M E M O R A N D U M **RSD-25-2003**

TO: Charles Allen, P.E.
T.E.B.M. for Pre-Construction
District 10, Jackson

cc: David Jones
Vaughn & Melton

FROM: William Broyles, P.E.
Geotechnical Engineering
Branch Manager
Division of Materials

BY: Christian Wallover
Geotechnical Branch

DATE: October 20, 2003

SUBJECT: Perry County
FD04 097 0015 016-021 049D
KY 15
Mars No. 4829101D
Item 10-269.02
Stations 14+00 to 230+00
Cut Slope Recommendations

A rock core inspection was held on October 15, 2003 at the Geotechnical Branch in Frankfort. Present at the meeting were Aaron Niehoff, Corbett Caudill, Chris Slone, Richard Wilson, and Christian Wallover from the Department. After reviewing the plans, cross sections and rock cores the group agreed to the following recommendations:

1/. Cut limits from station 14+00 to station 22+00.

A) Station 14+00 Right Side
Groundline to grade 2:1 Slope

The base of the rock disintegration zone extends 15.8 feet below groundline, 125 feet right of station 14+00.

B) Station 18+50 Right Side
Groundline to grade 3:1 Slope

The base of the rock disintegration zone exceeds 54 feet below groundline, 115 feet right of station 18+55.

2/. Cut limits from station 32+50 to station 37+50.

A)	Station 35+50	Left Side
	Groundline to elev. 1147	2:1 Slope
	Elev. 1147 to elev. 1128	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1128 to elev. 1092	1¾:1 Slope w/a 18' Intermediate Bench
	Elev. 1092 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 4 feet below groundline, 210 feet left of station 35+50; and 13.6 feet below groundline, 115 feet left of station 35+50.

3/. Cut limits from station 40+00 to station 41+50.

A)	Station 40+50	Left Side
	Groundline to grade	2:1 Slope

The base of the rock disintegration zone is estimated to be 10 feet below groundline, 80 feet left of station 40+50.

4/. Cut limits from station 42+50 to station 50+50.

A)	Station 43+50	Left and Right Side
	Groundline to grade	2:1 Slope

The base of the rock disintegration zone extends 19.7 feet below groundline, 70 feet right of station 43+50.

B)	Station 46+50	Left Side
	Groundline to elev. 1247	2:1 Slope
	Elev. 1247 to elev. 1236	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1236 to elev. 1192	½:1 Presplit Slope w/a 25' Intermediate Bench
	Elev. 1192 to elev. 1156	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1156 to elev. 1124	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1124 to grade	½:1 Presplit Slope

	Right Side
Groundline to elev. 1156	20' Intermediate Bench
Elev. 1156 to elev. 1124	½:1 Presplit Slope w/a
	20' Intermediate Bench
Elev. 1124 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 14.6 feet below groundline, 230 feet left of station 46+50; and 10.7 feet below groundline, 75 feet left of station 46+50.

5/. Cut limits from station 50+50 to station 56+50.

A)	Station 51+00	Left Side
	Groundline to grade	2½:1 Slope

The base of the rock disintegration zone extends 9.3 feet below groundline, 90 feet left of station 51+00.

B)	Station 53+00	Left Side
	Groundline to elev. 1240	2:1 Slope
	Elev. 1240 to elev. 1220	½:1 Presplit Slope w/a
		18' Intermediate Bench
	Elev. 1220 to elev. 1190	½:1 Presplit Slope w/a
		25' Intermediate Bench
	Elev. 1190 to elev. 1158	½:1 Presplit Slope w/a
		20' Intermediate Bench
	Elev. 1158 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 10.1 feet below groundline, 190 feet left of station 53+00; and 15.5 feet below groundline, 80 feet left of station 53+00.

6/. Cut limits from station 62+50 to station 76+00.

A)	Station 64+50	Left Side
	Groundline to elev. 1261	2:1 Slope
	Elev. 1261 to elev. 1254	½:1 Presplit Slope w/a
		20' Intermediate Bench
	Elev. 1254 to elev. 1231	½:1 Presplit Slope w/a
		18' Intermediate Bench
	Elev. 1231 to grade	¼:1 Presplit Slope

	Right Side
Groundline to elev. 1307	2:1 Slope
Elev. 1307 to elev. 1289	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1289 to elev. 1254	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1254 to elev. 1231	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1231 to grade	¼:1 Presplit Slope

The base of the rock disintegration zone extends 4.5 feet below groundline, 200 feet right of station 64+50; and 19.2 feet below groundline, 75 feet right of station 64+50.

B) Station 69+00

	Left Side
Groundline to elev. 1481	2:1 Slope
Elev. 1481 to elev. 1477	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1477 to elev. 1444	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1444 to elev. 1410	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1410 to elev. 1383	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1383 to elev. 1360	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1360 to elev. 1338	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1338 to elev. 1314	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1314 to elev. 1289	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1289 to elev. 1260	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1260 to elev. 1231	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1231 to grade	¼:1 Presplit Slope

	Right Side
Groundline to elev. 1382	2:1 Slope
Elev. 1382 to elev. 1360	¼:1 Presplit Slope w/a 18' Intermediate Bench

Elev. 1360 to elev. 1338	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1338 to elev. 1314	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1314 to elev. 1289	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1289 to elev. 1260	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1260 to elev. 1231	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1231 to grade	¼:1 Presplit Slope

The base of the rock disintegration zone extends 18.1 feet below groundline, 135 feet left of station 68+80.

B) Station 74+00 — Left Side

Groundline to elev. 1377	1:1 Slope
Elev. 1337 to elev. 1354	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1354 to elev. 1338	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1338 to elev. 1314	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1314 to elev. 1289	¼:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1289 to elev. 1268	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1268 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 6 feet below groundline, 295 feet left of station 74+12; and 6 feet below groundline, 85 feet left of station 74+00.

7/. Cut limits from station 86+50 to station 97+50.

A) Station 91+00 — Left Side

Groundline to elev. 1493	3:1 Slope
Elev. 1493 to elev. 1485	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1485 to elev. 1450	½:1 Presplit Slope w/a 20' Intermediate Bench

Elev. 1450 to elev. 1422	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1422 to elev. 1394	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1394 to elev. 1378	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1378 to elev. 1345	¼:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1345 to elev. 1321	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1321 to grade	¼:1 Presplit Slope

	Right Side
Groundline to elev. 1460	2:1 Slope
Elev. 1460 to elev. 1450	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1450 to elev. 1422	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1422 to elev. 1394	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1394 to elev. 1378	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1378 to elev. 1345	¼:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1345 to elev. 1321	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1321 to grade	¼:1 Presplit Slope

The base of the rock disintegration zone extends 30.7 feet below groundline, 75 feet left of station 91+00.

B)

Station 95+50	Left Side
Groundline to elev. 1384	1½:1 Slope
Elev. 1384 to elev. 1375	½:1 Presplit Slope w/a 15' Overburden Bench
Elev. 1375 to elev. 1345	¼:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1345 to elev. 1321	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1321 to grade	¼:1 Presplit Slope

	Right Side
Groundline to elev. 1383	1¾:1 Slope
Elev. 1383 to elev. 1375	½:1 Presplit Slope w/a 15' Overburden Bench
Elev. 1375 to elev. 1345	¼:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1345 to elev. 1321	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1321 to grade	¼:1 Presplit Slope

The base of the rock disintegration zone extends 6.3 feet below groundline, 220 feet left of station 95+50; and 15 feet below groundline, 70 feet left of station 95+50.

8/. Cut limits from station 100+50 to station 103+50.

A) Station 102+00 — Right Side

Groundline to existing highwall	3:1 Slope
Existing highwall to grade	3:1 Slope

The base of the rock disintegration zone extends 39.6 feet below groundline, 608.71 feet right of station 101+60.92; exceeds 60 feet below groundline, 401.2 feet right of station 101+99.48; exceeds 65 feet below groundline, 259.65 feet right of station 102+04.93; and exceeds 27 feet below groundline, 100 feet right of station 102+00.

9/. Cut limits from station 105+25 to station 108+75.

A) Station 107+00 — Right Side

Groundline to elev. 1426	1½:1 Slope
Elev. 1426 to elev. 1398	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1398 to elev. 1363	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1363 to elev. 1329	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1329 to elev. 1300	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1300 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 7 feet below groundline, 275 feet right of station 107+00; and is estimated to be 4 feet below groundline, 80 feet right of station 107+00.

10/. Cut limits from station 112+25 to station 116+75.

A)	Station 115+00	Right Side
	Groundline to elev. 1433	1½:1 Slope
	Elev. 1434 to elev. 1411	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1411 to elev. 1393	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1393 to elev. 1357	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1357 to elev. 1319	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1319 to elev. 1282	½:1 Presplit Slope w/a 20' Intermediate bench

The base of the rock disintegration zone extends 8 feet below groundline, 300 feet right of station 115+00; and 5 feet below groundline, 145 feet right of station 115+00.

11/. Cut limits from station 120+25 to station 121+50.

A)	Station 120+50	Right Side
	Groundline to elev. 1395	1½:1 Slope
	Elev. 1395 to elev. 1384	½:1 Presplit Slope w/a 15' Overburden Bench
	Elev. 1384 to elev. 1355	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1355 to elev. 1329	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1329 to elev. 1288	½:1 Presplit Slope w/a 20 Intermediate Bench
	Elev. 1288 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 5 feet below groundline, 235 feet right of station 120+50; and 6 feet below groundline, 100 feet right of station 120+50.

12/. Cut limits from station 126+00 to station 133+50.

A)	Station 128+50	Left Side
	Groundline to elev. 1342	Daylight Slope
	Elev. 1342 to elev. 1317	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1317 to elev. 1297	¼:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1297 to grade	½:1 Presplit Slope
		Right Side
	Groundline to elev. 1432	Daylight Slope
	Elev. 1432 to elev. 1408	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1408 to elev. 1375	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1375 to elev. 1343	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1343 to elev. 1317	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1317 to elev. 1297	¼:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1297 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends zero feet below groundline, 150 feet right of station 128+50; and 6 feet below groundline, 80 feet left of station 128+50.

B)	Station 133+00	Left Side
	Groundline to elev. 1331	1½:1 Slope
	Elev. 1331 to elev. 1317	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1317 to elev. 1292	¼:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1292 to grade	½:1 Presplit Slope
		Right Side
	Groundline to elev. 1331	2:1 Slope
	Elev. 1331 to elev. 1317	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1317 to elev. 1292	¼:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1292 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 5 feet below groundline, 100 feet right of station 133+00.

13/. Cut limits from station 148+50 to station 150+00.

A)	Station 149+00	Left and Right Side
	Groundline to grade	3:1 Slope

The base of the rock disintegration zone extends 25.7 feet below groundline, 100 feet left of station 149+00.

14/. Cut limits from station 152+00 to station 162+00.

A)	Station 157+50	Left Side
	Groundline to grade	2:1 Slope
		Right Side
	Groundline to elev. 1290	1½:1 Slope w/a 20' Intermediate Bench
	Elev. 1290 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 6.3 feet below groundline, 280 feet right of station 157+50; and 15.7 feet below groundline, 100 feet right of station 157+50.

15/. Cut limits from station 162+00 to station 183+00.

A)	Station 166+00	Right Side
	Groundline to Existing Highwall	1¼:1 Slope
	Existing Highwall to grade	3:1 Slope

The base of the rock disintegration zone extends 6.4 feet below groundline, 320 feet right of station 166+00; and 55 feet below groundline, 110 feet right of station 166+00.

B)	Station 171+00	Right Side
	Groundline to elev. 1353	2:1 Slope
	Elev. 1353 to elev. 1347	½:1 Presplit Slope w/a 15' Overburden Bench

Elev. 1347 to elev. 1310	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1310 to elev. 1286	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1286 to elev. 1265	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1265 to elev. 1233	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1233 to elev. 1209	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1209 to elev. 1184	½:1 Presplit Slope w/a 5' Intermediate Bench
Elev. 1184 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 6.7 feet below groundline, 280 feet right of station 171+70; and 34.8 feet below groundline, 90 feet right of station 171+00.

C)	Station 176+00	Right Side
	Groundline to elev. 1209	3:1 Slope w/a 18' Intermediate Bench
	Elev. 1209 to elev. 1184	½:1 Presplit Slope w/a 25' Intermediate Bench
	Elev. 1184 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 43.5 feet below groundline, 190 feet right of station 176+00; and 10 feet below groundline, 80 feet right of station 176+00.

D)	Station 181+00	Right Side
	Groundline to elev. 1209	3:1 Slope w/a 18' Intermediate Bench
	Elev. 1209 to elev. 1184	½:1 Presplit Slope w/a 25' Intermediate Bench
	Elev. 1184 to elev. 1155	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1155 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 18.4 feet below groundline, 190 feet right of station 181+00; and 7 feet below groundline, 40 feet right of station 181+00.

16/. Cut limits from station 189+00 to station 191+50.

A)	Station 190+00	Left Side
	Groundline to elev. 1129	1½:1 Slope
	Elev. 1129 to elev. 1101	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1101 to grade	1½:1 Slope

The base of the rock disintegration zone extends 9.8 feet below groundline, 100 feet left of station 190+00.

17/. Cut limits from station 199+00 to station 219+00.

A)	Station 202+00	Left Side
	Groundline to elev. 1104	20' Intermediate Bench
	Elev. 1104 to grade	½:1 Presplit Slope
		Right Side
	Groundline to elev. 1184	2:1 Slope
	Elev. 1184 to elev. 1178	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1178 to elev. 1142	½:1 Presplit Slope w/a 20'Intermediate Bench
	Elev. 1142 to elev. 1104	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1104 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 10 feet below groundline, 380 feet right of station 202+00; 9 feet below groundline, 255 feet right of station 202+00; and 19.4 feet below groundline, 80 feet right of station 202+00.

		Southwest Ramp
B)	**Station 9+12.30**	Left Side
	Groundline to elev. 1087	2:1 Slope w/a 15' Overburden Bench
	Elev. 1087 to elev. 1053	½:1 Presplit Slope w/a 20' Intermediate Bench
	Elev. 1053 to grade	½:1 Presplit Slope

	Right Side
Elev. 1090	Daylight Slope
Elev. 1090 to elev. 1053	½:1 Presplit Slope w/a 20' Intermediate Bench
Elev. 1053 to grade	½:1 Presplit Slope
	Mainline
Station 207+00	Left Side
Elev. 1090	Daylight Slope
Elev. 1090 to grade	½:1 Presplit Slope
	Right Side
Grade to Southeast Ramp	1½:1 Slope
	Southeast Ramp
Station 7+00.00	Left Side
Mainline ditch to grade	1½:1 Slope
	Right Side
Groundline to elev. 1080	1½:1 Presplit Slope w/a 15' Overburden Bench
Elev. 1080 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 7.5 feet below groundline, 100 feet left of station 207+00; and 20.7 feet below groundline, 50 feet right of station 0+00 of the Northeast Ramp.

C)

	Northwest Ramp
Station 3+90.12	Left Side
Groundline to elev. 1074	2:1 Slope
Elev. 1074 to grade	½:1 Presplit Slope
	Northeast Ramp
Station 3+92.72	Right Side
Groundline to elev. 1210	1¾:1 Slope
Elev. 1210 to elev. 1195	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1195 to elev. 1168	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1168 to elev. 1147	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1147 to elev. 1117	½:1 Presplit Slope w/a 18' Intermediate Bench

Elev. 1117 to elev. 1090	½:1 Presplit Slope w/a 18' Intermediate Bench
Elev. 1090 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 7 feet below groundline, 230 feet right of station 212+00; 26 feet below groundline, 80 feet right of station 212+00; and 25.7 feet below groundline, 250 feet right of station 3+50 of the Northeast Ramp.

		Northeast Ramp
D)	**Station 8+26.38**	Right Side
	Groundline to elev. 1211	2:1 Slope
	Elev. 1211 to elev. 1195	½:1 Presplit Slope w/a 10' Overburden Bench
	Elev. 1195 to elev. 1062	Remove along the RDZ
	Elev. 1062 to elev. 1168	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1168 to elev. 1147	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1147 to elev. 1117	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1117 to elev. 1090	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1090 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 10.5 feet below groundline, 200 feet right of station 216+50 of mainline.

18/. Cut limits from station 224+50 to station 228+50.

A)	Station 226+50	Left Side
	Groundline to elev. 1099	2:1 Slope
	Elev. 1099 to elev. 1095	½:1 Presplit Slope w/a 15' Overburden Bench
	Elev. 1095 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 28 feet below groundline, 186 feet left of station 226+40; and is estimated to be 3 feet below groundline, 80 feet left of station 226+50.

Approach @ Station 28+99

19/. Cut limits from station 0+50 to station 3+00.

A)	Station 1+00	Left Side
	Groundline to elev. 1060	2:1 Slope
	Elev. 1060 to elev. 1050	½:1 Presplit Slope w/a 15' Overburden Bench
	Elev. 1050 to grade	½:1 Presplit Slope w/a 14' Road Side Ditch Bench

The base of the rock disintegration zone extends 17.4 feet below groundline, 55 feet left of station 1+00.

B)	Station 2+00	Left Side
	Groundline to elev. 1080	3:1 Slope
	Elev. 1080 to elev. 1069	½:1 Presplit Slope w/a 18' Intermediate Bench
	Elev. 1069 to grade	½:1 Presplit Slope w/a 14' Road Side Ditch Bench
		Right Side
	Groundline to grade	Daylight Slope

The base of the rock disintegration zone extends 17.5 feet below groundline, 50 feet left of station 2+00.

Approach @ Station 31+26

20/. Cut limits from station 0+50 to station 4+74.

A)	Station 4+00	Left Side
	Groundline to grade	2:1 Slope
		Right Side
	Groundline to elev. 1069	3:1 Slope
	Elev. 1069 to grade	2:1 Slope

The base of the rock disintegration zone extends 28.2 feet below groundline, 120 feet left of station 4+00; and 10.5 feet below groundline, 24 feet left of station 4+00.

Approach @ Station 86+21

21/. Cut limits from station 0+50 to station 8+00.

A)	Station 4+50	Left Side
	Groundline to grade	3:1 Slope

The base of the rock disintegration zone exceeds 38 feet below groundline, 95 feet left of station 4+50; and 35 feet below groundline, 28 feet left of station 4+50.

Approach @ Station 152+03

22/. Cut limits from station 0+00 to station 5+00.

A)	Station 2+00	Right Side
	Groundline to existing highwall	1½:1 Slope
	Existing highwall to grade	3:1 Slope

The base of the rock disintegration zone exceeds 45.8 feet below groundline, 75 feet right of station 1+88; and exceeds 21 feet below groundline, 25 feet right of station 2+00.

South West Ramp

23/. Cut limits from station 0+00 to station 12+00.

A)	Station 10+00	Left Side
	Groundline to elev. 1093	2:1 Slope w/a
		18' Intermediate Bench
	Elev. 1093 to elev. 1053	½:1 Presplit Slope w/a
		20' Intermediate Bench
	Elev. 1053 to grade	½:1 Presplit Slope
		Right Side
	Groundline to elev. 1073	2:1 Slope
	Elev. 1073 to elev. 1053	½:1 Presplit Slope w/a
		20' Intermediate Bench
	Elev. 1053 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 15 feet below groundline, 50 feet left of station 10+00.

Interchange Approach

24/. Cut limits from station 5+00 to station 13+00.

A)	Station 6+50	Left Side
	Groundline to grade	2:1 Slope
		Right Side
	Groundline to elev. 1056	1¼:1 Slope
	Elev. 1056 to elev. 1038	½:1 Presplit Slope w/a 15' Overburden Bench
	Elev. 1038 to grade	½:1 Presplit Slope

The base of the rock disintegration zone extends 14 feet below groundline, 9 feet right of station 6+28.

The rock swell for this project is estimated to be 10 percent

Attached is a reduced copy of the cut slope configurations for the subject project with the lithologic divisions drawn on them. The lithologic divisions are drawn in blue on the cut sections and are to be used to calculate the select rock quantities. The abbreviations are as follows:

Sandstone...SS
Non Durable Sandstone...NON-SS
Durable Shale...DS
Non Durable Shale Class I...NDSCL-I
Non Durable Shale Class II...NDSCL-II
Non Durable Shale Class III...NDSCL-III
Unclassified Excavation...Common

If there are any questions, please advise.

