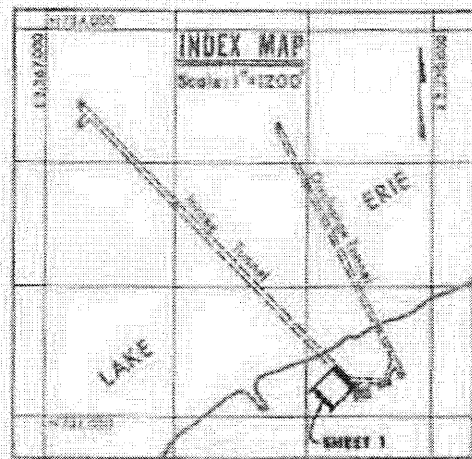
 **PERRY NUCLEAR POWER PLANT**

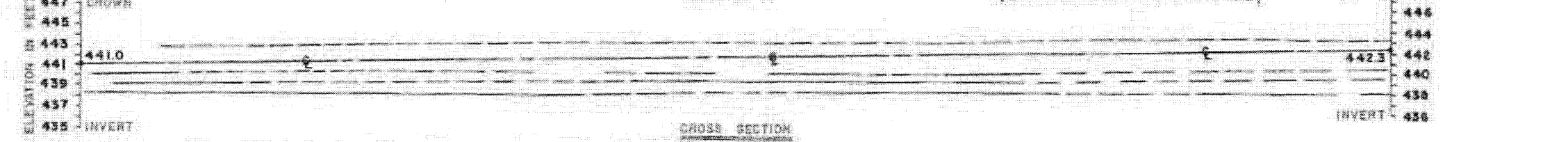
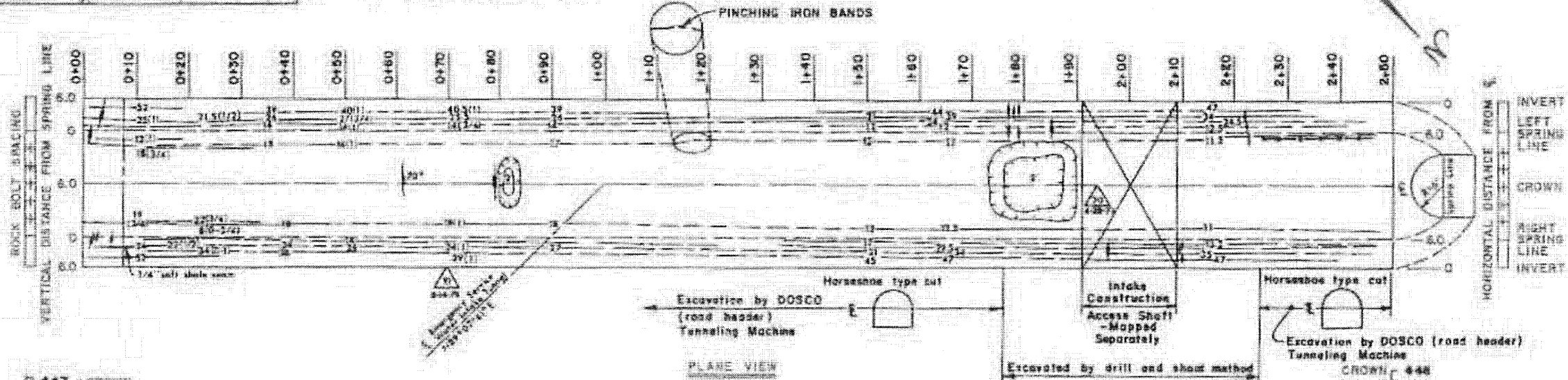
Location Map
Perry Nuclear Power Plant

Figure 2D-1



- SYMBOLS**
- *(1/2)* HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - 11/2-11* DISCONTINUOUS IRON BED
 - 11/11* HARD, LIGHT GREY SANDY SHALE TO SILTSTONE BED
 - 10/110-11* DISCONTINUOUS IRON BED WITHIN GREY BED
 - ⚡ FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP

- MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- *Notes:
Number (v) in parentheses indicates bed thickness.
Number preceding parenthesis indicates inches above or below spring line of station of measurement.



no. 1-5	no. 4	no. 5 at crown	no. 4	no. 5 at crown
5 Rock bolts in steel ribs with wire mesh between, roof surface coated vermiculite slurry		5 Rock bolts in steel ribs, covered by wire mesh	Roof bolts 1-5'	Roof 5 Rock bolts in steel ribs at 15'-4' centers, covered by wire mesh
3'-8"	3'-7"	3'-8"	3'-8"	3'-5"
Bedding fractures only		Very widely spaced	non-persistent 1'-3'	non-persistent 1'-10'
No inflow				No inflow
approx. 24' of horizon, approx. 35' of ground (11) 2 1/2' of shale				approx. 24' of horizon, approx. 25' of ground (11) 2 1/2' of shale

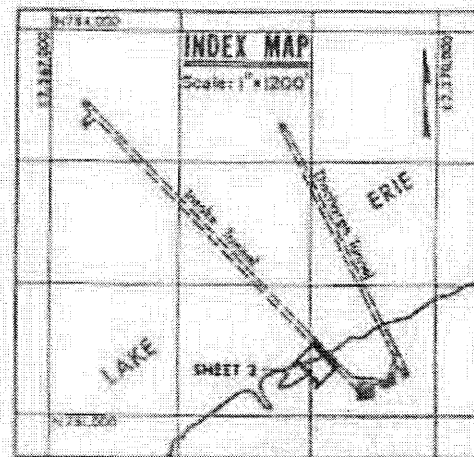
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 17 1/73)

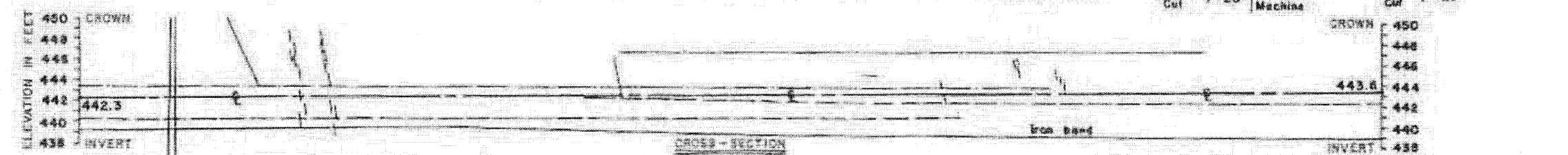
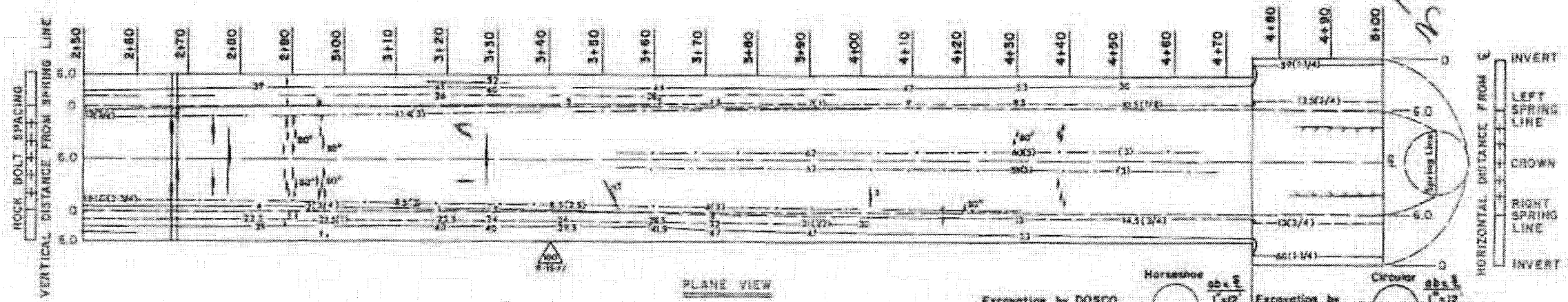
PERRY NUCLEAR POWER PLANT

Geologic Map of Tunnel Excavations

Figure 2D-2 (Sheet 1 of 24)



- SYMBOLS**
- 1/4" (1/4)" HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - 1/10" (2/20)" DISCONTINUOUS IRON BED
 - 1/2" (1/2)" HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - 3/16" (3/16)" DISCONTINUOUS IRON BED WITHIN GREY BED
 - Fracture Zone
 - Fault
 - Bedding Parting
 - Vertical Joint
 - Inclined Joint
 - Bedding, Strike and Dip
- MOISTURE ALONG BEDDING PARTING
- SEEPAGE FROM FEATURE
- OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
- METHANE GAS, MAXIMUM PERCENT I.E.L. WITH DATE OF OCCURRENCE
- *Note: Number(s) in parentheses indicates bed thickness. Number preceding parenthesis indicates inches above or below spring line at station of measurement.



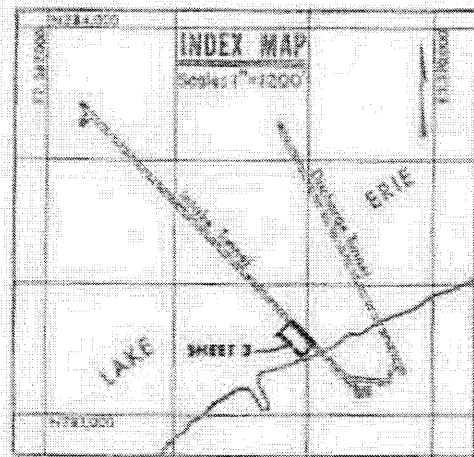
STATION	2+70	2+80	2+90	3+00	3+10	3+20	3+30	3+40	3+50	3+60	3+70	3+80	3+90	4+00	4+10	4+20	4+30	4+40	4+50	4+60	4+70	4+80	4+90	5+00
Excavation Progress																								
ESTIMATED ROCK CONDITION (TERZAGHI NO.)																								
TEMPORARY SUPPORT SYSTEM																								
BEDDING SPACING	1'-5"	1/2'-5"	1'-5"	2'-5"	1'-4"	1/2'-4"	3/4'-4"	1'-3"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"	1'-4"
FRACTURE SPACING	1'-10"	1'-10"	2'-10"	1/2'-10"	10'																			
WATER CONDITION																								
DEPTH OF COVER																								

(Rev. 12 1/73)

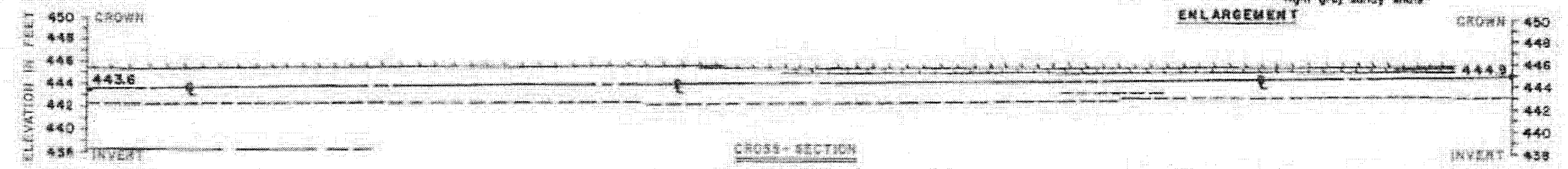
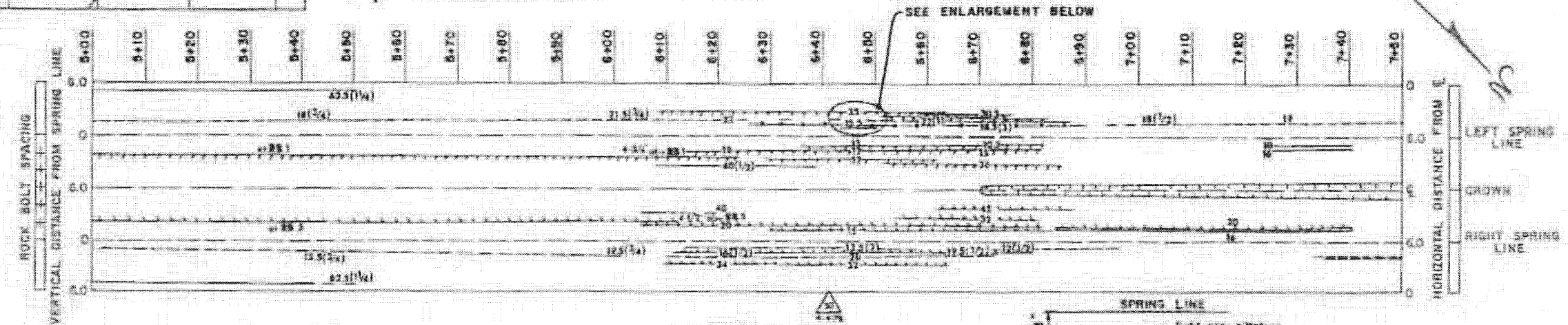
PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

Figure 20-2 (Sheet 2 of 24)



- SYMBOLS**
- HARD, TAN, BROWN, CERTY, IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP
 - MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT I.E.L. WITH DATE OF OCCURRENCE
- Notes:**
 Number(s) in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line at station of measurement.



