LIST OF EXHIBITS (Continued)

No.	Title
28.	Thickener Underflow Design Details (7 maps)
29.	NPDES Discharge Water Quality Data Summaries
30.	Prediction of Subsidence Due to Two-Seam Longwall Mining in Section 18
31.	Sedimentation Pond Approval, Documentation and Certification
32.	Pond Detention Calculations
33.	Star Point Mines Refuse Pile Expansion - Operation and Monitoring Plan
34.	Air Quality Approval Correspondence
35.	Reclamation Bond
36.	Bond Calculations
37.	NPDES Permit
38.	Refuse Pile Stability Analysis
39.	Resource Recovery and Protection Plan Approvals
40.	An Annotated Literature Review on the Effects of Mulching on Surface Disturbances Associated with Reclamation in the Western States with Emphasis on Plant Establishment Water and Wind Erosion
41.	Golden Eagle Cliff Nesting and Subsidence Monitoring and Mitigation Plan
42.	Sediment Pond No. 2 Energy Dissipation Structure
43.	Water Rights Mitigation Plan
44.	Static Safety Factor on Reclaimed Areas Investigation
45.	Riprap Calculations
46.	Culvert Capacity Calculations
47.	Pond Inlet and Outlet Design Calculation
48.	Pond 9 Calculations
49.	Diversion Ditch and Culvert Peak Flow Calculations

LIST OF EXHIBITS (Continued)

No.	Title
50.	Reclamation Channel Calculations
51.	An Evaluation of the Toxic and Acid Forming Properties of Overburden and Coal Refuse Materials
52.	Response to Initial Completeness Review Comment UMC 784.14(a)(1) Permit Renewal - August 1987
53.	Hydrologic Response to Land Subsidence Caused by Underground Coal Mining, Miller Creek Drainage, Carbon County, Utah
54.	Hydrologic Modifications
55.	Exploration Permits

RECEIVED
APR 28 1989
DIVISION OF
OIL, GAS & MINING

EXHIBIT 48

POND 9 CALCULATIONS

CONSULTANTS/ENGINEERS
HANSEN ALLEN & LUCE INC
6771 SOUTH 900 EAST
MIDVALE, UTAH 84047
(801) 566-5599

September 17, 1987

Mr. Ben Grimes
Plateau Mining Company
P.O. Drawer PMC
Price, Utah 84501

Re: Sediment Pond 9 Design Calculations

Dear Ben:

Presented herein is a design summary and accompanying calculations for Sediment Pond 9, which is to be constructed to allow Cyprus Plateau Mining Corporation to begin filling between the Phase I and Phase II areas of the coal refuse pile. The tributary area to Sediment Pond 9 will comprise the majority of the tributary area to the existing Sediment Pond 5. Therefore Sediment Pond 9 will drastically reduce the required capacity of Sediment Pond 5. A summary of the design and results from the calculations are presented below, and the design calculations are appended hereto for submittal to the Division of Oil, Gas, and Mining for their review.

Pond Storage Capacity Requirements

Sediment Pond 9 has been designed to provide sufficient storage to accommodate an estimated 3-year accumulated sediment yield plus sufficient runoff volume to totally contain the runoff volume from a 10-year 24-hour precipitation event. The tributary area assumed in the design for Sediment Pond 9 is the total area that will ultimately be tributary to the pond upon completion of the construction of the coal refuse pile. At the present time a significant portion of the coal refuse pile area will not be tributary to the pond, but will continue to be tributary to Sediment Pond 5 until the area between the Phase I and Phase II areas of the refuse pile are filled in, thereby reversing the present direction for surface water drainage in the area of the refuse pile.

Sediment yield to Sediment Pond 9 was estimated using the Universal Soil Loss Equation. Since the majority of the area that was tributary to Sediment Pond 5 will become tributary to Sediment Pond 9 after construction of Pond 9, factors previously estimated for the derivation of sediment yield to Sediment Pond 5

were used to estimate the sediment yield to Sediment Pond 9. The estimated 3-year sediment yield to Sediment Pond 9 is 1.98 acre feet.