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 5+00 to 13+00
A-9-A
Core Log Sta. 6+28, 9' Rt.
Elev. 1039.6-1028.9 Overburden
1028.9-1027.1 Talus
1027.1-1007.9 Shale : brown to gray, silty w/occasionally sandy partings

A-9-A

Com

RQD REC
0 89
0 86
0 100
0 7 98

N=4
N=11
SDI(JS) 89 (4)
98 (4)
90 (5)
80 (4)

NOSCL-I

Siltstone below 31.0

RDZ=14.0

2:1

1/4:1

Interpolated Base of RDZ

1056

1/2:1

15' OB

1038

1/2:1

6+50

1100 1090 1080 1070 1060 1050 1040 1030 1020 1010 1000 990 980

150 100 50 0 50 100 150

SCALE = 10

DATE

APPROVED BY

CUT STABILITY SECTION
STA. 6+50, INTERCHANGE APPR.

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 0+00 to Sta. 5+00
A-6-B
Core Log Sta. 1+88, 75' Rt.
Elev. 1294.9-1285.6 Overburden
1285.6-1248.6 Sandstone & Shale boulders, gravel (Mine Spoil)

1:1/2:1

A-6-B

RQD	REC	
		N=15
0	11	
7	18	
6	30	
0	21	
0	19	

Lost Water @ 9.3

3:1

Approximate Location of Highwall

Shale below 45.8

RDZ=exceeds 45.8

Interpolated Base of RDZ

A-6-A

N=50+
N=10
N=50+
N=25

2/27/03 ▽
NR

Com

1350 1340 1330 1320 1310 1300 1290 1280 1270 1260 1250 1240

2+00

50 0 50 100 150 200 250

SCALE = 10

CUT STABILITY SECTION
STA. 2+00, APPR. STA. 152+03

DATE

APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 0+50 to Sta. 8+00

A-5-B

N=44
N=19
N=16
N=13
N=36
N=17
N=27

NR
Dry 4/16/03

A-5-A

N=7
N=7
N=50+
N=12
N=6
N=15
N=50+

R
Dry 4/16/03

3:1

Com

Interpolated Base of RDZ

1350
1340
1330
1320
1310
1300
1290
1280

200
150
100
50
0
4+50
50

SCALE = 10

DATE

APPROVED BY

CUT STABILITY SECTION
STA. 4+50, APPR. STA. 86+21

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

4+25
120' Lt.
OW

A-3-C

N=3
N=4
N=17
N=50+

4/16/03

3:1

R	RQD	REC
4	0	64
	0	89
	13	98
	31	99
	23	98

SDI(JS)
83 (1)
88 (3)
84 (4)
80 (4)

RDZ=28.2

Interpolated Base of RDZ

Com

A-3-A

RQD	REC	SDI(JS)
		95 (4)
20	88	97 (6)
0	100	96 (5)

2:1

RDZ=10.5

DS

2:1

Cut Limits from Sta. 0+50 to Sta. 4+74
A-3-A
Core Log Sta. 4+00, 24' Lt.
Elev. 1076.8-1068.6 Overburden
1068.6-1052.8 Shale : brown to gray, silty weathering above 11.4

A-3-C
Core Log Sta. 4+00, 120' Lt.
Elev. 1023.0-1097.5 Overburden
1097.5-1094.8 Talus
1094.8-1085.9 Shale : dark gray, silty to clayey, w/carbonaceous partings
1085.9-1079.5 Shale : gray, silty w/sandy laminations
1079.5-1077.5 Sandstone : brown to gray, fine grain, shale laminations (Durable)
1077.5-1076.0 Shale : dark gray, silty w/sandstone laminations
1076.0-1070.2 Sandstone : brown to gray, fine grain w/shale laminations, water stains, crossbedding (Durable)
1070.2-1069.2 Shale : dark gray, silty w/sandstone laminations
1069.2-1067.1 Sandstone : brown, fine grain, shale laminations, crossbedding (Durable)
1067.1-1062.1 Sandstone : brown, fine grain, water stained (Durable)

1120 1110 1100 1090 1080 1070 1060 1050 1040 1030 1020 1010 1000 990

200 150 100 50 0 50

4+00

SCALE = 10

CUT STABILITY SECTION
STA. 4+00, APPR. STA. 31+26

REVISED 01 DATE

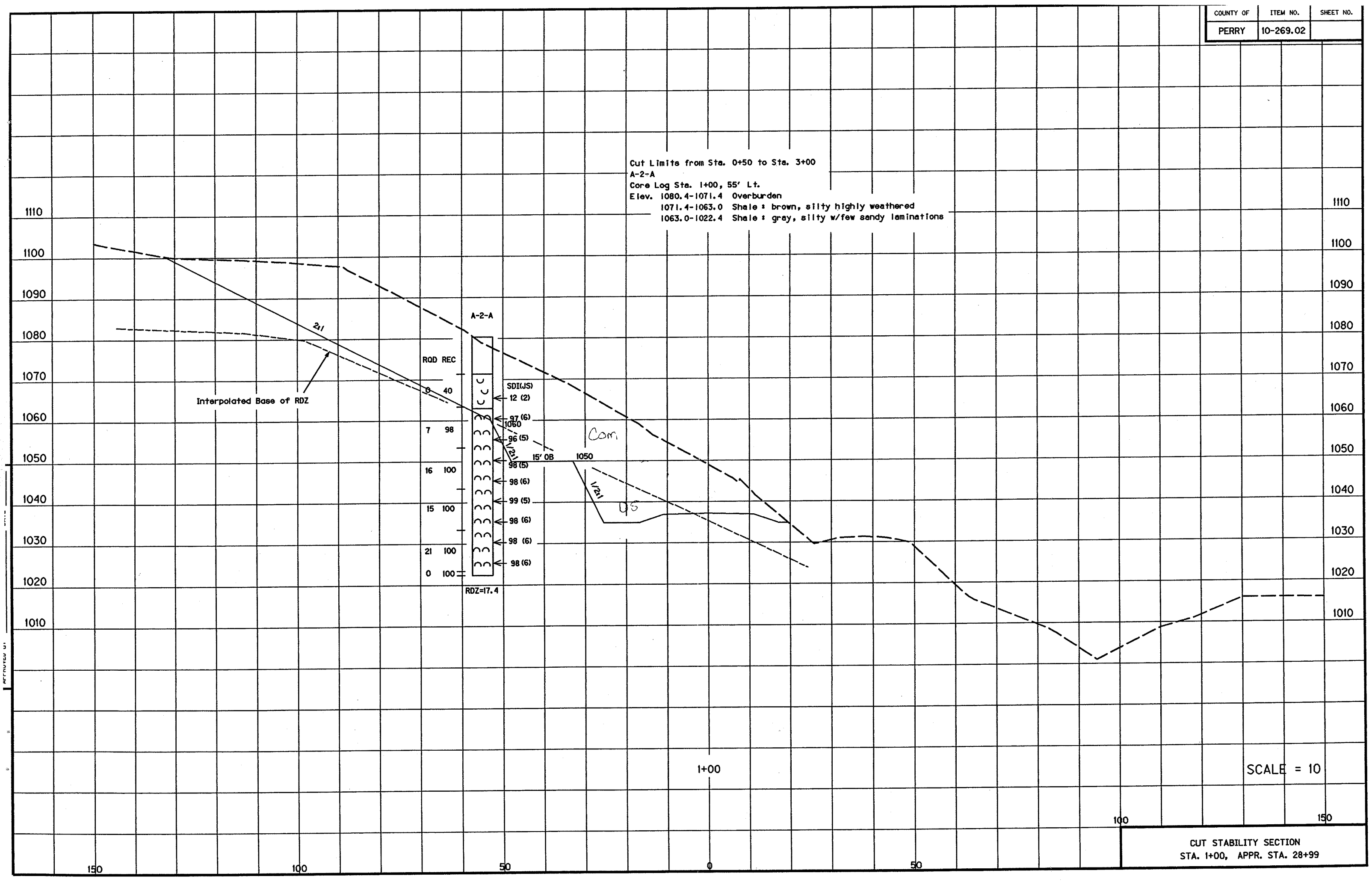
COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

A-2-B
Core Log Sta. 2+00, 50' Lt.
Elev. 1097.5-1082.8 Overburden
1082.8-1070.5 Shale : gray, silty to clayey, slightly weathered, slickensides throughout
1070.5-1068.5 Shale : gray, silty w/sandy laminations & zones
1068.5-1067.2 VOID
1067.2-1045.5 Shale : gray, silty w/sandy laminations & zones

A-2B-OW
A-2-B
3:1
4/16/03
N=22
N=47
R
RQD REC
1080
0 78
11 88
40 100
36 100
SDI(JS)
74 (3)
94 (5)
87 (5)
94 (6)
98 (6)
98 (6)
97 (6)
RDZ=17.5
Interpolated Base of RDZ
1/2:1
18' IB
1069
1/2:1
Com
NOSR-I
DS
Daylight
SCALE = 10
2+00
CUT STABILITY SECTION
STA. 2+00, APPR. STA. 28+99
DATE
APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 0+50 to Sta. 3+00
A-2-A
Core Log Sta. 1+00, 55' Lt.
Elev. 1080.4-1071.4 Overburden
1071.4-1063.0 Shale : brown, silty highly weathered
1063.0-1022.4 Shale : gray, silty w/few sandy laminations



CUT STABILITY SECTION
STA. 1+00, APPR. STA. 28+99

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

18-B
Core Log Sta. 226+40, 186' Lt.
Elev. 1136.1-1134.6 Overburden
1134.6-1115.7 Talus
1115.7-1104.9 Shale : brown to gray, silty to sandy w/sandstone laminations mostly weathered and fractured
1104.9-1098.7 Shale : gray, clayey to silty w/slickensides throughout
1098.7-1096.3 Shale : gray, silty to sandy
1096.3-1095.3 Sandstone : gray, fine grain, irregular shale laminations (Durable)
1095.3-1082.8 Sandstone : gray to brown, fine grain w/shale laminations, crossbedding shale above 41.5 (Durable)
1082.8-1073.4 Sandstone : brown, med. grain, water stained, crossbedding (Durable)

Cut Limits from Sta. 224+50 to Sta. 228+50
Open Face Log Sta. 216+50, Lt. Side
Elev. 1087-1061 Sandstone : brown, med. grain, thick to med. bedded (6'-1' thick) crossbedding (Durable)

18-B
226+40
186' Lt.

RQD	REC
0	38
32	88
0	49
0	100
0	100
0	77
31	97
56	100
81	100

RDZ=28.0

SDI(JS)
52 (2)
72 (4)
71 (3)
3 (2)

Numerous Vertical-50°
Water Stained Joints @ 20.4-31.2

Slickensides @ 32.3-37.4

Interpolated Base of RDZ

Vertical-80° Joints

1099
15' OB 1095
1095

V/2:1
V/2:1
V/2:1
SS

226+50

SCALE = 20

CUT STABILITY SECTION
STA. 226+50, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

17-G
Core Log Sta. 216+50, 200' Rt.

Elev.	1181.6-1176.7	Overburden
	1176.7-1171.1	Shale : brown, silty to clayey, w/sandstone partings, weathered
	1171.1-1168.3	Sandstone : gray, fine grain, crossbedding (Durable)
	1168.3-1153.5	Shale : gray to brown, silty to sandy w/sandstone partings & laminations
	1153.5-1147.2	Sandstone : brown, fine grain, cross bedding, water stained (Durable)
	1147.2-1132.1	Shale : gray, silty w/coal seam & slickensides
	1132.1-1117.4	Sandstone : brown, fine to med. grain, water stained, crossbedding (Durable)
	1117.4-1115.5	Coal Seam (Recovered 1.8')
	1115.5-1106.7	Shale : gray, silty to clayey w/slickensides throughout
	1106.7-1104.4	Coal Seam (Recovered 1.9')
	1104.4-1089.5	Shale : gray, silty to clayey w/slickensides throughout
	1089.5-1046.0	Sandstone : brown to gray, med. grain, occasionally shale laminations & coal spars, crossbedding, water staining (Durable)

Interpolated Base of RDZ

NOSCL-I 1147

NOSCL-II

SS 1117

NOSCL-III

Coal NOSCL-I 1090

SS

1/2:1

18' IB

17-G

RQD	REC	SDI(JS)
0	92	78 (3)
28	95	44 (4)
5	98	83 (5)
26	94	90 (4)
0	98	92 (4)
63	100	61 (3)
45	95	93 (5)
0	99	91 (5)
0	95	56 (4)
25	100	87 (4)
73	100	89 (3)
70	100	90 (5)
68	100	
50	100	

RDZ=10.5

2:1 1211

1/2:1 10' OB 1195

18' IB @ 1168
77° Water Stained
Joint @ 34.6-35.1
Coal Seam @ 36.2-36.6
Slickensides @ 36.6-37.7
68° W.S.J. @ 60.6-62.6
Lost Water @ 63.0
Slickensides @ 66.1-74.9

NORTHEAST RAMP STA. 8+26.38

216+50
KY 15 Mainline

SCALE = 20

CUT STABILITY SECTION STA. 216+50, KY 15 ML
NORTHWEST RAMP STA. 8+55.12
NORTHEAST RAMP STA. 8+26.38

DATE

APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

17-D
Core Log Sta. 212+00, 80' Rt.
Elev. 1193.2-1183.7 Overburden
1183.7-1167.8 Shale : brown, silty to sandy, occasionally sandstone zones, highly weathered & broken
1167.8-1159.7 Sandstone : brown, fine grain, water stained, broken & fractured above 26.8
1159.7-1144.3 Shale : gray to brown, silty w/sandy zones
1144.3-1142.8 Limestone : gray, fine crystalline
1142.8-1141.4 Sandstone : brown, fine grain, crossbedding (Durable)
1141.4-1138.2 Shale : brown to gray, silty, broken in zones
1138.2-1116.7 Sandstone : brown, fine grain, occasionally shale laminations, crossbedding, water stained, broken & rounded below 75.4 (Durable)
1116.7-1111.2 Shale : gray, silty w/slickensides, mostly broken
1111.2-1109.6 Coal Seam (Recovered 1.6')
1109.6-1095.4 Shale : gray, silty to sandy w/slickensides throughout
1195.4-1052.8 Sandstone : brown to gray, fine to med. grain, occasionally shale laminations & coal spars (Durable)

17-E
Core Log Sta. 212+00, 230' Rt.
Elev. 1210.1-1204.6 Overburden
1204.6-1198.3 Sandstone : brown, fine grain, w/shale laminations & partings crossbedding, water stained (Durable)
1198.3-1193.4 Shale : brown, sandy, water stained, weathered
1193.4-1191.7 Shale : (Siltstone) gray, sandy
1191.7-1186.1 Shale : brown to gray, silty to clayey
1186.1-1179.8 Coal Seam (Recovered 0.7')
1179.8-1174.6 Shale : dark gray to clayey, silty w/slickensides

A-7-B
NE Ramp
3+50
250' Rt.
1247.1

17-D
RQD REC: 0 74; 0 64; 0 95; 0 100; 6 93; 65 100; 31 100; 0 62; 0 100; 5 100; 63 100; 65 100; 55 100; 60 100; 76 100
SDI(JS): 47 (2); 73 (3); 20 (3); 97 (4); 77 (4); 70 (3); 66 (4); 95 (5); 21 (1); 51 (3); 47 (4); 74 (5)
RDZ=26.0

17-E
RQD REC: 10 88; 4 85; 0 32; 0 98
SDI(JS): 89(6); 59(5); 35(3)
RDZ=7.0

A-7-B
RQD REC: 0 100; 0 83; 0 86; 1210 10 97; 0 95
SDI(JS): 32 (1); 54 (2); 58 (1); 51(3); 61 (1); 83 (3); 82 (3); 93(5)
RDZ=25.7

Lost Water @ 23.5
68° Water Stained Joint @ 32.8-33.3
Coal Seam @ 34.2-34.9
80° Joint @ 36.3-37.4
83° W.S.J. w/secondary mineralization @ 49.1-49.9
83° W.S.J. @ 73.8-76.5
Slickensides @ 76.5-82.0 & 83.6-97.8
75° Joint @ 136.5-137.2
Conglomerate @ 135.9
84° Water Stained Joint @ 7.5-7.8 18' IB
75° W.S.J. @ 19.8-20.6
Slickensides @ 30.3-33.0
72° Water Stained Joint @ 43.5-44.0
Lost Water @ 45.5 Near Vertical
W.S.J. @ 46.0-46.5
Interpolated Base of RDZ
NON-SS
NOSCL-III
NOSCL-I
SS
Coal
1/2:1
2:1
1074
1195
1168
1147
1117
1090
18' IB
1 3/4:1

NORTHWEST RAMP STA. 3+90.12
212+00
KY 15 Mainline
NORTHEAST RAMP STA. 3+92.72

A-7-B
Core Log Sta. 3+50, 250' Rt.
Elev. 1247.1-1241.1 Overburden
1241.1-1224.1 Shale : brown, silty to sandy, broken & fractured, highly weathered
1224.1-1221.4 Coal Seam (Recovered 2.6')
1221.4-1203.6 Shale : gray to brown, silty w/slickensides
1203.6-1195.6 Sandstone : gray, fine grain, cross bedding, water stained (Non-Durable)

SCALE = 20

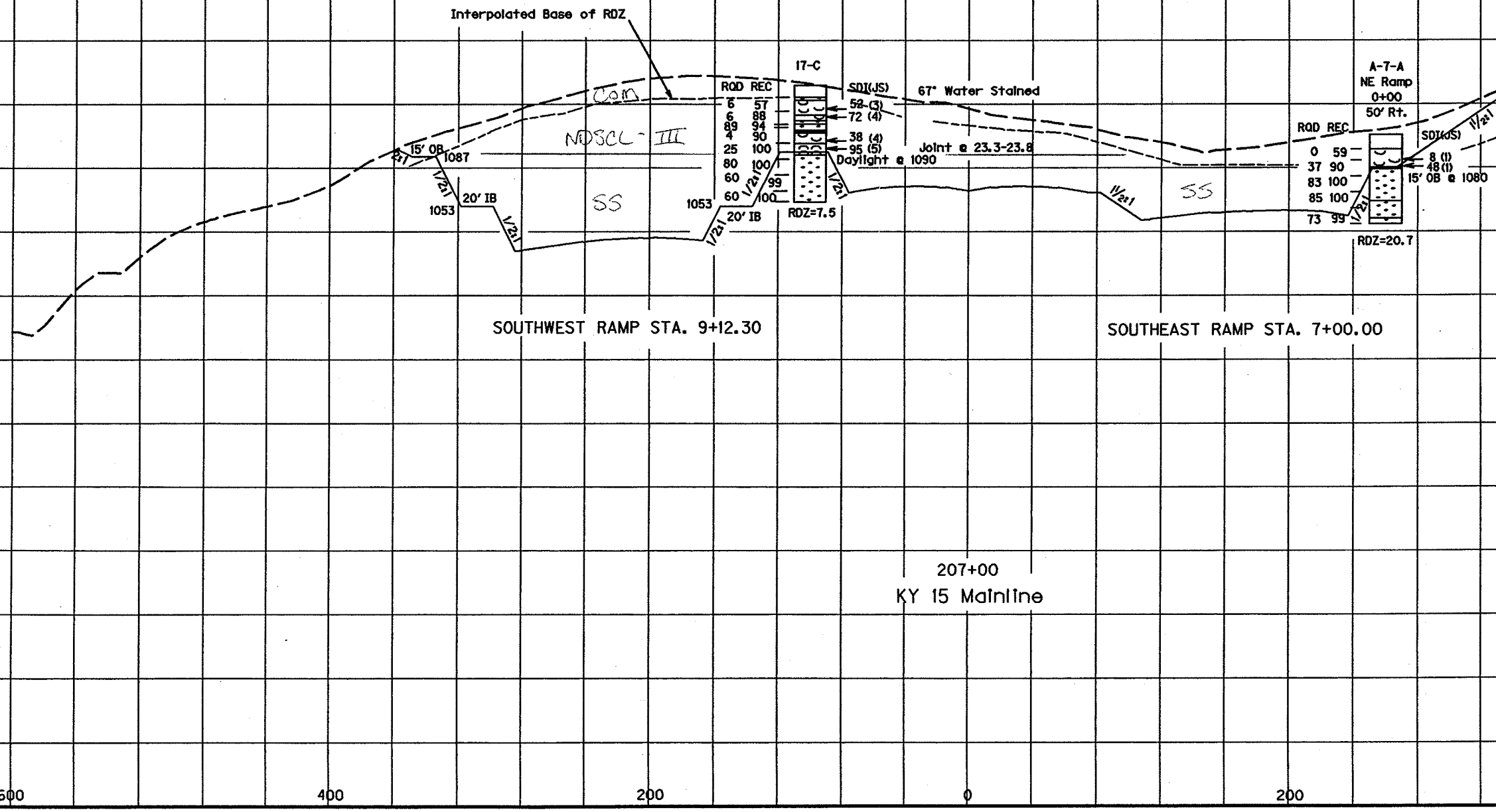
CUT STABILITY SECTION STA. 212+00, KY 15 ML
NORTHWEST RAMP STA. 3+90.12
NORTHEAST RAMP STA. 3+92.72