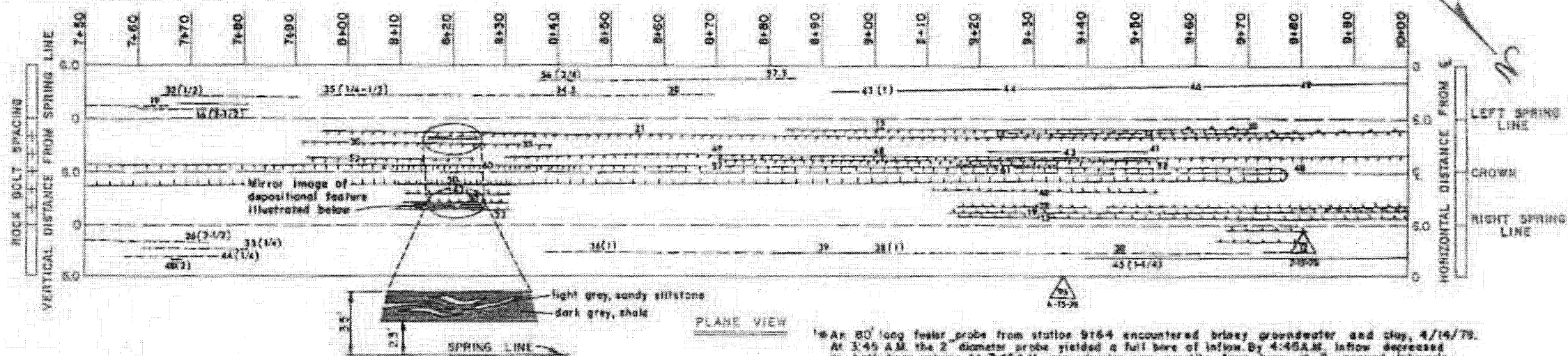
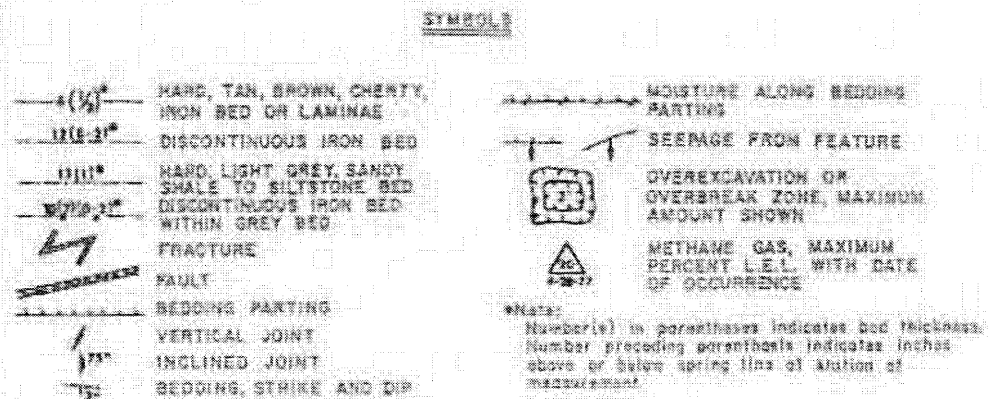
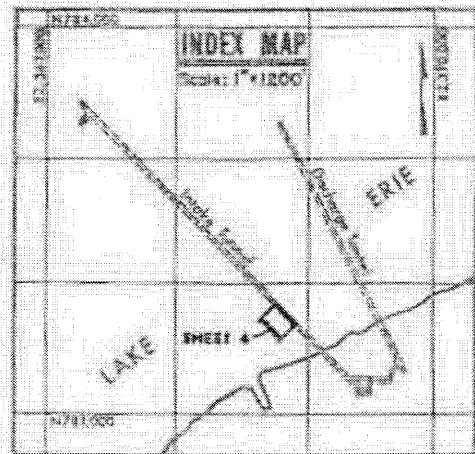
EXCAVATION PROGRESS	no. 4	no. 4-3
ESTIMATED ROCK CONDITION (TERZAGHI NO.)	5 Rock bolts @ 2' centers in this segment	Spalling off moist bed rock starting at sta. 6+70
TEMPORARY SUPPORT SYSTEM	2-2' @ 2' spaced by wire mesh	
BEDDING SPACING	1'-4"	
FRACTURE SPACING	Bedding fracture, only	
WATER CONDITION	No inflow	20 gpi maximum in crown along bedding fracture
DEPTH OF COVER	3' back	5.5' water
	12.5' subsurface (stone)	170.1' subsurface (shale)

(Rev. 12 1/03)

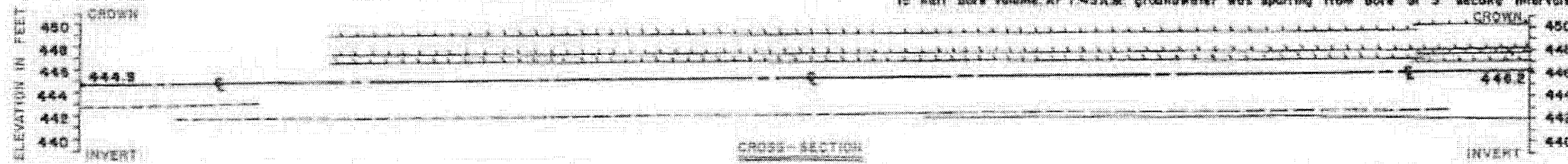
PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

Figure 2D-7 (Sheet 3 of 24)



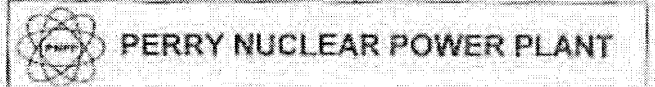
At 80' long test probe from station 9164 encountered brassy groundwater and clay, 4/16/79. At 3:45 A.M. the 2" diameter probe yielded a full bore of inflow. By 4:45 A.M. inflow decreased to half bore volume. At 7:45 A.M. groundwater was spurting from bore at 3 second intervals.



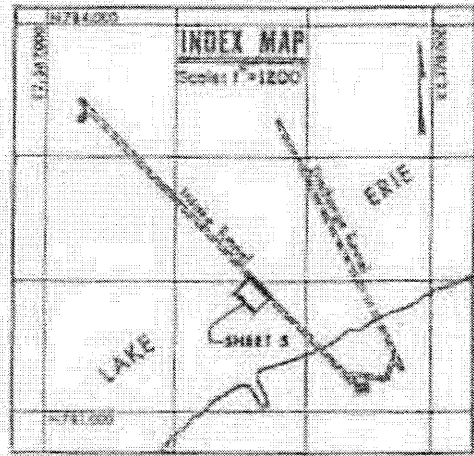
3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"
3'-0" Careful spalling along bedding fracture near crown 3 Rock bolts @ 2' centers in ribs spaced 2-1/2' apart, spaced by wire mesh					
1'-4"	1'-7"	1'-8"	1'-10"		
bedding fracture only					
Moisture along bedding fracture near crown			Moisture along bedding fracture near crown Seepage out of rock bolts w/ iron staining		Slight moisture along 20% of bedding fractures and rock bolts
5.4' water			10.5' water		11.8' water (plate)
ONLY subsurface (thick)					

EXCAVATION PROGRESS
 ESTIMATED ROCK CONDITION (TERZAGHI NO.)
 TEMPORARY SUPPORT SYSTEM
 BEDDING SPACING
 FRACTURE SPACING
 WATER CONDITION
 DEPTH OF COVER

(Rev. 12 1/73)



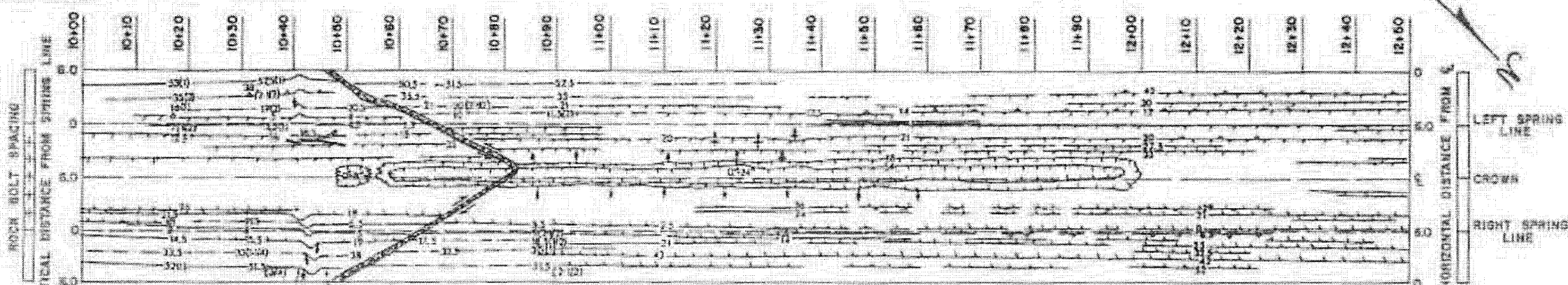
Geologic Map of
 Tunnel Excavations
 Figure 2D-2 (Sheet 4 of 24)



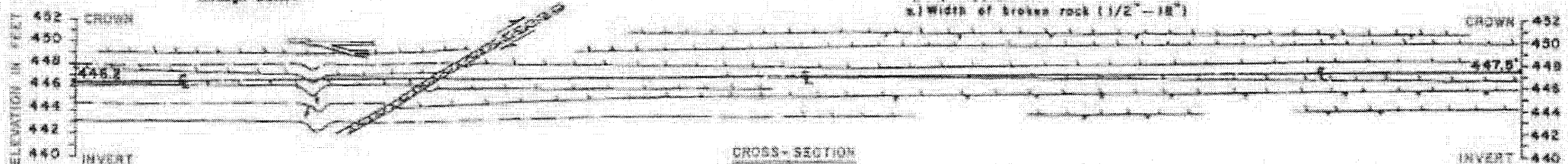
- SYMBOLS**
- 1 1/2" HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - 11(0-2)" DISCONTINUOUS IRON BED
 - 12(1)" HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - 10(10-2)" DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT (with sense of motion)
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP

- MOISTURE ALONG BEDDING PARTING
- SEEPAGE FROM FEATURE
- OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
- METHANE GAS, MAXIMUM PERCENT I.E.L. WITH DATE OF OCCURRENCE

* Note:
 Number(s) in parenthesis indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line of station of measurement.



- FAULT GEOMETRY**
- a.) Apparent displacement - 22"
 - b.) Actual vertical displacement - 12"
 - c.) Strike - N47° E
 - d.) Dip - approx 17°
 - e.) Width of broken rock (1/2" - 18")



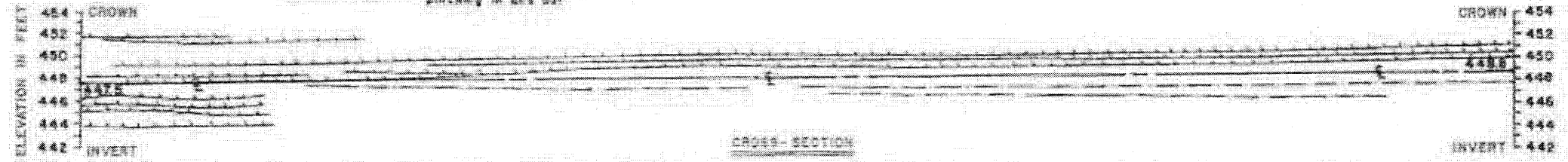
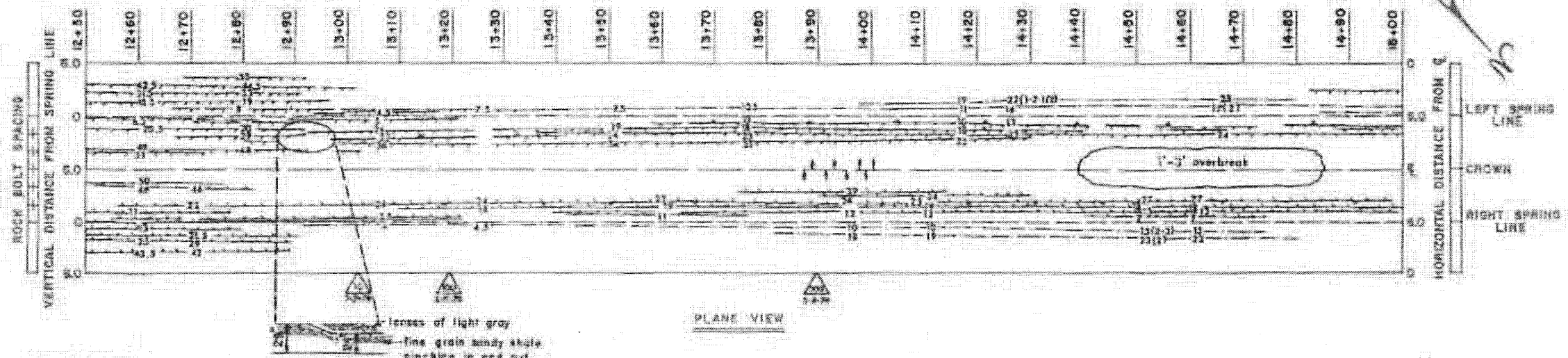
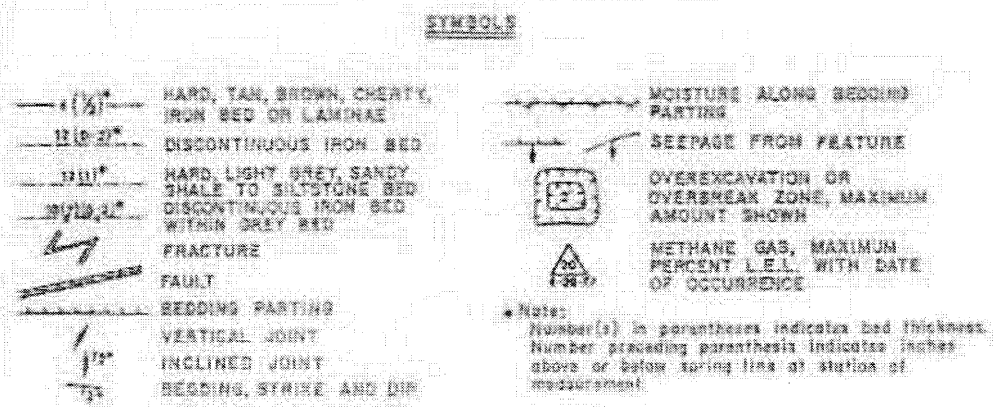
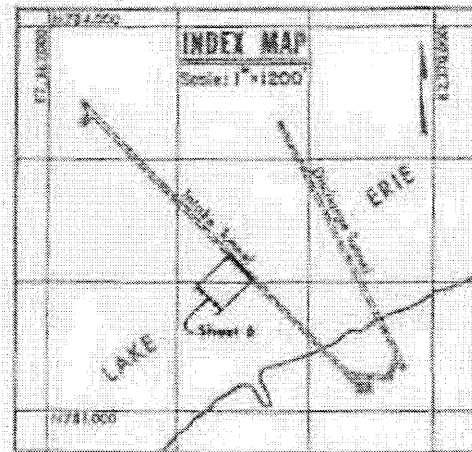
Excavation Progress	Estimated Rock Condition (TERZAGHI NO.)	Temporary Support System	Bedding Spacing	Fracture Spacing	Water Condition	Depth of Cover
No. 5-6 5 rock bolts at 7' centers in ribs at 13' centers, spanned by wire mesh 0-24' of overbreak between rock bolts in steel ribs at 3'-3.5' centers 5 rock bolts at 7' centers in steel ribs at 3'-3.5' centers spanned by wire mesh full chauling	10 11 12	No inflows slight seep from old water flowing from chauling 2 inflows at approx. 1 gal/min	Bedding fractures 1/2 to 1/8" thick highly fractured fault zone w/ gouge Bedding fractures only, spaced as above	Full chauling approx. 6'-14' 8'-15'	No inflows slight inflow from rock bolts slight moisture along approx. 20% of bedding fractures and rock bolts	10.7' sub-surface (shale) 4.5' water 10.7' sub-surface (shale)

