CBC Designs Additional Slurry Storage for Betsie Branch Impoundment in Bell County Kentucky

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This Case Study presents the design of additional stages for Betsie Branch Refuse Disposal facility owned by Nally & Hamilton located in Bell County, Kentucky. The site can be found on the Balkan and Varilla, USGS quad-rangle maps. It is at 36º 45' - 23.2" North latitude and 83º 33' - 11.6" West longitude. The additional stages for the structure are to be constructed of coarse refuse with a final crest elevation of 1455 feet, providing approximately 7,127,271 cubic yards of slurry disposal to an elevation of 1439 feet. At the time of design, the facility consists of an existing embankment that had been previously ap-proved to a crest elevation of 1352 feet, with an approved fine coal refuse elevation of 1340 feet.

At the time of this design, the crest elevation of the existing structure was 1300 to 1310 feet. The facility had been abandoned and the fine coal refuse in the impoundment had been covered. The water drained around the facility via an excavated spillway on the left abutment looking downstream. The elevation of the control inlet of the spillway is 1292 feet based on previous approved designs from 1981.The purpose of this new design was to provide the design of two additional stages above the currently approves 1352 feet of the structure, up to a final elevation of 1455 feet. The previously approved crest was 1352 feet and Stage A of this new design proposed raising the structure to a new elevation of 1410 feet. Stage B would then raise the crest to a final elevation of 1455 feet. It was proposed in this design that sound rock from the mining operation be used to fill the new stages to 1290 feet. This will provide added stability and drainage characteristics to the facility. A cohesive facing, 10 feet thick (measured perpendicular to the slope) was designed to be constructed on the upstream face of the embankment to inhibit seepage. Because of the height and storage capacity of this structure it is rated a Class C, High Hazard Structure. The stages of this structure are shown in Table 1-1 below.

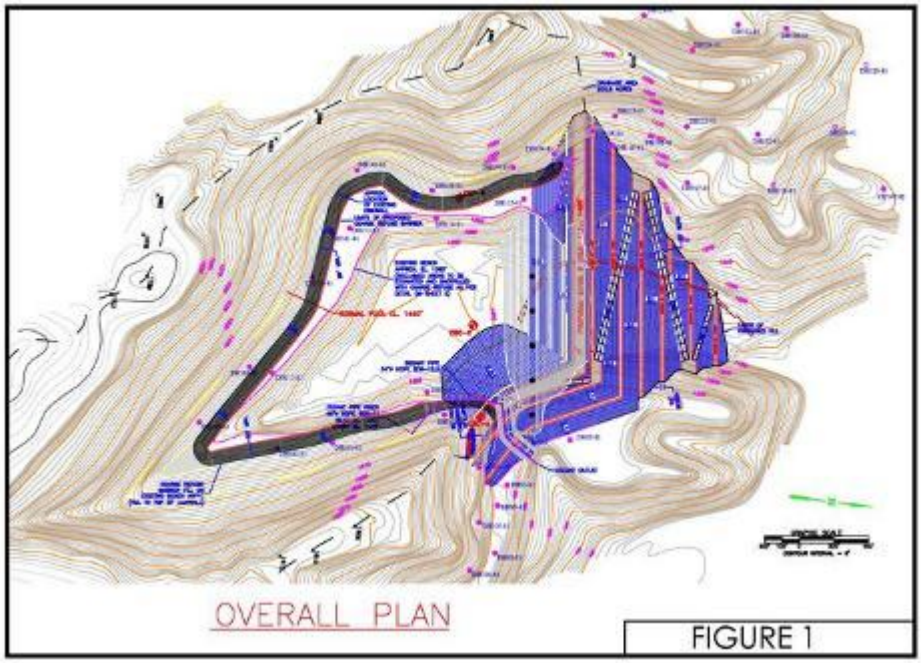
Table 1-1

Staging Details

STAGE NO.	CREST ELEV. (ft)	VOL. TO CONSTRUCT (cu. yds)		TIME TO CONSTRUCT (yrs)		STORAGE PROVIDED FOR SLURRY AT END OF STAGE (cu. yds)		ELEV. OF SLURRY AT END OF STAGE (ft)
		IND.	CUM.	IND.	CUM.	(cu. yds)	CUM. TIME (yrs)	
Previously Approved	1352	445,305		0.53		1,114,241	5.48	1306
*Sound rock Toe	1290	1,394,033		--	--	--	--	--
A1+ Mine Barrier	1410	2,047,044	2,047,044	2.44	2.44	1,114,241	5.48	1326
A2	1410	162,275	2,209,319	0.19	2.63	3,838,664	18.88	1327
B	1455	2,354,598	4,563,917	2.81	5.44	7,127,271	35.0	1343