DATE
APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

17-C
Core Log Sta. 207+00, 100' Lt.
Elev. 1132.0-1124.5 Overburden
1124.5-1122.7 Sandstone : brown, fine to med. grain, water stained (Durable)
1122.7-1113.3 Shale : brown to gray, silty to sandy w/sandstone partings, weathered
1113.3-1109.8 Shale : dark gray, silty w/numerous sandstone laminations, carbonaceous
1109.8-1107.7 Sandstone : gray, to brown, fine to med. grain (Durable)
1107.7-1103.5 Sandstone : gray, fine grain, w/irregular shale laminations, crossbedding shale above 25.0 (Durable)
1103.5-1102.0 Coal Seam (Recovered 0.6')
1102.0-1095.3 Shale : gray, silty w/slickensides throughout
1095.3-1088.0 Shale : dark gray, silty to sandy w/limited sandstone laminations, weathered at base
1088.0-1059.0 Sandstone : brown to gray, med. grain w/shale laminations, coal spars, water stains, crossbedding, (Durable)

A-7-A
Core Log Sta. 0+00, 50' Rt.
Elev. 1100.8-1091.6 Overburden
1091.6-1080.1 Shale : brown to gray, silty to clayey, weathered
1080.1-1079.1 Shale : (Siltstone) gray w/sandy laminations
1079.1-1059.2 Sandstone : brown to gray, fine grain w/shale laminations coal spars, water stains (Durable)
1059.2-1048.2 Sandstone : gray, med. grain (Durable)
1048.2-1044.6 Sandstone : gray, fine grain, shale partings, coal spars (Durable)



SCALE = 40

CUT STABILITY SECTION STA. 207+00, KY 15 ML
SOUTHWEST RAMP STA. 9+12.30
SOUTHEAST RAMP STA. 7+00.00

DATE

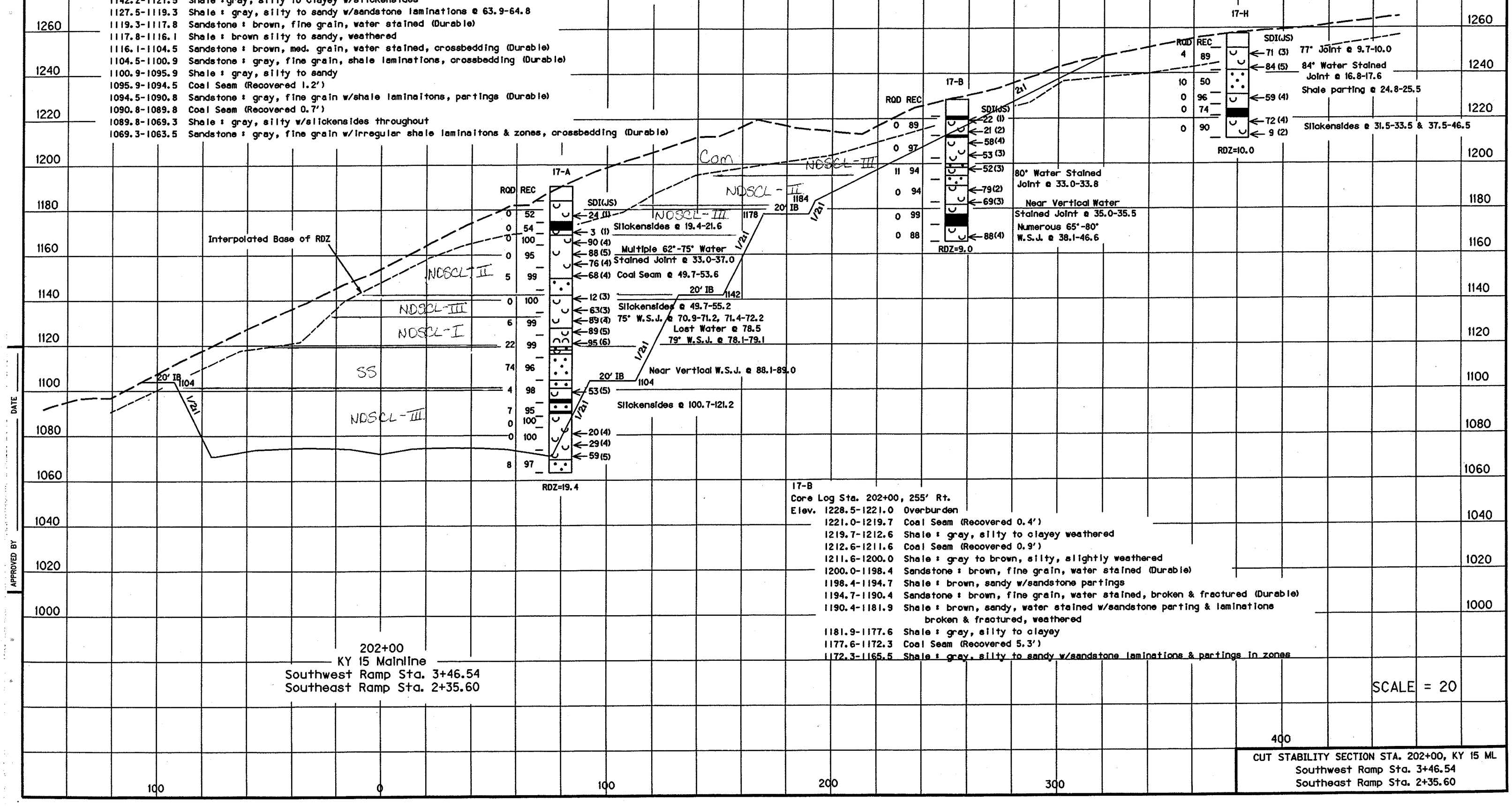
APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 199+00 to Sta. 219+00

17-A
Core Log Sta. 202+00, 80' Rt.
Elev. 1190.5-1184.0 Overburden
1184.0-1174.8 Shale : brown, silty to clayey, highly weathered, possible in filled verticle joints
1174.8-1171.1 Coal Seam (Recovered 1.4')
1171.1-1168.9 Shale : gray, silty to clayey w/slickensides throughout
1168.9-1149.7 Shale : brown to gray; silty to sandy w/sandstone laminations, partings & zones; broken, and fractured in zones
1149.7-1142.2 Sandstone : gray to brown, fine to very fine grain, shale laminations, water stains (Durable)
1142.2-1127.5 Shale : gray, silty to clayey w/slickensides
1127.5-1119.3 Shale : gray, silty to sandy w/sandstone laminations @ 63.9-64.8
1119.3-1117.8 Sandstone : brown, fine grain, water stained (Durable)
1117.8-1116.1 Shale : brown silty to sandy, weathered
1116.1-1104.5 Sandstone : brown, med. grain, water stained, crossbedding (Durable)
1104.5-1100.9 Sandstone : gray, fine grain, shale laminations, crossbedding (Durable)
1100.9-1095.9 Shale : gray, silty to sandy
1095.9-1094.5 Coal Seam (Recovered 1.2')
1094.5-1090.8 Sandstone : gray, fine grain w/shale laminaitons, partings (Durable)
1090.8-1089.8 Coal Seam (Recovered 0.7')
1089.8-1069.3 Shale : gray, silty w/slickensides throughout
1069.3-1063.5 Sandstone : gray, fine grain w/irregular shale laminaitons & zones, crossbedding (Durable)

17-H
Core Log Sta. 202+00, 380' Rt.
Elev. 1257.6-1251.1 Overburden
1251.1-1241.3 Shale : brown, silty to sandy w/sandstone laminations & partings, possible coal seam @ 7.8-8.5, weathered
1241.3-1230.6 Sandstone : brown to gray, fine grain, water stained (Durable)
1230.6-1224.0 Shale : brown to gray, sandy to silty w/slickensides
1224.0-1220.1 Coal Seam w/shale partings (Recovered 2.1')
1220.1-1211.1 Shale : dark gray, silty to clayey w/slickensides throughout



17-B
Core Log Sta. 202+00, 255' Rt.
Elev. 1228.5-1221.0 Overburden
1221.0-1219.7 Coal Seam (Recovered 0.4')
1219.7-1212.6 Shale : gray, silty to clayey weathered
1212.6-1211.6 Coal Seam (Recovered 0.9')
1211.6-1200.0 Shale : gray to brown, silty, slightly weathered
1200.0-1198.4 Sandstone : brown, fine grain, water stained (Durable)
1198.4-1194.7 Shale : brown, sandy w/sandstone partings
1194.7-1190.4 Sandstone : brown, fine grain, water stained, broken & fractured (Durable)
1190.4-1181.9 Shale : brown, sandy, water stained w/sandstone parting & laminations broken & fractured, weathered
1181.9-1177.6 Shale : gray, silty to clayey
1177.6-1172.3 Coal Seam (Recovered 5.3')
1172.3-1165.5 Shale : gray, silty to sandy w/sandstone laminations & partings in zones

202+00
KY 15 Mainline
Southwest Ramp Sta. 3+46.54
Southeast Ramp Sta. 2+35.60

SCALE = 20

CUT STABILITY SECTION STA. 202+00, KY 15 ML
Southwest Ramp Sta. 3+46.54
Southeast Ramp Sta. 2+35.60

DATE

APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 189+00 to Sta. 191+50

16-A

Core Log Sta. 190+00, 100' Lt.

Elev. 1129.1-1122.4 Overburden

1122.4-1119.7 Overburden w/boulders

1119.7-1101.4 Sandstone : brown, med. grain, water stained (Durable)

1101.4-1080.4 Shale : brown to gray, silty to clayey w/sandstone zone @ 41.1-42.0, highly weathered

Interpolated Base of RDZ

1V/2H

16-A

1129

RQD REC

61 70

66 100

53 100

14 96

0 100

0 84

0 88

0 100

0 67

SS

SDI(JS)

83° Water Stained Joint @ 7.0-7.5

Shale parting @ 10.5-11.1

Coal Seam @ 27.7-27.9

Lost Water @ 32.5

18' IB @ 1101

30 (1)

11 (2)

66 (5)

24 (3)

RDZ=9.8

NQSCL-III

1V/2H

1220

1200

1180

1160

1140

1120

1100

1080

1060

1040

1020

1000

300 200 100 0 100 200 300

190+00

SCALE = 20

CUT STABILITY SECTION
STA. 190+00, KY 15

DATE

APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

15-H
Core Log Sta. 181+00, 190' Rt.

Elev.		
1247.4-1240.9		Overburden
1240.9-1231.9		Sandstone : boulders <0.1' to 3.0 thick (Mine Spoil)
1231.9-1229.0		Coal Seam (Recovered 0.7')
1229.0-1209.0		Shale : gray, silty to clayey w/sandy zones & sandstone laminations, slickensides throughout, weathered
1209.9-1185.8		Shale : (Siltstone) brown to gray, sandy w/abundant sandstone laminations, partings & zones, water stains
1185.8-1183.8		Shale : gray, silty w/slickensides
1183.8-1177.9		Coal Seam (Recovered 4.4')
1177.9-1174.9		Shale : gray, silty w/slickensides
1174.9-1172.9		Sandstone : gray, very fine grain, w/shale laminations, crossbedding (Durable)
1172.9-1164.4		Shale : gray, silty w/slickensides

15-G
Core Log Sta. 181+00, 40' Rt.

Elev.		
1179.1-1173.9		Overburden
1173.9-1158.9		Shale : brown to gray, silty to clayey, broken & fractured zones, weathered
1158.9-1154.9		Sandstone : gray to brown, very fine grain, shale laminations, crossbedding water stains, broken zones (possible fracture) (Durable)
1154.9-1147.9		Shale : gray, silty to clayey, w/slickensides
1147.9-1145.2		Shale : gray, clayey w/slickensides throughout
1145.2-1141.7		Shale : gray, clayey to silty
1141.7-1129.3		Shale : (Siltstone) brown to gray, sandy, water stained, fractured
1129.3-1127.7		Shale : gray, silty to sandy
1127.7-1126.1		Coal Seam (Recoverd 1.3')
1126.1-1120.6		Shale : gray, silty to sandy w/slickensides
1120.6-1116.1		Sandstone : brown, med. grain, water stained (Durable)

Interpolated Base of RDZ

NOSCL-III
NOSCL-II
NOSCL-I
Core

1/2:1
3:1

15-G

ROD REC: 0 85 | 0 68 | 12 88 | 0 96 | 18 96 | 10 68 | 0 100 | 58 100

SDI(JS): 21 (2) | 23 (1) | 63 (1) | 35 (5) | 69 (4) | 92 (5) | 97 (4) | 83 (4)

RDZ=7.0

Numerous 48°-75° Water Stained Joint @ 5.2-20.2
Blocked off @ 20.2
Slickensides @ 26.1, 31.2-33.9
Coal Seam @ 26.2-26.4
87° Water Stained Joint @ 33.9-35.3
63°-Vertical W.S.J. @ 40.1-42.2
Lost Water @ 44.5
82° W.S.J. @ 44.9-49.0
72° W.S.J. @ 44.3-44.7, 49.3-49.5 & 49.7-50.0
Blocked off @ 53.0
Slickensides @ 53.0-54.7
82° W.S.J. @ 60.8-61.2

1209
25' IB
1184
18' IB
1155

15-H

ROD REC: 0 27 | 0 77 | 0 89 | 15 99 | 0 89 | 0 87 | 13 97 | 0 99

SDI(JS): 92 (5) | 9 (3) | 64 (2) | 64 (4) | 100 (5) | 96 (5) | 92 (4) | 98 (5) | 98 (5) | 28 (4) | 93 (5) | 92 (5)

RDZ=18.4

Near Vertical-78° Water Stained Joint In Filled w/clay @ 14.4-15.5
86° Joint @ 22.3-23.1
Coal Seam @ 23.6-23.7
45° W.S.J. @ 37.6
Vertical W.S.J. @ 43.8-44.4
Partial Water loss @ 45.5
75° W.S.J. @ 44.7-45.2
Coal Seam @ 63.3
Slickensides @ 72.5-73.2 & 63.0-63.6
80° W.S.J. 48.9-49.6
Lost Water @ 70.0
Conglomerate @ 82.8-83.0

NOTE : THE INTERMEDIATE BENCH @ ELEVATION 1155 TRANSITIONS FROM ZERO AT STATION 176+00 TO 18' @ STATION 177+50.

181+00

SCALE = 20

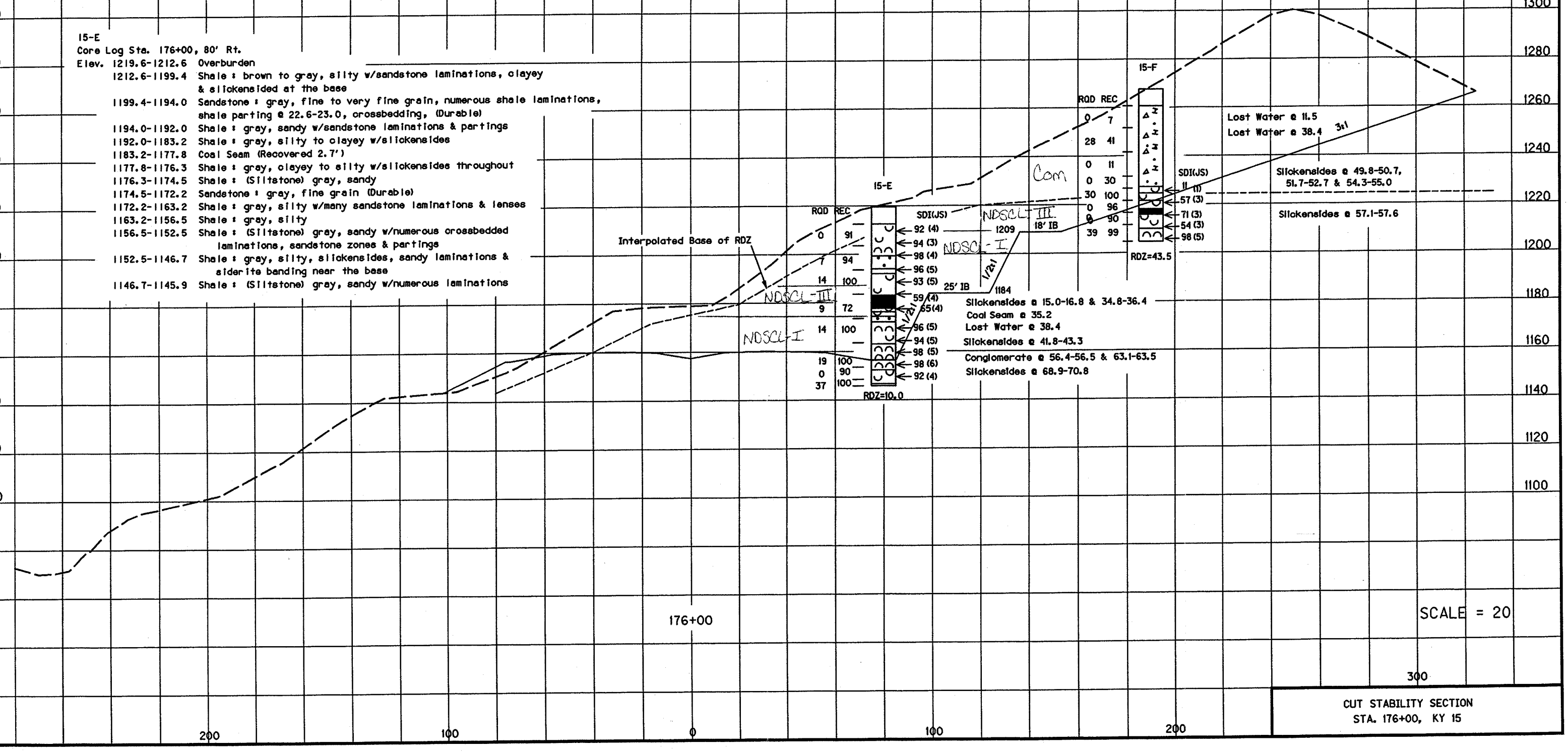
CUT STABILITY SECTION
STA. 181+00, KY 15

APPROVED BY _____ DATE _____

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

15-E
Core Log Sta. 176+00, 80' Rt.
Elev. 1219.6-1212.6 Overburden
1212.6-1199.4 Shale : brown to gray, silty w/sandstone laminations, clayey & slickensided at the base
1199.4-1194.0 Sandstone : gray, fine to very fine grain, numerous shale laminations, shale parting @ 22.6-23.0, crossbedding, (Durable)
1194.0-1192.0 Shale : gray, sandy w/sandstone laminations & partings
1192.0-1183.2 Shale : gray, silty to clayey w/slickensides
1183.2-1177.8 Coal Seam (Recovered 2.7')
1177.8-1176.3 Shale : gray, clayey to silty w/slickensides throughout
1176.3-1174.5 Shale : (Siltstone) gray, sandy
1174.5-1172.2 Sandstone : gray, fine grain (Durable)
1172.2-1163.2 Shale : gray, silty w/many sandstone laminations & lenses
1163.2-1156.5 Shale : gray, silty
1156.5-1152.5 Shale : (Siltstone) gray, sandy w/numerous crossbedded laminations, sandstone zones & partings
1152.5-1146.7 Shale : gray, silty, slickensides, sandy laminations & siderite banding near the base
1146.7-1145.9 Shale : (Siltstone) gray, sandy w/numerous laminations

