

APPENDIX Q

**Culvert C-9a
and
Coal Stockpile
Extension**



01/99

Appendix Q
Culvert C-9a and Coal Stockpile Extension

Culvert C-9a is a 15" CMP which carries drainage from ditch D-13 to Sediment Pond 'A'. This culvert has been extended approximately 180' to allow for expansion of the coal stockpile area, as shown on Plates 1 and 2. The extended culvert is also a 15" CMP and continues to carry drainage from ditch D-13 to Pond 'A'. Extending the culvert and stockpile has the following effects on the hydrologic controls:

- 1- Drainage area to Ditch D-13 is reduced to approximately 4.59 acres, reducing the flow to this ditch from 5.51 cfs to 4.43 cfs;
- 2- The flow to extended culvert C-9a is from ditch D-13 and is also reduced from 5.51 cfs to 4.43 cfs;
- 3- Ditch D-14 and culvert C-9b have been eliminated.

The extended stockpile area will also have the effect of eliminating ditch D-14 and a 12" CMP culvert C-9b, which flowed to Sediment Pond 'A'. Due to the difficulties of maintaining ditches and culverts along the edge of a coal stockpile, these structures will be eliminated, and flow from the stockpile and Primary Road PR-5 will continue to go to Sediment Pond 'A' in the form of sheet flow.

New calculated flows for culvert C-9a and ditch D-13 are shown on Tables IV-8 and IV-13, respectively. Ditch D-14 and culvert C-9b have also been eliminated from these tables. The extended culvert and stockpile area are shown on revised Plates 1 and 2. Computer backup calculations are included with this appendix.

Project Title = DRAINAGE TO D-13 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1
Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0
Area = 4.6 acres
Hydraulic length = 800.00 Feet
Elevation change = 31.0 feet.
Concentration time = 0.11 hours
Concentration time type = SCS Upland Curves
Unit hydrograph type = Disturbed

-- Total Area = 4.6 acres

-- Storm data

Total precipitation = 1.9 inches
Storm type = SCS Type 2 storm, 24 hour storm
Peak Discharge = 4.43 cfs
Discharge volume = 0.39 acre ft

Project Title = DRAINAGE TO C-9a

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0
Area = 4.6 acres
Hydraulic length = 800.00 Feet
Elevation change = 31.0 feet.
Concentration time = 0.11 hours
Concentration time type = SCS Upland Curves
Unit hydrograph type = Disturbed

-- Total Area = 4.6 acres

-- Storm data

Total precipitation = 1.9 inches
Storm type = SCS Type 2 storm, 24 hour storm
Peak Discharge = 4.43 cfs
Discharge volume = 0.39 acre ft

Title of run: DITCH D-13

Solving for.....= Depth Normal

triangle

Flow depth (ft).....=	0.97
First Side slope.....=	1.0
Second Side slope.....=	1.0
Slope of diversion.....=	0.0262
Manning"s n.....=	0.025
CFS.....=	4.43
Cross section area (sqft)..=	0.94
Hydraulic radius.....=	0.34
fps.....=	4.72
Froude number.....=	1.42

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: ANDALEX WILDCAT

Comment: CULVERT C-9a

Solve For Full Flow Diameter

Given Input Data:

Slope.....	0.0200 ft/ft
Manning's n.....	0.025
Discharge.....	4.43 cfs

Computed Results:

Full Flow Diameter.....	1.22 ft
Full Flow Depth.....	1.22 ft
Velocity.....	3.80 fps
Flow Area.....	1.16 sf
Critical Depth....	0.86 ft
Critical Slope....	0.0280 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	4.43 cfs
QMAX @ .94D.....	4.77 cfs
Froude Number.....	FULL