ASH POND D DESIGN & CONSTRUCTION HISTORY
POSSUM POINT POWER STATION
DUMFRIES, VIRGINIA

Introduction

In support of the design and permitting efforts for the closure of Ash Ponds A, B, C, D and E at Possum Point Power Station, this document has been prepared to provide historical design and construction information regarding the current Ash Pond D, which is located northwest of the Power Station on Possum Point Road. The information contained herein is taken from the current Pond D design drawings and specifications, investigations, construction documentation/records, historical photos, and other related documents.

Ash Pond History – Possum Point Power Station

As noted above, there are five ash ponds at Possum Point that were constructed at various times within the history of the Station to store coal combustion residuals (fly ash and bottom ash) from power generating operations. These are shown on Figure 1. Ponds A, B, and C are located west of Possum Point Road and were used to store sluiced ash until the early 1960's. These were formed by damming three adjacent drainage ways and sluicing the ash to the formed impoundments. These filled by the early 1960's and original Ash Pond D was constructed on the north side of Possum Point Road by damming another natural drainage way. Its dam axis ran northwest-southeast and the dam had a crest elevation of +55 msl. Ash was sluiced to this location until 1967when it filled to capacity. In 1967, Ash Pond E was constructed to the west of original Ash Pond D and was used to store day to day ash produced at the station until the Station stopped burning coal in 2004. Ash pond E was formed by damming another large natural drainage way to the north and west of the others. Figure 2 is the 1967 design drawing for Ash Pond E which shows the then existing Ash Pond D dam and the proposed Ash Pond E dam. Photo 1 shows the downstream slope of the old Ash Pond D embankment viewed from Possum Point Road.

In the mid 1980's as Ash Pond E began to fill, Dominion investigated options to provide for future ash storage. The site of the original Ash Pond D (at the time filled to near capacity and abandoned) was investigated and a design was developed that would construct a new, taller dam (top elevation +150 msl) at the location of the old dam and provide adequate storage space for a term of 30-40 years. Ash Pond E would continue to be used for day to day ash storage but when it reached near capacity, it would be hydraulically dredged every 2-3 years and the accumulated ash transferred to the "new" Ash Pond D. The new (and current) Ash Pond D dam was constructed in 1987-1988.