15-F
Core Log Sta. 176+00, 190' Rt.
Elev. 1267.7-1260.7 Overburden
1260.7-1227.4 Sandstone boulders <0.1' to 3.0' thick (Mine Spoil)
1227.4-1224.7 Shale : black, gray above 41.0, clayey to silty, carbonaceous, highly weathered
1224.7-1221.7 Shale : (Siltstone) gray, sandstone laminations @ base, shaley above 43.7
1221.7-1218.2 Shale : gray, silty to clayey
1218.2-1216.0 Coal Seam w/shale parting (Recoverd 1.4') slickensides
1216.0-1210.1 Shale : gray, silty w/clayey zones & slickensides
1210.1-1204.7 Shale : (siltstone) gray, sandy w/sandstone laminations, crossbedding



SCALE = 20

300

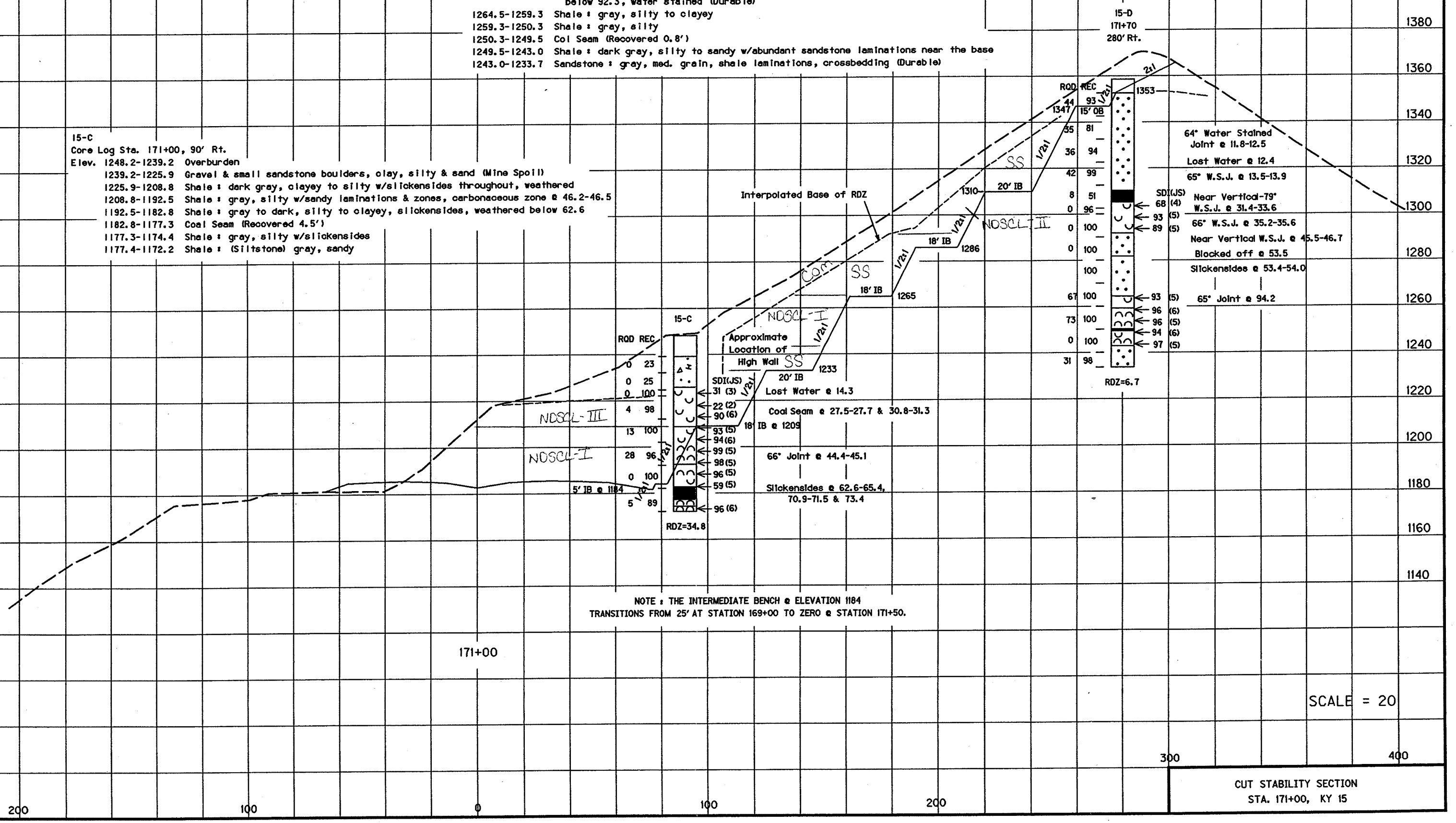
CUT STABILITY SECTION
STA. 176+00, KY 15

APPROVED BY
DATE

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

15-D
Core Log Sta. 171+70, 280' Rt.
Elev. 1358.7-1352.7 Overburden
1352.7-1310.4 Sandstone : brown, med. grain, shale laminations, water stained (Durable)
1310.4-1305.3 Coal Seam (Recovered 2.7')
1305.3-1291.9 Shale : gray, silty w/slickensides
1291.9-1281.8 Sandstone : brown, med. grain, shale pebbles & laminations water stained (Durable)
1281.8-1264.5 Sandstone : brown to gray, fine to med. grain, shale laminations, coal spars below 92.3, water stained (Durable)
1264.5-1259.3 Shale : gray, silty to clayey
1259.3-1250.3 Shale : gray, silty
1250.3-1249.5 Col Seam (Recovered 0.8')
1249.5-1243.0 Shale : dark gray, silty to sandy w/abundant sandstone laminations near the base
1243.0-1233.7 Sandstone : gray, med. grain, shale laminations, crossbedding (Durable)

15-C
Core Log Sta. 171+00, 90' Rt.
Elev. 1248.2-1239.2 Overburden
1239.2-1225.9 Gravel & small sandstone boulders, clay, silty & sand (Mine Spoil)
1225.9-1208.8 Shale : dark gray, clayey to silty w/slickensides throughout, weathered
1208.8-1192.5 Shale : gray, silty w/sandy laminations & zones, carbonaceous zone @ 46.2-46.5
1192.5-1182.8 Shale : gray to dark, silty to clayey, slickensides, weathered below 62.6
1182.8-1177.3 Coal Seam (Recovered 4.5')
1177.3-1174.4 Shale : gray, silty w/slickensides
1177.4-1172.2 Shale : (Siltstone) gray, sandy



NOTE : THE INTERMEDIATE BENCH @ ELEVATION 1184
TRANSITIONS FROM 25' AT STATION 169+00 TO ZERO @ STATION 171+50.

SCALE = 20

CUT STABILITY SECTION
STA. 171+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

15-B
Core Log Sta. 166+00, 320' Rt.
Elev. 1427.1-1422.1 Overburden
1422.1-1381.8 Sandstone : brown, med grain, shale laminations, water stains crossbedding, (Durable), (Non-Durable zones @ 9.3-11.8 & 35.5-39.2)
1381.8-1364.7 Sandstone : brown, med. grain w/shale partings, water stained, broken & fractured zones (Durable)
1364.7-1362.5 Shale : (Claystone) gray
1362.5-1326.4 Sandstone : brown to gray, fine to med. grain. water staining many fractured & broken zones
1326.4-1321.4 Coal Seam (Recovered 2.3')
1321.4-1305.4 Shale : gray, silty to clayey w/slickensides
1305.4-1286.6 Sandstone : brown to gray, med. grain w/water staining above 131.4 (Durable)
1286.6-1277.2 Sandstone : gray, fine to med. grain, few coal spars (Non-Durable above 148.0)
1277.2-1272.1 Shale : gray, clayey to silty

Cut Limits from Sta. 162+00 to Sta. 183+00
15-A
Core Log Sta. 166+00, 110' Rt.
Elev. 1287.5-1258.3 Fill Material (Mine Spoil)
1258.3-1232.5 Sandstone : boulders 0.8->0.1' thick, gravel & a small amount of clay and silt (Mine Spoil)
1232.5-1217.5 Shale : dark gray. silty to sandy, coal seams, weathered
1217.5-1213.2 Shale : gray, silty to sandy w/sandstone laminations & partings
1213.2-1209.4 Shale : gray to brown, silty to sandy, weathered & fractured, slickensides
1209.4-1200.3 Sansdtone : brown to gray, fine grain w/shale laminations & partings (Durable)

Interpolated Base of RDZ

11/4:1

15A-OW
N=28
N=50+
Dry 2/20/03

15-A
R

Approximate Location of Highwall

Com

RQD REC
14 37
0 13
16 30
6 24
0 71
0 98
0 98
4 97
12 93
50 100

SDI(JS)
77 (4)
60 (4) 3:1
42 (2)
95 (5)
85 (5)

Lost Water @ 29.2
Coal Seam @ 61.9-62.2 & 62.8-63.2
Slickensides @ 62.2-63.5 & 74.3-75.0
68-77° Water Stained Joint @ 75.0-79.3

RDZ=55.0

NDSCL-III
NDSCL- I

15-B

RQD REC
53 86
73 93
54 100
57 89
48 99
49 87
41 100
44 97
43 71
32 81
0 93
16 98
53 100
30 98
49 98

SDI(JS)
83 (4)
75 (4)
43 (3)
62 (2)
86 (2)
89 (3)
93 (5)
50 (4)

70° Joint @ 11.0-11.3 & 11.8-12.0
Lost Water @ 16.8
Conglomerate @ 21.8-22.3
Shale parting @ 45.3-45.9 & 56.2-56.5
82° Joint @ 49.6-50.1
Vertical Water Stained Joint @ 50.6-51.3
64-72° W.S.J. @ 53.7-55.0
61° W.S.J. @ 70.7-71.0
70° W.S.J. @ 71.3-71.7
Vertical W.S.J. @ 71.8-73.2, 86.6-90.6 & 97.3-99.4
78° W.S.J. @ 83.8-84.9
Coal Seam @ 100.0
Slickensides @ 105.7-106.5
Near Vertical Joint @ 124.0-124.7

RDZ=6.4

166+00

1500 1480 1460 1440 1420 1400 1380 1360 1340 1320 1300 1280 1260 1240 1220 1200 1180

100 0 100 200 300 400 500

SCALE = 20

CUT STABILITY SECTION
STA. 166+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 152+00 to 162+00

14-B

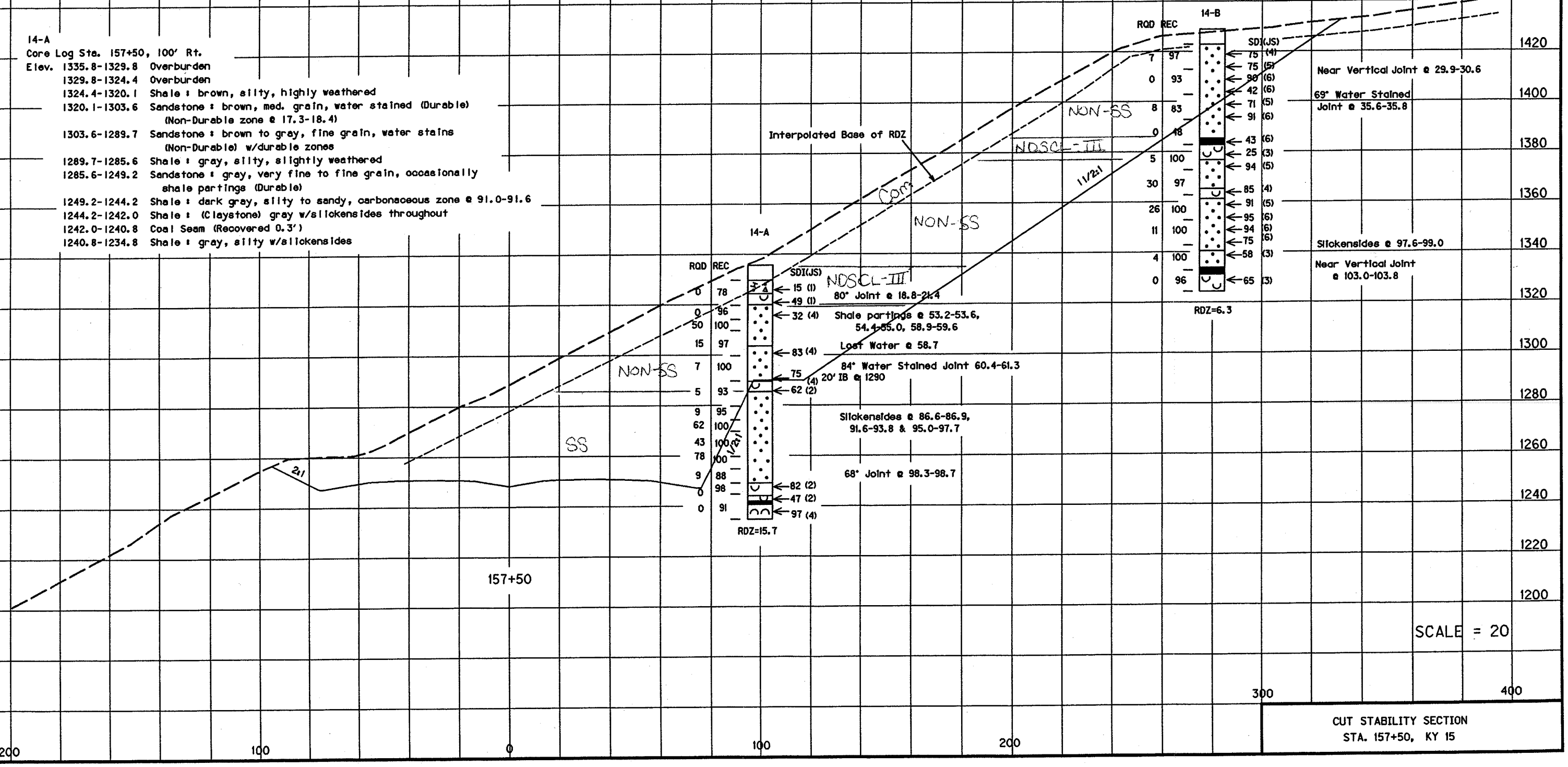
Core Log Sta. 157+50, 280' Rt.

Elev. 1428.9-1422.9 Overburden
1422.9-1385.4 Sandstone : brown, med. grain, water stained, crossbedding (Non-Durable)
1385.4-1382.9 Possible Coal Seam (No Recovery)
1382.9-1376.9 Shale : gray, silty to clayey
1376.9-1365.4 Sandstone : brown. fine to med. grain, water stained, crossbedding (Durable)
1365.4-1361.4 Shale : brown, sandy w/sandstone partings, weathered
1361.4-1340.6 Sandstone : brown to gray, med. grain w/few shale laminations, crossbedding, (Non-Durable w/durable zones)
1340.6-1333.9 Sandstone : gray, med. grain, highly weathered, (Non-Durable)
1333.9-1331.3 Coal Seam (Recovered 2.1')
1331.3-1324.4 Shale : gray, clayey to silty, weathered

14-A

Core Log Sta. 157+50, 100' Rt.

Elev. 1335.8-1329.8 Overburden
1329.8-1324.4 Overburden
1324.4-1320.1 Shale : brown, silty, highly weathered
1320.1-1303.6 Sandstone : brown, med. grain, water stained (Durable) (Non-Durable zone @ 17.3-18.4)
1303.6-1289.7 Sandstone : brown to gray, fine grain, water stains (Non-Durable) w/durable zones
1289.7-1285.6 Shale : gray, silty, slightly weathered
1285.6-1249.2 Sandstone : gray, very fine to fine grain, occasionally shale partings (Durable)
1249.2-1244.2 Shale : dark gray, silty to sandy, carbonaceous zone @ 91.0-91.6
1244.2-1242.0 Shale : (Claystone) gray w/slickensides throughout
1242.0-1240.8 Coal Seam (Recovered 0.3')
1240.8-1234.8 Shale : gray, silty w/slickensides



SCALE = 20

CUT STABILITY SECTION
STA. 157+50, KY 15

APPROVED BY

DATE

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 148+50 to Sta. 150+00
13-A
Core Log Sta. 149+00, 100' lt.
Elev. 1297.1-1271.6 Overburden
1271.6-1261.6 Sandstone : Lt. gray, fine grain, shale & coal laminations, crossbedding (Durable)

13-A OW
N=15
N=13
N=5
R
Dry 2/25/03

13-A
RQD REC
44 99
RDZ=25.7

3:1
3:1
Com
Lost Water @ 25.5
Interpolated Base of RDZ

1340
1320
1300
1280
1260
1240

149+00

300 200 100 0 100 200 300

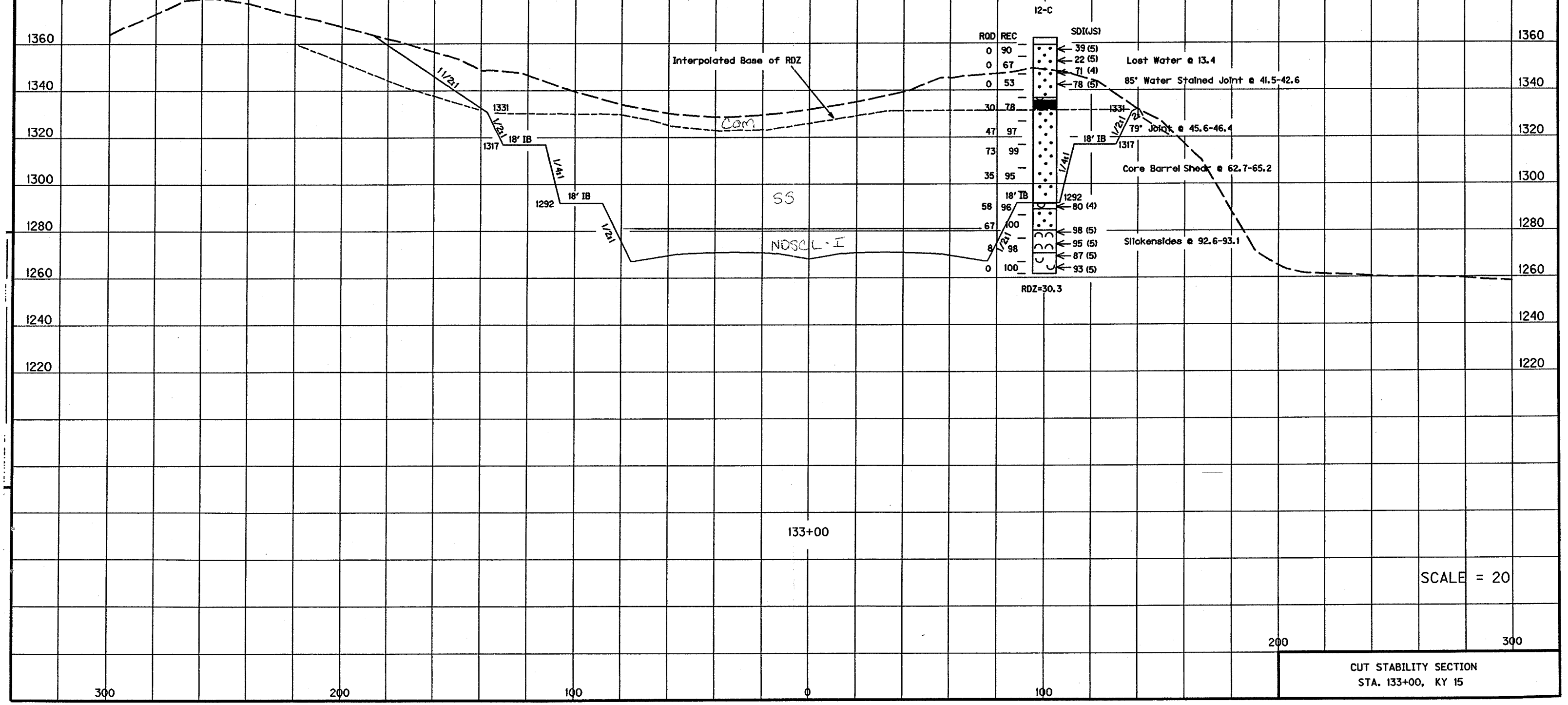
SCALE = 20

CUT STABILITY SECTION
STA. 149+00, KY 15

APPROVED BY
DATE

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

12-C
Core Log Sta. 133+00, 100' Rt.
Elev. 1362.3-1359.3 Overburden
1359.3-1336.8 Sandstone : brown, fine to med. grain, water stained, broken & fractured in zones (Non-Durable)
1336.8-1335.6 Shale : gray, silty to clayey
1335.6-1332.0 Coal Seam (Recovered 1.5')
1332.0-1291.7 Sandstone : brown to gray, med to fine grain, shale laminations in zones, water stains (Durable)
1291.7-1289.3 Shale : gray, silty
1289.3-1280.2 Sandstone : gray, fine grain, w/shale laminations & partings, crossbedding (Durable)
1280.2-1270.5 Shale : gray, silty to sandy, coarsening upward into sandstone
1270.5-1261.8 Shale : gray, silty w/slickensides