The outlet for the structure during construction of Stage A was designed to be the approved excavated spillway for the approved stage of construction. The spillway had an inlet elevation prior to new construction of 1340 feet. Slurry can be deposited in the reservoir up to 1 foot below the 1340 elevation. A 34 inch O.D., SDR 15.5 HDPE decant pipe with a 48 inch diameter riser with SDR = 21 will be installed during stage A and constructed to elevation 1410 leaving the spillway open. When Stage A1 reaches elevation 1410 feet, the decant pipe installed in the spillway with an inlet of 1390 feet was design ed to be utilized as the principal spillway, closing the gap in the in the approved excavated spillway. The pipe will pass the PMF storm water with three (3) feet of freeboard or greater and will evacuate 90% of the stored storm water in less than 10 days for all stages. The decant pipe will provide the means of passage for the deign of storm for the remainder of the construction some 35 years.

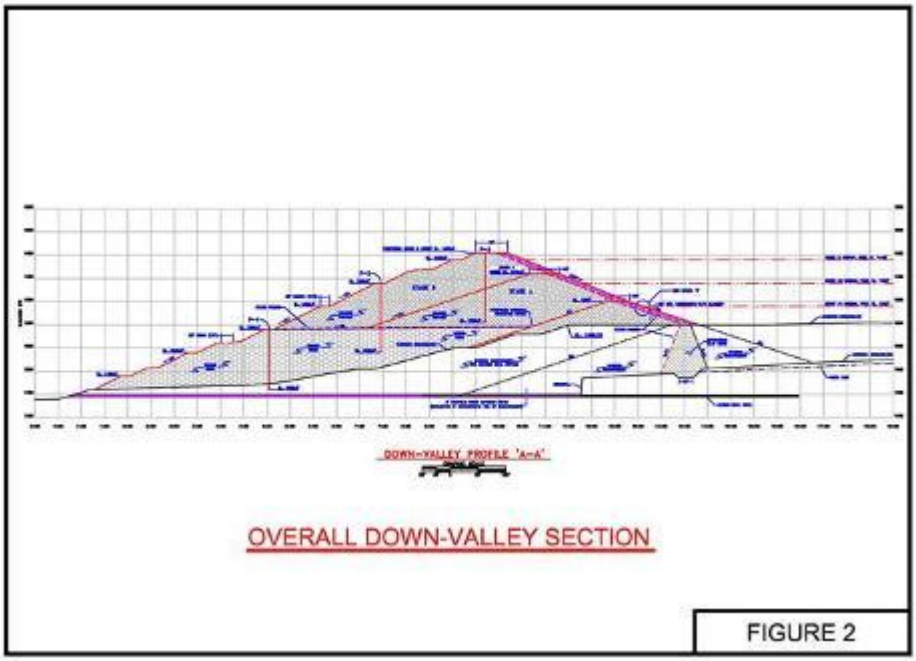
Figure 1



CBC Design Avoids Additional Stream Impact Saving Time to Permit the Expansion

Both additional stages designed in this expansion of the existing embankment were designed to be constructed on the existing structure, and neither of the stages extend downstream of the existing toe of the original embankment. There was, therefore, was no need for an extension of the existing underdrain. In addition, since the construction is totally within the plan area of the existing structure, no additional stream area was impacted. The coarse refuse fill is designed to be compacted in accordance with the requirements of refuse dams (95% of maximum standard Proctor dry unit weight) Figure 2 shows a composite down-valley section of the designed structure.

Figure 2



Should you have any questions about this Case Study, please contact our ***Director of Marketing*** - **Joe Dennis** @ 937-428-6150.