The runoff volume from the 10-year 24-hour precipitation event was estimated by use of the U.S. Soil Conservation Service curve number methodology. The required runoff storage volume in Sediment Pond 9 to provide sufficient storage to totally contain the estimated runoff from the 10-year 24-hour precipitation event, in addition to the three-year sediment storage volume, is 4.45 acre feet.

Spillways

Sediment Pond 9 has been designed to have both a primary and emergency spillway, with the crest of the emergency spillway set 1 foot higher than the crest of the primary spillway. As indicated on the plans, both spillways are pipe drop inlet type spillways consisting of a 36-inch diameter CMP standpipe, connected to a 36-inch CMP outlet pipe. The outlet pipe will discharge into the existing 60-inch diameter CMP culvert which receives runoff from the undisturbed areas west of the coal stacking and transfer area located north of Sediment Pond 9.

The spillways were designed such that the combined capacity of the primary and emergency spillways would allow passage of the routed hydrograph through the pond from the 25-year 24-hour precipitation event. Both inflow hydrograph prediction and routing of the inflow hydrograph through the pond were accomplished by use of the Army Corps of Engineers HEC1 computer model, using the Soil Conservation Service unit hydrograph curve number methodology option of the model. The inflow hydrograph was routed through the pond assuming that the pond was full to the crest of the primary spillway. By routing the inflow hydrograph through the pond, the hydrograph peak was reduced from the peak inflow of 52 cfs to a peak outflow of 40 cfs, the flowrate used in the design of the primary and emergency spillways.

The outflow hydrograph from the sediment pond was combined with the hydrograph through the 60-inch diameter culvert (into which the outflow from the pond will be discharged) to check the capacity of the 60-inch pipe with the added flow from the pond. The critical section of the 60-inch pipe is downstream from the discharge point from the pond where the 60-inch pipe changes from a full-round pipe to a half-round pipe. It was determined that the 60-inch half-round pipe could carry the combined peak (145 cfs) from the pond and the area tributary to the 60-inch pipe with 0.5 feet of freeboard.

Sediment Pond Efficiency

Dewatering of the runoff storage volume from the sediment pond will be accomplished using a self dewatering small diameter trickle type device, consisting of a 3-inch diameter orifice placed at the top of the sediment storage volume. The efficiency of the pond in removing inflowing sediments was estimated using the SEDIMOT II computer model, which is the IBM PC version of the DEPOSITS model developed by the Agriculture Engineering Department at the University of Kentucky for determining detention performance of sediments in trap structures. Results from the SEDIMOT II model are attached as part of the calculations for the design of the sediment pond. As indicated on the attached printout, the estimated peak effluent settleable concentration of suspended sediments using the 3-inch diameter orifice (set at the top of the sediment storage volume) was only .03 mg/l.

Diversion Ditches

Diversion Ditch 7E, which is presently tributary to sediment Pond 5, will be rerouted to Sediment Pond 9. The new rerouted section of this ditch has been designed to handle the peak flowrate from the runoff hydrograph of the 10-year 24-hour precipitation event.

As illustrated on the plans, due to the steep terrain much of this rerouted segment of the ditch will require some form of channel lining. The uppermost segment of the ditch which is too steep to be lined with a reasonable size of rock riprap will be lined with a 24-inch diameter pipe. Other segments of the ditch in which slopes are somewhat flatter and in which flow velocities are in excess of 5 fps will be lined with rock riprap. Two separate methodologies were compared in sizing the rock riprap linings for the channel. The first methodology was that presented in the OSM design manual for steep channels entitled, "Surface Mining Water Diversion Design Manual." The second methodology uses " Shields Criteria" as presented in "Sediment Transport Technology" by Simons and Senturk. The second methodology provided the more conservative design which we also felt to be more applicable. Lining requirements and typical channel cross-sections and rock gradations are presented in the plans and specifications for construction of the pond.

If you have questions regarding the information presented herein, please call.

