

APPENDIX P
PROPOSED CULVERT ADDITIONS
WILDCAT LOADOUT

MARCH 1998

*Proposed Culvert Additions
Wildcat Loadout
March 1998*

INCORPORATED
EFFECTIVE:
MAY 05 1998
UTAH DIVISION OF OIL, GAS AND MINING
CBA

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General

The upper areas of ditches D7 and D8 along Primary Road PR-9 have been showing signs of erosion due to the change in grade at this upper end. Gabions and silt fence had been installed; however, they were not as effective as hoped, and were a constant maintenance problem, particularly during the heavy rains of 1997.

This proposal is to remove the gabions and silt fence and place 50' - 70' of culvert in the upper ends of each ditch. The culverts will be fitted with an end section or small headwall to ensure runoff will go into the culvert and ditch. Sizing calculations for runoff from these areas show that 12" C.M.P. culverts are more than adequate to handle the expected flows.

The culverts will be installed in disturbed area ditches and will drain to existing ditches and to Sediment Pond "C" as shown on Plate 1.

Culvert Installation

It is proposed to add two 12" C.M.P. culverts (one on each side) along Primary Road - 9. One culvert will be approximately 70' long and will be placed in Ditch D8 on the south side of the road. This culvert will collect runoff from the coal stockpile area and direct it into ditch D8 and to Sediment Pond "C". This culvert will be designated C-36.

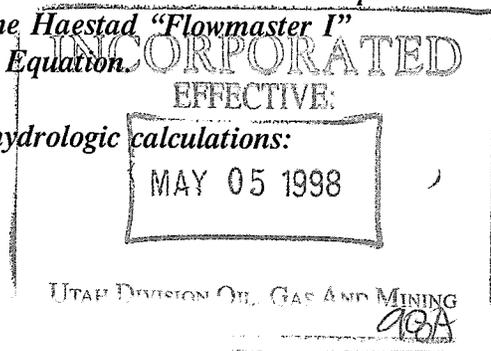
The other culvert will be located directly across the road from C-36. This culvert will be approximately 50' in length, and will convey runoff from the Shop area to ditch D7 and to Sediment Pond "C". This culvert will be designated C-37.

The culvert locations are shown on revised Plate 1 in the Wildcat Loadout Permit.

Calculations

Runoff calculations were performed using the O.S.M. "Storm 6.21" Computer Program. Culvert sizing was checked with the Haestad "Flowmaster I" Program, Version 3.43, using the Manning's Equation.

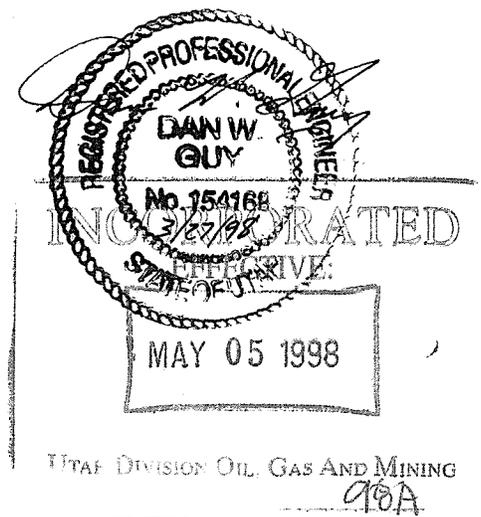
The following parameters were used for the hydrologic calculations:



<i>Culvert</i>	<i>C-36</i>	<i>C-37</i>
<i>Drains From:</i>	<i>Coal Stockpile</i>	<i>Shop Area</i>
<i>Drainage Area (ac.)</i>	<i>0.80</i>	<i>0.69</i>
<i>Hyd. Length (ft.)</i>	<i>250</i>	<i>250</i>
<i>Elevation Change (ft.)</i>	<i>5</i>	<i>10</i>
<i>Runoff CN</i>	<i>90</i>	<i>90</i>
<i>10 yr.-24 hr. Event (in.)</i>	<i>1.85</i>	<i>1.85</i>
<i>Peak Flow - 10/24 (cfs)</i>	<i>0.74</i>	<i>0.58</i>
<i>Culvert Slope (%)</i>	<i>6.5</i>	<i>6.5</i>
<i>Culvert Length (ft.)</i>	<i>70</i>	<i>50</i>
<i>Manning's No. (Culvert)</i>	<i>0.020</i>	<i>0.020</i>
<i>Velocity (fps)</i>	<i>4.47</i>	<i>4.21</i>
<i>Req'd Culvert Diam. (ft.)</i>	<i>0.46</i>	<i>0.42</i>
<i>Actual Culvert Diam. (ft.)</i>	<i>1.00</i>	<i>1.00</i>

Summary

The proposed 12" culverts are adequately sized to carry the expected runoff from a 10 year - 24 hour precipitation event for the respective drainage areas. The expected outlet velocities are less than 5 fps; therefore, no outlet protection should be necessary.