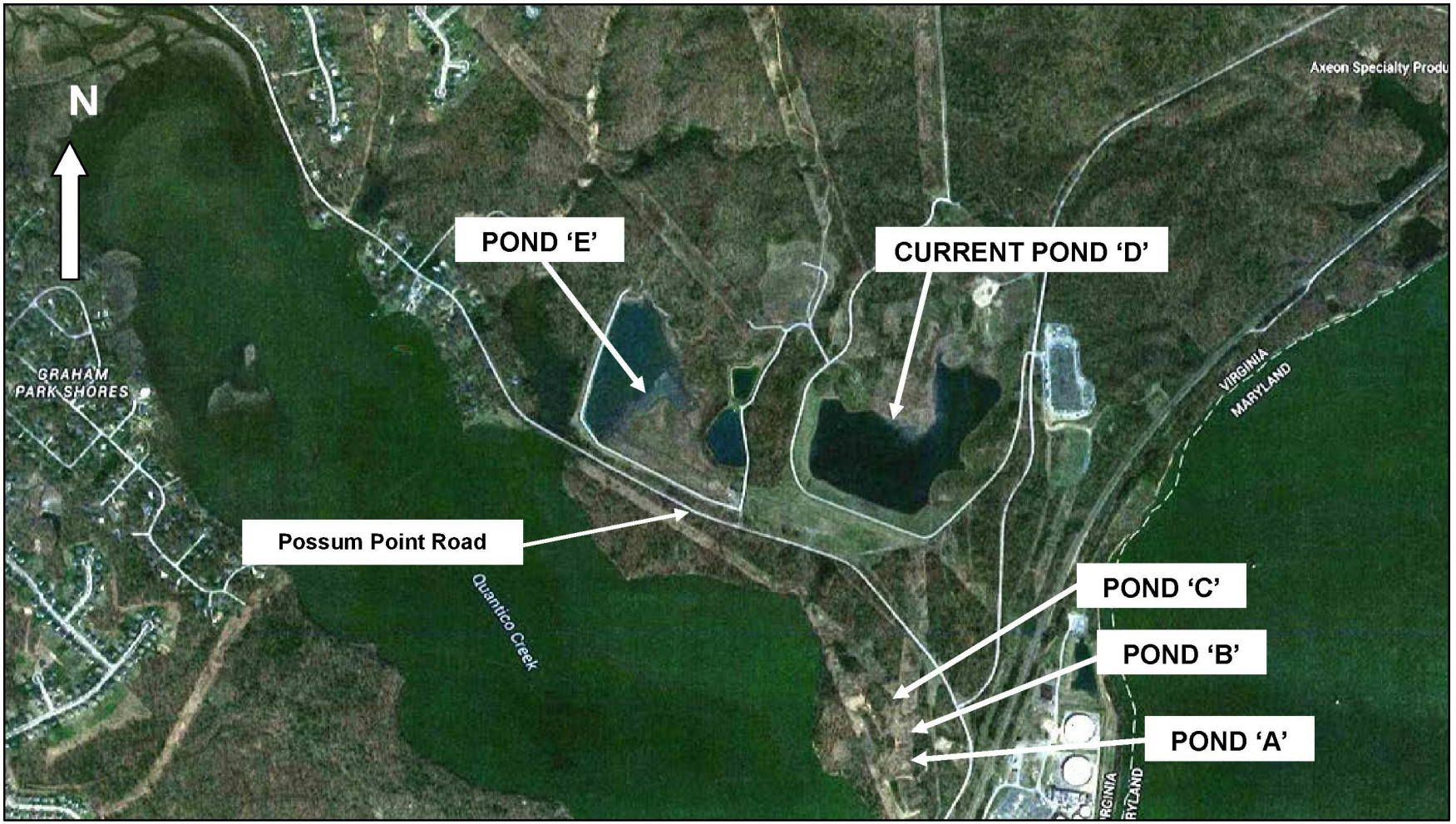


FIGURE 1
POSSUM POINT ASH PONDS - AERIAL VIEW

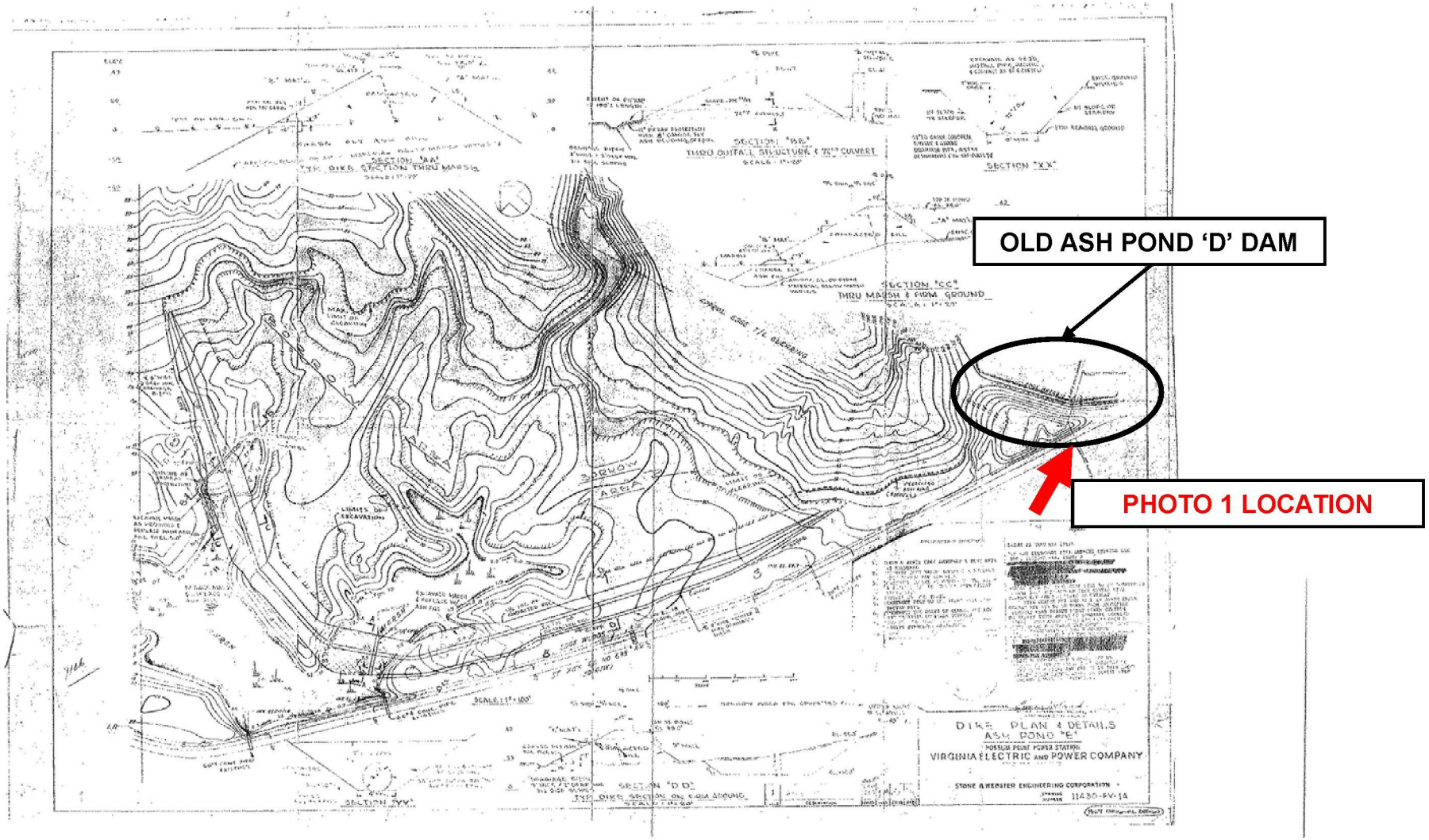


FIGURE 2
1967 ASH POND 'E' DESIGN DRAWING 11430-FY-1A
SHOWING THEN EXISTING OLD ASH POND 'D' DAM

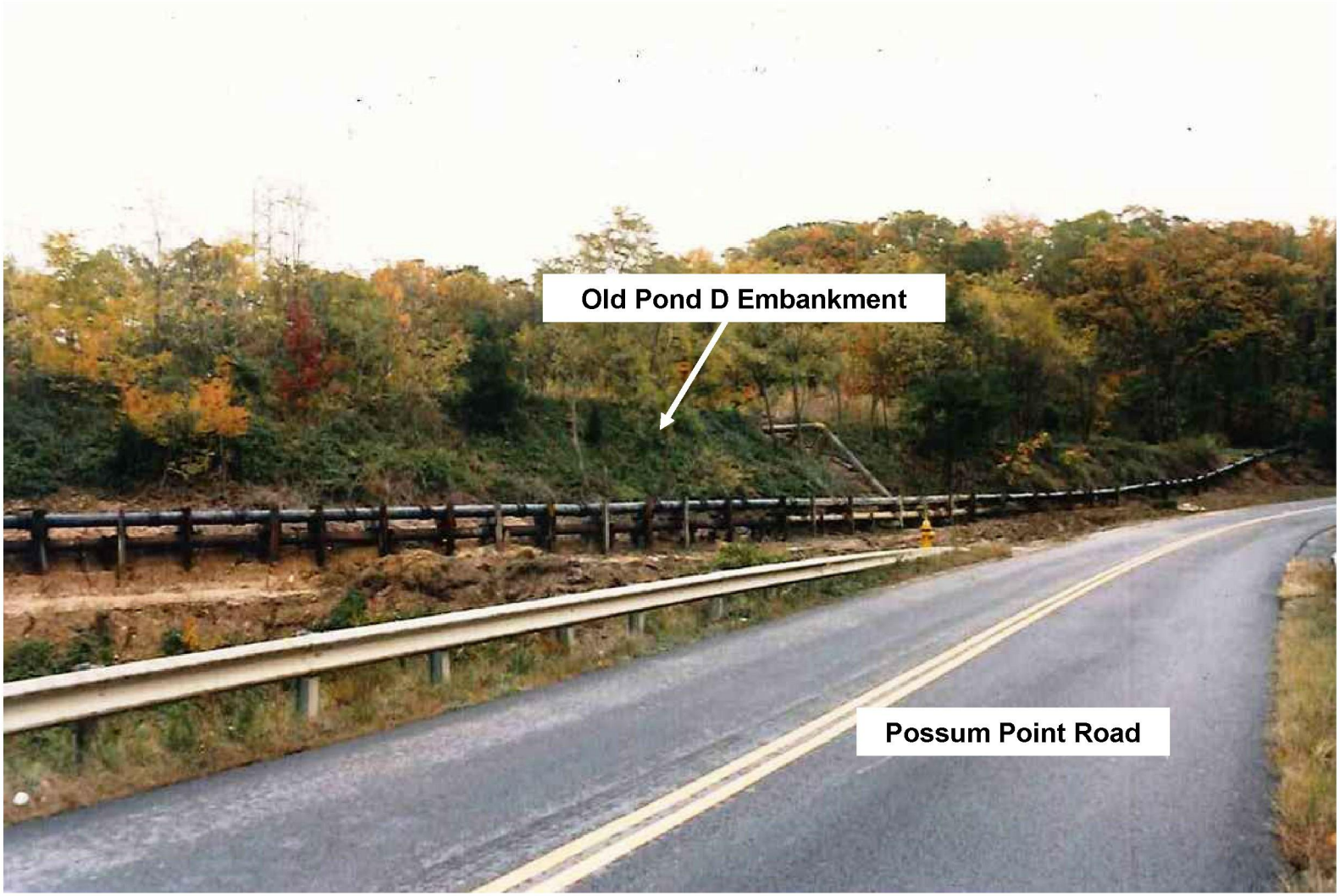


PHOTO 1
OLD POND D EMBANKMENT DOWNSTREAM SLOPE – 1986
CREST ELEVATION 55 +/-

New Ash Pond D Pond Design Features

Dam Foundation

A part of the "new" Ash Pond D design effort in 1986, subsurface investigations were performed to identify subsurface conditions at the location of the proposed new dam and in areas that were being considered to obtain borrow soils for new dam construction. The new dam would be constructed where the old dam had previously impounded up to 50 feet of fly ash and bottom ash. In addition, there were up to 20 feet of soft sediments below the ash. In order to construct the new dam, it would be necessary to remove the impounded ash and soft sediments beneath the "foundation" of the new dam to provide a stable surface upon which to place dam fill and to limit settlement of the new dam. Figure 3 is a cross section developed from the subsurface investigations at the centerline of the proposed new Ash Pond D dam showing the ponded ash from the old dam, soft sediments below, and the naturally occurring soil layers along the abutments of the new dam (and within the proposed impoundment). Photos 2, 3 and 4 show the removal of ash from the old Ash Pond D within the footprint of the new Ash Pond D dam and initial placement of new dam fill.

Groundwater Protection Plan