Sincerely,

Marvin E. Allen

Marvin E. Allen, P.E.
Executive Vice President

HANSEN ALLEN & LUCE INC

CLIENT Plateau Mining Company
PROJECT Sediment Pond 9
FEATURE Sediment Pond 9 Design
PROJECT NO.

SHEET 1 OF 40
COMPUTED [illegible]
CHECKED
DATE 6/22/87
rev 8/24/87 GJP

I - Sediment Pond 9 storage volume required to retain a 3 year sediment yield and the 10-year 24-hour precipitation event.

Note: Pond 9 will be sized for the ultimate area anticipated to be tributary to the pond upon completion of the coal refuse pile. Completion of the refuse pile represents the maximum tributary area to the pond since ditch 7E will no longer convey runoff from the area above the pile to the southwest to Sediment Pond 5.

- Basin Characteristics:

Drainage Area = 80.0 acres as planimetered from 1" = 200' scale map.

of which: 35.2 acres are undisturbed
16.7 acres are refuse material assuming the ultimate area to be covered by refuse material
and 28.1 acres are disturbed areas.

AREA (acres)	CN	S (inches)	Q (for P = 2.1 inches) (inches)
35.2	75	3.33	0.43
16.7	70	4.29	0.28
28.1	90	1.11	1.18

$$\text{Vol weighted } Q' = \frac{0.43(35.2) + 16.7(0.28) + 28.1(1.18)}{80.0} = 0.66 \text{ in}$$

for Q = 0.66 in (w/P = 2.1") ⇒ $\boxed{CN_{(\text{Vol weighted})} = 81.}$

Basin Slope: 26.6% assumed to be the same as previously calculated for Pond 5

Hydraulic Length: 9130 ft.

- Runoff Volume to pond from the 10-yr 24-hr precip event of 2.1 inches:

Using the SCS CN methodology

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

where: Q = Runoff in inches
P = precipitation in inches
$S = \frac{1000}{CN} - 10$

11/85

$$S = \frac{1000}{81} - 10 = 2.35$$

$$Q = \frac{[2.1 - 0.2(2.35)]^2}{2.1 + 0.8(2.35)} = 0.667 \text{ inches.}$$

$$\text{Runoff Volume} = Q * \text{Area} = \frac{0.667 \text{ in}}{12 \frac{\text{in}}{\text{ft}}} * 80.0 \text{ ac} = \underline{\underline{4.45 \text{ ac-ft}}}$$

- Sediment Storage Volume

Sediment yield is determined from the Universal Soil Loss Equation, multiplied by a sediment delivery ratio

$$USLE = R \cdot K \cdot LS \cdot C \cdot P$$

where R = rainfall factor in ft-tons/ac/hr.
K = soil erodibility factor in tons/ac/yr/unit of K
LS = topographic factor of length and steepness of slope
C = cover factor and
P = Erosion control practise factor.

$$LS = \left(\frac{650 + 450s + 65s^2}{10{,}000 + s^2}\right)\left(\frac{l}{72.6}\right)^m$$

where l = slope length in feet to channel
s = slope steepness in percent
m = exponent depending on steepness of slope = 0.6 for slopes > 10 percent

These factors were previously derived for Pond 5. Since Pond 9 will take most of Pond 5's tributary area, the factors derived for Pond 5 are applicable to Pond 9. A unit weight of 75 lbs/ft³ was assumed for the sediment to convert from tons to acre ft.

Area D-Dist. U-Undist. Ac	R ft-tons/ac/hr	K tons/ac/yr/unit K	l ft	s %	LS	C	P	Est. Soil Loss tons/ac/yr.	Sediment Delivery Ratio	Estimated Sediment Contribution to Pond ac-ft/ac/yr	ac-ft/yr	Accumulated 3 year ac-ft	2 year ac-ft
44.8 D	22.0	0.28	205	16.0	4.5	1.0	1.0	27.7	0.47	0.0080	0.36	1.98	1.32
35.2 U	22.0	0.28	118	54.0	22.2	0.2	1.0	27.4	0.5	0.0084	0.30		

- Total Storage Volume Required

  = Runoff Storage Volume + Sediment Storage Vol.

