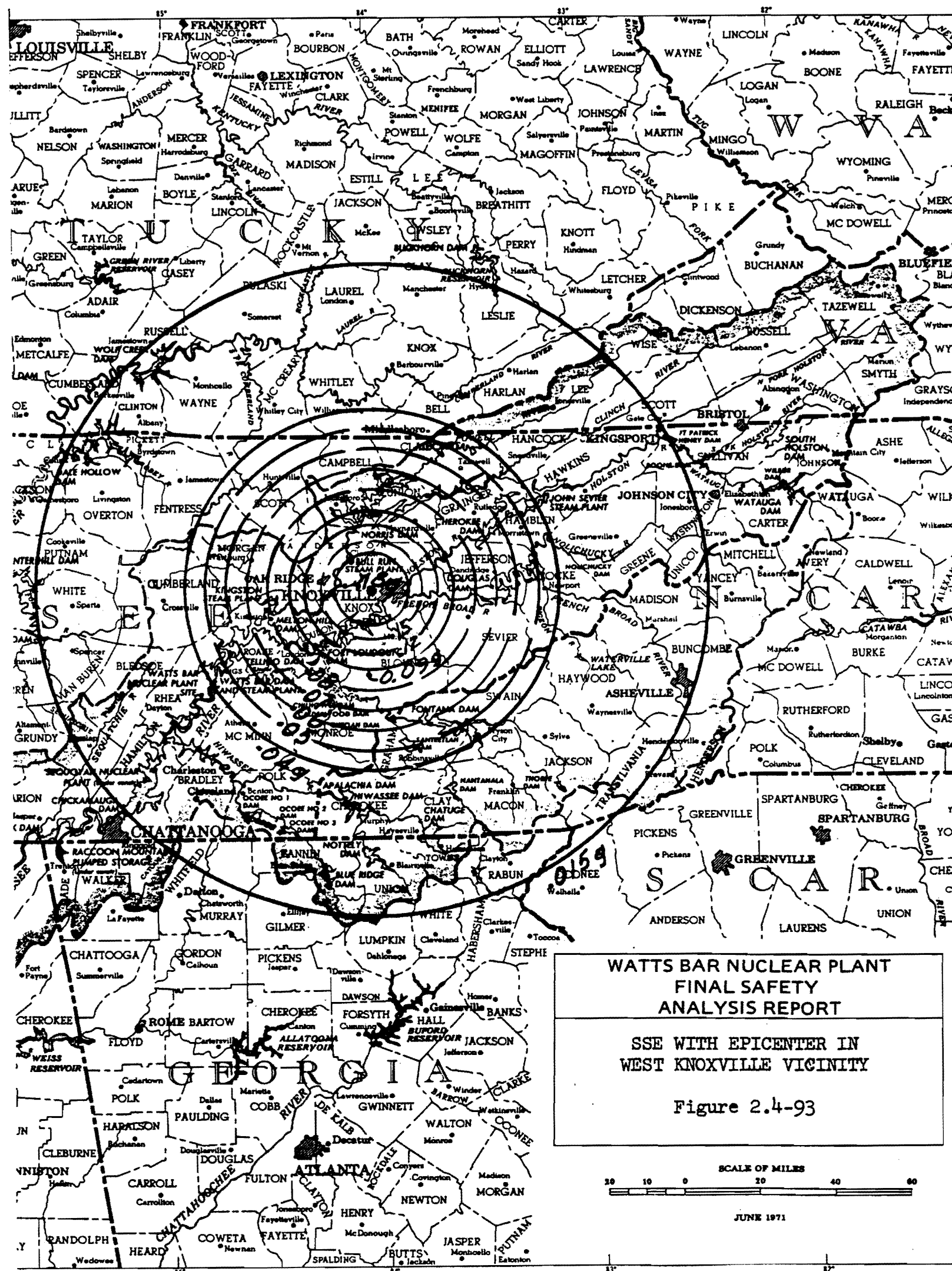


Figure 2.4-93 SSE With Epicenter In West Knoxville Vicinity

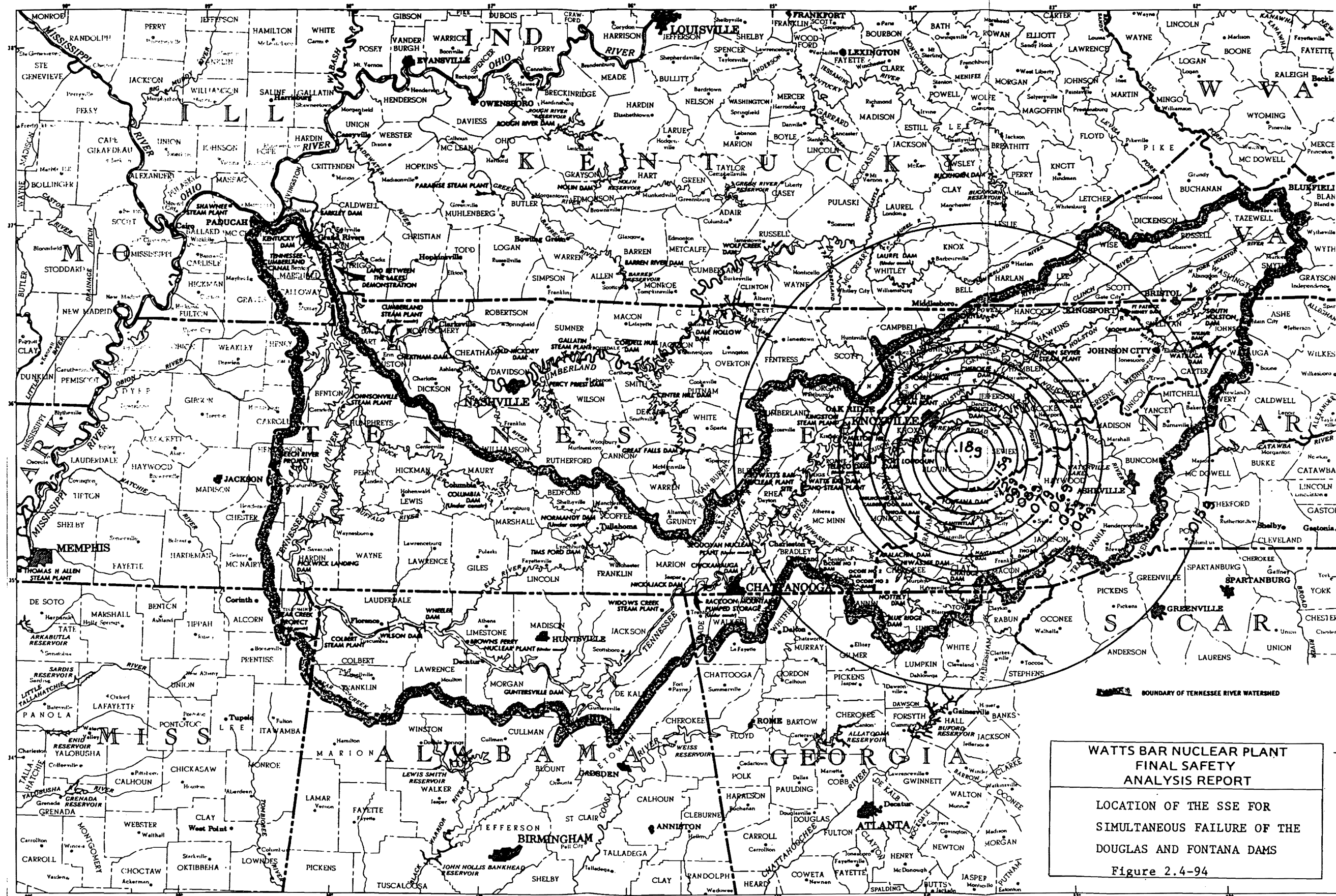


Figure 2.4-94 Location of SSE For Simultaneous Failure of The Douglas and Fontana Dams