(Rev. 12/1/03)

PERRY NUCLEAR POWER PLANT

Geologic Map of
 Tunnel Excavations

Figure 2D-2 (Sheet 5 of 24)



Rib bent 2'-4" between rock bolts no. 3-4		Rib bent 2'-0" between rock bolts no. 2-3		no. 4-5		Shielding employed Cutting bit buried in overbreak	
Approx. 8'-12"		Approx. 2'-12"		Rib bent 2'-4" between rock bolts no. 2-3		Approx. 6'-10"	
				bedding fractures only, spaced as bedding spacing			
No inflow		Approximately 20% of bedding fractures and rock bolts show minimal amounts of moisture					
+11.5 water						+12.5 water	
+11.5 subsurface (shale)						+12.5 subsurface (shale)	

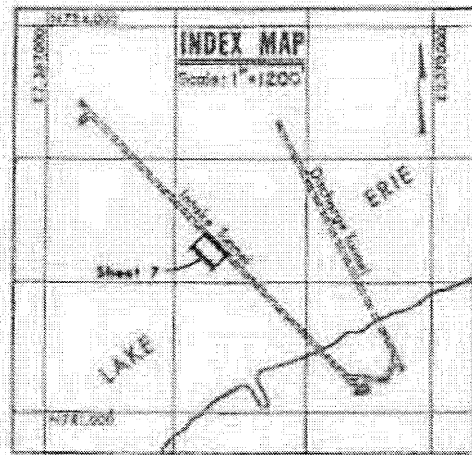
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

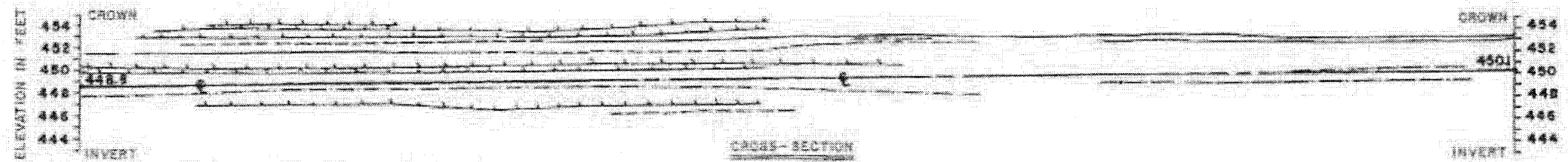
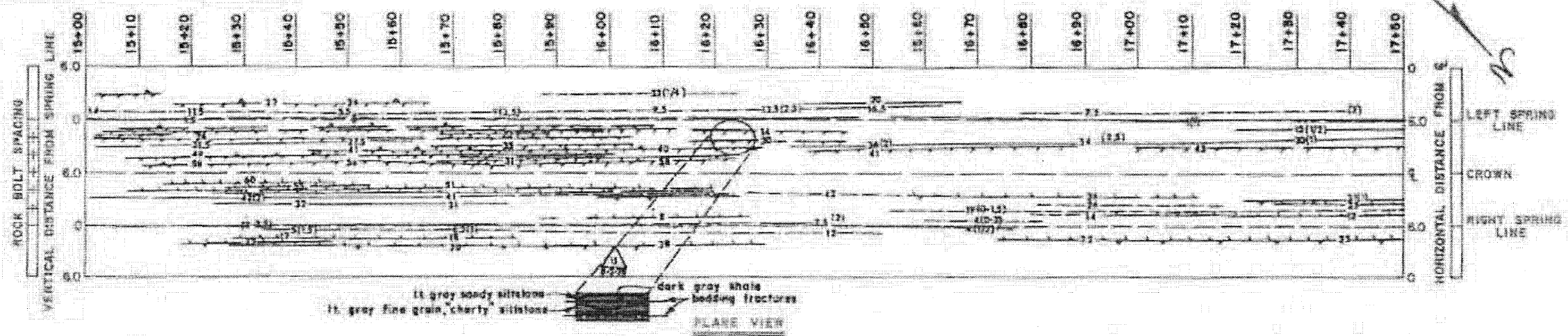
Geologic Map of
Tunnel Excavations

Figure 2D-2 (Sheet 6 of 24)



- SYMBOLS**
- $1\frac{1}{2}^\circ$ HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - $12(2.2)^\circ$ DISCONTINUOUS IRON BED
 - $17(1)^\circ$ HARD LIGHT GREY SANDY SHALE TO SILTSTONE BED
 - $20(1.5)^\circ$ DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP

- MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERSPREAD ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- * Note: Number(s) in parentheses indicates bed thickness. Number preceding parenthesis indicates inches above or below spring line at station of measurement.



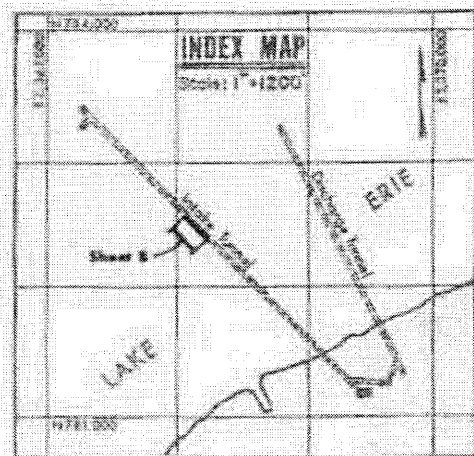
15+10	15+30	15+50	15+70	15+90	16+10	16+30	16+50	16+70	16+90	17+10	17+30	17+50
<p>EXCAVATION PROGRESS</p> <p>ESTIMATED ROCK CONDITION (TERZAGHI NO.)</p> <p>TEMPORARY SUPPORT SYSTEM</p> <p>BEDDING SPACING</p> <p>FRACTURE SPACING</p> <p>WATER CONDITION</p> <p>DEPTH OF COVER</p>												
<p>Approx. 6"-10"</p> <p>Approx. 20% of bedding fractures show minimal moisture</p>												
<p>10.5' water</p> <p>101.7' subsurface (shale)</p>												

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

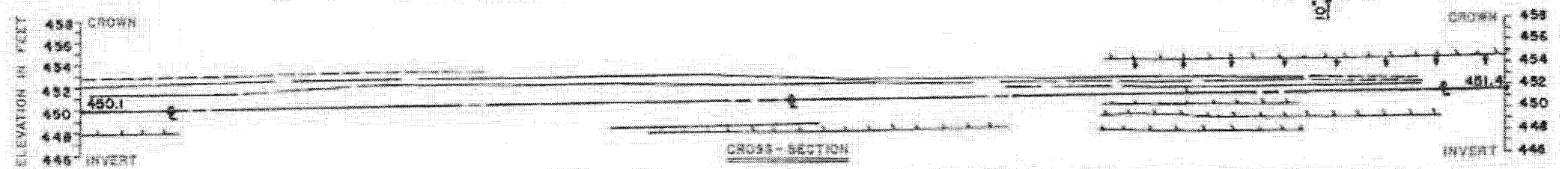
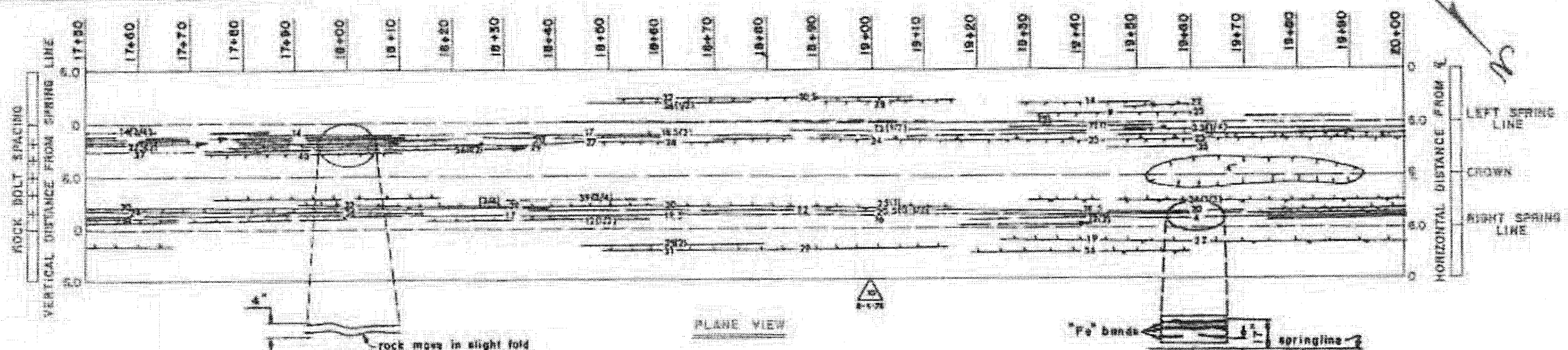
Figure 2D-2 (Sheet 7 of 24)



- SYMBOLS**
- $(\frac{1}{2})^\circ$ HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - $(\frac{1}{2})^\circ$ DISCONTINUOUS IRON BED
 - $(\frac{1}{2})^\circ$ HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - $(\frac{1}{2})^\circ$ DISCONTINUOUS IRON BED WITHIN GREY BED
 - $\frac{1}{2}$ FRACTURE
 - $\frac{1}{2}$ FAULT
 - $\frac{1}{2}$ BEDDING PARTING
 - $\frac{1}{2}$ VERTICAL JOINT
 - $\frac{1}{2}$ INCLINED JOINT
 - $\frac{1}{2}$ BEDDING, STRIKE AND DIP

- MOISTURE ALONG BEDDING PARTING
- SEEPAGE FROM FEATURE
- OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
- METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE

*Note:
 Number(s) in parenthesis indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line of station of measurement.



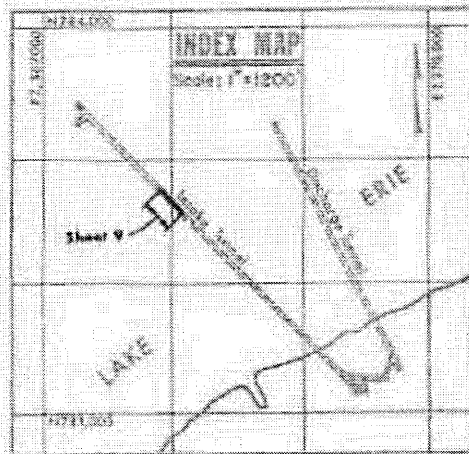
17+70	18+00	18+30	18+60	18+90	19+20	19+50	19+80	20+00
Slight scaling along crown for series length (between rock bolt 2 & 4)				Slight scaling from roof (0'-4")				None
3 rock bolts at 2.0' centers in steel ribs at 2.5' to 4.0' centers, spanned by wire mesh				Some ribs at 4.0' centers				
Approx. 3"				Approx. 4" to 10"				4" to 7"
Bedding fractures only								
Traces of moisture along a couple bedding fractures				Slight moisture on approx. 60% of the excavation				
14.5' water								11.5' water
101.5' subsurface (shale)								101.5' subsurface (shale)

- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/03)

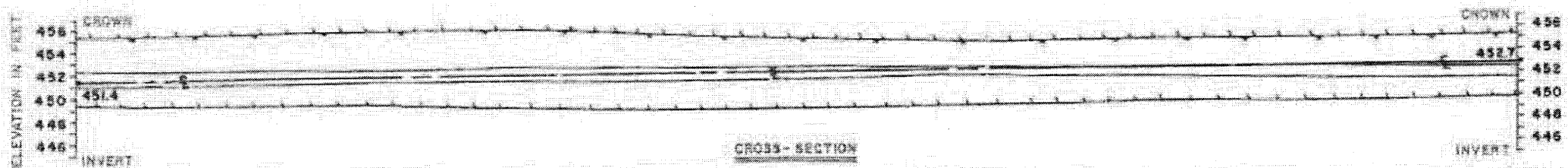
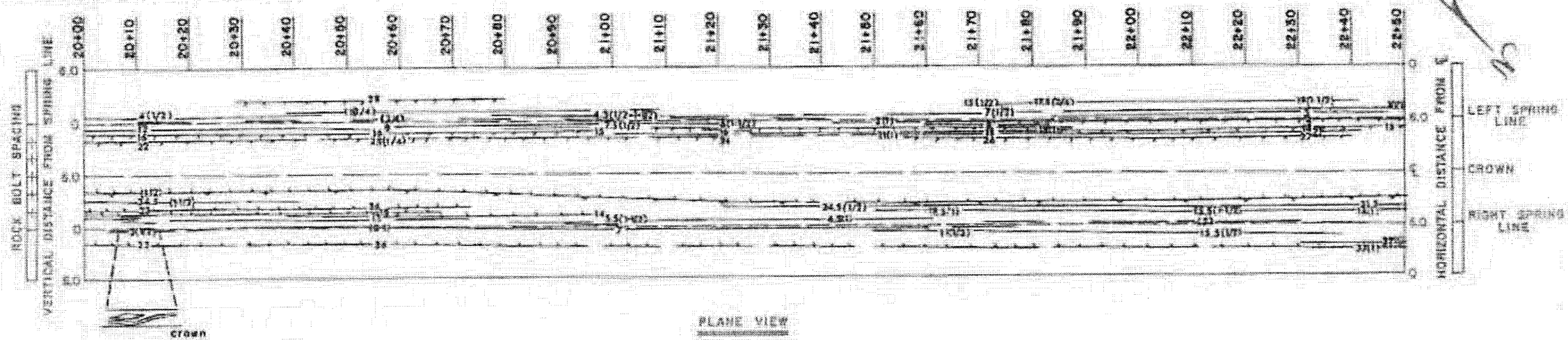
PERRY NUCLEAR POWER PLANT

Geologic Map of Tunnel Excavations
 Figure 2D-2 (Sheet 8 of 24)



SYMBOLS

- \bullet (1/2)" HARD, TAN, BROWN, CHERT, IRON BED OR LAMINAE
 - \bullet (1/2)" DISCONTINUOUS IRON BED
 - \bullet (1/2)" HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - \bullet (1/2)" DISCONTINUOUS IRON BED WITHIN GREY BED
 - --- FRACTURE
 - --- FAULT
 - --- BEDDING PARTING
 - --- VERTICAL JOINT
 - --- INCLINED JOINT
 - --- BEDDING, STRIKE AND DIP
- --- MOISTURE ALONG BEDDING PARTING
 - --- SEEPAGE FROM FEATURE
 - \square OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - \triangle METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- Note:**
 Number(s) in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line at station of measurement.