  = 4.45 ac-ft + 1.98 ac-ft = 6.43 ac-ft.

II - Inflow Design Hydrograph from the 25-year 24-hour Precipitation Event:

- Basin Characteristics - As previously presented.

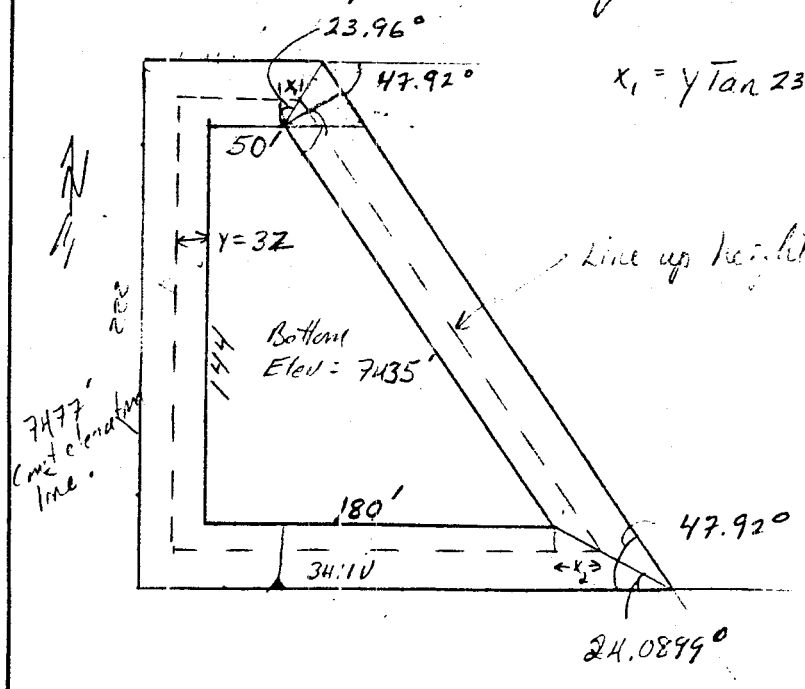
  Drainage Area = 80.0 acres
  Basin Slope = 26.6 %
  Wt. Curve Number = 81
  Hydraulic Length = 9130 ft
  25-yr 24-hr Precip = 2.6 inches

- Peak inflow from the attached printout which is from the Army Corps of Engineers computer model "HEC1" based on the SCS unit hydrograph curve number methodology.

  = 52 cfs.

III - Stage Capacity of Sediment Pond to Meet Design Volume Requirement

Proposed pond configuration



$x_1 = y \tan 23.96° = 3z \tan 23.96°$

$x_2 = \frac{y}{\tan 23.96°} = \frac{3z}{\tan 23.96°}$

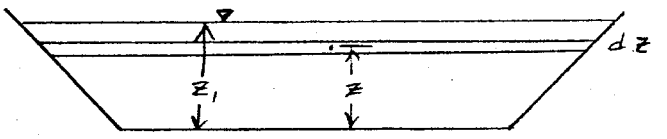
Area at height z above the bottom of the pond would equal the average of the two east west legs of the pond, multiplied by the north south length at the height z above the bottom of the pond.

$$= \left[\frac{(50+3z+3z\,\mathrm{Tan}\,24.0899^\circ)+\left(180+3z+\frac{3z}{\mathrm{Tan}\,24.0899}\right)}{2}\right]*(144+6z)$$

$$= (115.0+7.0417\,z)*(144+6z)$$

$$= 16{,}560.0 + 1704.0\,z + 42.25\,z^2$$

Volume at any height z_1 above bottom of pond can then be determined by integration.