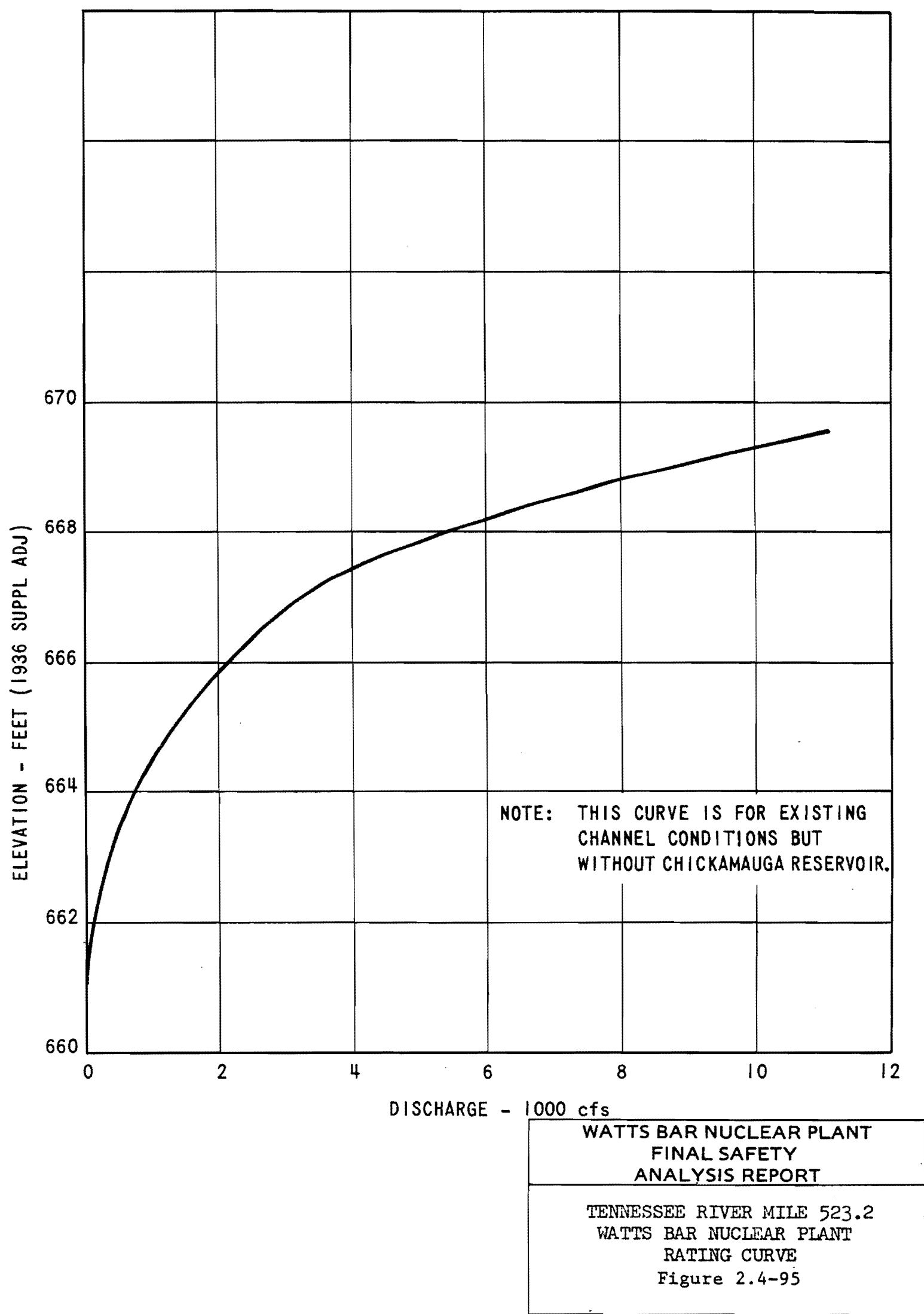
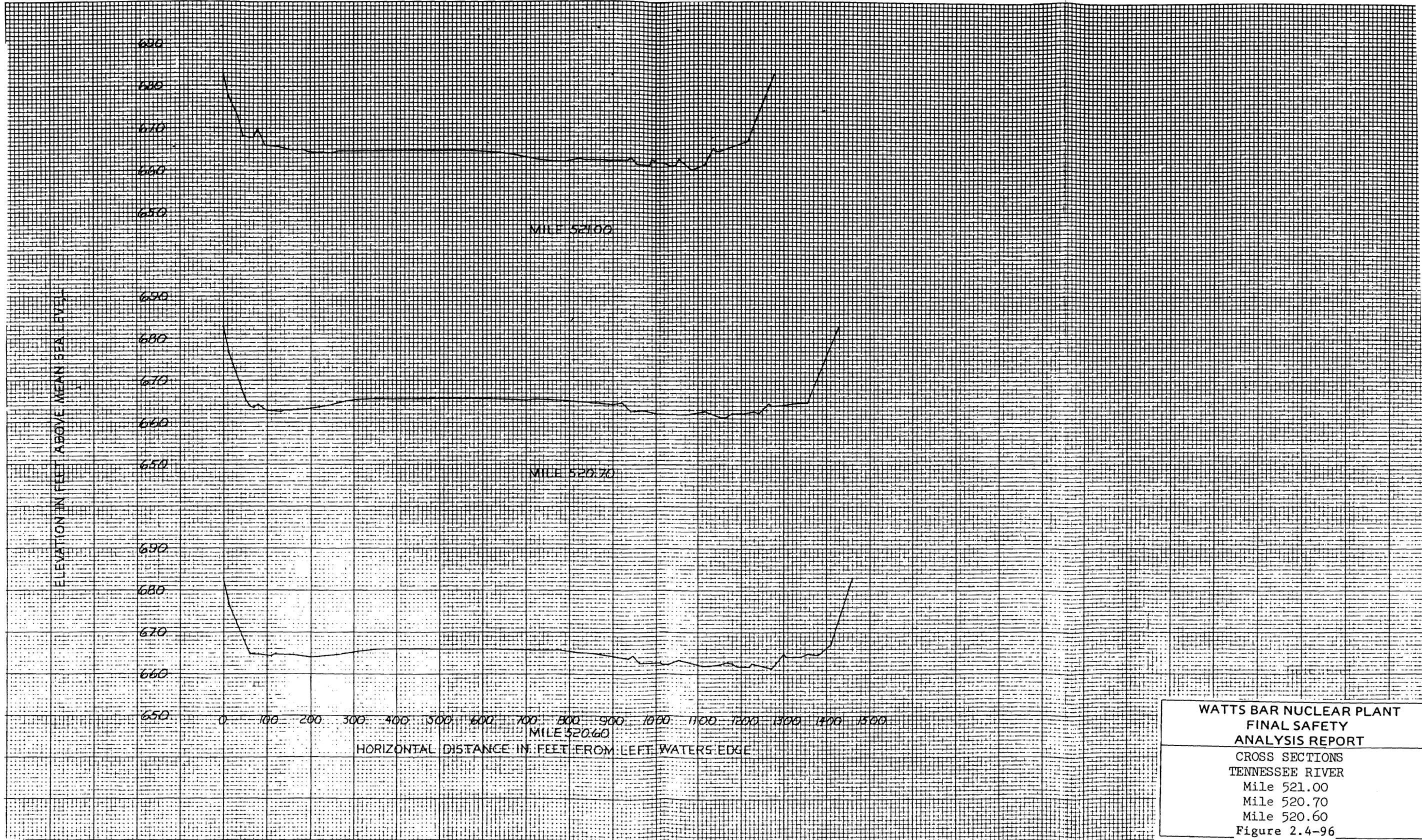


Figure 2.4-95 Tennessee River Mile 523.2 Watts Bar Nuclear Plant Rating Curve



WATTS BAR NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT
CROSS SECTIONS
TENNESSEE RIVER
Mile 521.00
Mile 520.70
Mile 520.60
Figure 2.4-96

Figure 2.4-96 Cross Sections Tennessee River (mile 521.00) (mile 520.70) (mile 520.60)