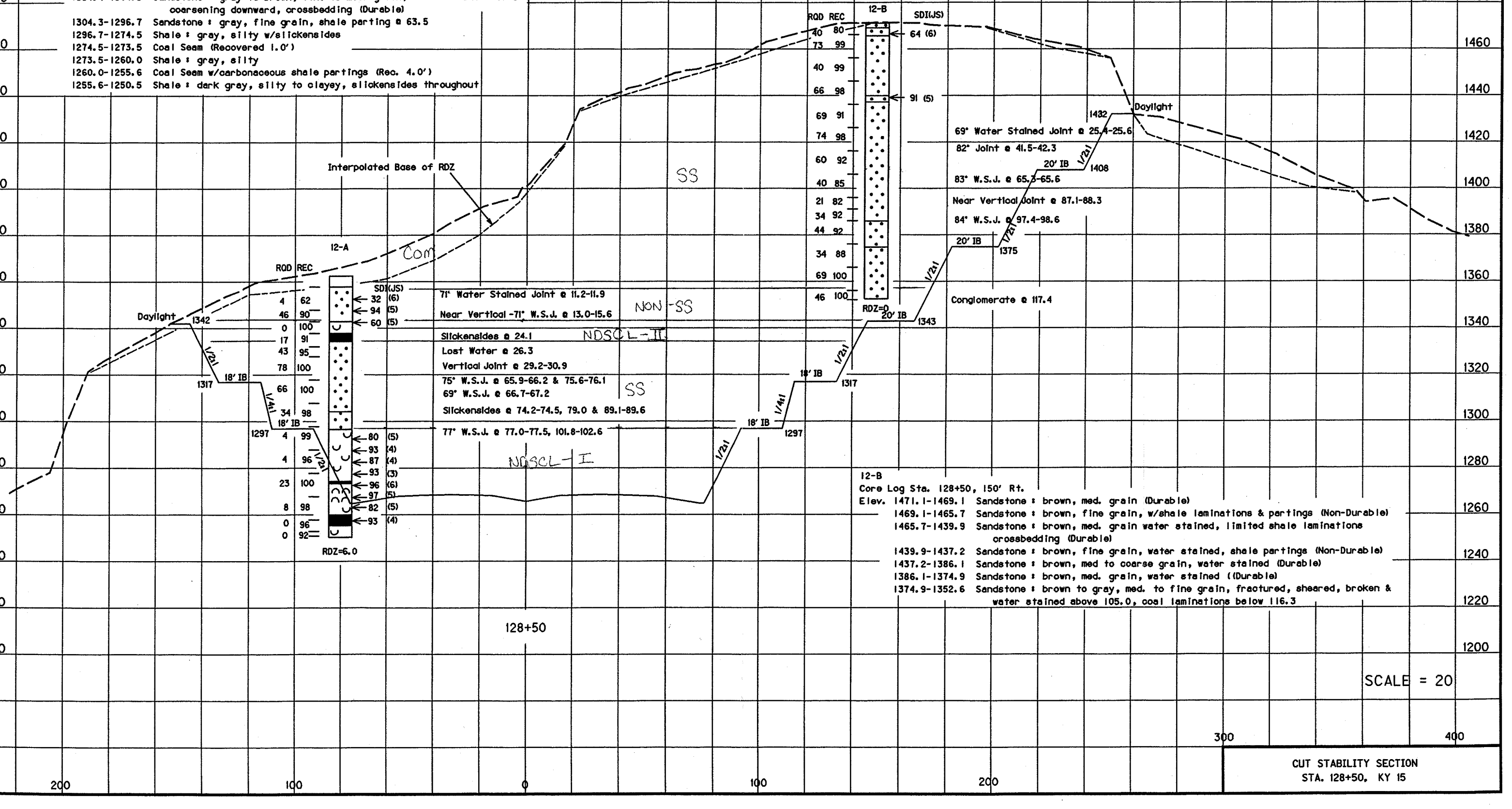
CUT STABILITY SECTION
STA. 133+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 126+00 to Sta. 133+50

12-A
Core Log Sta. 128+50, 80' Lt.
Elev. 1362.6-1358.0 Overburden
1358.0-1343.0 Sandstone : brown to gray, med. grain, w/coal spars, water stained, (Durable), (Non-Durable above 15.6)
1343.0-1338.0 Shale : dark gray, silty
1338.0-1334.4 Coal Seam (Recovered 3.4')
1334.4-1304.3 Sandstone : gray to brown, fine to med. grain, w/shale laminations coarsening downward, crossbedding (Durable)
1304.3-1296.7 Sandstone : gray, fine grain, shale parting @ 63.5
1296.7-1274.5 Shale : gray, silty w/slickensides
1274.5-1273.5 Coal Seam (Recovered 1.0')
1273.5-1260.0 Shale : gray, silty
1260.0-1255.6 Coal Seam w/carbonaceous shale partings (Rec. 4.0')
1255.6-1250.5 Shale : dark gray, silty to clayey, slickensides throughout

12-B
Core Log Sta. 128+50, 150' Rt.
Elev. 1471.1-1469.1 Sandstone : brown, med. grain (Durable)
1469.1-1465.7 Sandstone : brown, fine grain, w/shale laminations & partings (Non-Durable)
1465.7-1439.9 Sandstone : brown, med. grain water stained, limited shale laminations crossbedding (Durable)
1439.9-1437.2 Sandstone : brown, fine grain, water stained, shale partings (Non-Durable)
1437.2-1386.1 Sandstone : brown, med to coarse grain, water stained (Durable)
1386.1-1374.9 Sandstone : brown, med. grain, water stained ((Durable)
1374.9-1352.6 Sandstone : brown to gray, med. to fine grain, fractured, sheared, broken & water stained above 105.0, coal laminations below 116.3



SCALE = 20

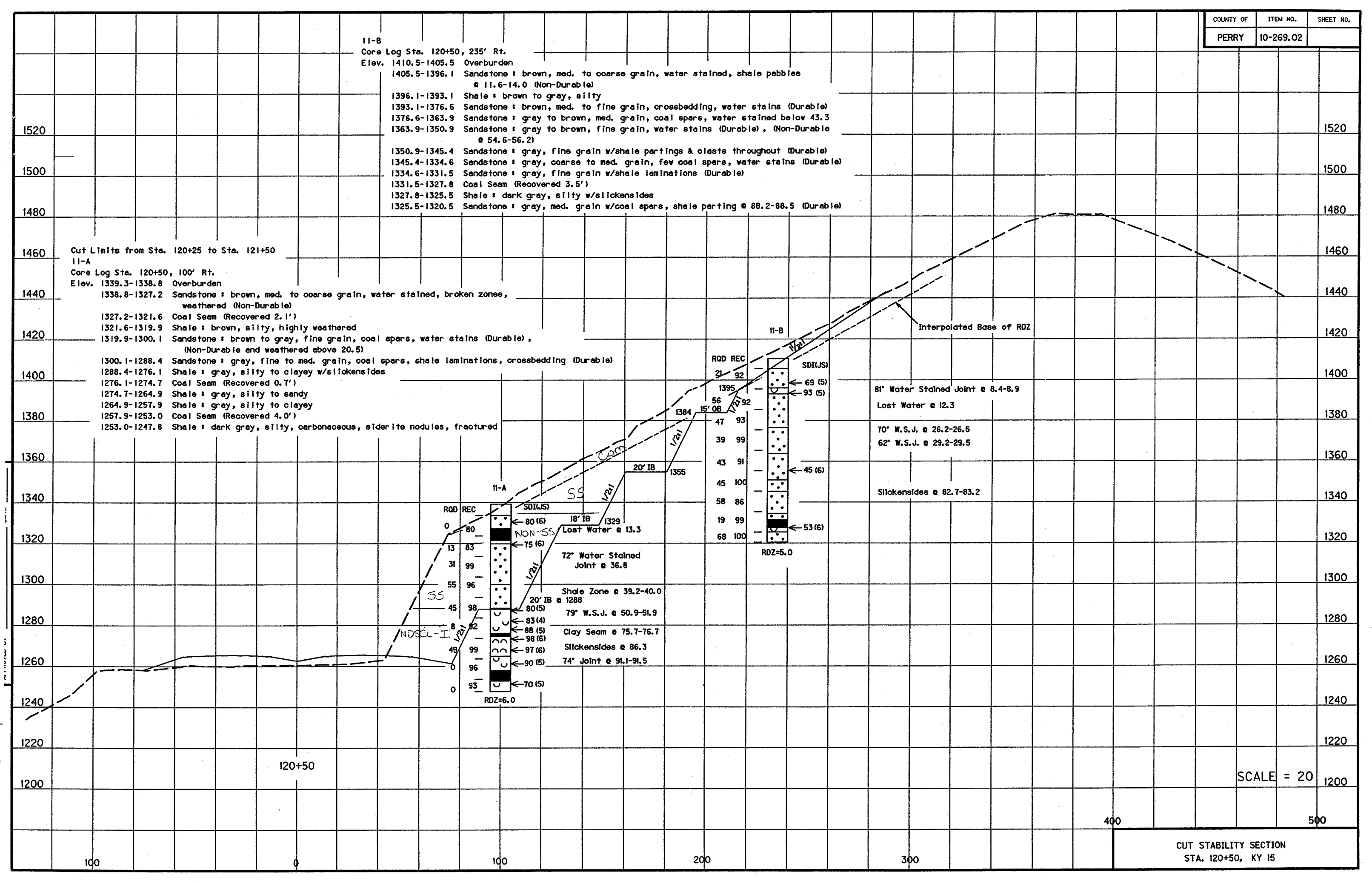
CUT STABILITY SECTION
STA. 128+50, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

11-B
Core Log Sta. 120+50, 235' Rt.
Elev. 1410.5-1405.5 Overburden
1405.5-1396.1 Sandstone : brown, med. to coarse grain, water stained, shale pebbles @ 11.6-14.0 (Non-Durable)
1396.1-1393.1 Shale : brown to gray, silty
1393.1-1376.6 Sandstone : brown, med. to fine grain, crossbedding, water stains (Durable)
1376.6-1363.9 Sandstone : gray to brown, med. grain, coal spars, water stained below 43.3
1363.9-1350.9 Sandstone : gray to brown, fine grain, water stains (Durable), (Non-Durable @ 54.6-56.2)
1350.9-1345.4 Sandstone : gray, fine grain w/shale partings & clasts throughout (Durable)
1345.4-1334.6 Sandstone : gray, coarse to med. grain, few coal spars, water stains (Durable)
1334.6-1331.5 Sandstone : gray, fine grain w/shale laminations (Durable)
1331.5-1327.8 Coal Seam (Recovered 3.5')
1327.8-1325.5 Shale : dark gray, silty w/slickensides
1325.5-1320.5 Sandstone : gray, med. grain w/coal spars, shale parting @ 88.2-88.5 (Durable)

Cut Limits from Sta. 120+25 to Sta. 121+50

11-A
Core Log Sta. 120+50, 100' Rt.
Elev. 1339.3-1338.8 Overburden
1338.8-1327.2 Sandstone : brown, med. to coarse grain, water stained, broken zones, weathered (Non-Durable)
1327.2-1321.6 Coal Seam (Recovered 2.1')
1321.6-1319.9 Shale : brown, silty, highly weathered
1319.9-1300.1 Sandstone : brown to gray, fine grain, coal spars, water stains (Durable), (Non-Durable and weathered above 20.5)
1300.1-1288.4 Sandstone : gray, fine to med. grain, coal spars, shale laminations, crossbedding (Durable)
1288.4-1276.1 Shale : gray, silty to clayey w/slickensides
1276.1-1274.7 Coal Seam (Recovered 0.7')
1274.7-1264.9 Shale : gray, silty to sandy
1264.9-1257.9 Shale : gray, silty to clayey
1257.9-1253.0 Coal Seam (Recovered 4.0')
1253.0-1247.8 Shale : dark gray, silty, carbonaceous, siderite nodules, fractured



SCALE = 20

CUT STABILITY SECTION
STA. 120+50, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

10-B
Core Log Sta. 115+00, 300' Rt.
Elev. 1471.1-1436.6 Overburden
1436.6-1410.5 Sandstone : brown, fine to med. grain, occasionally shale pebbles in zones, water stained (Durable)
1410.5-1407.6 Shale : dark gray, silty, water stains
1407.6-1396.6 Sandstone : brown, med. grain, shale pebbles, water stained (Durable), (Non-Durable above 65.5)
1396.6-1393.2 Sandstone : brown to gray, fine grain, few coal spars (Durable)
1393.2-1375.8 Sandstone : brown to gray, med. grain w/numerous coal spars, water stains (Durable)
1375.8-1370.9 Sandstone : brown, med. grain, w/coal spars, water stained (Durable)
1370.9-1357.1 Sandstone : gray, fine to med. grain, limited shale laminations & nodules (Durable)
1357.1-1353.2 Sandstone : gray, med. grain w/shale partings & clasts throughout
1353.2-1345.6 Sandstone : gray, fine to med. grain w/occasionally shale laminations & nodules (Durable)

Cut Limits from Sta. 112+25 to Sta. 116+75

10-A
Core Log Sta. 115+00, 145' Rt.
Elev. 1362.5-1358.0 Overburden
1358.0-1338.2 Sandstone : brown, med. grain, water stained, slightly weathered (Non-Durable)
1338.2-1319.4 Sandstone : gray, med. to fine grain, coal spars increasing below 35.0' (Durable)
1319.4-1315.3 Coal Seam (Recovered 3.1')
1315.3-1301.1 Sandstone : gray, fine grain w/shale crossbedded laminations & pebbles (Durable)
1301.1-1289.6 Sandstone : gray, med. grain, w/few shale laminations & coal spars (Durable)
1289.6-1286.8 Sandstone : gray, fine grain w/crossbedded shale laminations, partings & zones (Durable)
1286.8-1281.6 Sandstone : gray, fine grain, w/shale laminations occasionally (Durable)
1281.6-1263.8 Shale : gray, silty w/slickensides
1263.8-1258.0 Shale : gray, silty to sandy w/abundant crossbedded sandstone laminations, siderite nodules

Interpolated Base of RDZ

10-B
RQD REC
70 95
66 98
87 99
1433
55 94
61 96
49 100
89 (4)
82 79
75 96
34 90
39 99
81 99
54 95
87 100
RDZ=8.0

Lost Water @ 22.5
SDI(JS) 80° Joint @ 57.7-58.3
Conglomerate @ 60.1-60.6
Blocked off @ 72.7
Broken Zones w/possible clay seams @ 78.7-83.1
Vertical Joint @ 109.9-112.6 & 110.6-119.8

10-A
RQD REC
48 96
68 94
92 100
59 97
1319
34 92
77 100
67 100
41 100
0 99
54 100
RDZ=5.0

SDI(JS)
48 (5) 20' IB
74 (4)
88 (5)
95 (5)
1357
Shale partings @ 13.3-13.7
79° Joint @ 47.1
58°-Near Vertical Water Stained Joint @ 61.9-62.4
Slickensides @ 87.5, 89.6, 94.5-95.5 & 96.3-97.6
Coal Seam @ 95.5-96.3
86 (5)
91 (5)
94 (5)
95 (6)
99 (6)
1411
1393
1282
18' IB
20' IB
V2:1
SS
NDSCL
Cam

1520 1500 1480 1460 1440 1420 1400 1380 1360 1340 1320 1300 1280 1260 1240 1220 1200

100 0 100 200 300 400 500

115+00

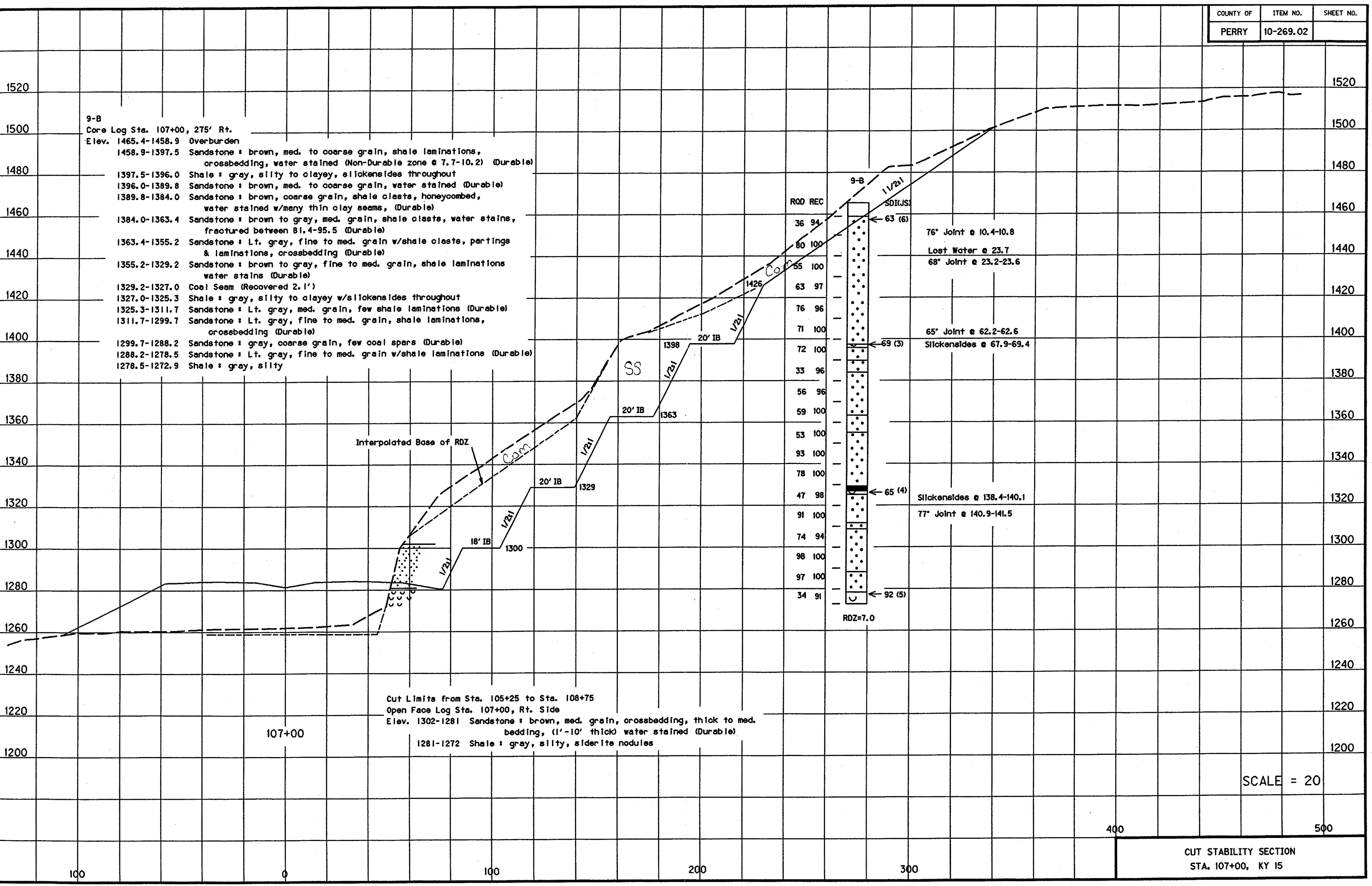
SCALE = 20

CUT STABILITY SECTION
STA. 115+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

9-B
Core Log Sta. 107+00, 275' Rt.