$$\text{Total Volume} = \int_0^{z_1}(16{,}560.0 + 1704.0\,z + 42.25\,z^2)\,dz$$

$$= \Big[16{,}560.0\,z + \frac{1704.0\,z^2}{2} + \frac{42.25\,z^3}{3}\Big]_0^{z_1}$$

$$= 16{,}560.0\,z_1 + 852.0\,z^2 + 14.083\,z^3$$

STAGE CAPACITY CURVE FROM THIS RELATIONSHIP

ELEV.	z_1	Volume ft³	Volume ac-ft	
7435	0	0	0	
7436	1	17426	0.4	
7437	2	36640.7	0.84	
7438	3	57728.2	1.33	← 60% Sediment Cleanout @ EL 7437.7 = 1.19 ac-ft.
7439	4	80773.3	1.85	← Orifice @ 7439.3 Sediment Volume = 2.02 ac-ft.
7440	5	105860.3	2.43	
7441	6	133073.9	3.05	
7442	7	162498.4	3.73	
7443	8	194218.4	4.46	
7444	9	228318.5	5.24	
7445	10	264883	6.08	
7446	11	303996	6.98	← Primary Spillway @ 7445.5 Volume = 6.52 ac-ft
7447	12	345743.4	7.94	
7448	13	390208.3	8.96	

IV. size primary and secondary spillways with primary spillway set at 10 year runoff volume plus 3 year sediment volume if possible (2-year sediment volume minimum) and secondary spillway set 1 foot higher than primary spill.

SIZE Primary spillway and secondary spillway

criteria:

1) Primary set at 3 yr sediment + 10 yr volume = 6.43 acre-feet (if 2-yr sediment + 10 yr-24 hr volume then 5.77 acre-feet) see p. 2 & 3 of MA. calc's

$V = 16{,}560.0\, z_1 + 852.0\, z_1^2 + 14.083\, z_1^3$

$V = 6.43$ acre-ft $= 280{,}091$ ft^3 $\Rightarrow z_1 = ?$

try $z_1 = 10.5 \Rightarrow V = 284{,}116 \Rightarrow 6.5$ AF ok

$\therefore$ elev. 7445.5 feet

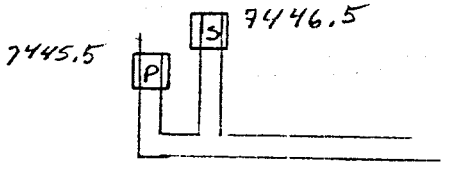
2) Trial spill way configuration

25 yr 24 hr peak = 46 cfs, runoff volume = 6.0 AF

available storage with 1' Freeboard = 0.9 AF

assuming top at 7448 and w.s. max at 7447

guess need to pass 40 cfs through spillways



weir flow $Q = C L H^{3/2}$ use $C = 3.0$

orifice flow $Q = C' a \sqrt{2gH}$ use $C' = 0.6$

assume weir flow on S w/ $H = 0.4'$

Secondary

if 18" ϕ riser $\Rightarrow Q_S = 3\,(4.7)(.4)^{1.5} = 3.6$ cfs

if 24" ϕ riser $\Rightarrow Q_S = 3\,(6.3)(.4)^{1.5} = 4.8$ cfs

Primary

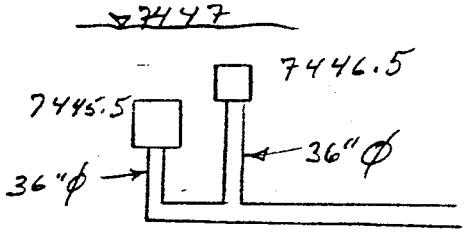
if 24" ϕ riser $\Rightarrow$ weir $Q_{wP} = 3(6.3)(1.4)^{1.5} = 31$ cfs

orifice $Q_{op} = .6\,(3.14)\sqrt{2g\,1.4} = 18$ cfs

if 36" ϕ riser $\Rightarrow$ $\boxed{\text{orifice } Q_{op} = .6\,(7.07)\sqrt{2g\,1.4} = 40 \text{ cfs}}$

$\therefore$ try 36" ϕ primary and 36" ϕ secondary

STAGE DISCHARGE FOR 36"Φ Primary and 36"Φ Secondary



$Q_{weir} = CLH^{3/2}$ & $C = 3$, $L = 9.42$ (36")

$Q_{orifice} = CA\sqrt{2gH}$ $C = .6$, $A = 7.07$ (36")

