I. CIVIL DESIGN

A. Introduction

Pearce Creek Confined Disposal Area is a 260 acre site that consists of a perimeter dike that is approximately 13,850 linear feet at an average elevation of +47.0 (NAVD88), a baffle dike that is approximately 2,250 linear feet, a containment dike that is approximately 1,550 linear feet, a sluice box with three-30 inch diameter steel outflow pipes, and a series of perimeter access roads. The design effort for the lining of Pearce Creek Confined Disposal Area includes earthwork, installation of a new sluice box and outflow pipes, installation of a geomembrane liner, placing protective fill on top of the geomembrane liner, reestablishing the existing dikes to elevation +50.0 (NAVD88), construction and grading of baffle dikes, and construction of a new access road along the top of the dike. The existing grades within the confined disposal area are such that there is positive drainage towards the existing sluice box and outflow pipes located at the southeastern most portion of the disposal area. The new sluice box and outflow pipe location will be relocated along the northern most disposal area dike. The inflow locations (discharge pipe locations for dredging operations) will be at the southwestern and southeastern most corner of the disposal area. See Figure 1 for the existing configuration of the facility and Figure 2 for the proposed configuration of the facility.

B. Demolition

Prior to beginning grading operations within the confined disposal area, the existing sluice box and three existing 30 inch diameter steel outflow pipes will be removed. Also, an existing 30 inch diameter steel dredging discharge pipe from the Elk River will be removed. The trench constructed to remove the pipe will be backfilled with dredge material on the inside of the existing dike. Any trenching required for pipe removal on the exterior of the existing dike will be backfilled with select material to existing grade and seeded as per the contract specifications.

The contractor will be responsible for maintaining drainage within the disposal area during construction once the outflow pipes are removed. The existing baffle dike and the existing containment dike will be removed in order to grade the area and install the geomembrane liner.

C. Grading

The contour grading is designed so that positive drainage is achieved towards the new sluice box location, which is along the northern most perimeter dike (see Figure 2). The overall flow path for the final grade is from elevation +38.0 (NAVD88) to the sluice box location which has been set at elevation +21.8 (NAVD88). For future capacity, it was determined that a minimum of 12 feet would be needed between the elevation of the top of the dike and the elevation of the liner. Due to this, at the inflow locations, elevation +38.0 (NAVD88) was selected as the highest finish grade elevation within the disposal area.

Underneath the existing dike, the liner will be placed at elevation +47.0 (NAVD88) for the entire length of existing perimeter dike. In areas where the existing dike is higher than elevation +47.0 (NAVD88), the existing dike will need to be cut down. The material obtained

from cutting the dike down in these locations will be used to fill any locations along the dike where the existing dike is lower than elevation +47.0 (NAVD88). Since elevation +47.0 (NAVD88) is the average elevation of the existing dike, the earthwork quantities should be close to being balanced for liner placement underneath the existing dike.

At the inside edge along the top of the existing perimeter dike, the liner grade will proceed down the face of the existing dike at a 3H:1V slope until it reaches elevation +38.0 (NAVD88). In order to achieve the 3H:1V slope down the existing face, some minor shaping of the dike may be required. From elevation +38.0 (NAVD88), the liner is sloped between 0.15% and 0.6%. This is an average of approximately 0.4% over the entire area of the liner along the drainage path from the inflow locations to the sluice location (see Figure 3). Using a steeper slope over the entire area using the determined starting elevation forced the invert of the sluice to a very low elevation (for example, using a constant 0.5% slope brought the elevation of the sluice box to approximately elevation +18.5 (NAVD88)). The conditions of the soil at elevations at this level are not suitable for achieving proper stability of the sluice structure. Due to the conditions of the soil, the slopes had to vary across the area of the liner in order to bring the elevation of the sluice structure above the wet and unsuitable soils.

At least 1 foot of protective fill on top of the geomembrane liner is required to protect it from being damaged during future operations within the disposal area. The outside limit of dike raising operations is set at a location that is 3 feet from the outside edge of the existing dike. From this location, at elevation +47.0 (NAVD88), which is the location of the geomembrane liner, the final grade for the dike will have a 2H:1V slope on the outside face to elevation +50.0 (NAVD88), a 14 foot top width, and a 3H:1V slope on the inside face. The final grade incorporates the 1 foot protective fill on top of the liner and the criteria used to raise the dikes to elevation +50.0 (NAVD88). To achieve the final grades as described, roughly 1,400,000 cubic yards of cut and 1,400,000 cubic yards of fill will be required.

From the sluice box location, the drainage will proceed through four-36 inch diameter solid HDPE (High Density Polyethylene) outflow pipes that will discharge into Elk River. The pipes are each approximately 660 feet long and flow from the sluice box at an invert elevation of +22.3 (NAVD88) to an outlet elevation of approximately +1.0 (NAVD88). At the outlet end of the pipe, there will be riprap erosion protection.

D. Roads

The top of the dike at elevation +50.0 (NAVD88) will also be used as an access road. The access roadway surface will be made up of 6 inches of crusher run aggregate (MSHA CR-6). The limits of the CR-6 will be to a distance of 5 feet on either side of the new dike centerline. The existing access roads will tie into the new access road on top of the raised dike using the same 6 inch thickness of CR-6 at a maximum slope of 10%. There will also be a dike with an access road that extends from the northern perimeter dike to the sluice location.