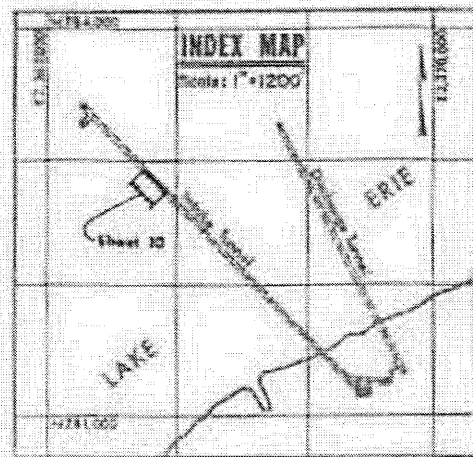
2'-0"	4'-0"	4'-0"	4'-0"	2'-0"
3 rock bolts at 2' centers in steel ribs at 4' centers spanned by wire mesh		3 rock bolts at 2' centers in steel ribs at 2.5'-4.0' centers spanned by wire mesh		
3'-8"		4'-8"		
Bedding fractures only				
Slight moisture from open parting along west wall for entire length				
17.5 water		17.5 water		
M1.8 substructure (shale)		M1.8 substructure (shale)		

- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

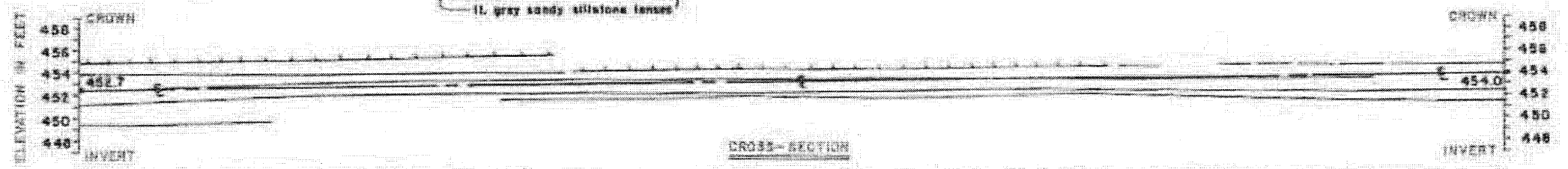
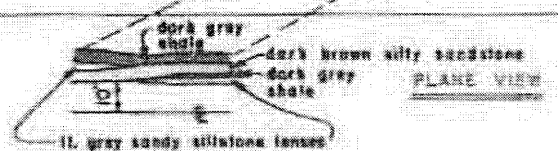
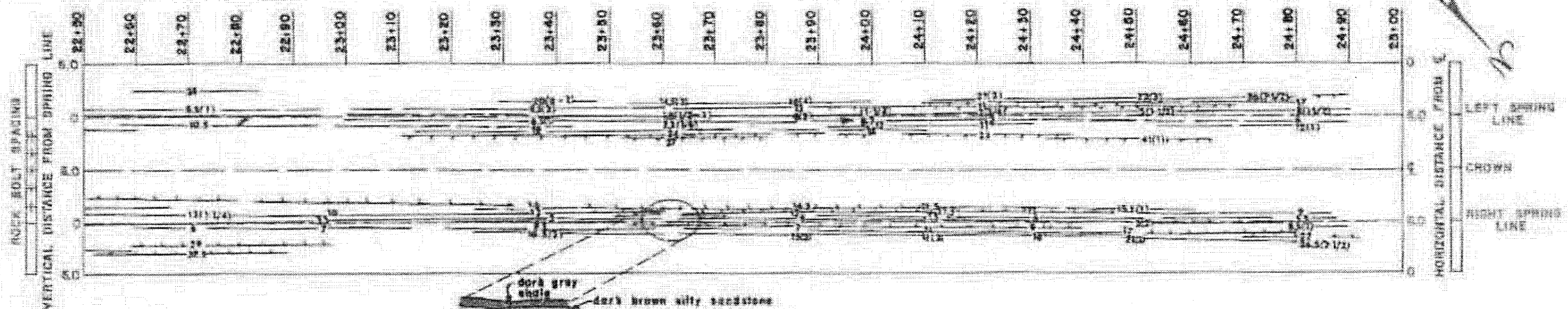
(Rev. 12 1/03)



Geologic Map of
Tunnel Excavations
Figure 2B-2 (Sheet 9 of 24)



- SYMBOLS**
- HARD, TAN, BROWN, CERTY, IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - INCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP
 - MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- Note:**
 Number(s) in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line at station of measurement.



Slight overbreak between steel ribs nos. 3 & 4 1'-6" deep (max 2'4")		Slight overbreak between steel ribs nos. 3 & 4 1'-6" deep (max 1'1")	
Track bolts in 7' centers in steel ribs at 1.5' to 4.0' centers, supported by wire mesh			
3'-7"		1'-8"	
Bedding fractures only, spaced as above			
Minor bedding fractures, above springline along east wall		No seepage	
1.5' max		1.5' max	
No. 1 Substation (shown)		No. 2 Substation (shown)	

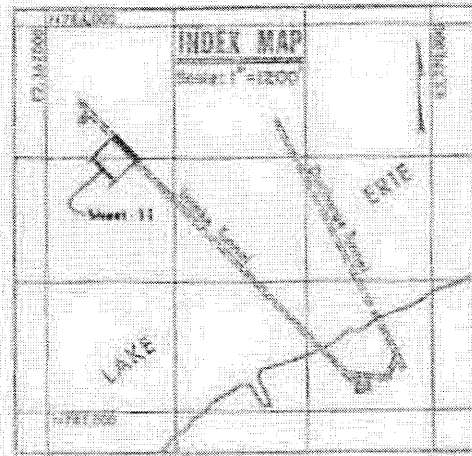
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO. 1)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

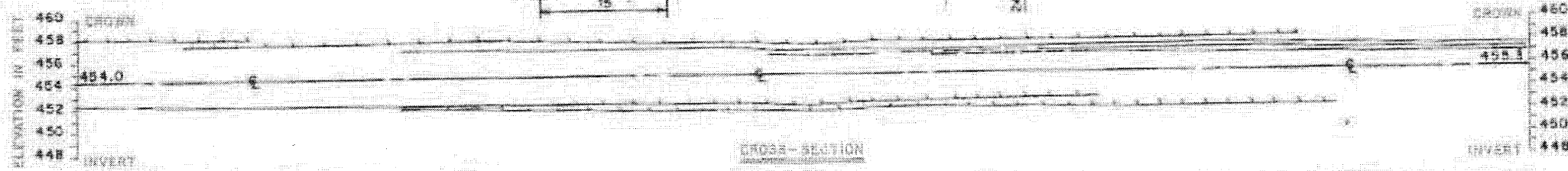
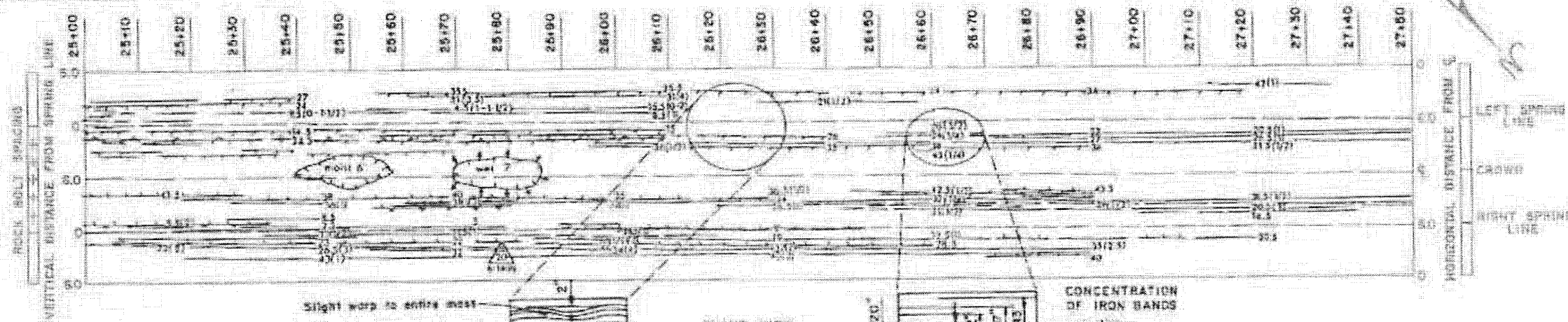
Figure 2D-2 (Sheet 10 of 24)



- SYMBOLS**
- HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP

- MOISTURE ALONG BEDDING PARTING
- SEEPAGE FROM FEATURE
- OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
- METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE

* Note:
 Number(s) in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line at station of measurement.



3-5'	3-7'	3-11'	4-8'
Slight overbreak along entire section, 0" - 6" deep max. (3)		Slight overbreak along entire section, 0" - 6"	
16" - 6" overbreak in crown (max. 3)		Slight overbreak along entire section, 0" - 6"	
Additional rock bolts and ribs added to prohibit additional overbreak.		5 rock bolts at 2 centers in steel ribs at 4.0 centers, spanned by wire mesh	
Slight dip from overbreak in crown (Moist in overbreak)		Bedding fractures only spaced at crown	
Slight moisture along bedding fractures		No seepage	
3.1% dip water		2.7% dip water	
* 14.0' subsurface (thick)		* 14.0' subsurface (thick)	

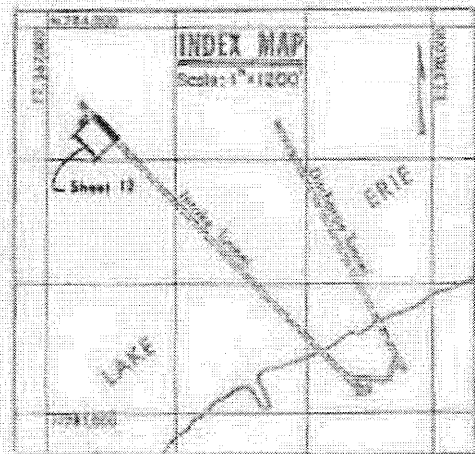
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI RQD)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SEPARATION
- FRACTURE GRADING
- WATER QUALITY
- DEPTH OF COVER

(Rev. 12/1/03)

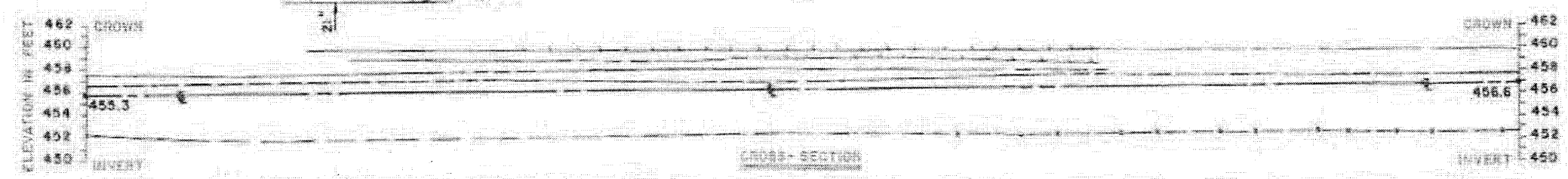
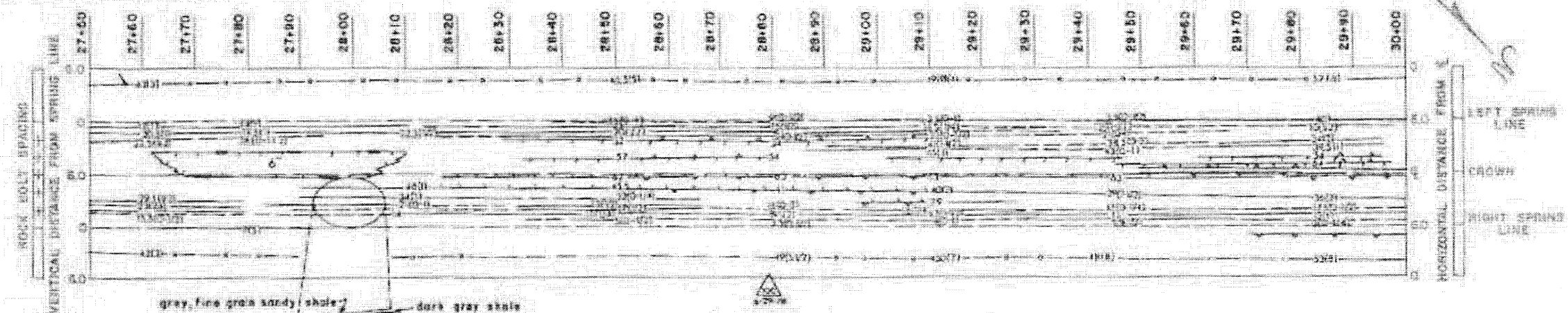
PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

Figure 2D-2 (Sheet 11 of 24)



- SYMBOLS**
- HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITH GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP
 - MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- * Note: Number(s) in parentheses indicates bed thickness. Number preceding parenthesis indicates inches above or below spring line at station of measurement.