STAGE	VOLUME (AF)	DETENTION VOLUME (AF)	DISCHARGE PRIMARY (36"Φ) Hp (ft)	weir (cfs)	orifice (cfs)	SECONDARY (36"Φ) Hs (feet)	weir cfs	ΣQ
7435	0	0						
7445.5	6.52	0	0	0	0			0
7446.0	6.98	0.42	0.5	10.0	~~24~~			10.0
7446.5	7.45	0.85	1.0	28.3	~~34~~	0	0	28.3
7447	7.93	1.30	1.5	~~51.9~~	41.7	0.5	10.0	51.7
7447.5	8.44	1.76	2.0		48.1	1.0	28.3	76.4
7448	8.96	2.24	2.5		53.8	1.5 → Orifice Flow.	41.7	95.5

Based on the information presented above the inflow hydrograph is routed through the pond using the Army Corps of Engineers computer model "HEC1". From the attached printout of the HEC1 run by routing the inflow hydrograph through the pond, the peak is reduced from 52 cfs to 40 cfs at a peak stage elevation of 7446.75 feet which would leave 1.25 feet of freeboard with the top of the embankment set at 7448 feet. Therefore the spillway configuration as proposed will work.

The outlet works should be as illustrated on the following page.

A 3-inch diameter dewatering orifice is to be installed at elevation 7439.3. The efficiency of the pond in settling out settleable solids was analyzed with the "SEDIMOT II" watershed and sedimentology model. The peak effluent settleable concentration was estimated to be 0.03 mg/L (0.00002 ML/L) as shown on the attached computer printout page 33 of 38. Particle size gradations used in the model for coal refuse and natural soils upstream from the pond are attached.

HANSEN ALLEN & LUCE inc

CLIENT Plateau Mining Company
PROJECT Sediment Pond 9
FEATURE Design
PROJECT NO. 2-5-

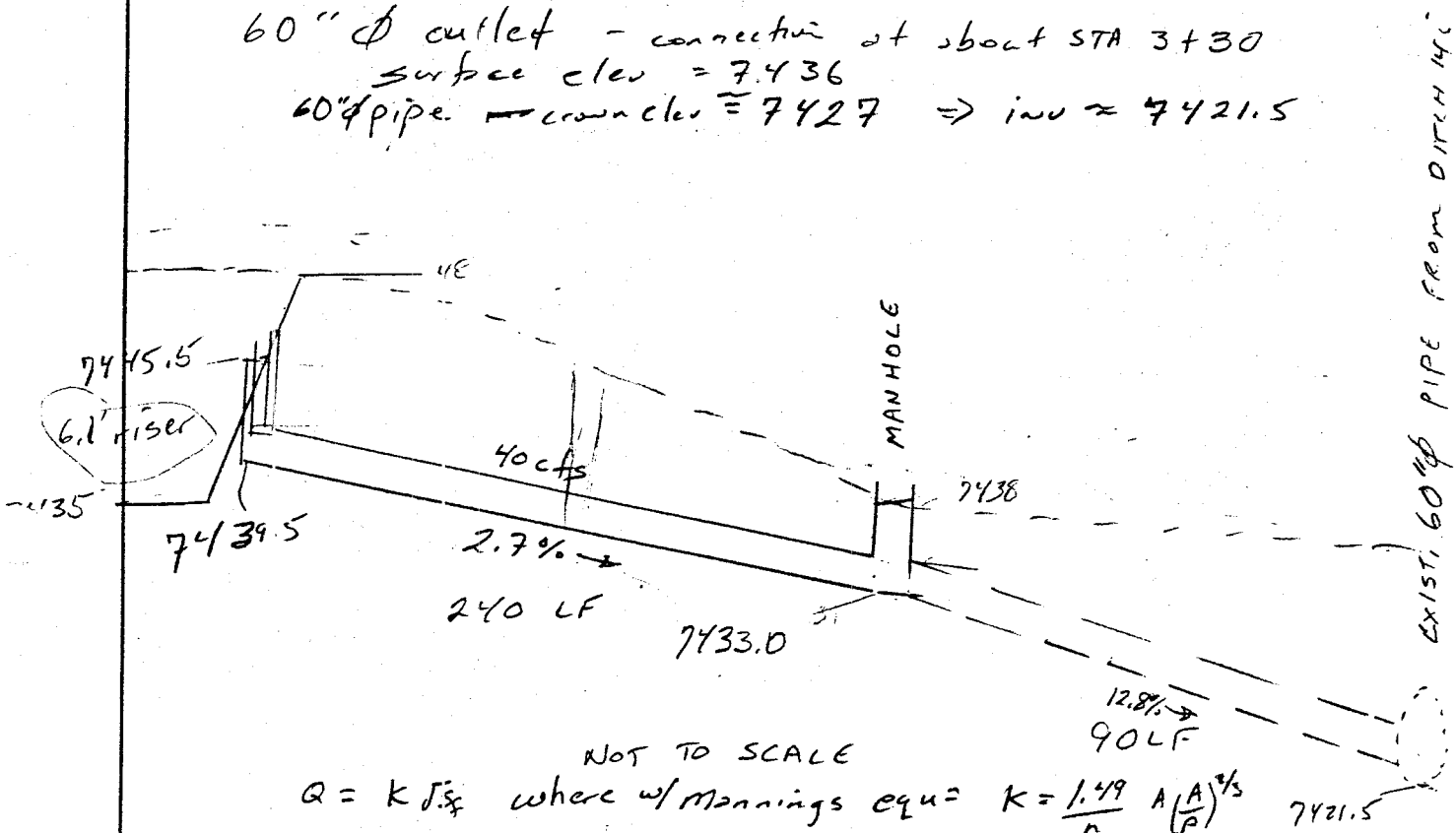
SHEET 7 OF 40
COMPUTED WP
CHECKED
DATE June 30, 1987