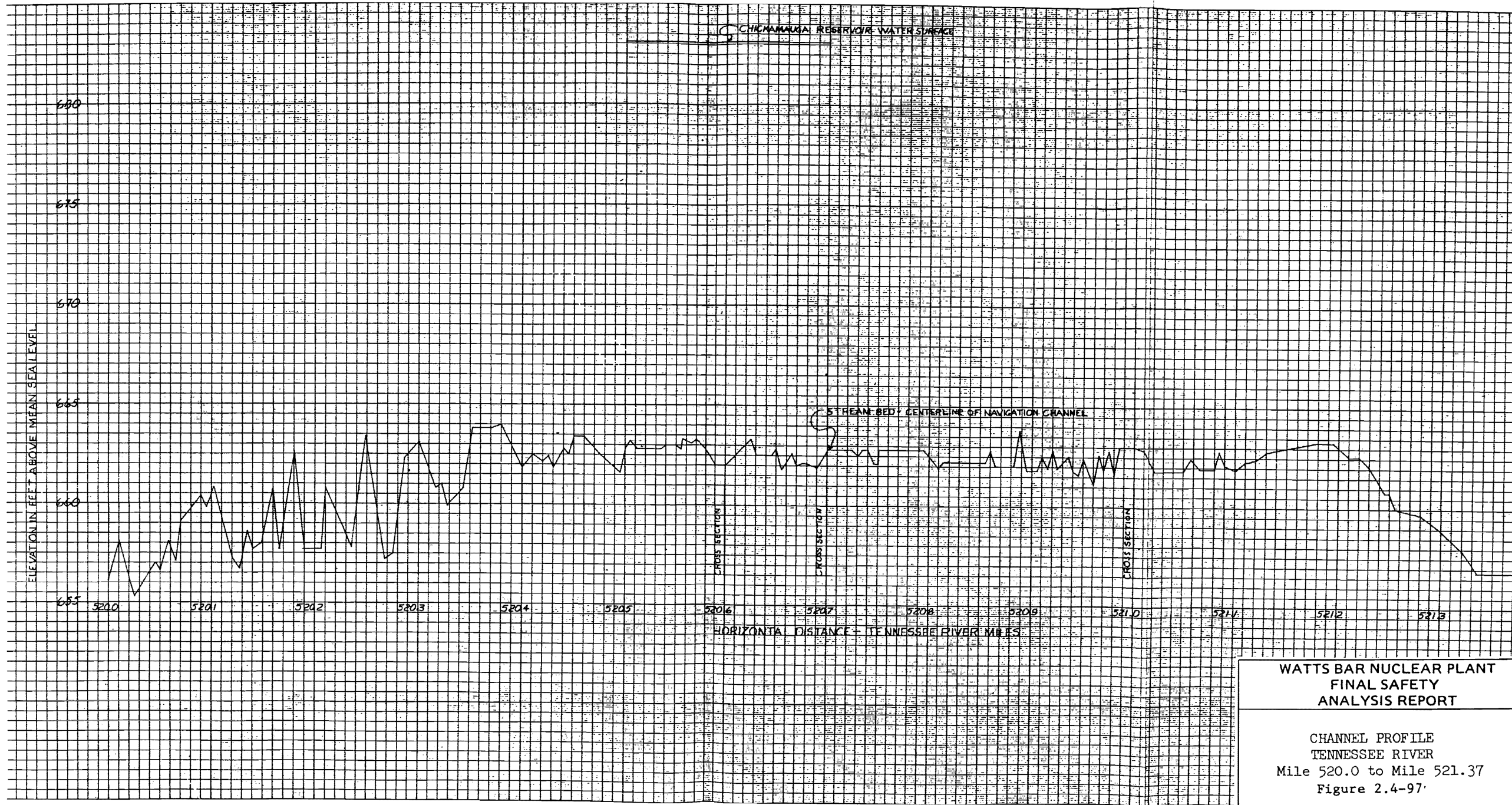


Figure 2.4-97 Channel Profile Tennessee River (mile 520.0 to mile 521.37)

Figure 2.4-98 Not Used

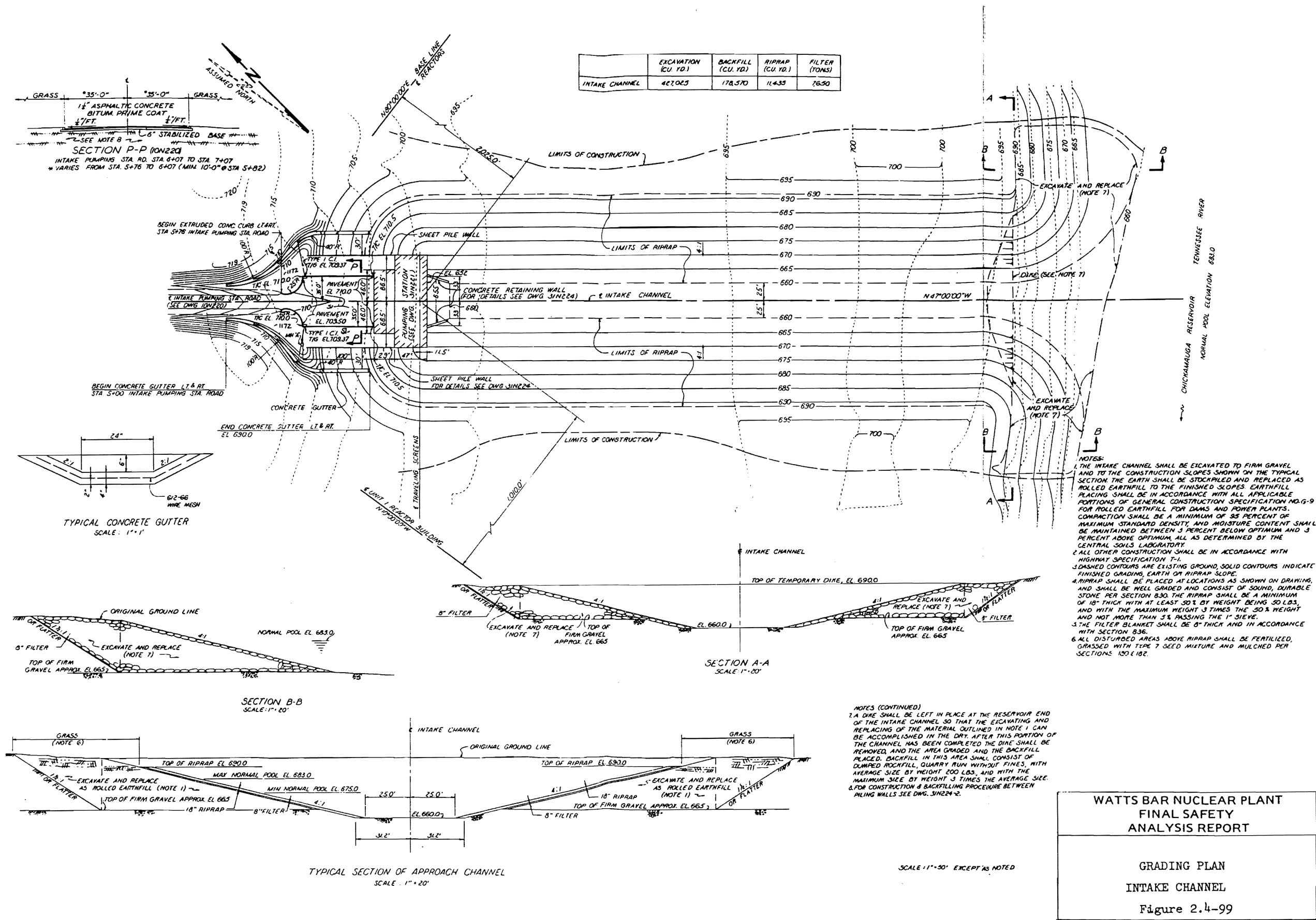
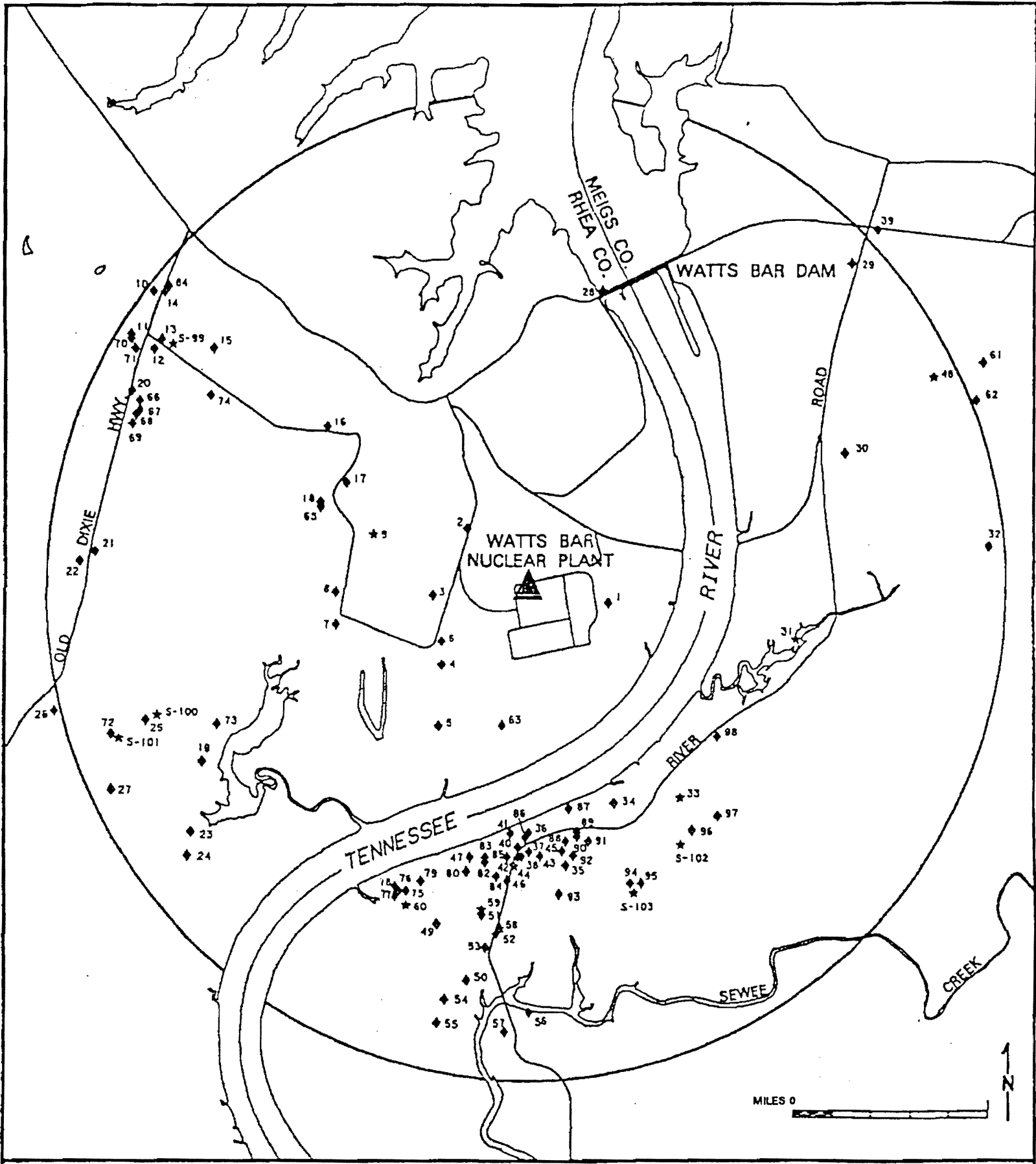