Project Title = WILDCAT C-36 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

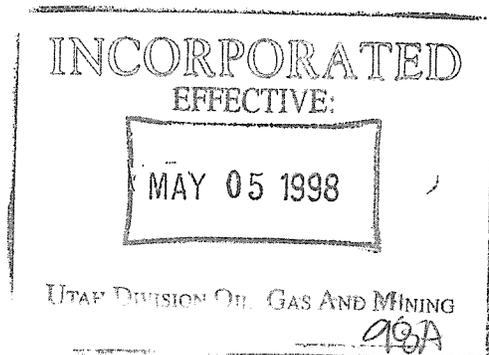
-- Watershed data for watershed # 1

Curve number = 90.0
Area = 0.8 acres
Hydraulic length = 250.00 Feet
Elevation change = 5.0 feet.
Concentration time = 0.05 hours
Concentration time type = SCS Upland Curves
Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches
Storm type = SCS Type 2 storm, 24 hour storm
Peak Discharge = 0.74 cfs
Discharge volume = 0.06 acre ft



Project Title = WILDCAT C-37 (10/24)

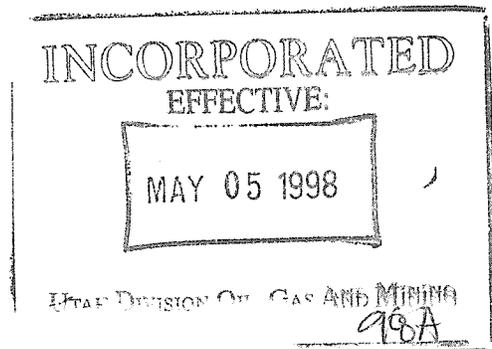
WATERSHED HYDROGRAPH

Inflow into structure # 1
Structure type: Null

-- Watershed data for watershed # 1
Curve number = 90.0
Area = 0.7 acres
Hydraulic length = 250.00 Feet
Elevation change = 10.0 feet.
Concentration time = 0.03 hours
Concentration time type = SCS Upland Curves
Unit hydrograph type = Disturbed

-- Total Area = 0.7 acres

-- Storm data
Total precipitation = 1.9 inches
Storm type = SCS Type 2 storm, 24 hour storm
Peak Discharge = 0.58 cfs
Discharge volume = 0.06 acre ft



Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: WILDCAT LOADOUT

Comment: CULVERT C-36 (STOCKPILE AREA)

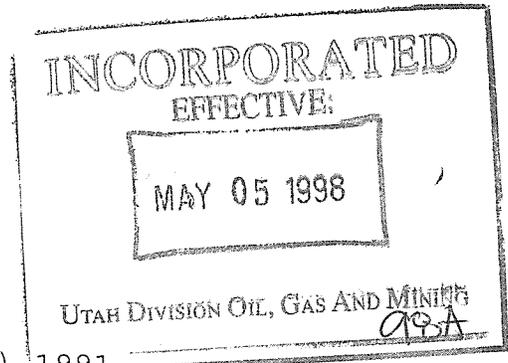
Solve For Full Flow Diameter

Given Input Data:

Slope.....	0.0650 ft/ft
Manning's n.....	0.020
Discharge.....	0.74 cfs

Computed Results:

Full Flow Diameter.....	0.46 ft
Full Flow Depth.....	0.46 ft
Velocity.....	4.47 fps
Flow Area.....	0.17 sf
Critical Depth....	0.43 ft
Critical Slope....	0.0563 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	0.74 cfs
QMAX @.94D.....	0.80 cfs
Froude Number.....	FULL



Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: WILDCAT LOADOUT

Comment: CULVERT C-37 (SHOP AREA)

Solve For Full Flow Diameter

Given Input Data:

Slope.....	0.0650 ft/ft
Manning's n.....	0.020
Discharge.....	0.58 cfs .68

Computed Results:

Full Flow Diameter.....	0.42 ft ✓
Full Flow Depth.....	0.42 ft
Velocity.....	4.21 fps
Flow Area.....	0.14 sf
Critical Depth....	0.39 ft
Critical Slope....	0.0564 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	0.58 cfs
QMAX @.94D.....	0.62 cfs
Froude Number.....	FULL