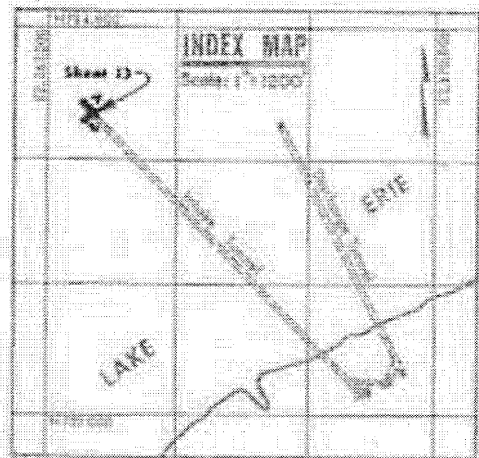
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (PERCENTAGE)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

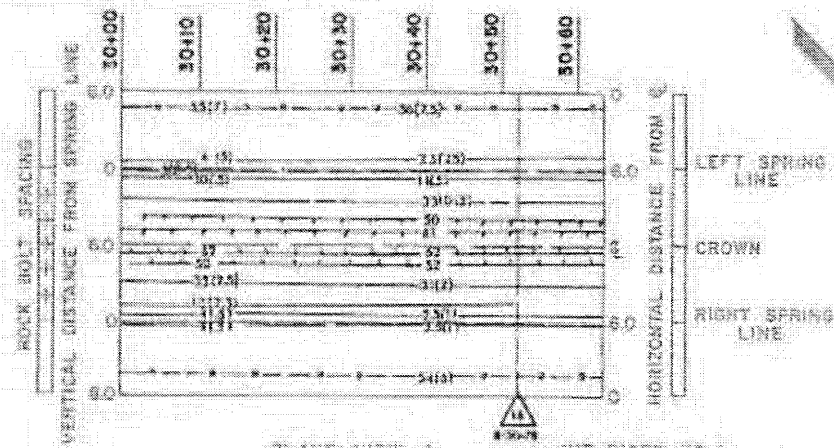
Geologic Map of
Tunnel Excavations

Figure 2D-2 (Sheet 12 of 24)

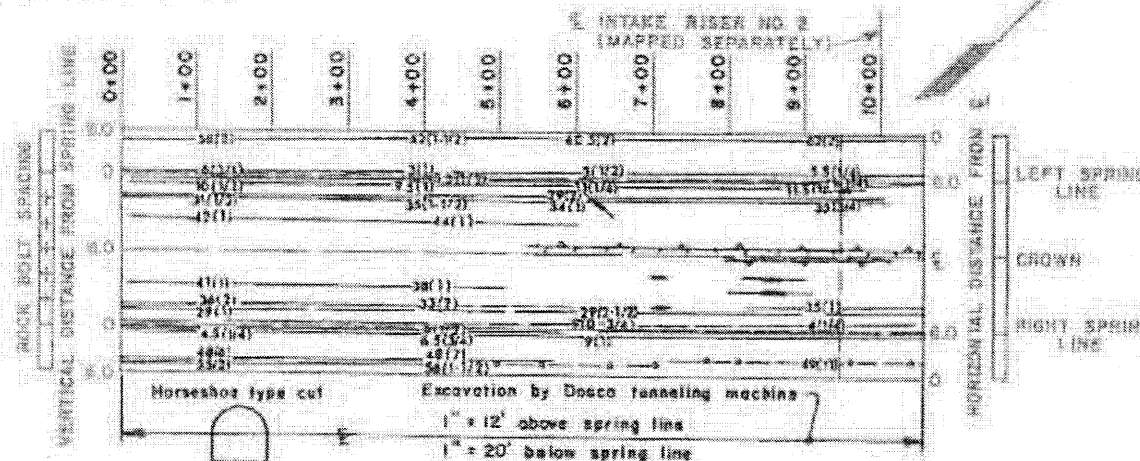


- SYMBOLS**
- HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP

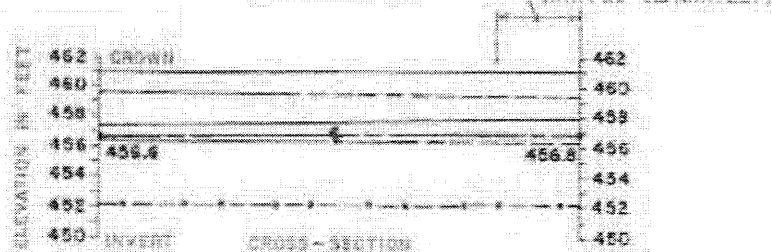
- MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- *Note: Number(s) in parenthesis indicates bed thickness. Number preceding parenthesis indicates inches above or below spring line at station of measurement.



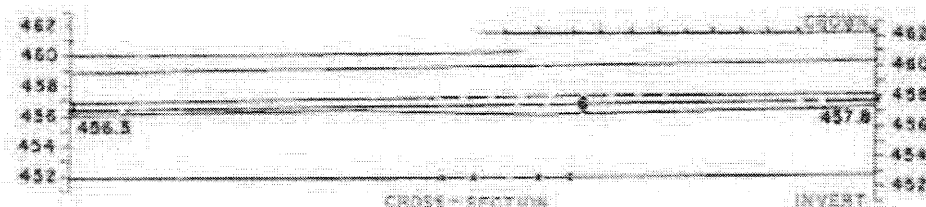
PLANE VIEW A



PLANE VIEW B



CROSS-SECTION



CROSS-SECTION

EXCAVATION PROGRESS	ESTIMATED ROCK CONDITION (TERZAGHI NO.)	TEMPORARY SUPPORT SYSTEM	BEDDING SPACING	FRACTURE SPACING	WATER CONDITION	DEPTH OF COVER
Excavation progress	ESTIMATED ROCK CONDITION (TERZAGHI NO.)	TEMPORARY SUPPORT SYSTEM	BEDDING SPACING	FRACTURE SPACING	WATER CONDITION	DEPTH OF COVER
Slight overbreak along entire section		3 rock bolts at 2' centers in steel ribs at 4' centers spanned by wire mesh	4'-6"	Bedding fractures only, spaced as above	Slight moisture along all bedding fractures	27.5' top water 91.5' subsurface (shale)

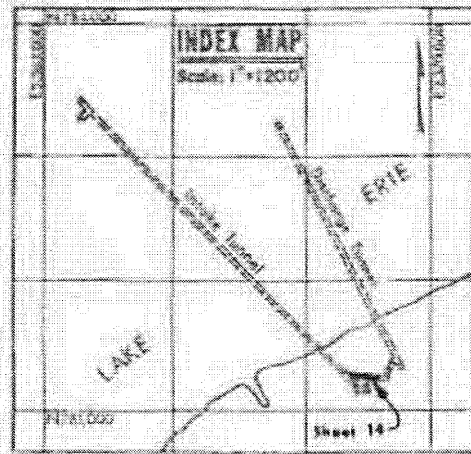
EXCAVATION PROGRESS	ESTIMATED ROCK CONDITION (TERZAGHI NO.)	TEMPORARY SUPPORT SYSTEM	BEDDING SPACING	FRACTURE SPACING	WATER CONDITION	DEPTH OF COVER
Excavation progress	ESTIMATED ROCK CONDITION (TERZAGHI NO.)	TEMPORARY SUPPORT SYSTEM	BEDDING SPACING	FRACTURE SPACING	WATER CONDITION	DEPTH OF COVER
Slight overbreak along entire section		3 rock bolts at 2' centers in steel ribs at 4'-4.5' centers, spanned by wire mesh	3'-8"	Bedding fractures only, spaced as above	No seepage	21.5' water 91.7' subsurface (shale)

(Rev. 12 1/03)

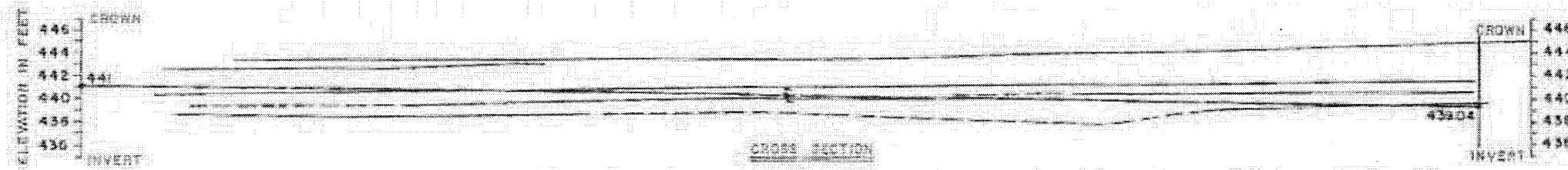
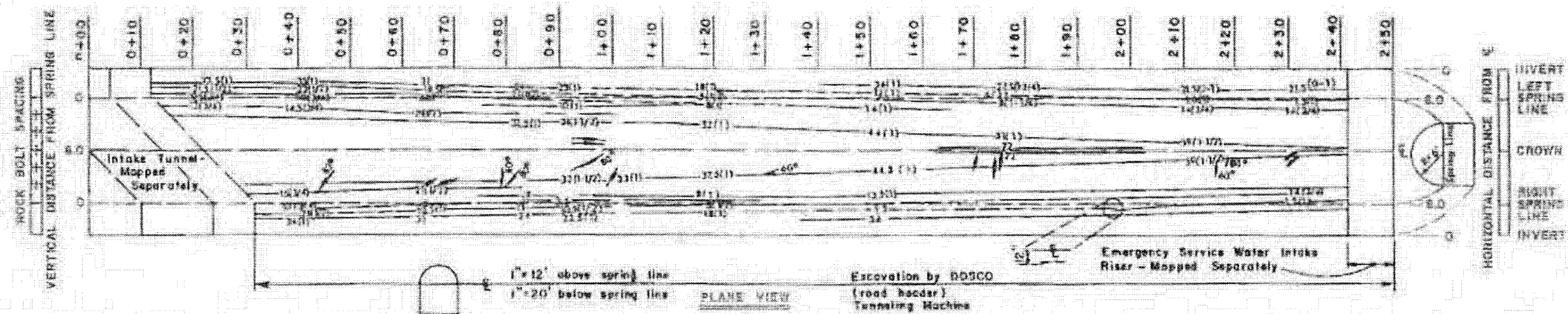
PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

Figure 20-2 (Sheet 13 of 24)



- SYMBOLS**
- (X)° HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - 2(S 2)° DISCONTINUOUS IRON BED
 - 3(L)° HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - 10(7W-2)° DISCONTINUOUS IRON BED WITHIN GREY BED
 - ↔ FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP
- SYMBOLS**
- MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - ☐ OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - ⚠ METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- * Note: Number in parentheses indicates bed thickness. Number preceding parentheses indicates inches above or below spring line at station of measurement.



STATION	0+00	0+10	0+20	0+30	0+40	0+50	0+60	0+70	0+80	0+90	1+00	1+10	1+20	1+30	1+40	1+50	1+60	1+70	1+80	1+90	2+00	2+10	2+20	2+30	2+40	2+50	
ESTIMATED ROCK CONDITION (OVERBREAK NO.)	3																										
TEMPORARY SUPPORT SYSTEM	None																										
BEDDING SPACING	3'-4"																										
FRACTURE SPACING	Widely spaced 10'-20'																										
WATER CONDITION	No seepage																										
DEPTH OF COVER	33.5' at intake and 27.5' at end of 112.5' of shaft																										

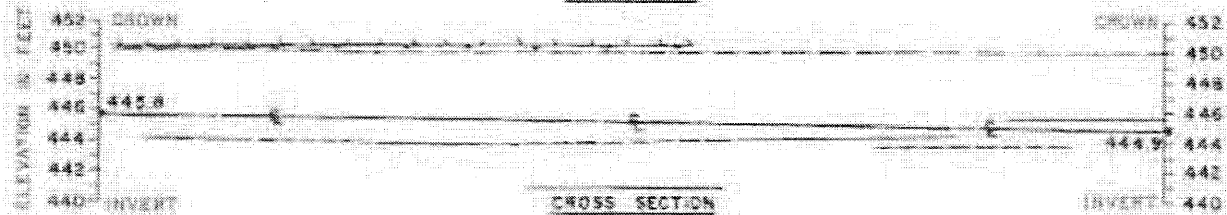
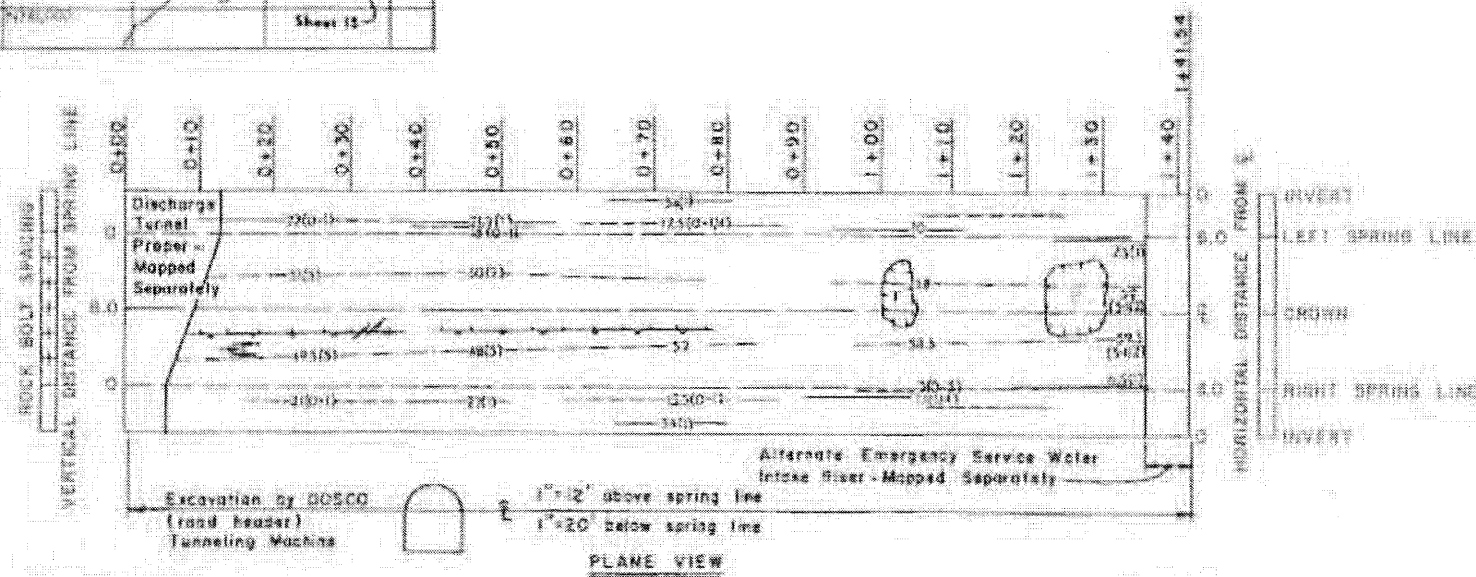
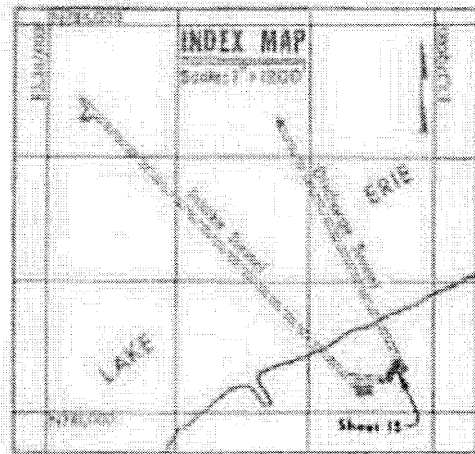
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (OVERBREAK NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

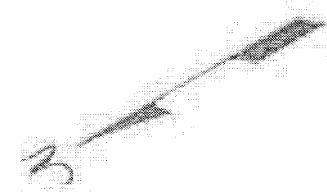
Geologic Map of Tunnel Excavations

Figure 2D-2 (Sheet 14 of 24)



2'	2'	2'	2'
re =			
3 rock bolts at 2' centers in steel ribs at 10'-11' centers, spanned by wire mesh.			
1/2"x2"	2"x2"	2"x2"	Approx. 1"-1 1/2" openings
3"x2"	Bedding fractures only, spaced as above		
Slight seepage from bedding parting along west wall			No inflows
Approx. 115' limestone 275' gravel fill 11.7' above		Approx. 215' limestone 275' gravel fill 112.7' above	

EXCAVATION ADDRESS:
ESTIMATED ROCK CONDITION (TERZAGHI NO.):
TEMPORARY SUPPORT SYSTEM:
BEDDING SPACING:
FRACTURE SPACING:
WATER CONDITION:
DEPTH OF COVER:



- SYMBOLS**
- HARD, TAN, BROWN, SHERTY IRON BED OR LAMINAR
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITH GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP
 - MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN

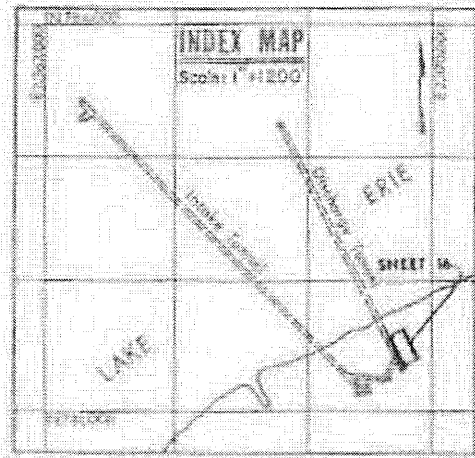
Notes:
Number(s) in parentheses indicates bed thickness.
Number preceding parenthesis indicates inches above or below spring line at station of measurement.