Figure 2.4-99 Grading Plan Intake Channel

Figure 2.4-100 Deleted by Amendment 83

Figure 2.4-101 Deleted by Amendment 33



- LEGEND
- ◆ WELL
 - ★ SPRING
 - ROADS
 - 2 MILE RADIUS OF PLANT SITE

AMENDMENT 83

WATTS BAR NUCLEAR PLANT
 FINAL SAFETY
 ANALYSIS REPORT

WELL AND SPRING INVENTORY
 WITHIN 2 MILE RADIUS OF WATTS BAR
 NUCLEAR PLANT SITE
 FSAR FIG 2.4-102

SCANNED DOCUMENT
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 THE WBNP OPTICGRAPHICS SCANNER DATABASE

Figure 2.4-102 Wells And Spring Inventory Within 2-Mile Radius of Watts Bar Nuclear Plant Site

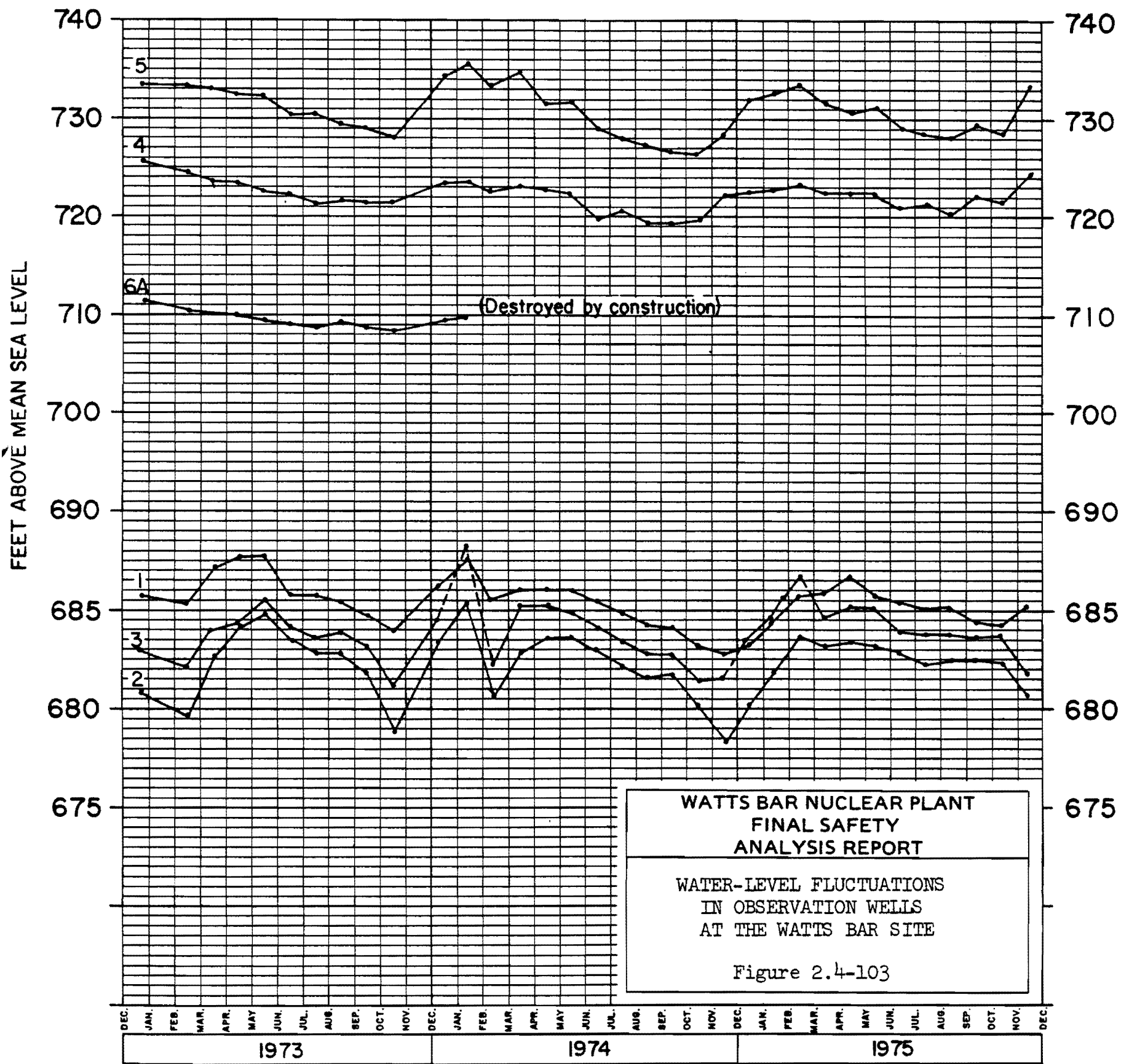
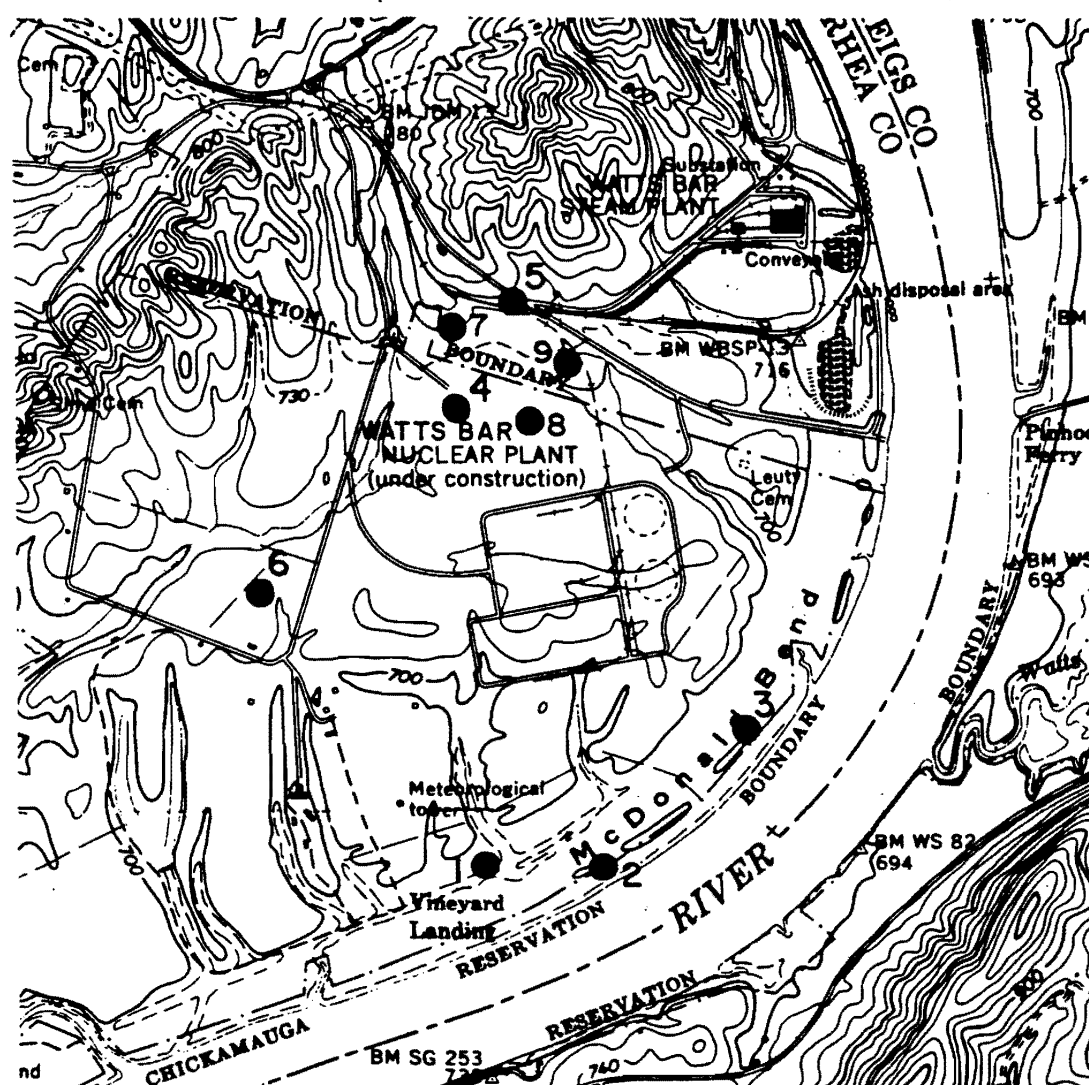