Elev. 1465.4-1458.9 Overburden
1458.9-1397.5 Sandstone : brown, med. to coarse grain, shale laminations, crossbedding, water stained (Non-Durable zone @ 7.7-10.2) (Durable)
1397.5-1396.0 Shale : gray, silty to clayey, slickensides throughout
1396.0-1389.8 Sandstone : brown, med. to coarse grain, water stained (Durable)
1389.8-1384.0 Sandstone : brown, coarse grain, shale clasts, honeycombed, water stained w/many thin clay seams, (Durable)
1384.0-1363.4 Sandstone : brown to gray, med. grain, shale clasts, water stains, fractured between 81.4-95.5 (Durable)
1363.4-1355.2 Sandstone : Lt. gray, fine to med. grain w/shale clasts, partings & laminations, crossbedding (Durable)
1355.2-1329.2 Sandstone : brown to gray, fine to med. grain, shale laminations water stains (Durable)
1329.2-1327.0 Coal Seam (Recovered 2.1')
1327.0-1325.3 Shale : gray, silty to clayey w/slickensides throughout
1325.3-1311.7 Sandstone : Lt. gray, med. grain, few shale laminations (Durable)
1311.7-1299.7 Sandstone : Lt. gray, fine to med. grain, shale laminations, crossbedding (Durable)
1299.7-1288.2 Sandstone : gray, coarse grain, few coal spars (Durable)
1288.2-1278.5 Sandstone : Lt. gray, fine to med. grain w/shale laminations (Durable)
1278.5-1272.9 Shale : gray, silty



Cut Limits from Sta. 105+25 to Sta. 108+75
Open Face Log Sta. 107+00, Rt. Side
Elev. 1302-1281 Sandstone : brown, med. grain, crossbedding, thick to med. bedding, (1'-10' thick) water stained (Durable)
1281-1272 Shale : gray, silty, siderite nodules

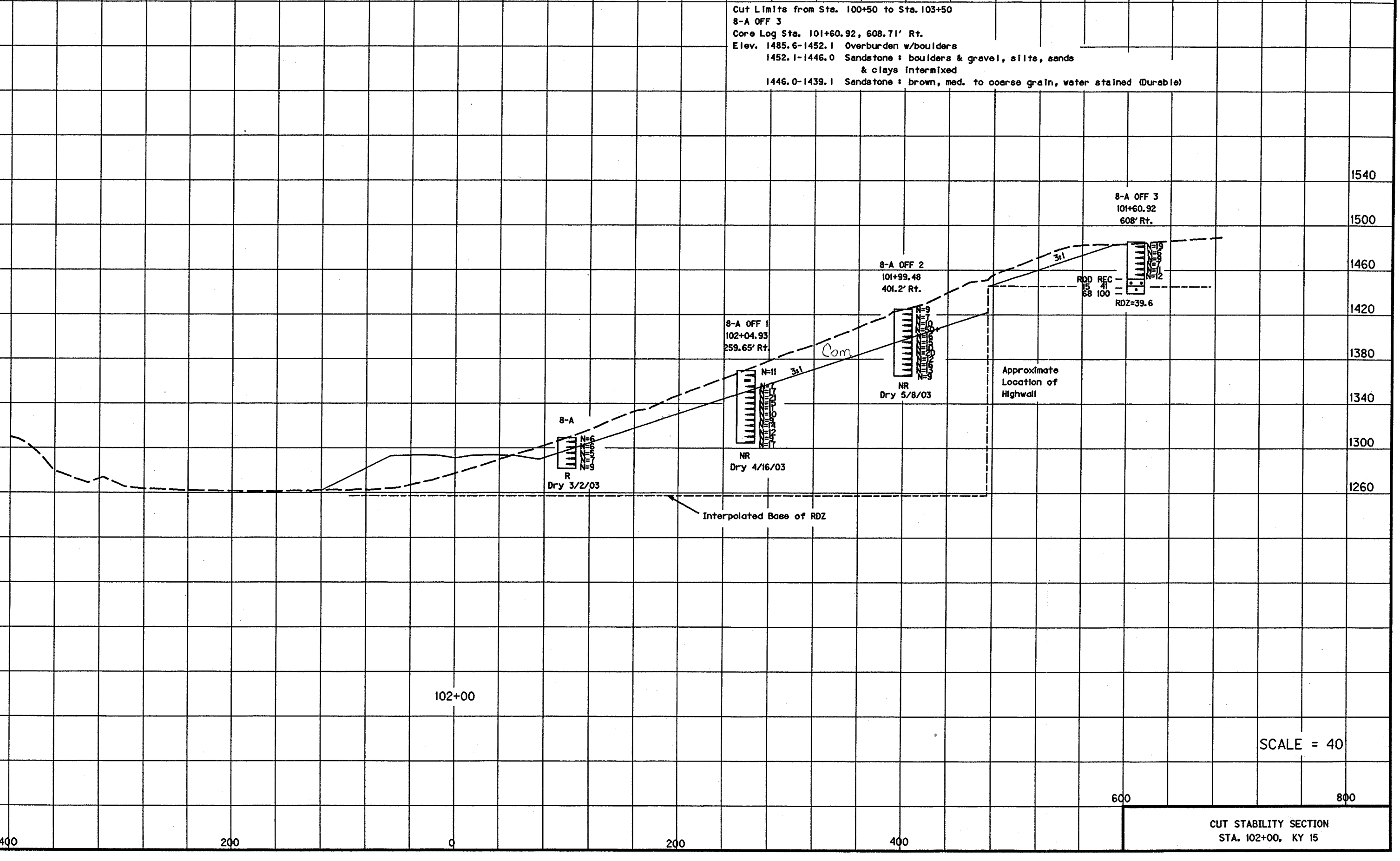
76° Joint @ 10.4-10.8
Lost Water @ 23.7
68° Joint @ 23.2-23.6
65° Joint @ 62.2-62.6
Slickensides @ 67.9-69.4
Slickensides @ 138.4-140.1
77° Joint @ 140.9-141.5

SCALE = 20

CUT STABILITY SECTION
STA. 107+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 100+50 to Sta. 103+50
8-A OFF 3
Core Log Sta. 101+60.92, 608.71' Rt.
Elev. 1485.6-1452.1 Overburden w/boulders
1452.1-1446.0 Sandstone : boulders & gravel, silts, sands & clays intermixed
1446.0-1439.1 Sandstone : brown, med. to coarse grain, water stained (Durable)



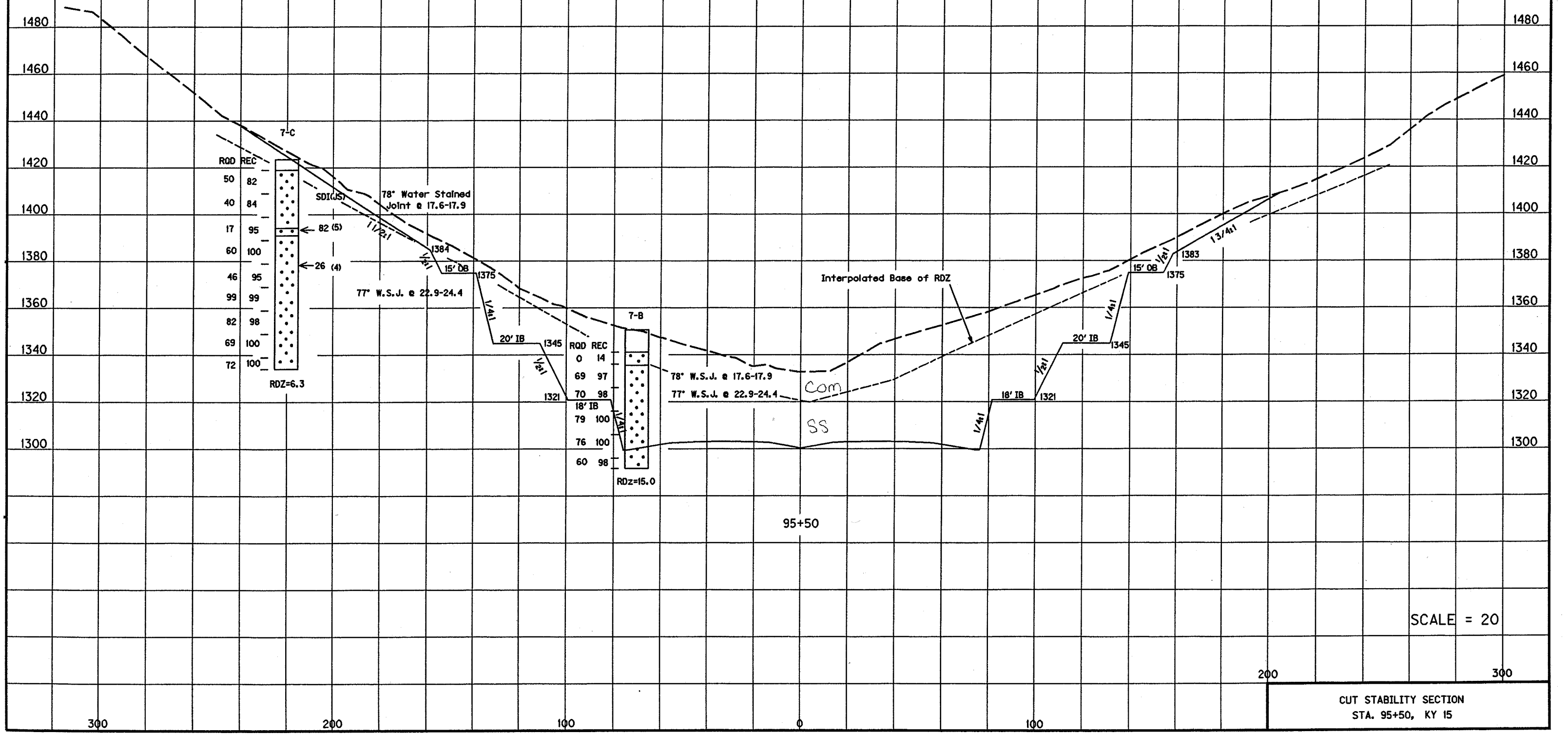
SCALE = 40

CUT STABILITY SECTION
STA. 102+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

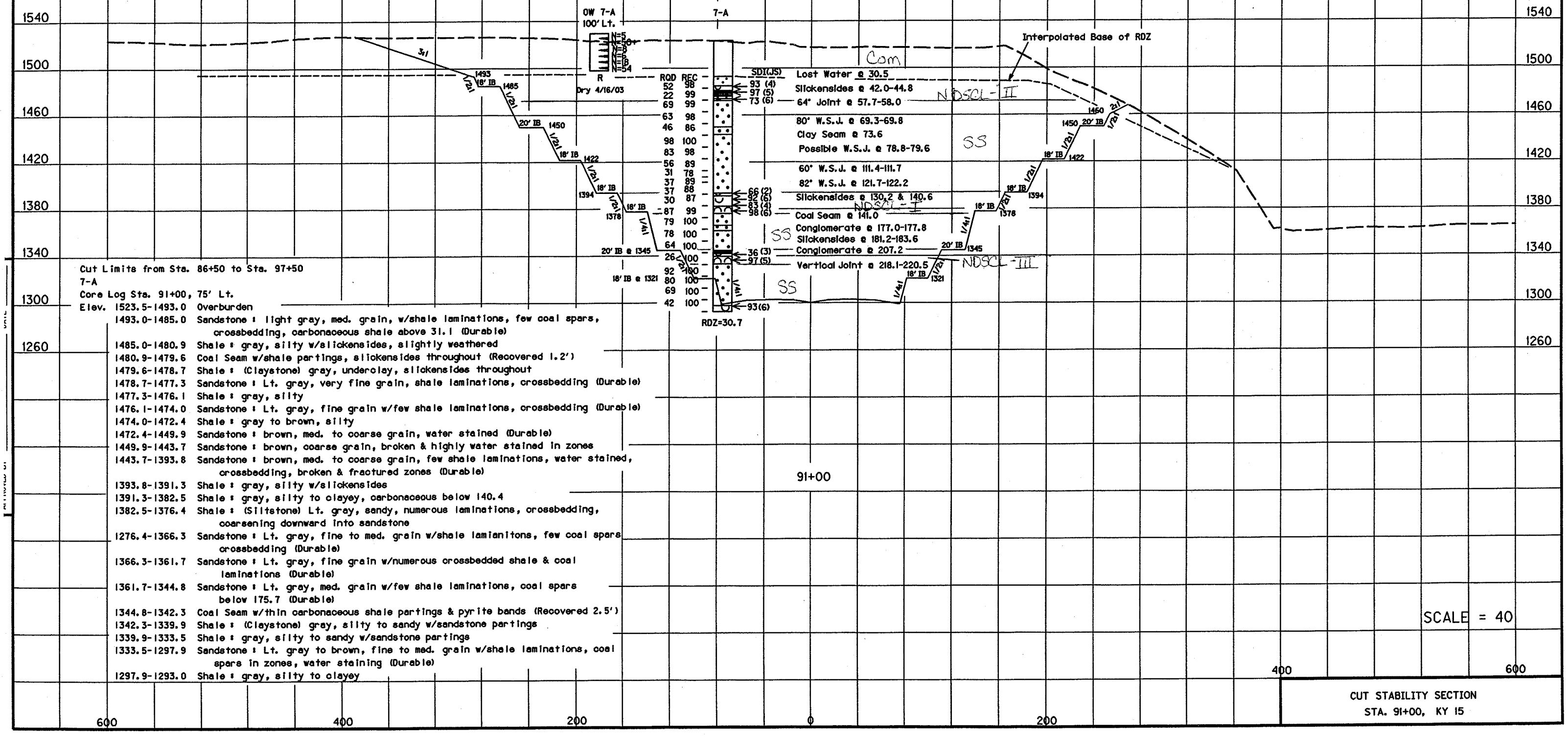
7-C
Core Log Sta. 95+50, 220' Lt.
Elev. 1423.6-1419.1 Overburden
1419.1-1394.3 Sandstone : brown to gray, med. grin, water stained, broken & possible friable zones
1394.3-1391.1 Sandstone : gray, med. grain, poorly cemented (Non-Durable)
1391.1-1334.1 Sandstone : gray, fine to med. grain, occasional shale laminations & coal spars (Durable), w/Non-Durable zones @ 44.5-46.0 & 48.4-49.0)

7-B
Core Log Sta. 95+50, 70' Lt.
Elev. 1350.7-1341.2 Overburden
1341.2-1335.7 Sandstone boulders & gravel w/a small amount of clay (Talus)
1335.7-1296.2 Sandstone : gray to brown, fine to med. grain, shale laminations, coal spars, water stains (Durable)
1296.2-1291.7 Sandstone : gray, med. to coarse grain, w/few coal spars & shale pebbles Durable)



CUT STABILITY SECTION
STA. 95+50, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	



Cut Limits from Sta. 86+50 to Sta. 97+50
7-A
Core Log Sta. 91+00, 75' Lt.

Elev.		
1523.5-1493.0	Overburden	
1493.0-1485.0	Sandstone :	light gray, med. grain, w/shale laminations, few coal spars, crossbedding, carbonaceous shale above 31.1 (Durable)
1485.0-1480.9	Shale :	gray, silty w/slickensides, slightly weathered
1480.9-1479.6	Coal Seam	w/shale partings, slickensides throughout (Recovered 1.2')
1479.6-1478.7	Shale :	(Claystone) gray, underclay, slickensides throughout
1478.7-1477.3	Sandstone :	Lt. gray, very fine grain, shale laminations, crossbedding (Durable)
1477.3-1476.1	Shale :	gray, silty
1476.1-1474.0	Sandstone :	Lt. gray, fine grain w/few shale laminations, crossbedding (Durable)
1474.0-1472.4	Shale :	gray to brown, silty
1472.4-1449.9	Sandstone :	brown, med. to coarse grain, water stained (Durable)
1449.9-1443.7	Sandstone :	brown, coarse grain, broken & highly water stained in zones
1443.7-1393.8	Sandstone :	brown, med. to coarse grain, few shale laminations, water stained, crossbedding, broken & fractured zones (Durable)
1393.8-1391.3	Shale :	gray, silty w/slickensides
1391.3-1382.5	Shale :	gray, silty to clayey, carbonaceous below 140.4
1382.5-1376.4	Shale :	(Siltstone) Lt. gray, sandy, numerous laminations, crossbedding, coarsening downward into sandstone
1276.4-1366.3	Sandstone :	Lt. gray, fine to med. grain w/shale lamianitons, few coal spars crossbedding (Durable)
1366.3-1361.7	Sandstone :	Lt. gray, fine grain w/numerous crossbedded shale & coal laminations (Durable)
1361.7-1344.8	Sandstone :	Lt. gray, med. grain w/few shale laminations, coal spars below 175.7 (Durable)
1344.8-1342.3	Coal Seam	w/thin carbonaceous shale partings & pyrite bands (Recovered 2.5')
1342.3-1339.9	Shale :	(Claystone) gray, silty to sandy w/sandstone partings
1339.9-1333.5	Shale :	gray, silty to sandy w/sandstone partings
1333.5-1297.9	Sandstone :	Lt. gray to brown, fine to med. grain w/shale laminations, coal spars in zones, water staining (Durable)
1297.9-1293.0	Shale :	gray, silty to clayey

CUT STABILITY SECTION
STA. 91+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

6-E
742+12
295' Lt.

RQD	REC
81	99
73	96
60	89
28	91
65	94
42	88
42	95
68	100
71	98
40	100
0	97
14	98
79	99
80	99
96	100
83	97

RDZ=6.0

SDI(JS)
81° Joint @ 7.1-8.4
Lost Water @ 18.3
92(4)
79° Water Stained Joint @ 42.3-42.7
93(4)
68° W.S.J. @ 43.8-44.6 & 61.2-61.8
91(3)
68° W.S.J. @ 43.8-44.6 & 61.2-61.8
76° Joint @ 102.8-103.3
Coal Seam @ 104.6-113.0
76(4)
78(5)
92(5)
97(5)
Slickensides @ 106.1-107.2 & 110.7-113.0
61° Joint @ 141.9
63° Joint @ 151.0-151.2
57° Joint @ 153.0

1377 1/4:1 SS
18' IB 1354 V2:1
18' IB 1338 1/4:1
18' IB 1314 SS 1/4:1
1289 18' IB V2:1
1268 20' IB V2:1

NDSCL-II Interpolated Base of RDZ
NDSCL-I
NDSCL-III
NDSCL-I

6-D

RQD	REC
0	93
0	98
0	98
55	96
9	99
91	99

RDZ=6.0

SDI(JS)
5 (1)
92 (4)
61 (3)
90(6)
95 (5)
89(4)
86 (4)
Slickensides @ 23.6-24.8 & 33.4-35.9
Coal Seam @ 47.6-48.0

6-E
Core Log Sta. 74+12, 295' Lt.
Elev. 1456.6-1450.6 Overburden
1450.6-1380.1 Sandstone : brown, med. grain, (Durable),
(w/Non-Durable zones @ 36.0-38.0, 56.0-61.0 & 72.3-75.9)
1380.1-1354.1 Sandstone : gray, med. to fine grain, occasional coal spars (Durable)
1354.1-1351.9 Shale : gray, silty
1351.9-1350.5 Shale : (Siltstone) gray, sandy
1350.5-1340.4 Shale : gray, silty w/slickensides
1340.4-1332.8 Shale : gray, silty w/numerous crossbedded sandstone laminations & partings
1332.8-1329.9 Coal Seam (Recovered 2.6')
1329.9-1299.6 Sandstone : gray, fine to med. grain, w/shale laminations, crossbedding (Durable)

6-D
Core Log Sta. 74+00, 85' Lt.
Elev. 1303.5-1298.7 Overburden
1298.7-1292.4 Sandstone : brown, med. grain, water stained (Durable)
1292.4-1281.1 Shale : gray, silty
1281.1-1279.9 Coal Seam (Recovered 0.5')
1279.9-1267.7 Shale : gray, silty w/slickensides
1267.7-1262.7 Coal Seam (Recovered 3.4')
1262.7-1255.9 Shale : gray, silty w/slickensides
1255.9-1248.2 Shale : gray, silty to sandy, broken @ 51.1-52.5
1248.2-1238.7 Sandstone : brown, med. grain, water stained (Durable)

1540 1520 1500 1480 1460 1440 1420 1400 1380 1360 1340 1320 1300 1280 1260 1240 1220 1200

1520 1500 1480 1460 1440 1420 1400 1380 1360 1340 1320 1300 1280 1260 1240 1220 1200

500 400 300 200 100 0 74+00 100

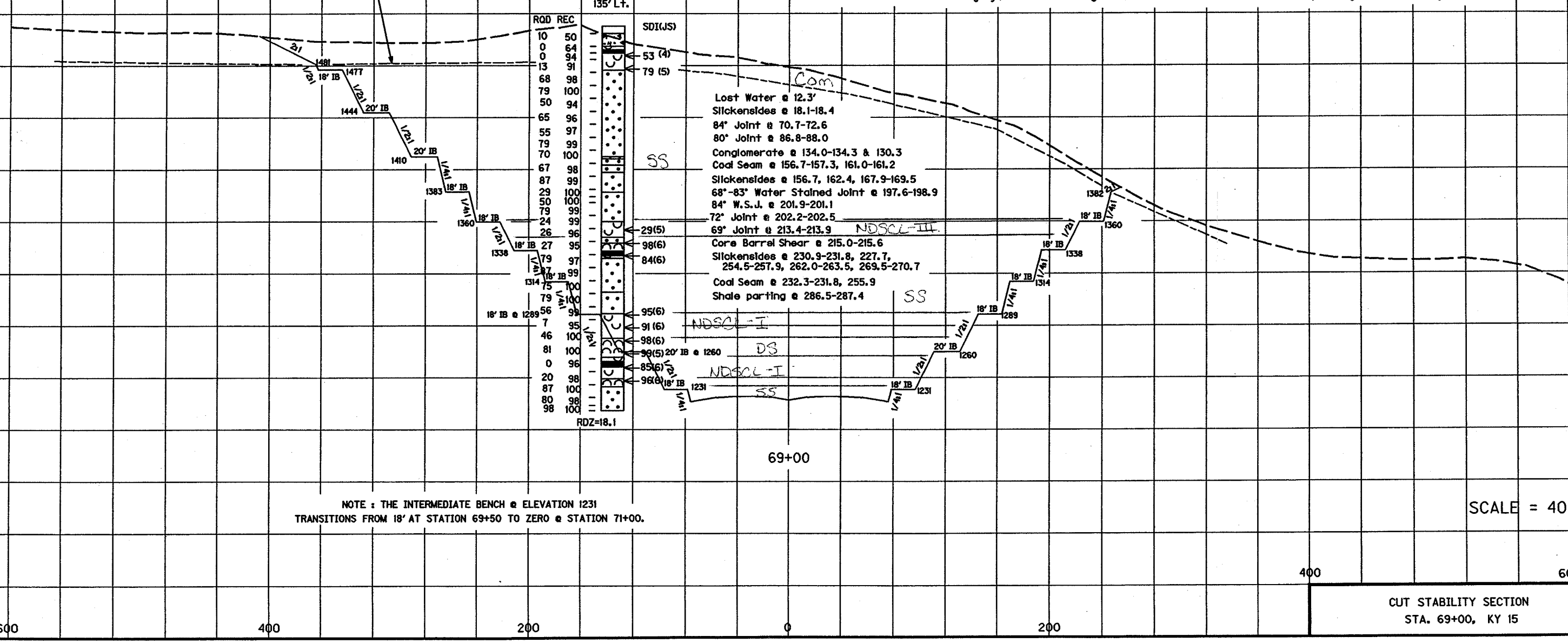
SCALE = 20

CUT STABILITY SECTION
STA. 74+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

6-C
Core Log Sta. 68+80, 135' Lt.