(Rev. 12 1/03)

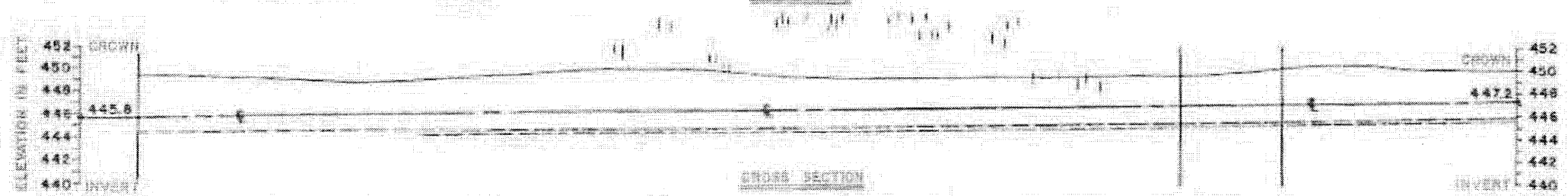
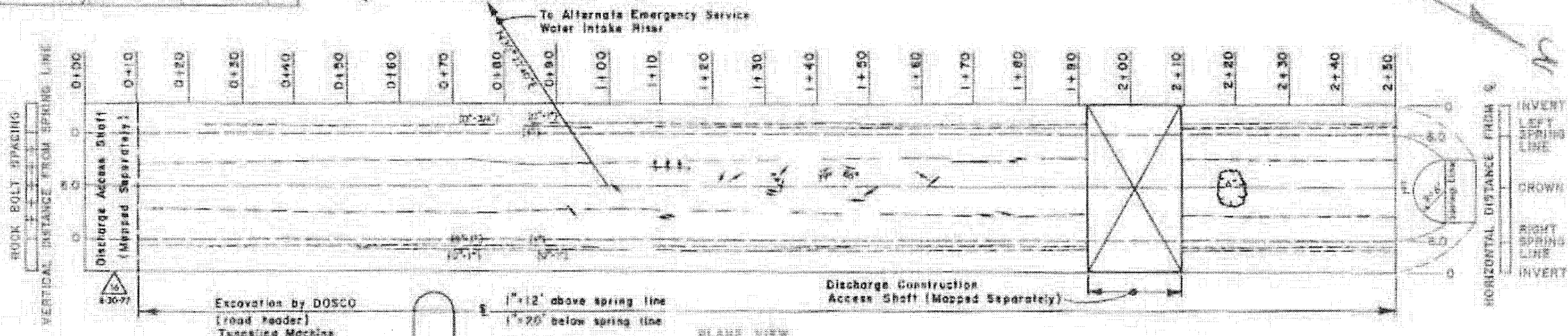
PERRY NUCLEAR POWER PLANT

Bedologic Map of
Tunnel Excavations

Figure 2D-2 (Sheet 15 of 24)



- SYMBOLS**
- 1 1/2" HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - 1 1/2" DISCONTINUOUS IRON BED
 - 1 1/2" HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - 1 1/2" DISCONTINUOUS IRON BED WITHIN GREY BED
 - 2" FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP
- MOISTURE ALONG BEDDING PARTING**
- SEEPAGE FROM FEATURE**
- OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN**
- METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE**
- * Note:**
 Number(s) in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line of station of measurement.



STATION	0+00	0+10	0+20	0+30	0+40	0+50	0+60	0+70	0+80	0+90	1+00	1+10	1+20	1+30	1+40	1+50	1+60	1+70	1+80	1+90	2+00	2+10	2+20	2+30	2+40	2+50
Excavation Progress																										
Estimated Rock Condition (Terzaghi No.)																										
Temporary Support System																										
Bedding Spacing																										
Fracture Spacing																										
Water Condition																										
Depth of Cover																										

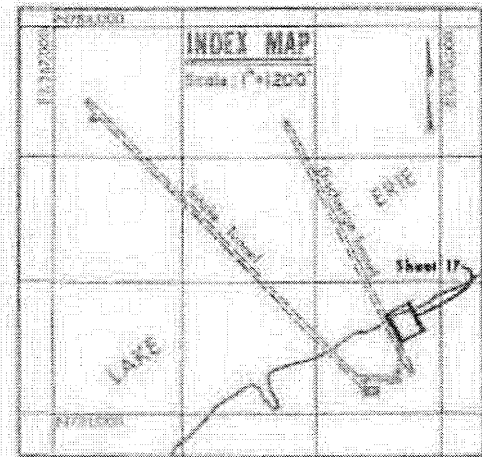
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/03)

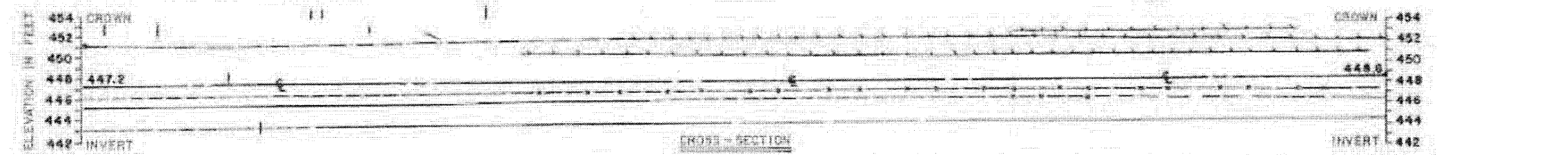
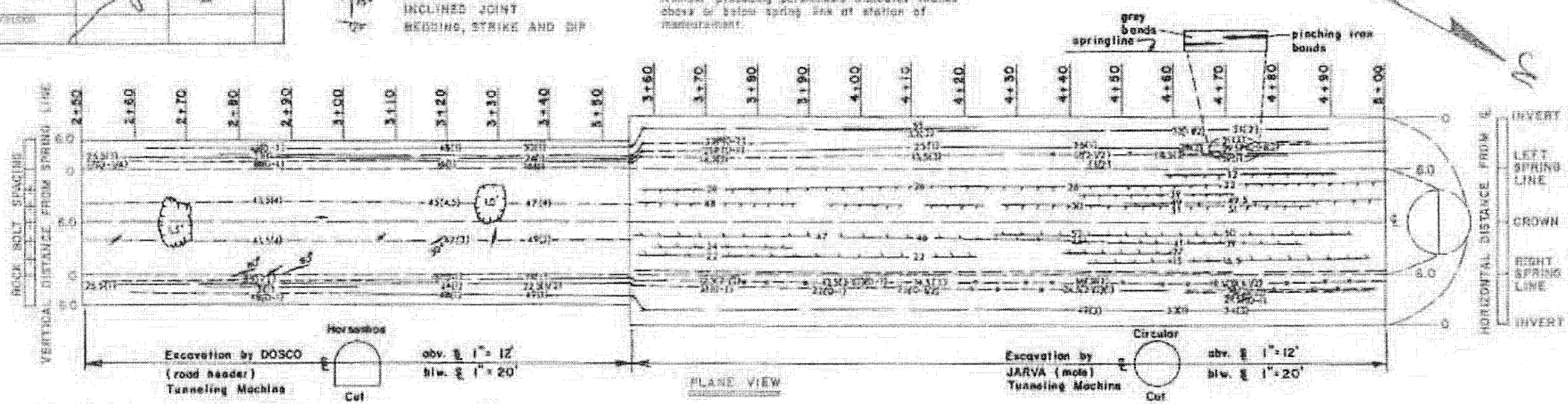
PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

Figure 20-2 (Sheet 15 of 24)



- SYMBOLS**
- 12(6-2)" HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - 12(1)" DISCONTINUOUS IRON BED
 - 12(1)" HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - 10(2-2)" DISCONTINUOUS IRON BED WITHIN GREY BED
 - ⚡ FRACTURE
 - FAULT
 - ⋯ BEDDING PARTING
 - | VERTICAL JOINT
 - / INCLINED JOINT
 - ↖ BEDDING, STRIKE AND DIP
- MOISTURE ALONG BEDDING PARTING**
- SEEPAGE FROM FEATURE**
- OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN**
- Note:**
 Number(s) in parenthesis indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line at station of measurement.



No. 4					
5 inch bolts at 2' centers in steel ribs at 30'-35' centers, spanned by wire mesh					
1'-4"	1'-5"	1'-6"	1'-9"	1'-11"	2'-11"
Approx. 5'-10"	Approx. 8'	Approx. 11'	Jointing less apparent in smooth circular bore excavation		Bedding fractures only, spaced as above
No inflow					
Approx. 24' lagging & 14' glocal 141 11x8' shale				Approx. 1' of bench & 13' of shale	

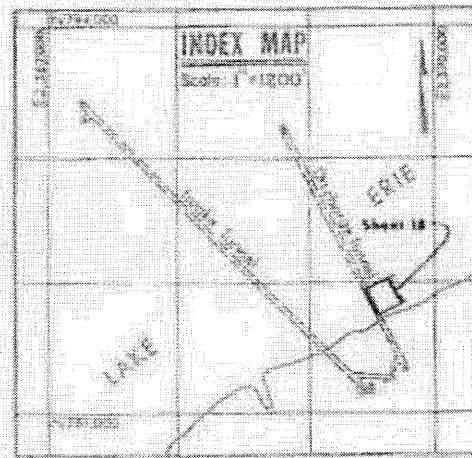
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12-1-03)

PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

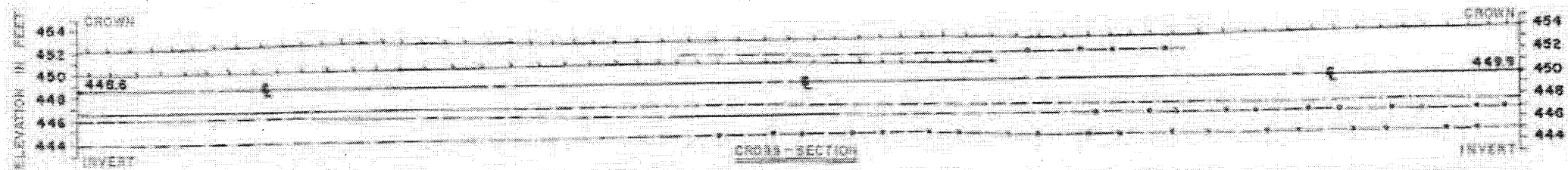
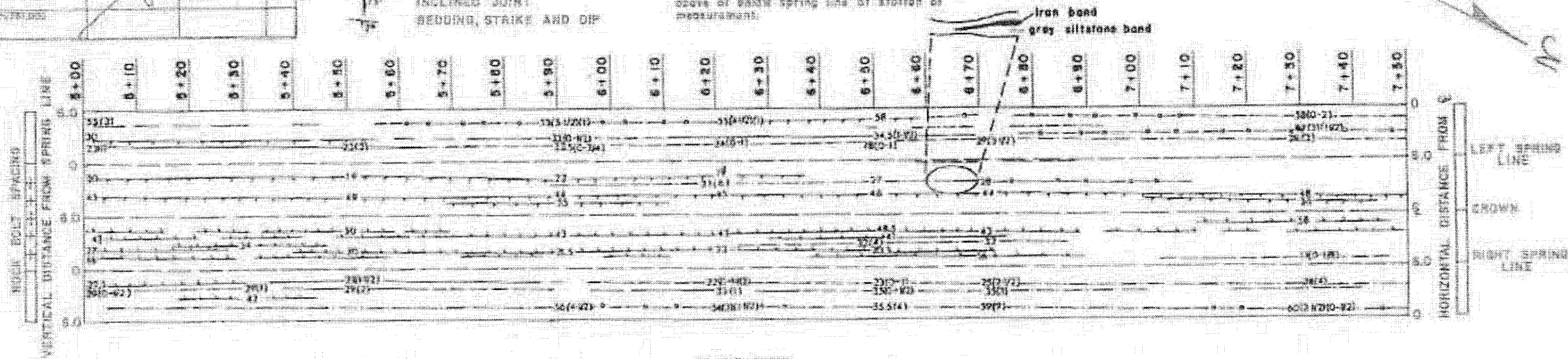
Figure 2D-2 (Sheet 17 of 24)



- SYMBOLS**
- HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP

- MOISTURE ALONG BEDDING PARTING
- SEEPAGE FROM FEATURE
- OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
- METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE

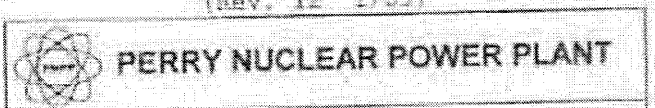
*Note: Numerical in parentheses indicates bed thickness. Number preceding parenthesis indicates inches above or below spring line at station of measurement.