Subsurface investigations previously noted identified that there were two water-bearing sand layers at the proposed new dam site and within the final perimeter of the new impoundment. In order to provide protection of the groundwater in these layers from any potential affect from the impounded ash, a groundwater protection scheme was developed and implemented to satisfy DEQ permit requirements.

The ash remaining from elevation 55+/- msl down to elevation 0 to +10 msl upstream of the new dam would be "surrounded" by a low permeability slurry trench wall. The wall would be keyed into a natural clay layer located below the entire site. From the top of the wall up to the Emergency Spillway elevation of +144 msl, the impoundment slopes would be lined with a minimum of one foot of compacted low permeability clay where the slope soils consisted of sand. Where the slope soils consisted of naturally occurring low permeability clay, no liner would be placed. Where there was a liner, it would be tied into the natural clay at their interface. This system would provide a continuous low permeability protective barrier to minimize any potential affects to groundwater from the ponded ash. Figure 4 shows the design location of the proposed new Ash Pond D dam, the old dam, the design location of the proposed slurry wall, and the proposed limits of the clay liner in a plan view. Figure 3 also shows the groundwater protection plan features in cross section.

Internal Drainage System

In order for the dam to be built at the desired geometry (location, height, and slopes), it was designed with an internal drainage system to keep the downstream slope dry and stable and to properly convey any infiltration through the dam from the new impoundment in a properly designed and controlled fashion. This drainage system consisted of a blanket drain and toe drain trench that extended as much as 275