POND 9 Outlets Primary 36" ⌀ @ 7445.5
Secondary 36" ⌀ @ 7446.5

invert of pond set at 7435

MH about 2+40 240 ft d.s. surface elev = 7438

60" ⌀ outlet - connection at about STA 3+30
surface elev = 7436
60" ⌀ pipe crown elev ≅ 7427 ⇒ inv ≈ 7421.5



NOT TO SCALE

$Q = k\sqrt{S_f}$ where w/ Mannings equ: $k = \frac{1.49}{n} A \left(\frac{A}{P}\right)^{2/3}$

if $S_f = 2\%$ $Q = 40$ cfs ⇒ $k = 282$ ⇒ 36" CMP

try 30" CMP need $S_f = \left(\frac{40}{5.39/.024}\right)^2 = .032$ ft/ft

$V = 8.2$ fps high, $h_v' = 1.0$, ⇒ high minor losses

USE 36" CMP

min slope $= \left(\frac{40}{8.69/.024}\right)^2 = 0.013$ ft/ft use 1.5% min

$V = \frac{40 \text{ cfs}}{7.07} = 5.7$ fps ok $h_v = 0.5'$

check $Q = \frac{a\,(2gH')^{1/2}}{(1 + k_e + k_b + k_c L)^{1/2}}$ use $k_e = 1.0$ and $k_b = 1.0$
$a = 7.07$ ft^2 $H'_{max} = 10'$
$k_c = .0246$

$\therefore Q_{max} = \frac{7.07\,(2g\,10)^{1/2}}{(1+1+1+(.0246)(315'))^{1/2}} = 62$ cfs ok

II - Check the capacity of the 60-inch culvert into which the outflow from Pond 9 will flow and the 60 inch half round downstream of the 60-inch full round pipe.

A- The two hydrographs, the outflow hydrograph from pond 9 and the inflow hydrograph to the 60 inch culvert (i.e. for Ditch 9) could be routed through the culverts prior to summing the hydrographs. However, since the velocity in the outfall 20-inch CMP from pond 9 and the velocity in the 60 inch pipe are expected to be relatively high, 5 fps or greater, routing the hydrographs through the pipes would make little difference in either the peak flows or the timing of the peak. Therefore, add the hydrographs directly. The inflow hydrograph to the 60 inch culvert as determined prior to 1982 the peak of which was presented in previous submittals to the agency, is presented on the attached "Hydrograph Computation Form." The outflow hydrograph from Pond 9 was previously submitted.