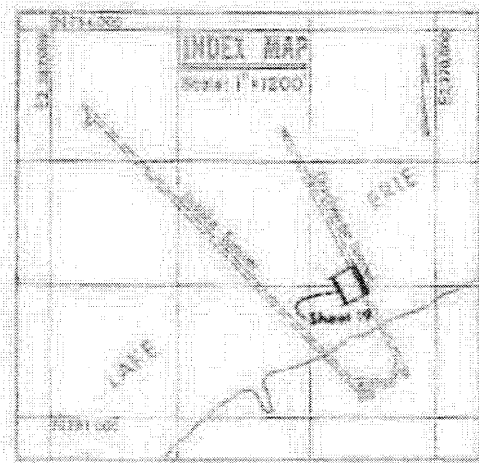
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Excavation Progress	No. 4												Steel ribs at 3.0' - 4.0' centers									
Estimated Rock Condition (Terzaghi No.)	3' - 11"												7' - 12"									
Temporary Support System	Bedding fractures only, spaced as above												Bedding fractures only, spaced as above									
Bedding Spacing	No inflows																					
Fracture Spacing																						
Water Condition																						
Depth of Cover													2.5' minimum + 1.0' subsurface (chase)									

- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/03)

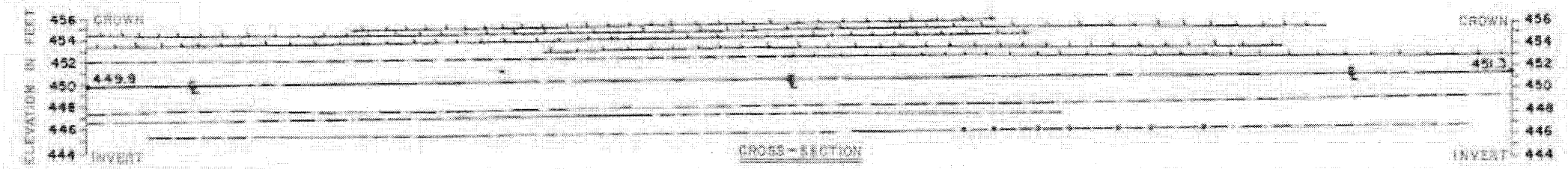
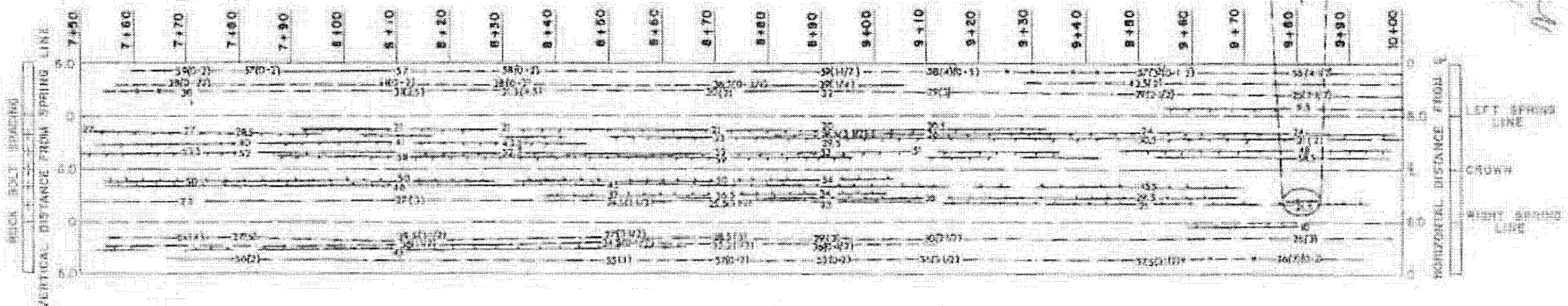


Geologic Map of Tunnel Excavations
Figure 2D-2 (Sheet 18 of 24)



- SYMBOLS**
- HARD, TAN, BROWN, CHERTY IRON BED OR LAMINAR
 - DISCONTINUOUS IRON BED
 - HARD LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING STRIKE AND DIP

- MOISTURE ALONG BEDDING PARTING
 - EEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERSREAK ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- NOTES:**
 Number(s) in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line at station of measurement.



No. 4	
stack bolts at 2' centers in steel ribs at 2'-6" centers, spanned by wire mesh	
4" x 12"	
Bedding fractures only, spaced as above	
No rillows	
4.5' max water 1 ft. 1" subsurface (hole)	7.5' max water 111.7" subsurface (hole)

- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/63)

PERRY NUCLEAR POWER PLANT

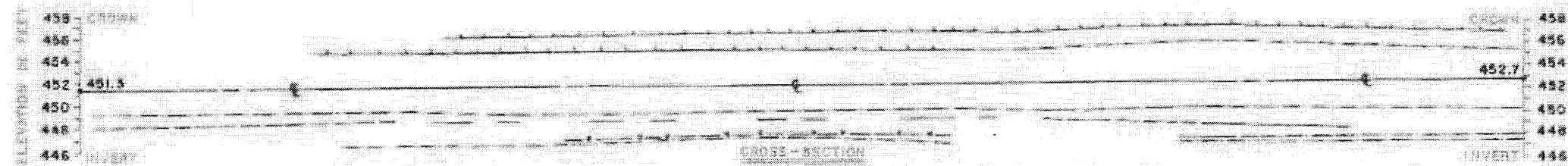
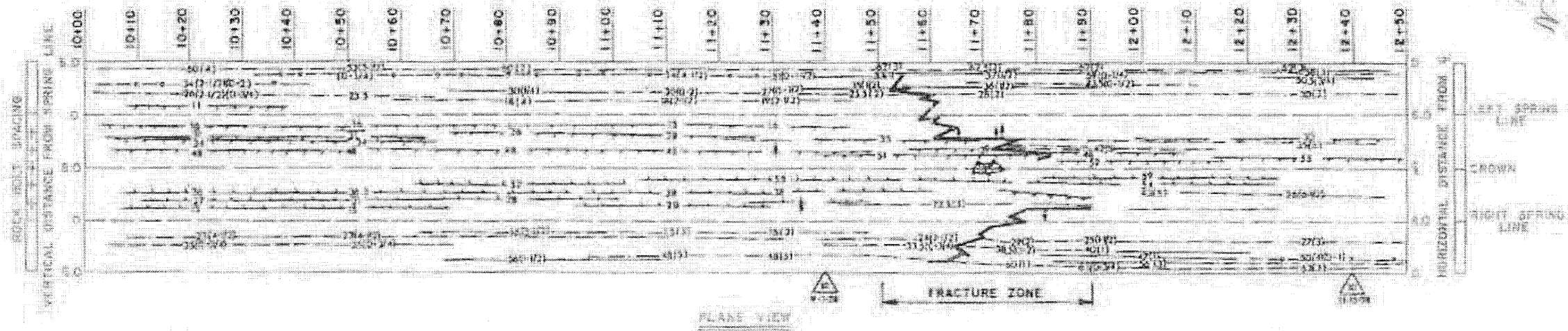
Geologic Map of
Tunnel Excavations

Figure 2D-2 (Sheet 19 of 24)



- SYMBOLS**
- HARD, TAN, BROWN, CERTY, IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING STRIKE AND DIP

- MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURES
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DEPTH OR OCCURRENCE
- Notes:**
 Numbers in parentheses indicate bed thickness.
 Number preceding parenthesis indicates inches above or below center line of station if applicable.



EXCAVATION PROGRESS ESTIMATED ROCK CONDITION (TERZAGHI NO.) TEMPORARY SUPPORT SYSTEM			
BEDDING SPACING FRACTURE SPACING WATER CONDITION DEPTH OF COVER			
Bedding fractures only, spaced as above No inflow		Zone of fractures in chevron pattern cutting excavation at low angle Seepage from rock bolts Seepage from bedding partings in fracture zone	
3 rock bolts at 2' centers in steel ribs at 4.0' A.S. centers, spanned by wire mesh		0.5' x 1.0' mesh back casting from crown	
3' x 10'		6' x 6'	
No inflow		No inflow	
7.5' water 111.7' subsidence (holes)		8.5' water 109.7' subsidence (holes)	

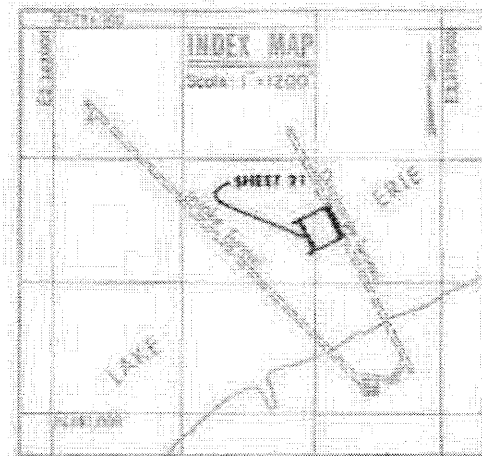
EXCAVATION PROGRESS
 ESTIMATED ROCK CONDITION (TERZAGHI NO.)
 TEMPORARY SUPPORT SYSTEM
 BEDDING SPACING
 FRACTURE SPACING
 WATER CONDITION
 DEPTH OF COVER

(Rev. 12-17-03)

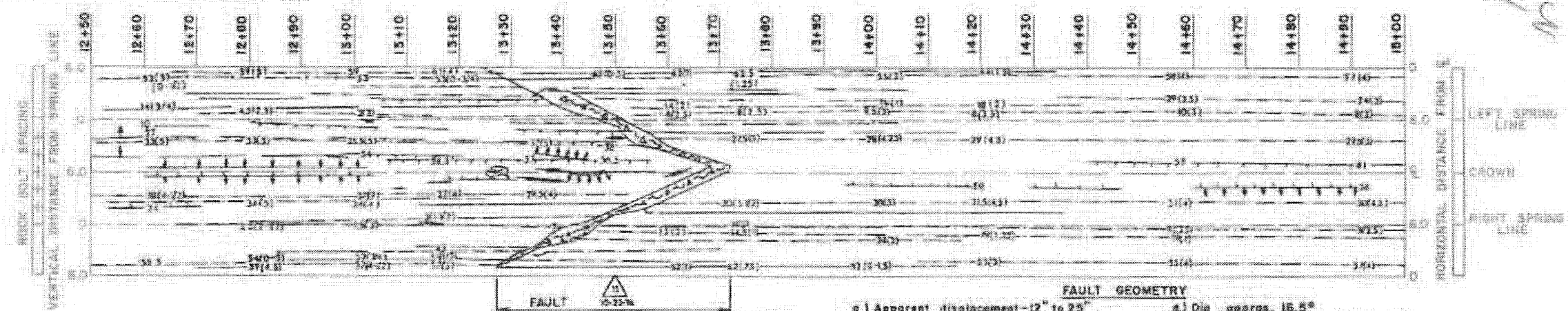
PERRY NUCLEAR POWER PLANT

Geologic Map of
 Tunnel Excavations

Figure 2D-2 (Sheet 20 of 24)

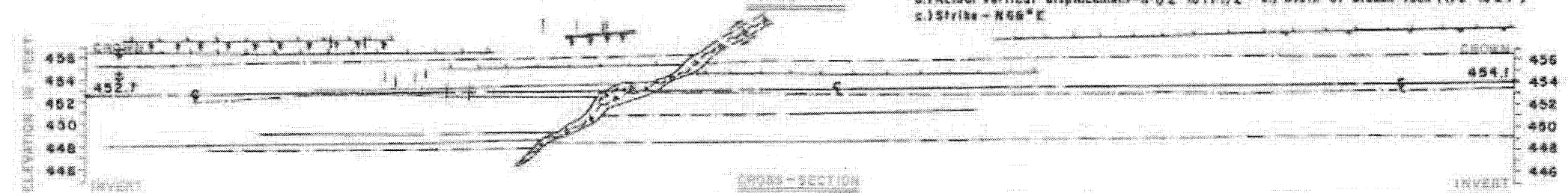


- SYMBOLS**
- $1\frac{1}{2}$ " HARD, TAN, BROWN, CHERTY, IRON BED OR LAMINAE
 - 12 1/2" DISCONTINUOUS IRON BED
 - 12 1/2" HARD LIGHT GREY SANDY SHALE TO SILTSTONE BED DISCONTINUOUS IRON BED WITH GREY BED
 - ↔ FRACTURE
 - ↔ FAULT (with sense of motion)
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING STRIKE AND DIP
 - MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - △ METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- Note:**
 Number(s) in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line of station of measurement.