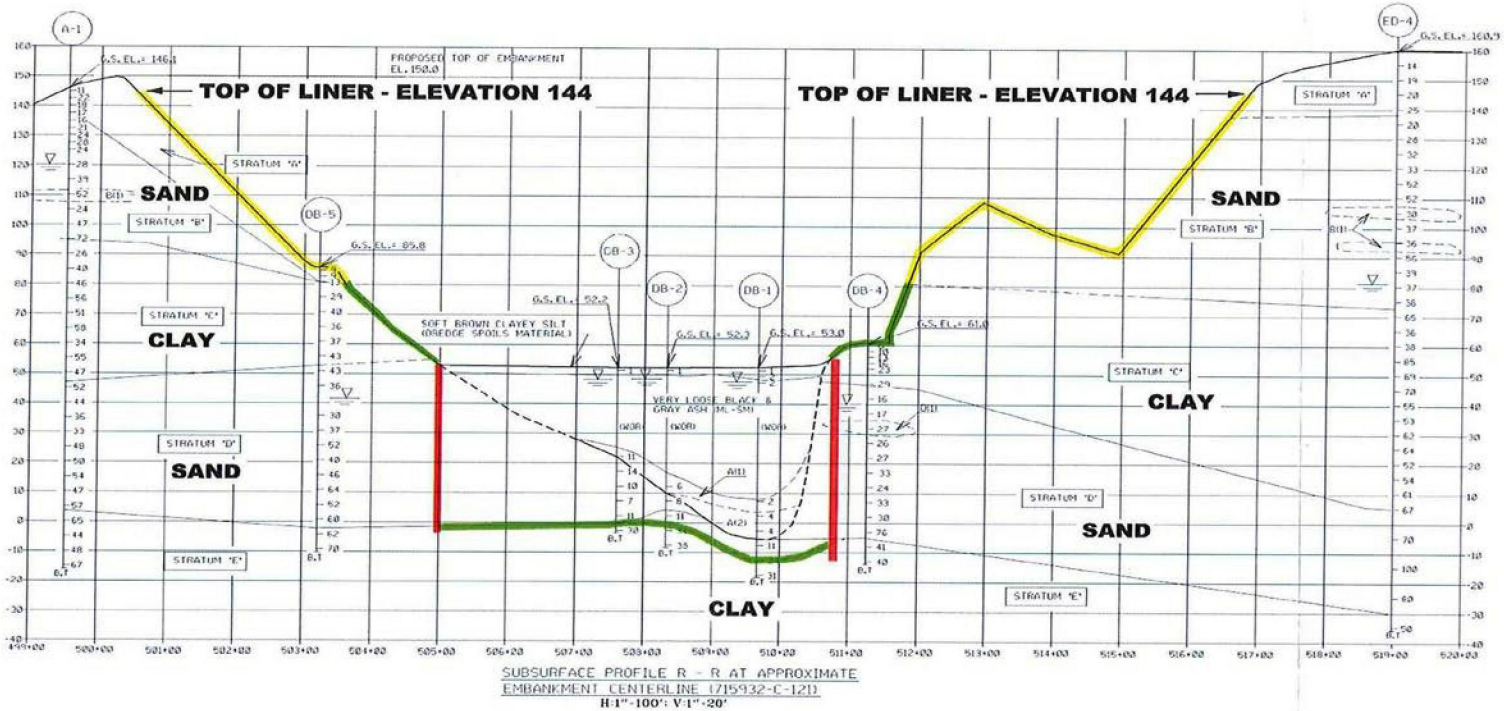
upstream from the toe of the dam. It consisted of VDH&T #57 crushed aggregate surrounded by VDH&T Class A fine aggregate acting as a filter.

This drainage system was designed to collect any infiltration through the dam or from naturally occurring groundwater and safely convey it downstream of the dam. The blanket/toe drain discharge was tied into a storm water junction box (built as part of the new dam construction) and any discharge into the box would flow through a then existing 72-inch diameter pipe that ran under Possum Point Road. The new junction box was constructed adjacent to the previously existing 72-inch pipe to provide a location for surface storm water runoff from the face of the dam and adjacent areas as well as the blanket/toe drain flow to be routed downstream.

Figure 5 is a plan view of the "new" Ash Pond D dam showing the blanket/toe drain (shaded), the surface storm drains, the previously mentioned slurry wall, and limit of the clay liner where they are located on the dam. Figure 6 is a cross section of the new Ash Pond D dam showing the blanket/toe drain, slurry wall, and clay liner limits at the approximate tallest section of the dam. Photo 5 is a 1988 construction photo showing the construction of the blanket drain. Figure 7 is a detail showing a cross section of the junction box adjacent to Possum Point Road that collects surface storm water runoff from the downstream face and adjacent areas of the Ash Pond D dam as well as inflows from the blanket/toe drain.

Photo 6 is a current (2014) view of the toe area of the Ash Pond D dam and a portion of the downstream slope.