Figure 2.4-103 Water-Level Fluctuations In Observation Wells at The Watts Bar Site



NOTE:

Topographic base from U.S.G.S - T.V.A. 7.5 minute quadrangle, Decatur, Tenn., 118-SE, Contour interval 20 feet.

LEGEND:

●² - Ground-water observation well showing number.

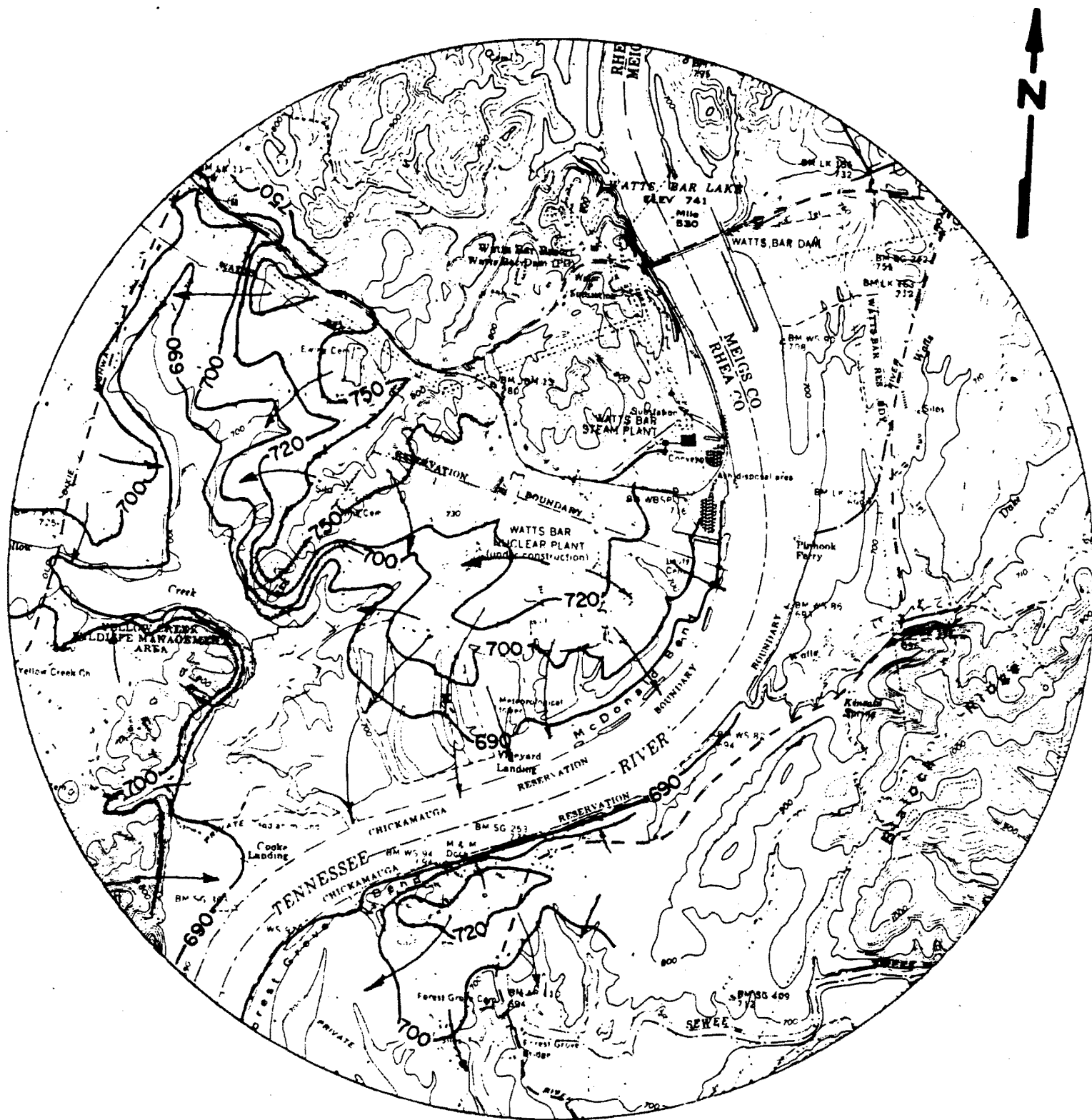
SCALE:

Revised by Amendment 50

**WATTS BAR NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT**

**LOCATIONS OF
GROUND - WATER
OBSERVATION WELLS
FIGURE 2.4-104**

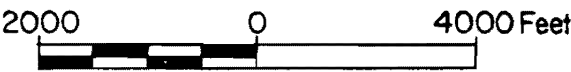
Figure 2.4-104 Locations of Ground - Water Observation Wells



EXPLANATION:

- 700 — Water table contour, in feet above mean sea level.
- General direction of ground-water movement.

SCALE:



Revised by Amendment 50

WATTS BAR NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT
GENERALIZED WATER-TABLE CONTOUR MAP
Figure 2.4-105