Elev.	1510.5-1505.0	Overburden
	1505.0-1495.0	Talus
	1495.0-1492.4	Shale : black, silty to clayey w/coal
	1492.4-1491.3	Shale : gray, clayey to silty w/slickensides
	1491.3-1489.6	Coal Seam w/shale partings (Recovered 1.4')
	1489.6-1476.6	Shale : dark gray, clayey to silty, carbonaceous partings, few slickensides throughout
	1476.6-1410.0	Sandstone : brown, med. to coarse grain, shale laminations, crossbedding (Durable)
	1410.0-1408.5	Sandstone : brown, med. grain w/shale partings (Durable)
	1408.5-1403.6	Sandstone : brown, med. grain (Durable)
	1403.6-1398.0	Sandstone : gray, fine grain w/few coal spars & laminations (Durable)
	1398.0-1382.9	Sandstone : brown, coarse to med. grain, water stained, crossbedding, coal spars below 124.3 (Durable)
	1382.9-1360.1	Sandstone : gray, fine to med grain, w/shale laminations, coal spars, occasionally coarse grain partings w/numerous pebbles (Durable)
	1360.1-1348.1	Shale : gray to dark gray, silty w/coal seams & slickensides
	1348.1-1343.7	Sandstone : gray, fine grain w/shale laminaitons, crossbedding (Durable)
	1343.7-1337.5	Shale : gray, silty, sandy laminaitons, slickensides
	1337.5-1333.9	Coal Seam (Recovered 2.9')
	1333.9-1331.8	Shale : (Siltstone) gray, sandy rooted
	1331.8-1306.0	Sandstone : gray to brown, fine to med. grain, shale laminations, crossbedding, water staining (Durable)
	1306.0-1289.4	Sandstone : gray, med. to coarse grained w/limited coal spars (Durable)
	1289.4-1270.6	Shale : gray, silty, siderite nodules w/slickensides
	1270.6-1256.0	Shale : (Siltstone) gray w/sandstone laminations, partings & zones
	1256.0-1252.6	Shale : gray, silty w/slickensides
	1252.6-1248.5	Coal Seam (Recovered 3.7')
	1248.5-1239.2	Shale : gray, silty w/slickensides throuhout
	1239.2-1233.1	Shale : gray, silty to sandy w/sandstone laminations, partings & zones
	1233.1-1214.8	Sandstone : gray, fine to med. grain, shale laminaitons, few shale parting, crossbedding (Durable)



NOTE : THE INTERMEDIATE BENCH @ ELEVATION 1231
TRANSITIONS FROM 18' AT STATION 69+50 TO ZERO @ STATION 71+00.

SCALE = 40

CUT STABILITY SECTION
STA. 69+00, KY 15

DATE

APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

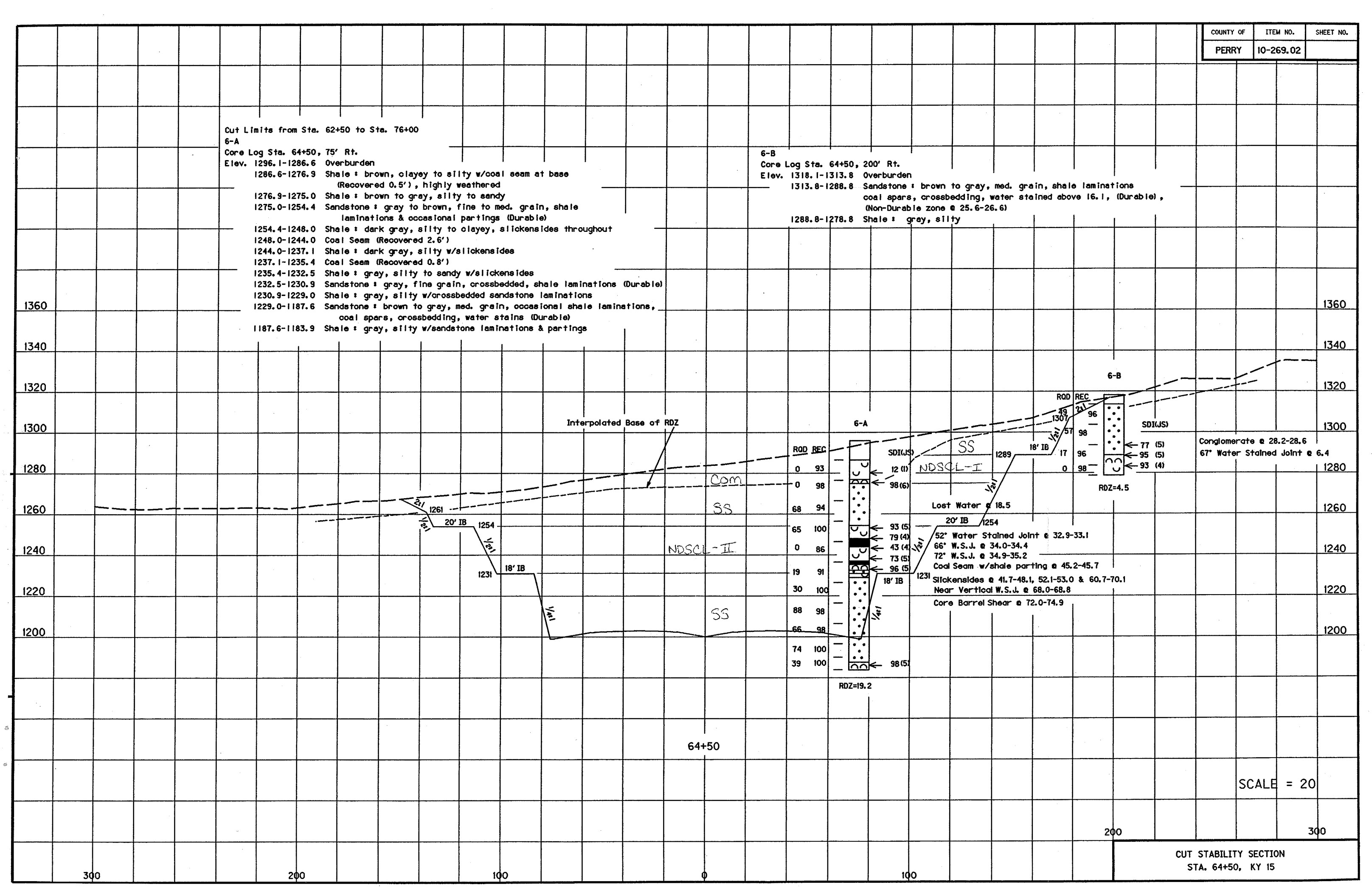
Cut Limits from Sta. 62+50 to Sta. 76+00

6-A
Core Log Sta. 64+50, 75' Rt.

Elev. 1296.1-1286.6 Overburden
1286.6-1276.9 Shale : brown, clayey to silty w/coal seam at base (Recovered 0.5'), highly weathered
1276.9-1275.0 Shale : brown to gray, silty to sandy
1275.0-1254.4 Sandstone : gray to brown, fine to med. grain, shale laminations & occasional partings (Durable)
1254.4-1248.0 Shale : dark gray, silty to clayey, slickensides throughout
1248.0-1244.0 Coal Seam (Recovered 2.6')
1244.0-1237.1 Shale : dark gray, silty w/slickensides
1237.1-1235.4 Coal Seam (Recovered 0.8')
1235.4-1232.5 Shale : gray, silty to sandy w/slickensides
1232.5-1230.9 Sandstone : gray, fine grain, crossbedded, shale laminations (Durable)
1230.9-1229.0 Shale : gray, silty w/crossbedded sandstone laminations
1229.0-1187.6 Sandstone : brown to gray, med. grain, occasional shale laminations, coal spars, crossbedding, water stains (Durable)
1187.6-1183.9 Shale : gray, silty w/sandstone laminations & partings

6-B
Core Log Sta. 64+50, 200' Rt.

Elev. 1318.1-1313.8 Overburden
1313.8-1288.8 Sandstone : brown to gray, med. grain, shale laminations coal spars, crossbedding, water stained above 16.1, (Durable), (Non-Durable zone @ 25.6-26.6)
1288.8-1278.8 Shale : gray, silty



SCALE = 20

CUT STABILITY SECTION
STA. 64+50, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

5-B
Core Log Sta. 53+00, 80' Lt.
Elev. 1184.3-1178.5 Overburden
1178.5-1168.8 Shale : brown, silty to clayey, highly weathered
1168.8-1161.1 Shale : gray, silty, sandstone zone @ 15.8-16.2
1161.1-1158.0 Sandstone : gray, fine grain, shale laminations (Durable)
1158.0-1154.8 Shale : gray, silty w/slickensides
1154.8-1152.4 Sandstone : gray, fine grain w/shale laminations crossbedding (Durable)
1152.4-1148.6 Shale : (Siltstone) gray w/sandy zones & laminations, crossbedding
1148.6-1144.2 Shale : gray, silty to clayey w/sandy zones
1144.2-1141.0 Shale : light gray, silty to sandy
1141.0-1135.6 Shale : (Siltstone) gray, sandy, crossbedding
1135.6-1133.5 Sandstone : gray, fine grain w/shale laminations, crossbedding (Durable)

5-C
Core Log Sta. 53+00, 190' Lt.
Elev. 1251.3-1243.3 Overburden
1243.3-1231.4 Sandstone : brown to gray, fine grain w/shale laminations, crossbedding, water stains (Durable), (Non-Durable above 10.1)
1231.4-1202.8 Sandstone : gray, med. grain, w/shale laminations & clasts, coal spars, crossbedding (Durable)
1202.8-1192.3 Sandstone : gray, fine grain w/shale laminations (Durable)
1192.3-1189.5 Sandstone : brown, coarse grain, water stained (Durable)
1189.5-1188.2 Shale : gray, silty
1188.2-1182.8 Coal Seam (Recovered 5.4')
1182.8-1181.5 Shale : dark gray, silty to clayey w/slickensides throughout
1181.5-1170.0 Shale : gray, silty

1340 1320 1300 1280 1260 1240 1220 1200 1180 1160 1140 1120 1100

400 300 200 100 0 100 200

53+00

SCALE = 20

CUT STABILITY SECTION
STA. 53+00, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 50+50 to Sta. 56+50

5-A

Core Log Sta. 51+00, 90' Lt.

Elev. 1149.5-1144.0 Overburden
1144.0-1140.2 Sandstone & shale boulders
1140.2-1138.0 Sandstone : brown, fine grain, water stained (Durable)
1138.0-1134.4 Shale : brown to gray, silty to sandy w/sandstone laminations & partings
1134.4-1132.8 Sandstone : gray, fine grain w/crossdedded shale laminations (Durable)
1132.8-1129.1 Shale : gray, silty
1129.1-1124.7 Shale : gray, silty to clayey w/slickensides throughout
1124.7-1121.3 Coal Seam (Recovered 1.5')
1121.3-1116.3 Shale : gray, silty w/slickensides throughout
1116.3-1114.0 Shale : gray, silty to sandy w/sandstone partings & zones

1240
1220
1200
1180
1160
1140
1120
1100
1080
1060
1040

Com

2:1 2:1

Interpolated Base of RDZ

5-A

RQD	REC		SDI(JS)
0	76	A	90 (5)
11	100	B	96 (6)
		C	82 (5)
12	78	D	64(3)
			74 (5)

RDZ=9.3

66° Water Stained
Joint @ 12.3-13.4
83° Joint @ 30.4-31.1
Coal Seam @ 32.6
Slickensides @ 28.2-33.2

51+00

300 200 100 0 100 200 300

SCALE = 20

CUT STABILITY SECTION
STA. 51+00, KY 15

APPROVED BY

UNIT

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

4-C
Core Log Sta. 46+50, 230' Lt.
Elev. 1262.2-1255.9 Overburden
1255.9-1247.6 Shale : dark brown, silty to clayey, highly weathered
1247.6-1244.3 Shale : gray, silty to clayey w/slickensides throughout
1244.3-1235.7 Shale : gray, silty w/coal seam @ 13.9-14.6
1235.7-1230.9 Sandstone : brown, fine to med. grain, water stained, crossbedding (Durable)

4-B
Core Log Sta. 46+50, 75' Lt.
Elev. 1248.9-1242.9 Overburden
1242.9-1238.2 Shale : brown to gray, sandy to silty, weathered
1238.2-1191.9 Sandstone : brown, med. grain, shale pebbles, crossbedding, water stained (Durable)
1191.9-1186.1 Coal Seam (Recovered 2.6')
1186.1-1183.1 Shale : gray, clayey to silty w/slickensides
1183.1-1178.9 Shale : gray, silty, w/numerous sandstone laminations, partings & zones
1178.9-1171.3 Shale : dark gray, silty to clayey w/occasional sandstone laminations
1171.3-1142.8 Shale : gray, silty w/occasional sandstone laminations
1142.8-1124.1 Sandstone : brown to gray, fine grain w/shale laminations, crossbedding, water staining (Durable)
1124.1-1121.8 Coal Seam (Recovered 1.8')
1121.8-1117.9 Shale : gray, silty to clayey w/slickensides throughout
1117.9-1116.8 Coal Seam (Recovered 1.0')
1116.8-1106.4 Shale : dark gray, silty to sandy w/slickensides occasionally
1106.4-1102.9 Shale : (Siltstone) gray w/sandy laminations

1340 1320 1300 1280 1260 1240 1220 1200 1180 1160 1140 1120 1100

4-C
2:1 RQD REC
0 85
0 100
70 92
SDI(JS)
13 (1)
1247 1 (1)
86 (4)
76 (5)
18' IB
1236
RDZ=14.6
Slickensides @ 14.6-17.9
80° Water Stained Joint @ 25.8-26.5
Interpolated Base of RDZ
1/2:1
1/2:1
25' IB
1192
1/2:1
20' IB
1156
1/2:1
1124
20' IB
1/2:1
RDZ=10.7
SS
DS
NOSCL II
Com

4-B
RQD REC
47 96
77 98
61 99
51 100
69 98
6 56
24 100
0 100
5 99
0 97
15 100
71 100
55 96
13 96
13 100
SDI(JS)
43 (4)
98 (5)
96 (5)
89 (5)
96 (6)
95 (6)
96 (5)
84 (4)
92 (5)
94 (6)
66 (4)
89 (4)
88 (3)
99 (4)
53° Water Stained Joint @ 11.9
Vertical W.S.J. @ 12.2-14.3
Lost Water @ 25.3
76° W.S.J. @ 38.9-39.4
76° W.S.J. @ 47.2-47.7
67° W.S.J. @ 48.5-48.9
72° W.S.J. @ 49.3-49.7
Slickensides @ 62.8-63.8
Coal Seam @ 87.4-87.6 & 93.9
Slickensides @ 89.9-90.1 & 93.9-5.1
62° W.S.J. @ 101.9-103.1
Slickensides @ 127.1-131.0
1156
20' IB
1/2:1
1124
20' IB
1/2:1
NOSCL-I
SS
NOSCL-II

46+50

NOTE : THE INTERMEDIATE BENCH @ ELEVATION 1124
TRANSITIONS FROM 20' AT STATION 47+50 TO ZERO @ STATION 49+50.

SCALE = 20

400 300 200 100 0 100 200

CUT STABILITY SECTION
STA. 46+50, KY 15

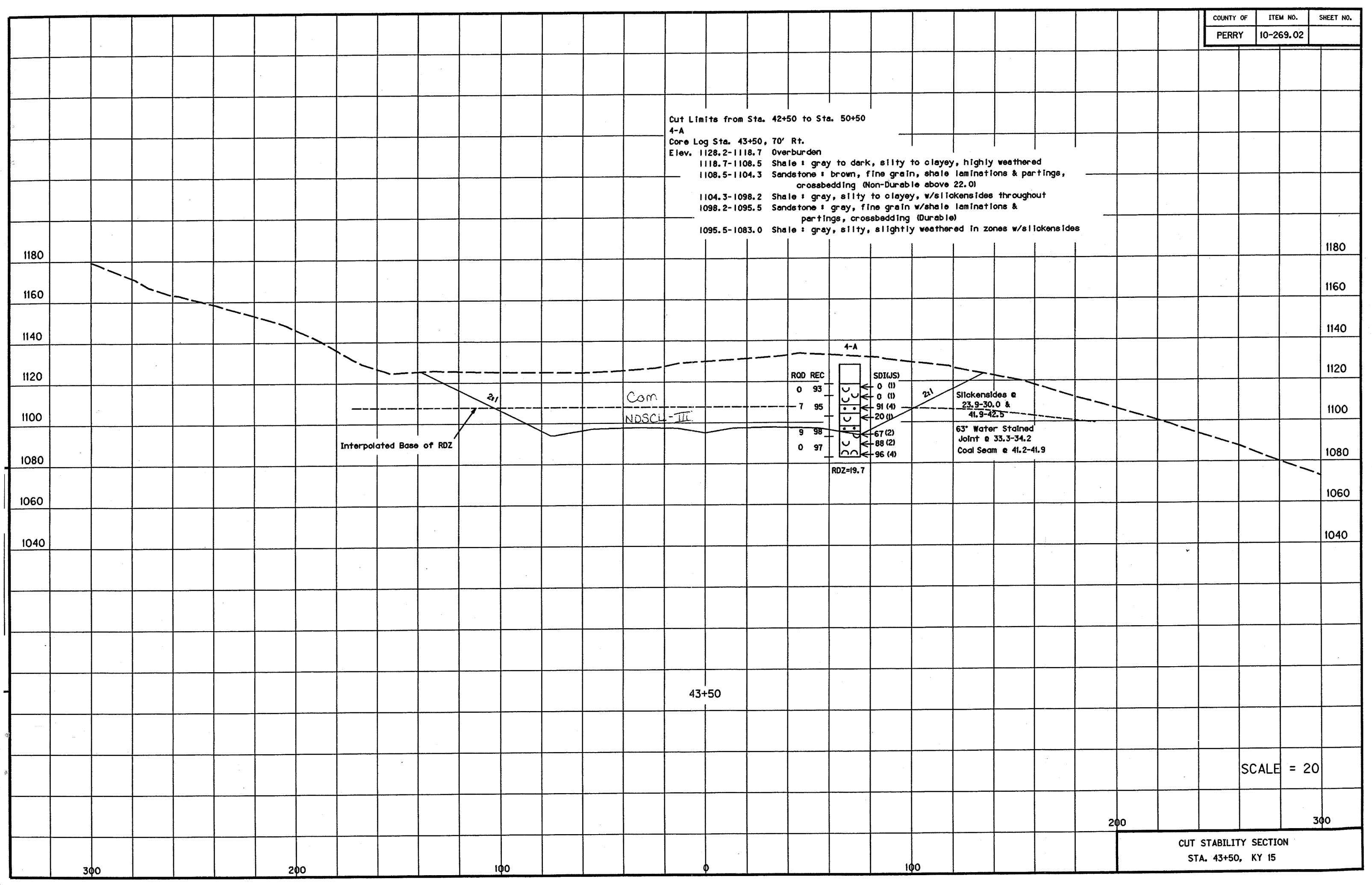
COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 42+50 to Sta. 50+50

4-A

Core Log Sta. 43+50, 70' Rt.