1988 GROUND WATER PROTECTION CONCEPT
POSSUM POINT ASH POND 'D'



LEGEND

- SLURRY TRENCH WALL
- NATURAL CLAY
- ONE (1) FOOT THICK COMPACTED CLAY LINER

FIGURE 3
SUBSURFACE PROFILE ACROSS PROPOSED NEW ASH POND D DAM CENTERLINE

PHOTO 2
OLD POND D ASH WITHIN THE NEW DAM FOOTPRINT – SUMMER 1987

PHOTO 3
REMOVAL OF ASH FROM NEW POND D FOOTPRINT – OCTOBER 1987

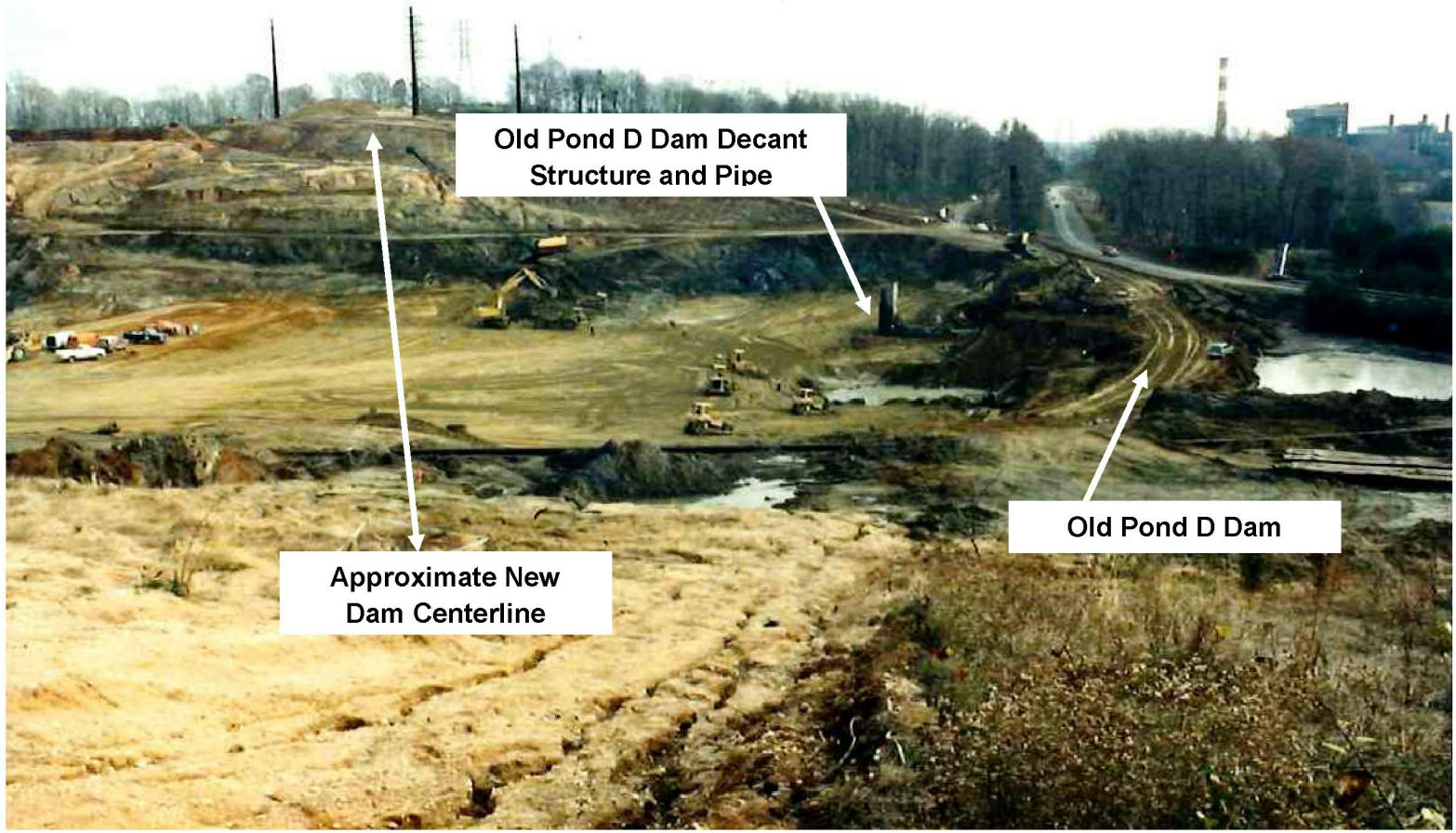


PHOTO 4
FILL OPERATIONS AT BASE OF NEW DAM – DECEMBER 1987
OLD ASH POND D DECANT STRUCTURE AND PIPE UNEARTHED