E. Figures

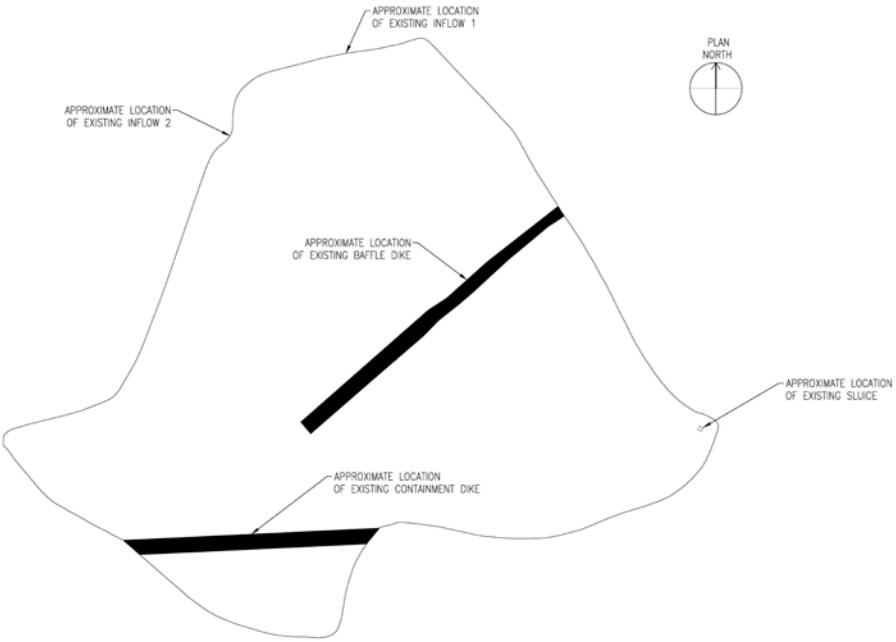

Figure 1: Existing Facility Configuration

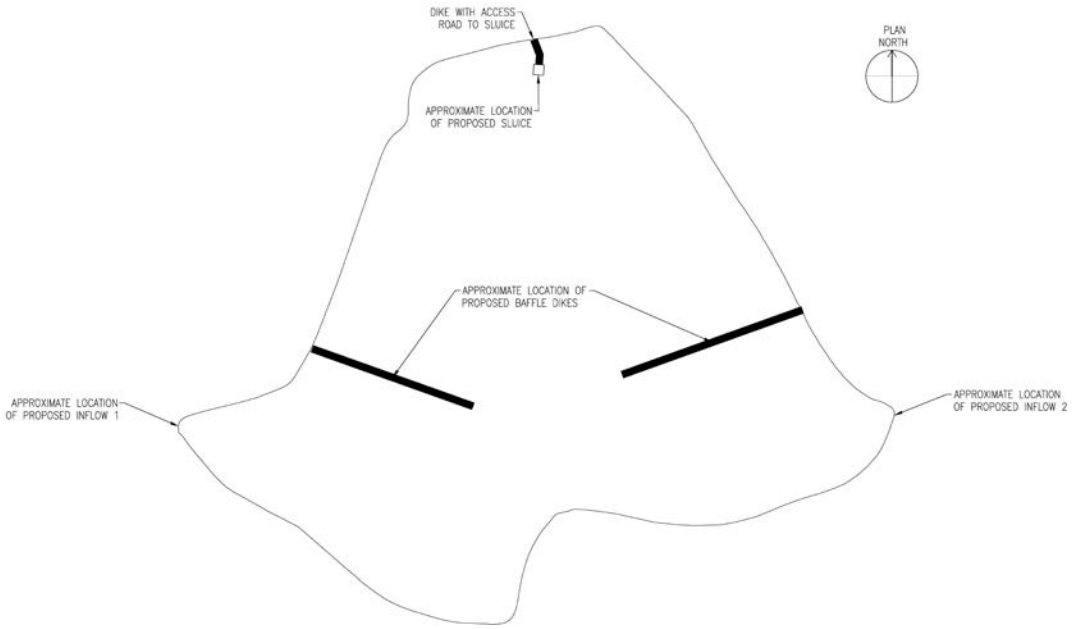

Figure 2: Proposed Facility Configuration

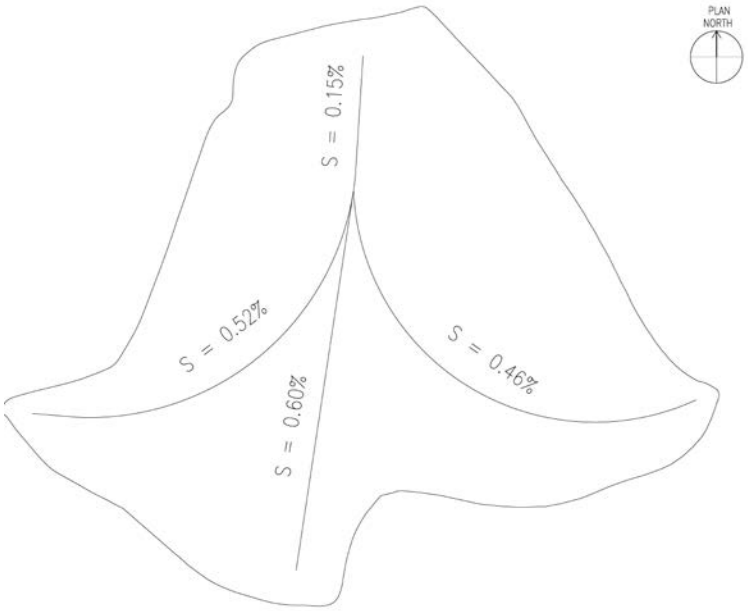

Figure 3: Defined Drainage Paths and Corresponding Grades