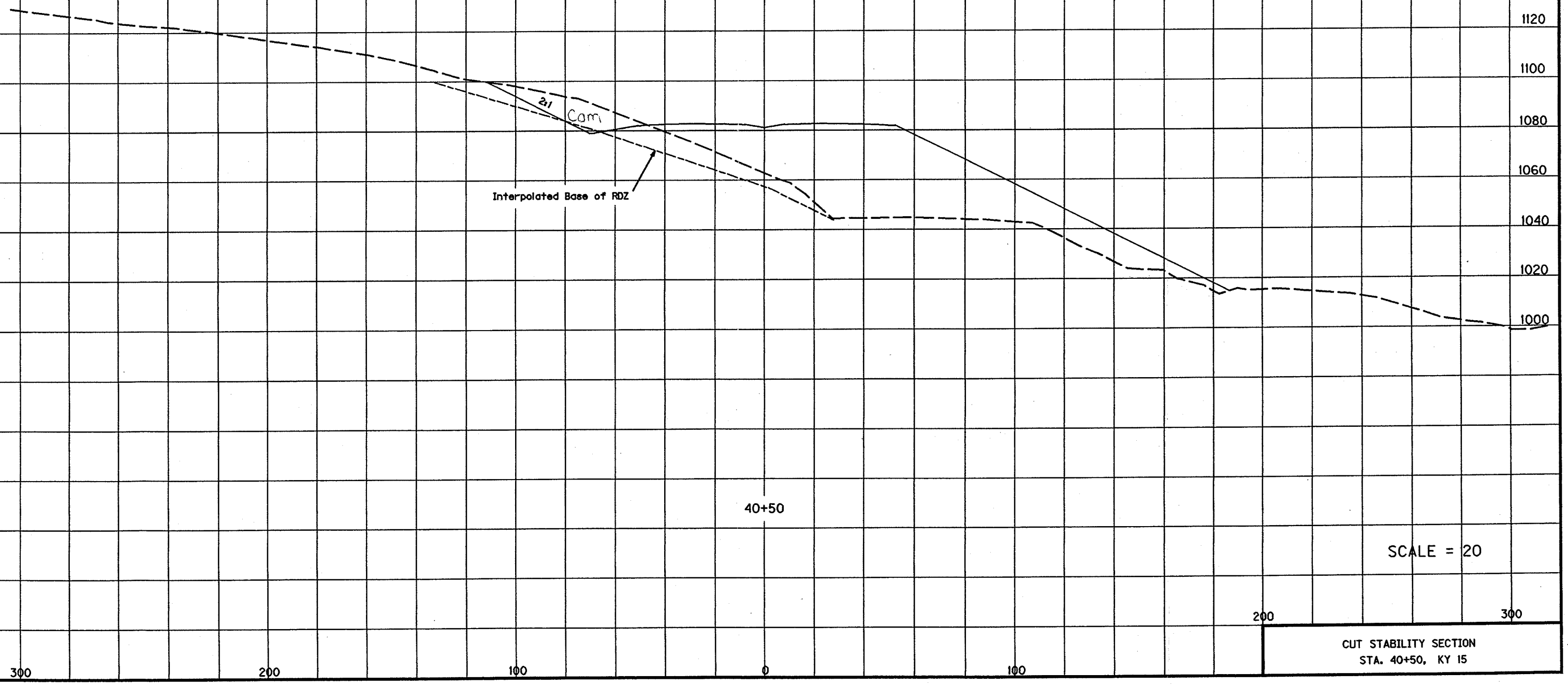
Elev. 1128.2-1118.7 Overburden
1118.7-1108.5 Shale : gray to dark, silty to clayey, highly weathered
1108.5-1104.3 Sandstone : brown, fine grain, shale laminations & partings, crossbedding (Non-Durable above 22.0)
1104.3-1098.2 Shale : gray, silty to clayey, w/slickensides throughout
1098.2-1095.5 Sandstone : gray, fine grain w/shale laminations & partings, crossbedding (Durable)
1095.5-1083.0 Shale : gray, silty, slightly weathered in zones w/slickensides



CUT STABILITY SECTION
STA. 43+50, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 40+00 to Sta. 41+50
NOTE : See Core Log Information @ Station 35+50



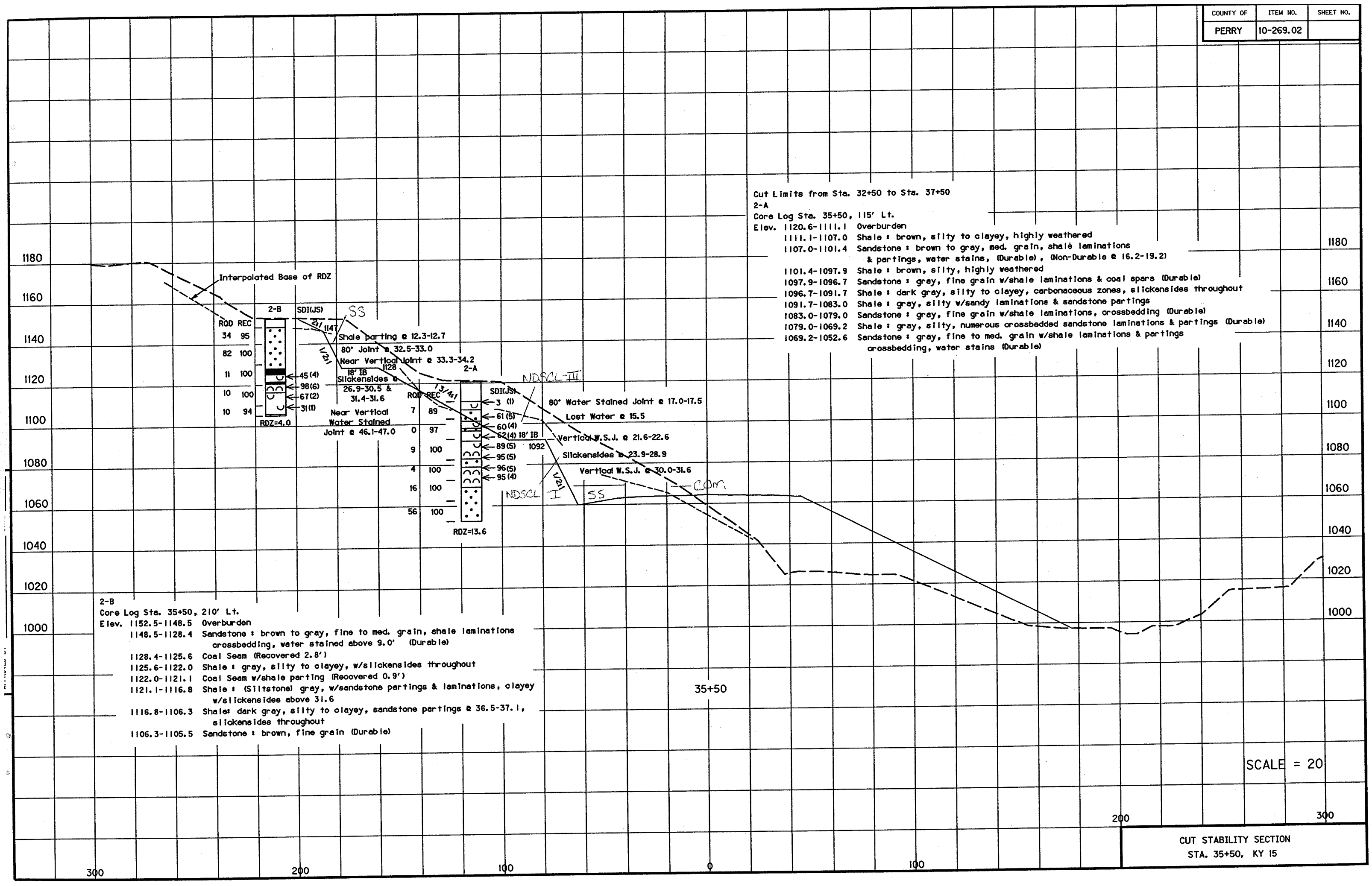
SCALE = 20

CUT STABILITY SECTION
STA. 40+50, KY 15

DATE

APPROVED BY

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	



Cut Limits from Sta. 32+50 to Sta. 37+50

2-A

Core Log Sta. 35+50, 115' Lt.

Elev. 1120.6-1111.1 Overburden
1111.1-1107.0 Shale : brown, silty to clayey, highly weathered
1107.0-1101.4 Sandstone : brown to gray, med. grain, shale laminations & partings, water stains, (Durable), (Non-Durable @ 16.2-19.2)
1101.4-1097.9 Shale : brown, silty, highly weathered
1097.9-1096.7 Sandstone : gray, fine grain w/shale laminations & coal spars (Durable)
1096.7-1091.7 Shale : dark gray, silty to clayey, carbonaceous zones, slickensides throughout
1091.7-1083.0 Shale : gray, silty w/sandy laminations & sandstone partings
1083.0-1079.0 Sandstone : gray, fine grain w/shale laminations, crossbedding (Durable)
1079.0-1069.2 Shale : gray, silty, numerous crossbedded sandstone laminations & partings (Durable)
1069.2-1052.6 Sandstone : gray, fine to med. grain w/shale laminations & partings crossbedding, water stains (Durable)

2-B

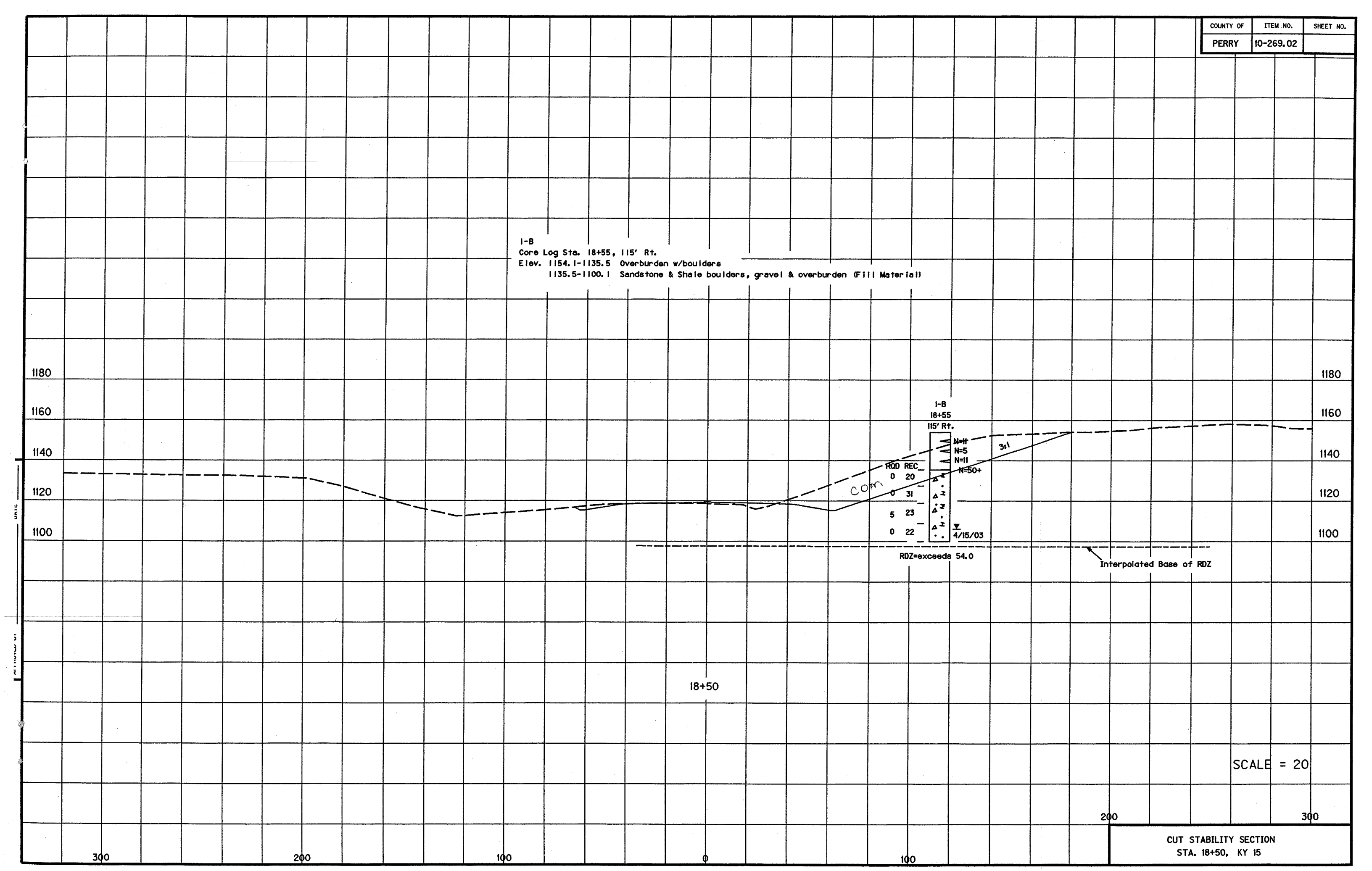
Core Log Sta. 35+50, 210' Lt.

Elev. 1152.5-1148.5 Overburden
1148.5-1128.4 Sandstone : brown to gray, fine to med. grain, shale laminations crossbedding, water stained above 9.0' (Durable)
1128.4-1125.6 Coal Seam (Recovered 2.8')
1125.6-1122.0 Shale : gray, silty to clayey, w/slickensides throughout
1122.0-1121.1 Coal Seam w/shale parting (Recovered 0.9')
1121.1-1116.8 Shale : (Siltstone) grey, w/sandstone partings & laminations, clayey w/slickensides above 31.6
1116.8-1106.3 Shale: dark gray, silty to clayey, sandstone partings @ 36.5-37.1, slickensides throughout
1106.3-1105.5 Sandstone : brown, fine grain (Durable)

CUT STABILITY SECTION
STA. 35+50, KY 15

COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

I-B
Core Log Sta. 18+55, 115' Rt.
Elev. 1154.1-1135.5 Overburden w/boulders
1135.5-1100.1 Sandstone & Shale boulders, gravel & overburden (Fill Material)



CUT STABILITY SECTION
STA. 18+50, KY 15

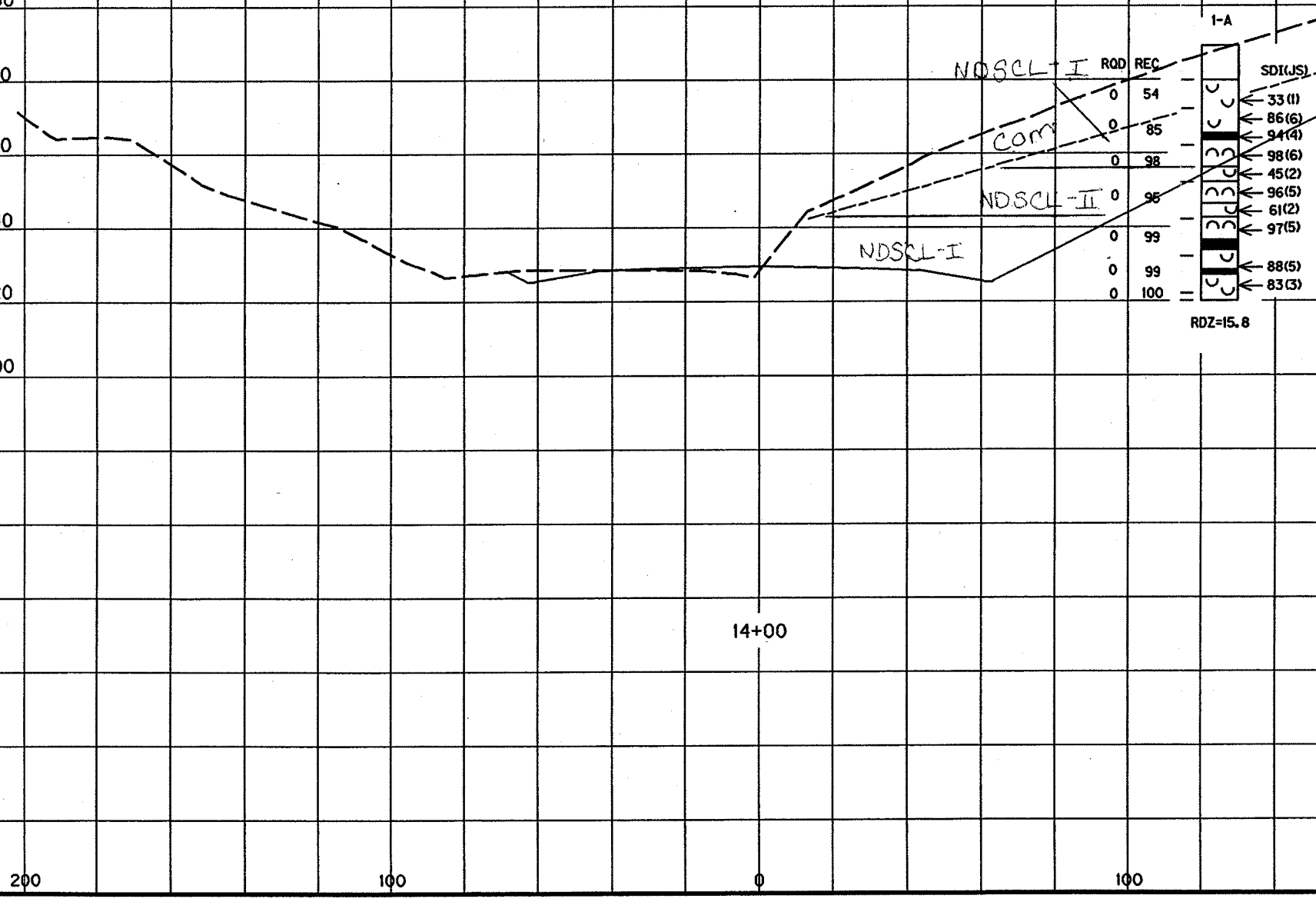
COUNTY OF	ITEM NO.	SHEET NO.
PERRY	10-269.02	

Cut Limits from Sta. 14+00 to Sta. 22+00

I-A

Core Log Sta. 14+00, 125' Rt.

Elev. 1189.0-1179.8 Overburden
1179.8-1165.3 Shale : brown to gray. silty w/sandy laminations above 15.8
1165.3-1163.5 Coal Seam (Recovered 0.4')
1163.5-1156.1 Shale : gray, silty w/sandy laminations & slickensides
1156.1-1152.1 Shale : gray, silty to clayey w/slickensides throughout
1152.1-1146.3 Shale : gray, silty
1146.3-1142.6 Shale : gray silty to clayey w/slickensides throughout
1142.6-1136.4 Shale : gray, silty to sandy
1136.4-1133.7 Coal Seam (Recovered 2.3')
1133.7-1128.4 Shale : gray, sandy to silty
1128.4-1127.0 Coal Seam w/carbonaceous shale partings (Rec. 1.4')
1127.0-1120.0 Shale : gray, silty to clayey, slickensides throughout, sandstone below 68.3'



SCALE = 20

CUT STABILITY SECTION
STA, 14+00, KY 15