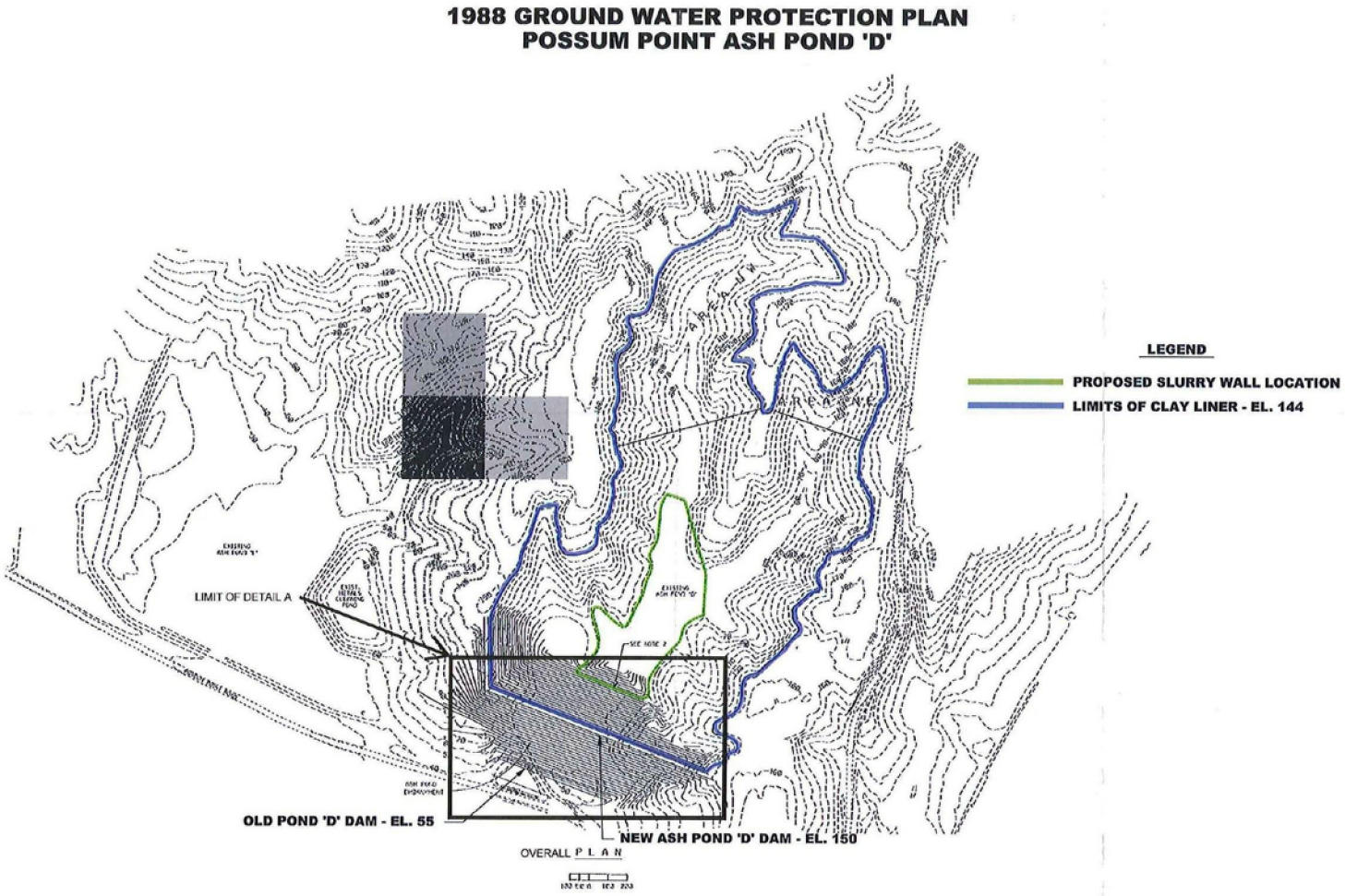


FIGURE 4
NEW ASH POND D GROUNDWATER PROTECTION PLAN

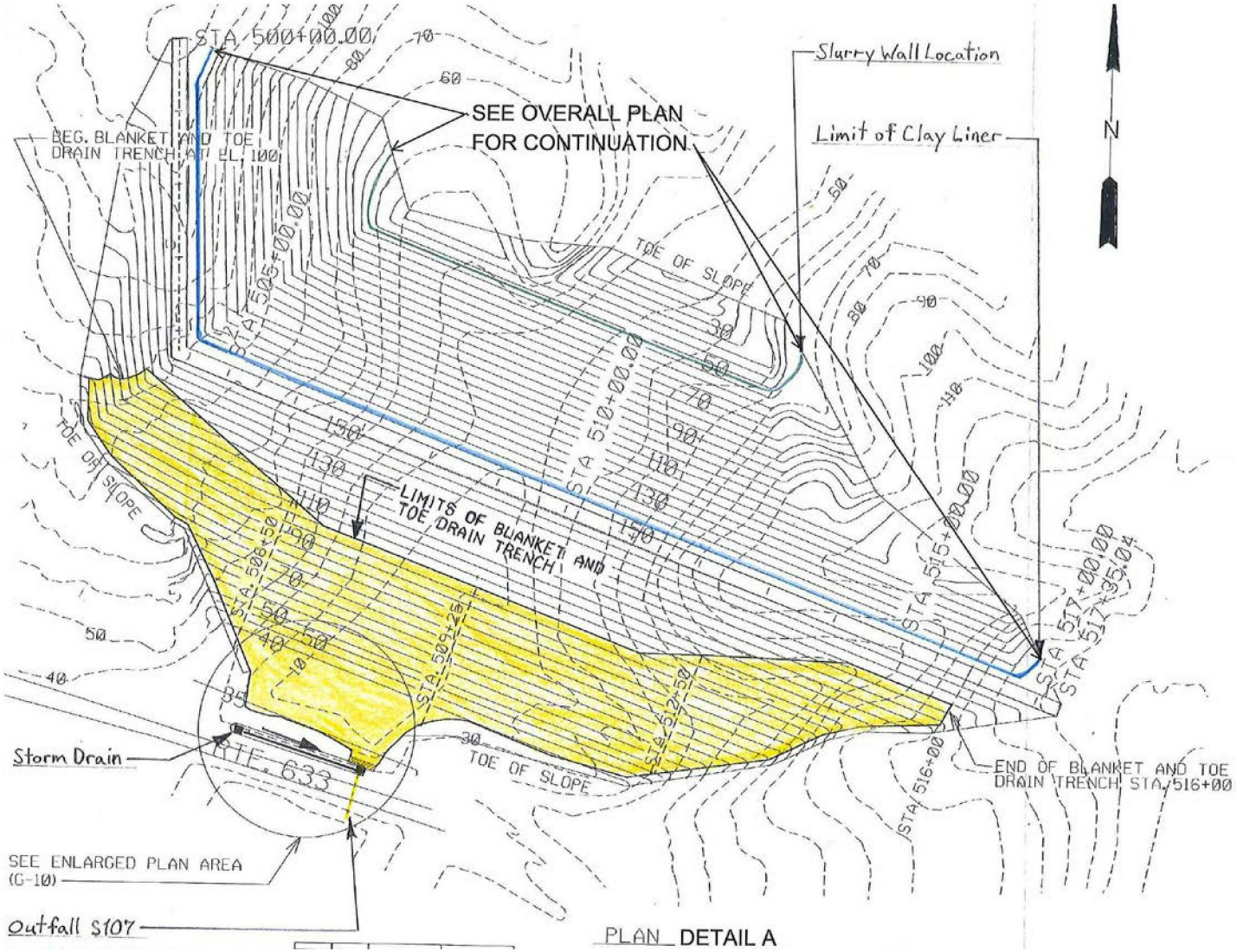


FIGURE 5
PLAN VIEW - ASH POND 'D' DAM BLANKET/TOE DRAIN LIMITS

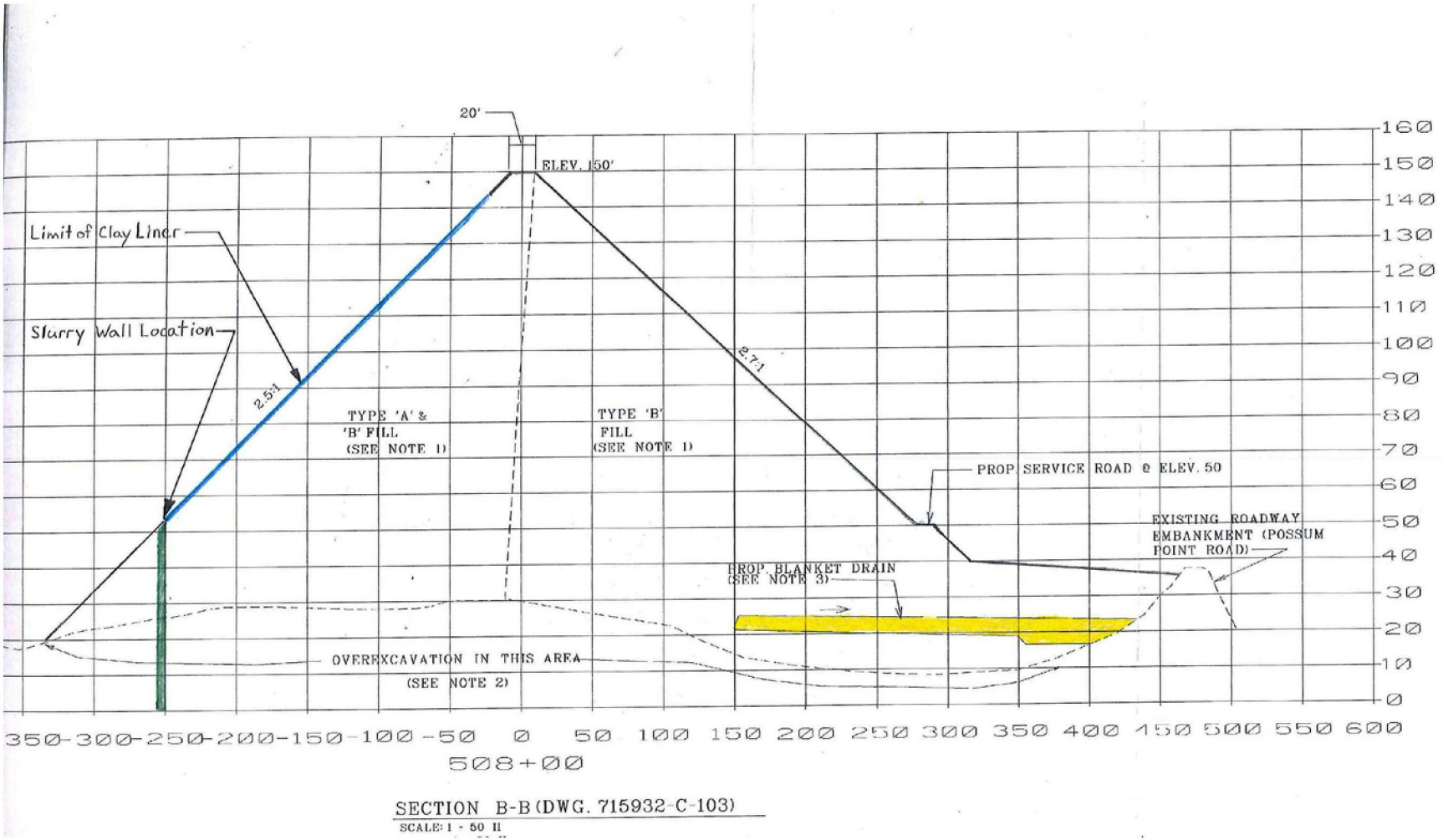
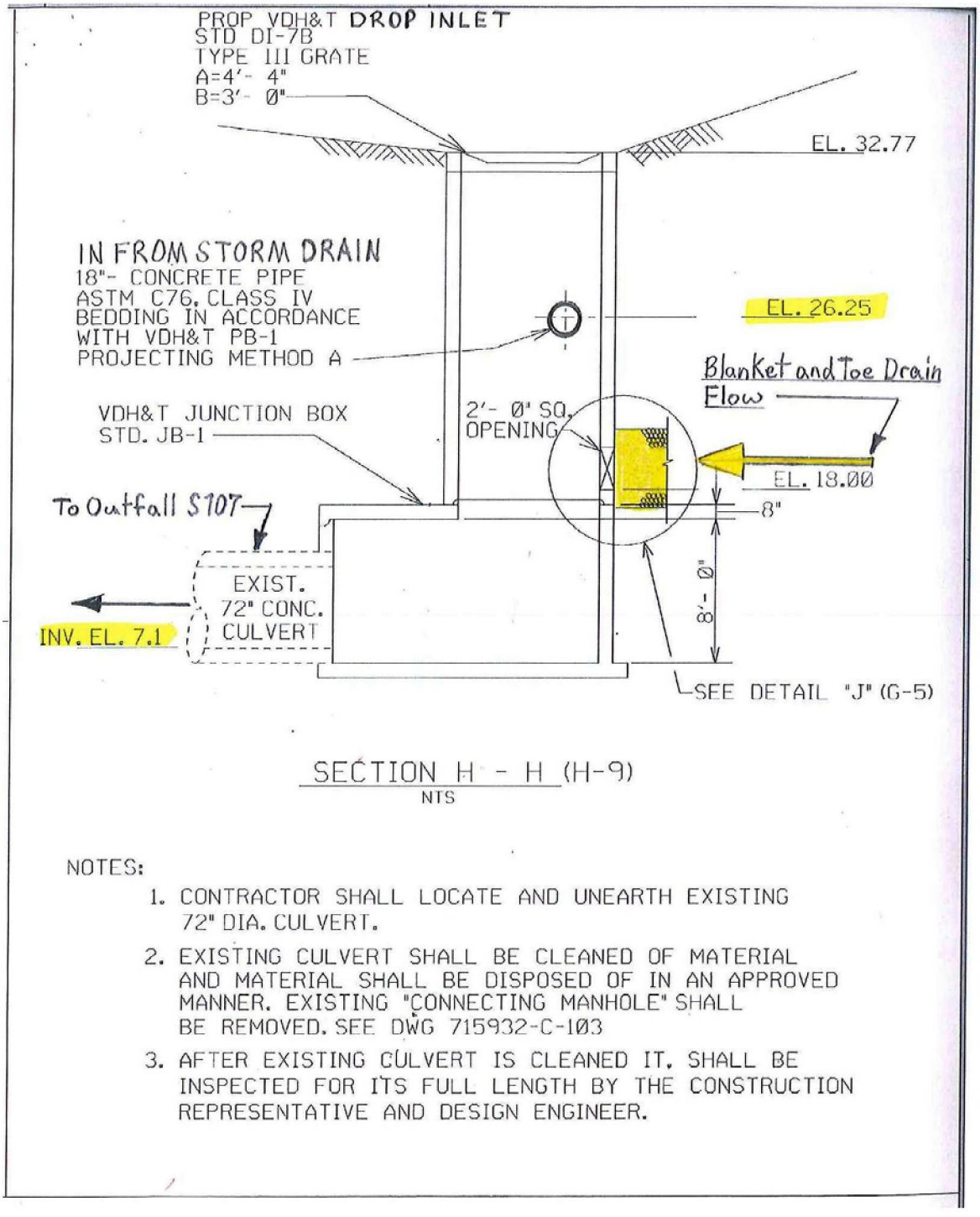