FAULT GEOMETRY

a.) Apparent displacement - 12" to 25" d.) Dip approx. 15.5°
 b.) Actual vertical displacement - 8 1/2" to 11 1/2" e.) Width of broken rock (1/2" to 24")
 c.) Strike - N66°E



NO. 4	NO. 4-B	NO. 4
5 rock bolts at 2' centers in steel ribs at 3.5'-4' centers, spanned by wire mesh	Full shoring employed	5 rock bolts at 2' centers in steel ribs at 3.5'-4' centers spanned by wire mesh
Bedding fractures spaced as above, joints widely spaced	Bed at 2' centers	Bedding fractures only, spaced as above
Moist bedding fractures where indicated	Several minor inflows in fractured areas	Several dripping flows along shoring, two max. inflows of 0.1 gal./min. each
8.5' water 107.7' subsurface (shale)		14.5' water 101.9' subsurface (shale)

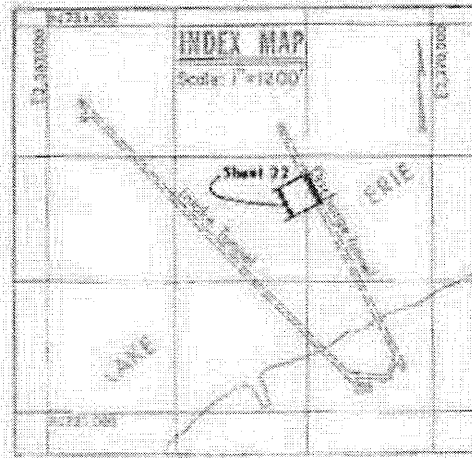
EXCAVATION PROGRESS
 ESTIMATED ROCK CONDITION (TERZAGHI NO.)
 TEMPORARY SUPPORT SYSTEM
 BEDDING SPACING
 FRACTURE SPACING
 WATER CONDITION
 DEPTH OF COVER

Rev. 12 1/03

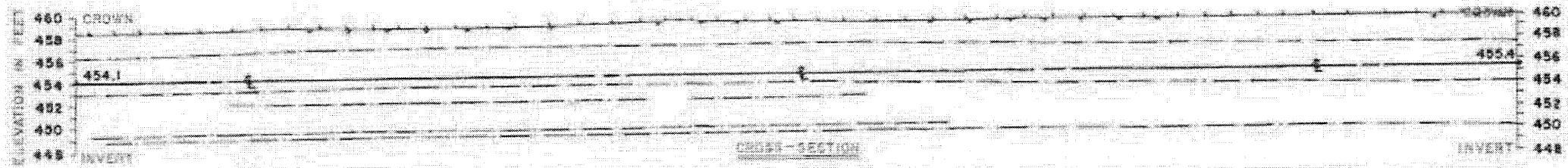
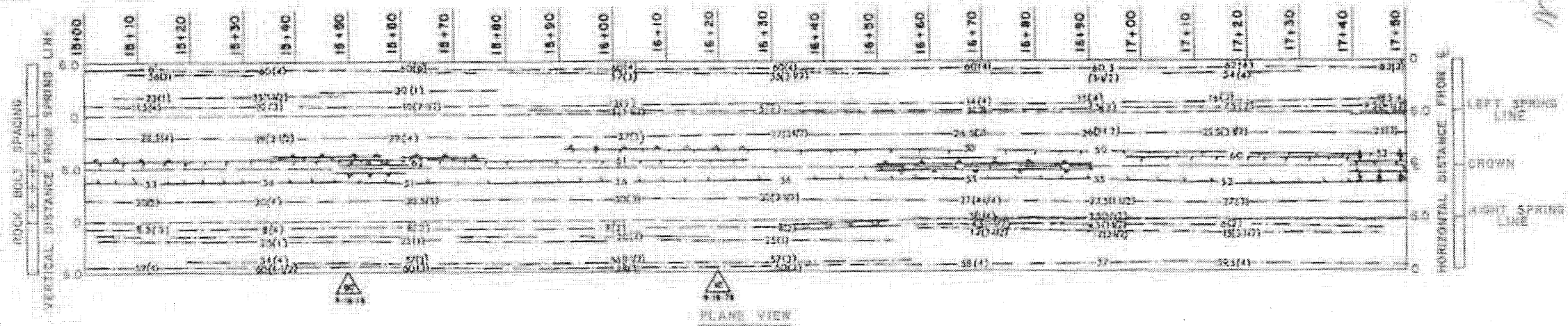
PERRY NUCLEAR POWER PLANT

Geologic Map of Tunnel Excavations

Figure 20-2 (Sheet 21 of 24)



- SYMBOLS**
- HARD, TAN, SHOWN, CERTY, IRON BED OR LAMINAR
 - DISCONTINUOUS IRON BED
 - HARD LIGHT GREY, SANDY SHALE TO SILTSTONE BED
 - DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT (with sense of motion)
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP
 - MOISTURE ALONG BEDDING PARTING
 - SEEPAGE FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
 - METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE
- NOTE:**
 Numerical in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line at station of measurement.



Slight overbreak along entire excavation (0"-6") ca. 4'			
3 rock bolts at 2' centers in steel ribs or 40"-42" centers spanned by wire mesh			
3'-9"	4'-2"	1'-10"	
Bedding fractures only, spaced as above			
Moisture from bedding parting	Moisture from bedding parting	Moisture from bedding parting	Moisture from bedding parting
+ 12.5" water		+ 11.5" water	
at 1.0' subsurface (shale)		at 1.0' subsurface (shale)	

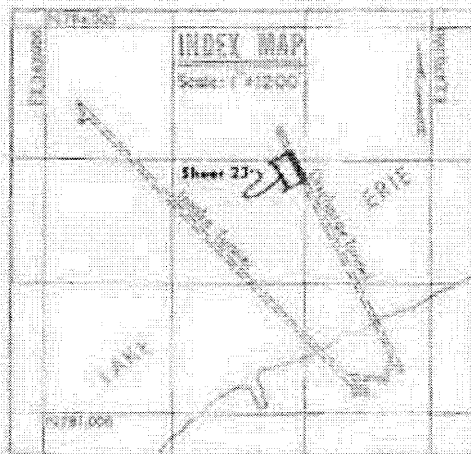
EXCAVATION PROGRESS
 ESTIMATED ROCK CONDITION (VERZASHI NO.)
 TEMPORARY SUPPORT SYSTEM
 BEDDING SPACING
 FRACTURE SPACING
 WATER CONDITION
 DEPTH OF COVER

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

Geologic Map of
 Tunnel Excavations

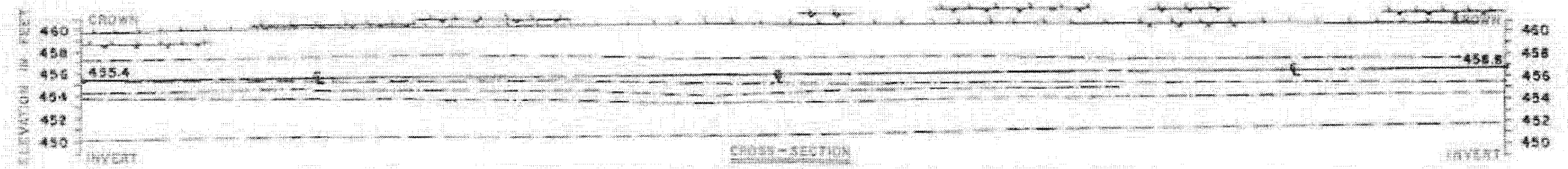
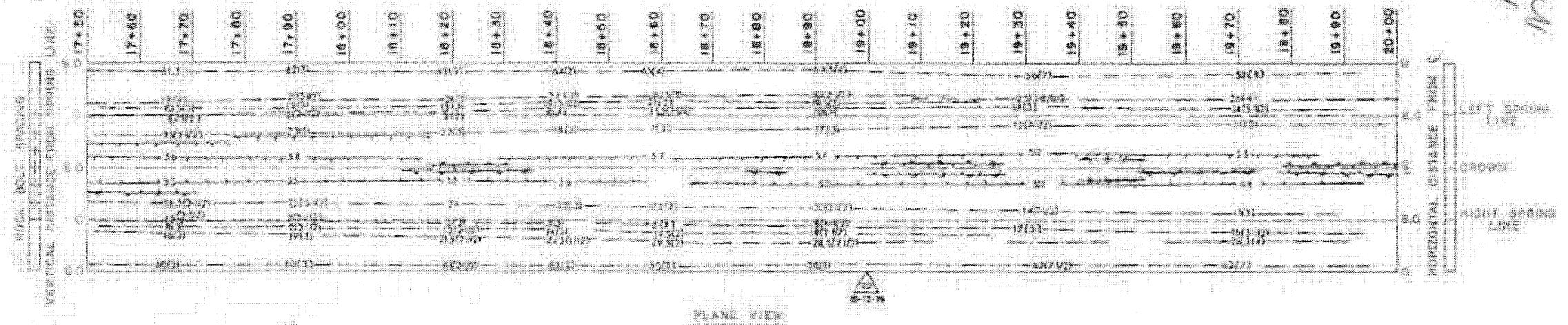
Figure 2D-2 (Sheet 22 of 24)



- SYMBOLS**
- HARD TAN, BROWN, CERTY, IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD LIGHT GREY SANDY SHALE OR SILTSTONE BED
 - DISCONTINUOUS IRON BED WITH GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING STAIRS AND DIP

- MOISTURE ALONG BEDDING PARTING
- SEEPAGE FROM FEATURE
- OVEREXCAVATION OR OVERBREAK ZONE, MAXIMUM AMOUNT SHOWN
- METHANE GAS, MAXIMUM PERCENT L.E.L. WITH DATE OF OCCURRENCE

Notes:
 Numbers in parentheses indicates bed thickness.
 Number preceding parenthesis indicates inches above or below spring line of station of measurement.



3 rows bolts at 2 centers or steel ribs at 20'-10" centers, covered by wire mesh			
1'-10"		4'-10"	
Moisture from bedding partings		Bedding fractures only, spaced as above	
Moisture from bedding partings		Moisture from bedding partings	
18.5' water		18.5' water	
19.2' (height of water table)		19.2' (height of water table)	

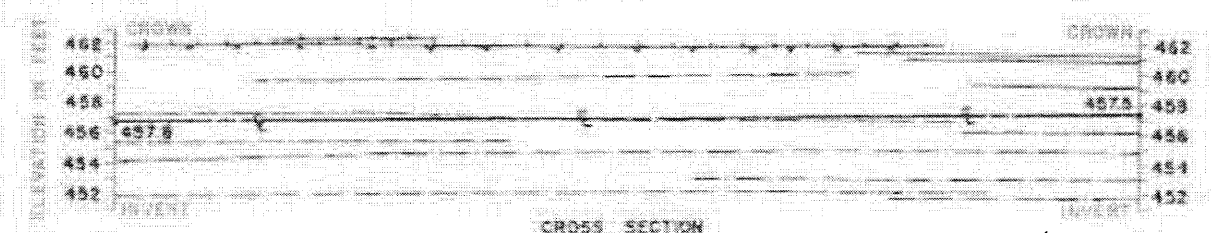
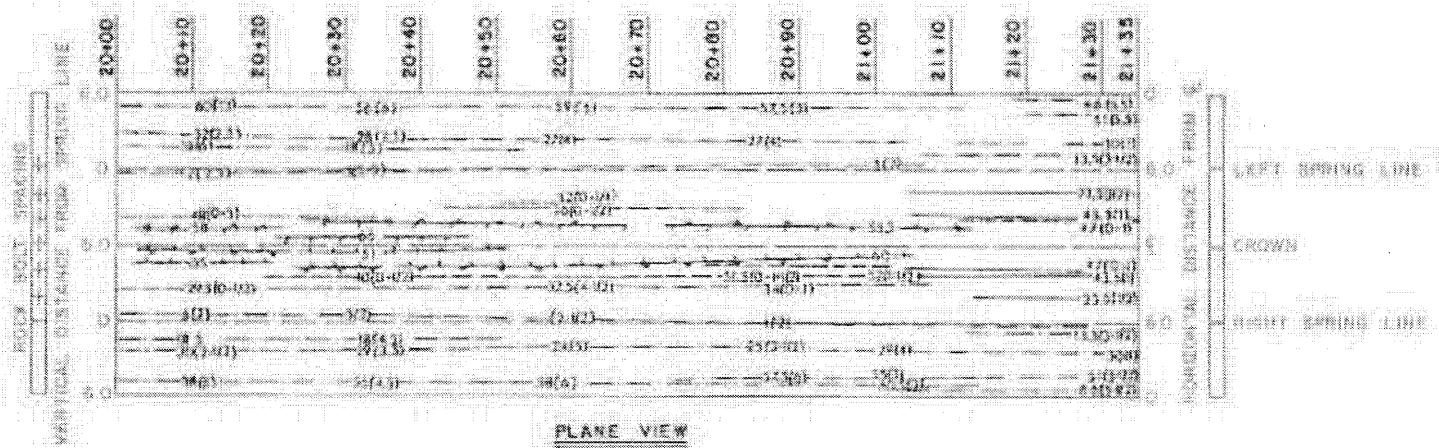
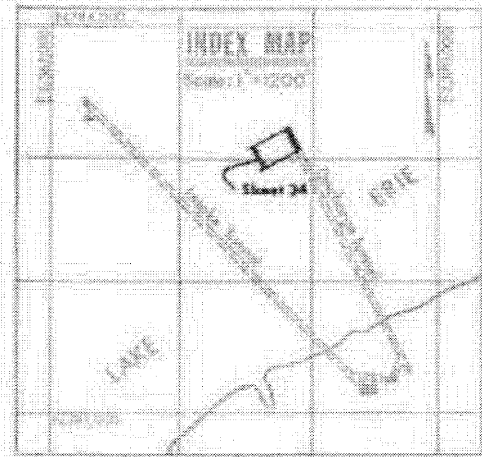
- EXCAVATION PROGRESS
- ESTIMATED ROCK CONDITION (TERZAGHI NO.)
- TEMPORARY SUPPORT SYSTEM
- BEDDING SPACING
- FRACTURE SPACING
- WATER CONDITION
- DEPTH OF COVER

(Rev. 12 1/03)

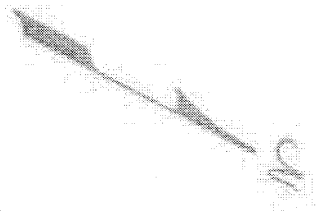
PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

Figure 2D-2 (Sheet 23 of 23)



<p>Excavation Progress</p> <p>ESTIMATED ROCK CONDITION (PERMANENT) NO. 1</p> <p>TEMPORARY SUPPORT SYSTEM</p> <p>BEDDING SPACING</p> <p>FRACTURE SPACING</p> <p>WATER CONDITION</p> <p>DEPTH OF COVER</p>	
<p>Slight overbreak along entire excavation (8'-1')</p>	
<p>1/2" rock bolts of 2" centers, in steel ribs at 4'-2' centers, spaced by wire mesh</p>	
<p>2'-1" Bedding partings only, spaced as above</p>	
<p>Slight moisture along bedding partings, where indicated</p>	
<p>18.5' water + 2.5' subsurface (shale)</p>	<p>2.5' water + 2.5' subsurface (shale)</p>



- SYMBOLS**
- HARD, TAN, BROWN, CHERTY IRON BED OR LAMINAE
 - DISCONTINUOUS IRON BED
 - HARD, LIGHT GREY, SANDY SHALE TO SILTY IRON BED
 - DISCONTINUOUS IRON BED WITHIN GREY BED
 - FRACTURE
 - FAULT
 - BEDDING PARTING
 - VERTICAL JOINT
 - INCLINED JOINT
 - BEDDING, STRIKE AND DIP
 - MOISTURE ALONG BEDDING PARTING
 - DEEPENING FROM FEATURE
 - OVEREXCAVATION OR OVERBREAK

Note:
 Number(s) in parentheses indicates bed thickness.
 Number preceding parenthesis indicates factor above or below spring line at station of measurement.

(Rev. 12 1/83)

PERRY NUCLEAR POWER PLANT

Geologic Map of
Tunnel Excavations

Figure 20-2 (Sheet 24 of 24)