Figure 2.4-105 Generalized Water-Table Contour Map January 1972

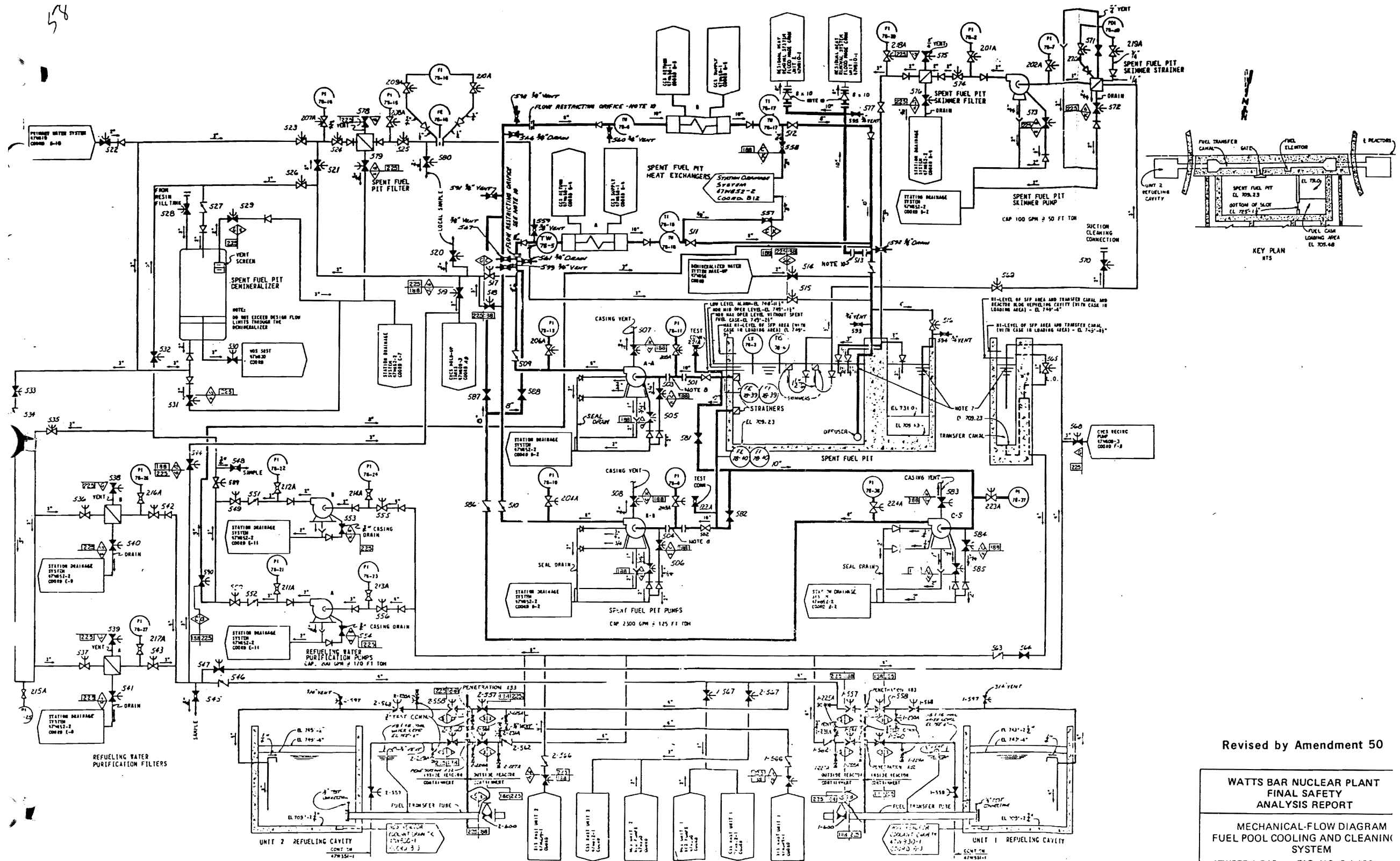
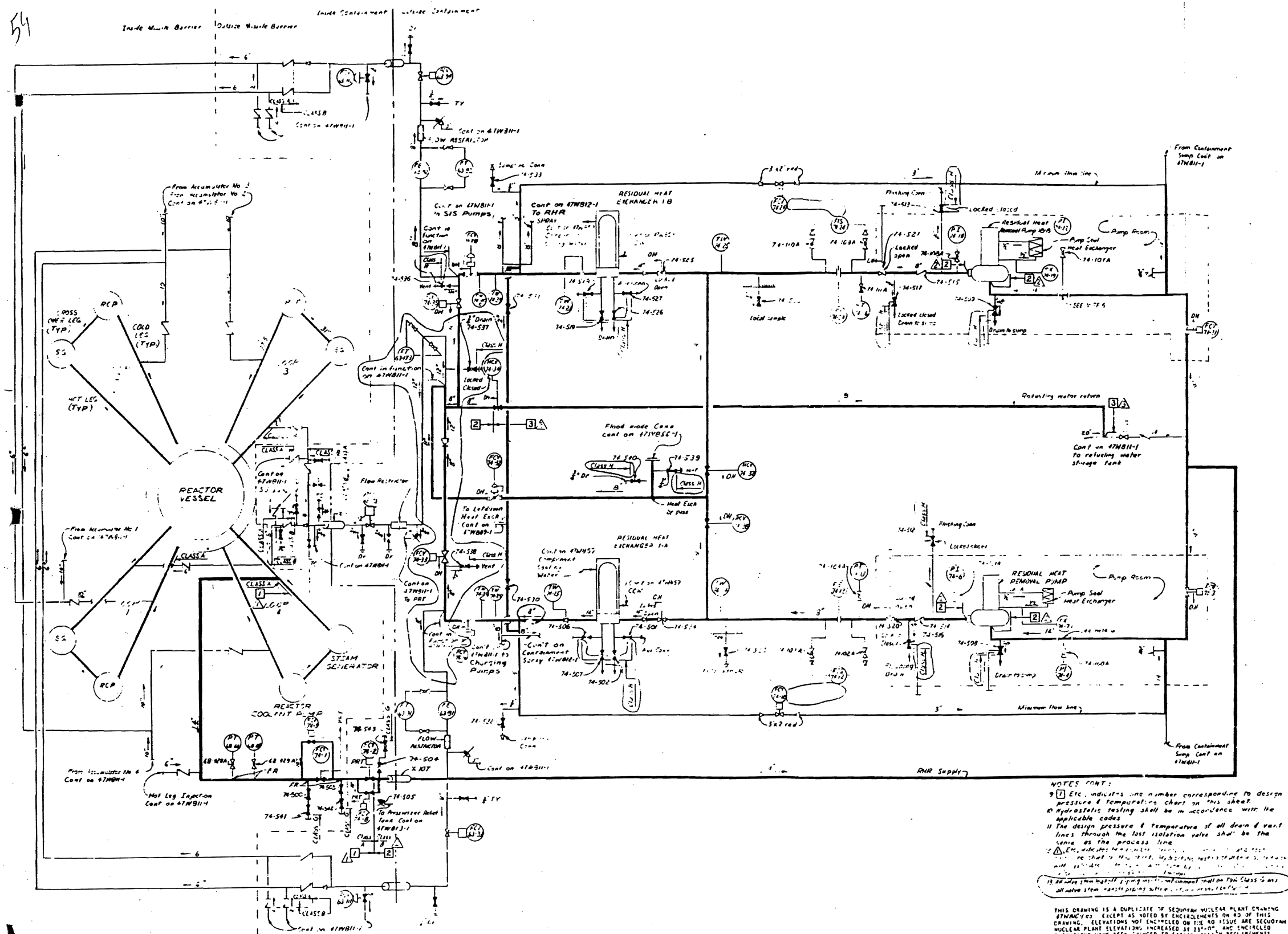


Figure 2.4-106 Mechanical - Flow Diagram Fuel Pool Cooling and Cleaning System



DESIGN PRESSURE & TEMPERATURE DATA		
Line No	Design Pressure (PSIG)	Design Temperature (°F)
1	6445	650
2	600	470
3	100	170

NOTES:

1. ALL 1/2" OR LARGER PIPE SHALL BE 10% OVER SIZE.
2. ALL PRESSURE RATING VALVES ARE 1/2" BASE UNLESS NOTED OTHERWISE.
3. ALL PUMP NUMBERS ARE 10% OVER SIZE UNLESS NOTED OTHERWISE.
4. ALL PIPING SHALL BE 10% OVER SIZE UNLESS NOTED OTHERWISE.
5. ALL PIPING SHALL BE 10% OVER SIZE UNLESS NOTED OTHERWISE.
6. ALL PIPING SHALL BE 10% OVER SIZE UNLESS NOTED OTHERWISE.
7. ALL PIPING SHALL BE 10% OVER SIZE UNLESS NOTED OTHERWISE.
8. ALL PIPING SHALL BE 10% OVER SIZE UNLESS NOTED OTHERWISE.
9. ALL PIPING SHALL BE 10% OVER SIZE UNLESS NOTED OTHERWISE.

NOTES CONT:

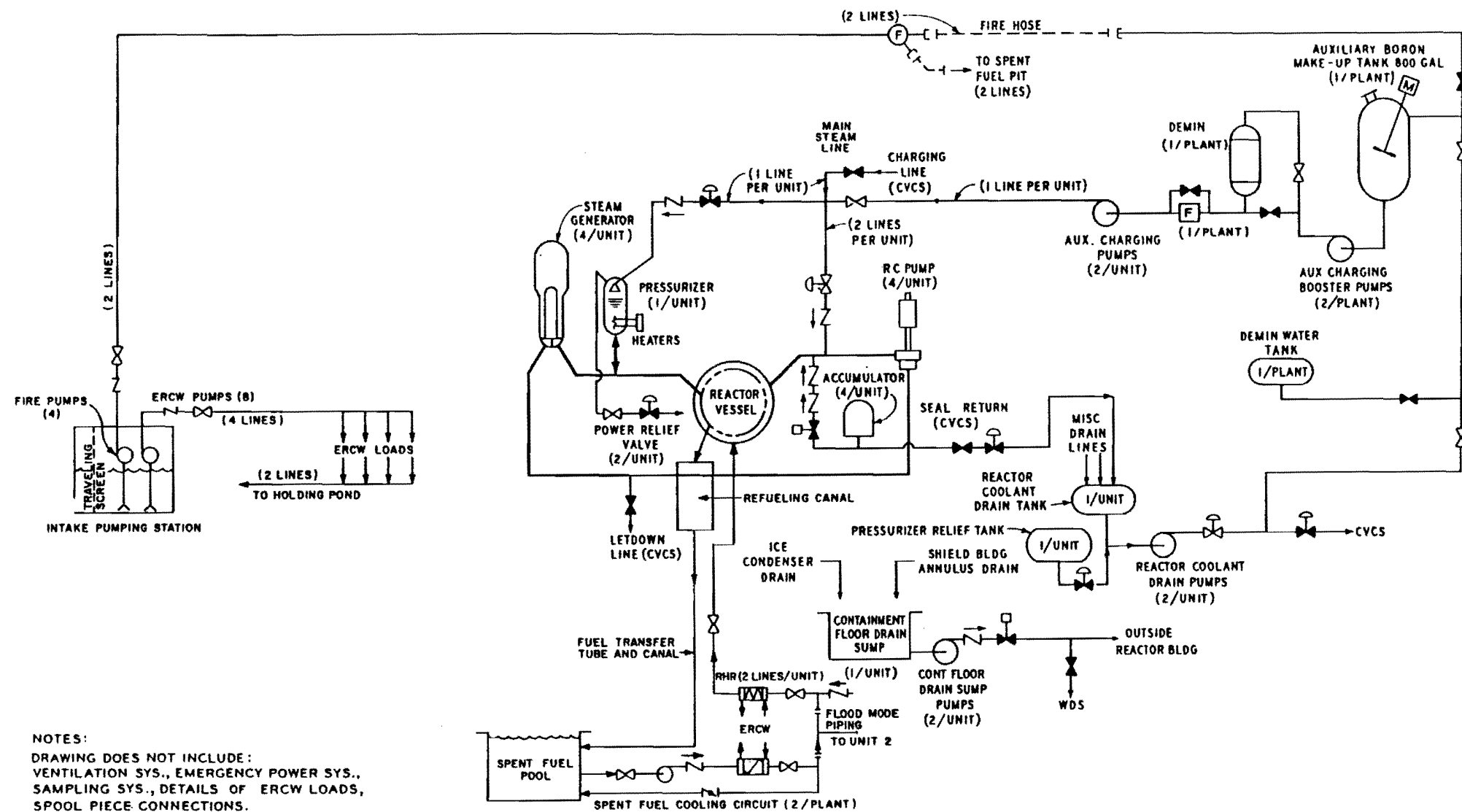
10. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.
11. HYDROSTATIC TESTING SHALL BE IN ACCORDANCE WITH THE APPLICABLE CODES.
12. THE DESIGN PRESSURE & TEMPERATURE OF ALL DRAIN & VENT LINES THROUGH THE LAST ISOLATION VALVE SHALL BE THE SAME AS THE PROCESS LINE.
13. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.
14. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.
15. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.
16. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.
17. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.
18. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.
19. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.
20. ETC. INDICATES LINE NUMBER CORRESPONDING TO DESIGN PRESSURE & TEMPERATURE CHART ON THIS SHEET.

THIS DRAWING IS A DUPLICATE OF SEQUOIA NUCLEAR PLANT DRAWING 47WAB10-1. EXCEPT AS NOTED BY ENCLOSURES OR AS OF THIS DRAWING, ELEVATIONS NOT ENCLOSED ON THE NO. 1000 ARE SEQUOIA NUCLEAR PLANT ELEVATIONS. INCREASED BY 211'-0" AND ENCLOSED ELEVATIONS HAVE BEEN CHANGED TO SATISFY DESIGN REQUIREMENTS.

Revised by Amendment

WATTS BAR NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT
POWERHOUSE UNITS 1 & 2
FLOW DIAGRAM
RESIDUAL HEAT REMOVAL
SYSTEM
TVA DWG NO. 47WAB10-1 R16
FIGURE 2.4-107

Figure 2.4-107 Powerhouse Units 1 & 2 Flow Diagram - Residual Heat Removal System



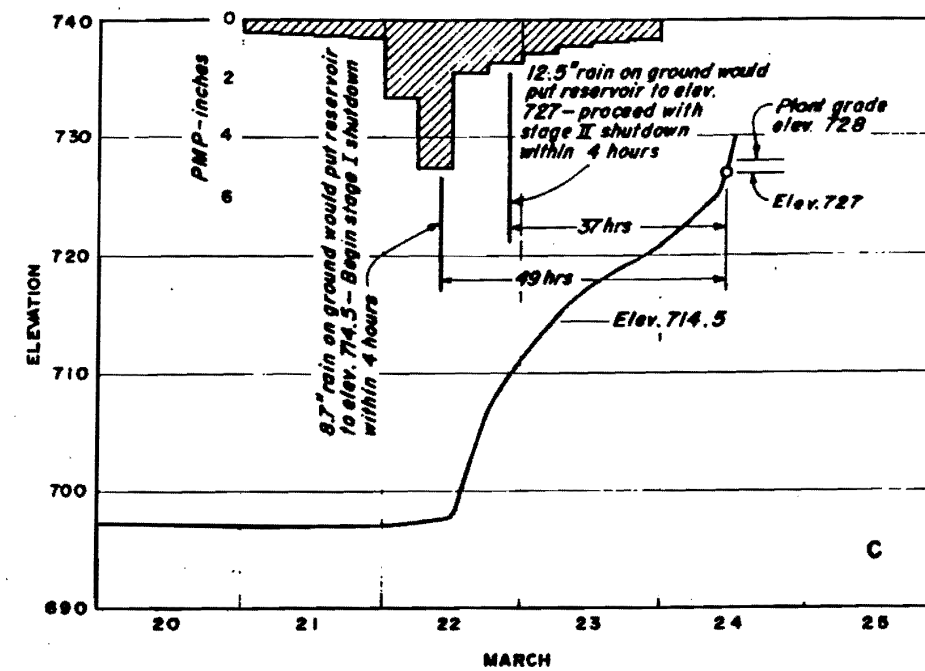
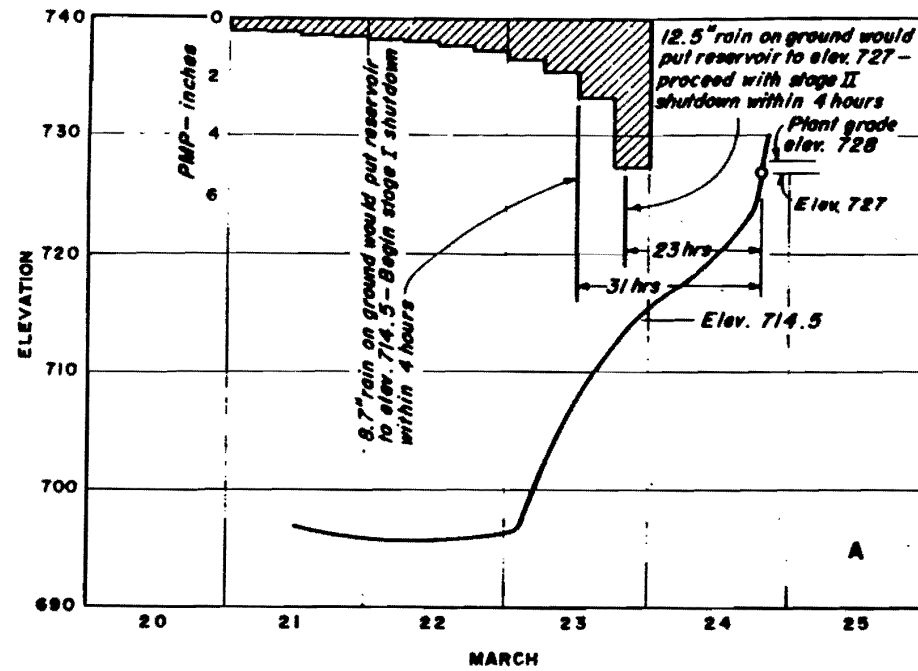
NOTES:
DRAWING DOES NOT INCLUDE:
VENTILATION SYS., EMERGENCY POWER SYS.,
SAMPLING SYS., DETAILS OF ERCW LOADS,
SPOOL PIECE CONNECTIONS.

WATTS BAR NUCLEAR PLANT FINAL SAFETY ANALYSIS REPORT

SCHEMATIC FLOW DIAGRAM
FLOOD PROTECTION PROVISIONS
OPEN REACTOR COOLING
(unit 1 shown, unit 2 similar)
Figure 2.4-108

Figure 2.4-108 Schematic Flow Diagram Flood Protection Provisions Open Reactor Cooling (Unit 1 Shown, Unit 2 Similar)





NOTE: Times shown allow 4 hours
for communications and
forecast computation.