FIGURE 6
CROSS SECTION - ASH POND 'D' DAM BLANKET /TOE DRAIN AT TALLEST SECTION

PHOTO 5
NEW ASH POND D DAM – BLANKET-TOE DRAIN CONSTRUCTION – APRIL 1988



NOTES:

1. CONTRACTOR SHALL LOCATE AND UNEARTH EXISTING 72" DIA. CULVERT.
2. EXISTING CULVERT SHALL BE CLEANED OF MATERIAL AND MATERIAL SHALL BE DISPOSED OF IN AN APPROVED MANNER. EXISTING "CONNECTING MANHOLE" SHALL BE REMOVED. SEE DWG 715932-C-103
3. AFTER EXISTING CULVERT IS CLEANED IT, SHALL BE INSPECTED FOR ITS FULL LENGTH BY THE CONSTRUCTION REPRESENTATIVE AND DESIGN ENGINEER.

FIGURE 7
DETAIL - ASH POND 'D' DAM
BLANKET/TOE DRAIN AND STORM WATER INFLOW TO JUNCTION BOX

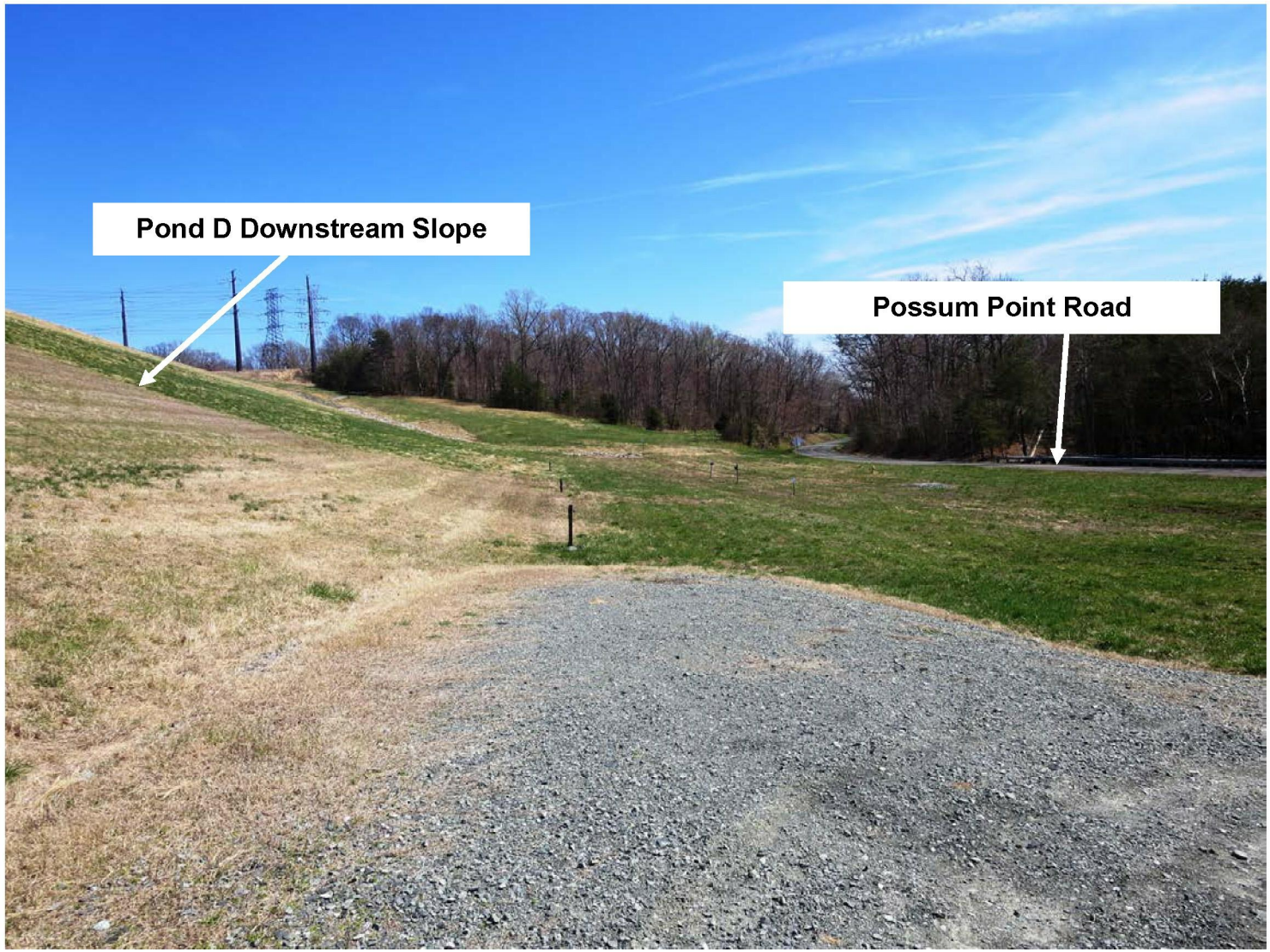


PHOTO 6
ASH POND D DOWNSTREAM SLOPE AND TOE AREA – APRIL 2014