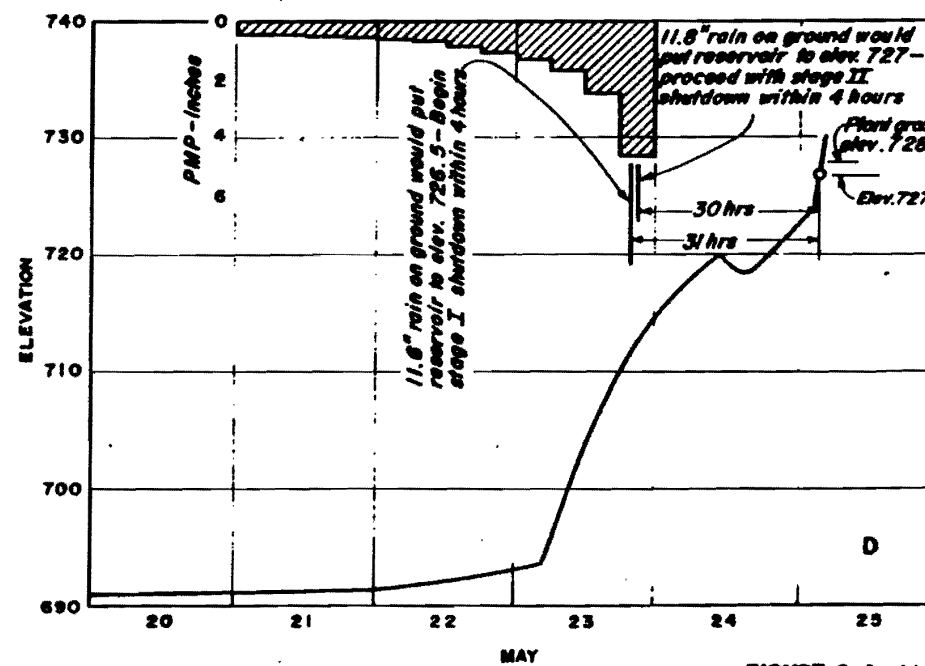
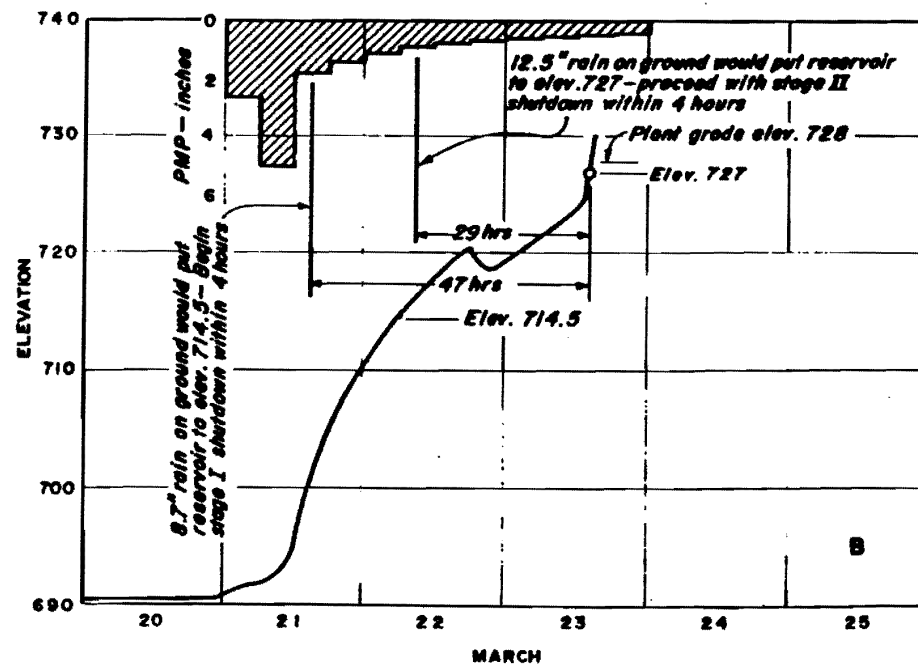
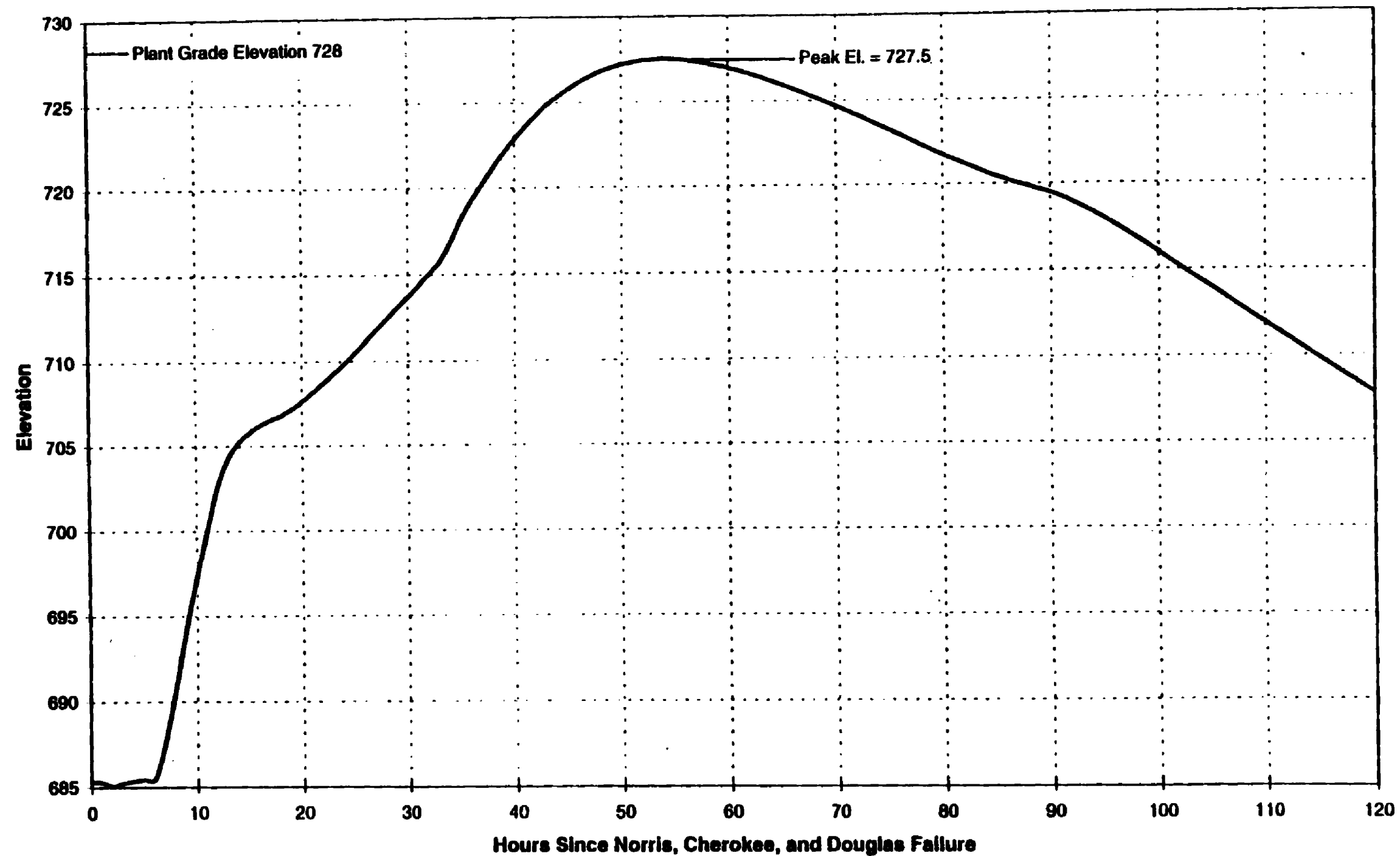


FIGURE 2.4-110

WATTS BAR NUCLEAR PLANT RAINFALL FLOOD PROTECTION PLAN BASIS FOR SAFE SHUTDOWN FOR PLANT FLOODING

Added by Amendment 32

Figure 2.4-110 Watts Bar Nuclear Plant Rainfall Flood Protection Plan Basis For Safe Shutdown For Plant Flooding



**Seismic Flood Analysis - Norris, Cherokee and Douglas SSE with 25-year Flood
Watts Bar Plant
Figure 2.4 - 111**

FSAR - Amendment 92

Figure 2.4-111 Douglas PMF Failure Wave at Watts Bar Plant