The summation of the hydrographs is presented below.

	Time since Beginning of Storm hrs.	Outflow Hydrograph Pond 9 cfs	Inflow Hydrograph to 60 inch cfs	Combined Hydrographs cfs.
6	11.1	0	0	0
42	11.7	0	1.0	1.0
18	12.3	3	8.4	11.5
54	12.9	39	57.1	96.1
	13.0	40	69.1 ← Interpolated	109.1
24	13.4	28	117.1	145.1
	14.0	14	77.4	91.4
36	14.6	9	55.4	64.4
12	15.2	7	45.2	42.2
48	15.8	5	38.8	43.8
		⋮	⋮	⋮

B- Check capacity of 60 inch full round and 60 inch half round to carry peak combined flow of 145 cfs.

Capacity of each would be limited by the minimum slope of the pipe.

Minimum slope of 60 inch downstream from inflow of pond 9 appears to be around 10%, however there are no survey data available to confirm this figure. This is the slope of the half round 60-inch downstream of the 60 inch full round. 10% is also the minimum slope of the 60-inch halfround pipe. Therefore if the half round is adequate the full round is also adequate.

Using mannings equation $Q = \frac{1.486}{n} \frac{A^{5/3}}{P^{2/3}} S^{1/2}$

for the 60-inch half round pipe with the following design parameters

$n = 0.024$
$Q = 145$ cfs
$D = 60'' = 5'$
$S = 10\% = 0.10$

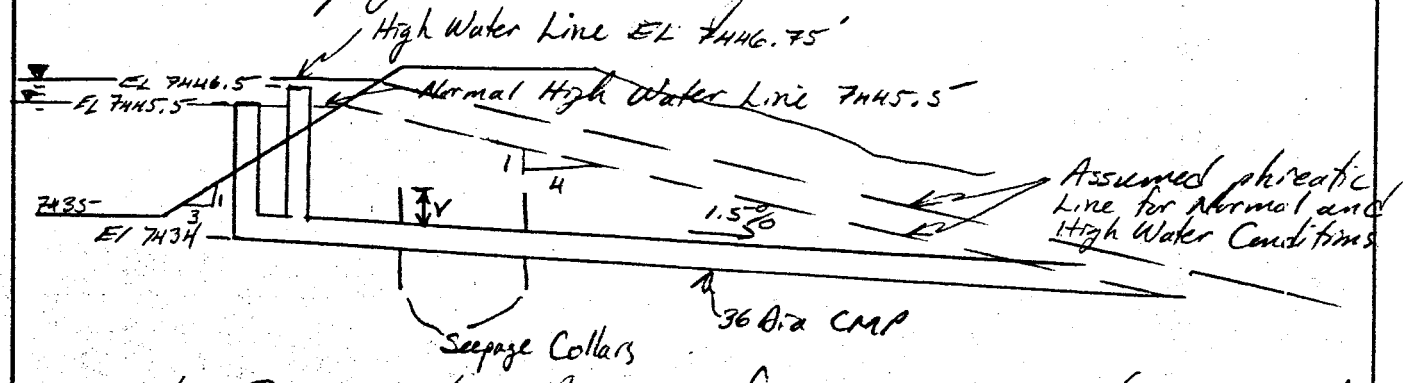
Flow characteristics:
Flow Area = 7.14 ft²
Wetted Perimeter = 6.74 feet
Hydraulic Radius = 1.06 ft.
Velocity = 20.3 f/s.
Flow Depth = 1.96 feet.

With a 60-inch half round the total available depth would be 30-inches or 2.5'. Therefore available freeboard = 2.5 - 1.96 = 0.5 feet which is greater than the 0.3 feet required in Section 8NR.43(f)(2) of the Division of Oil, Gas, and Mining regulations. The addition of the inflow to the 60-inch pipe from pond 9 adds only 0.3 feet of flow depth at the 10% slope.

VI - Check orifice size for automatic dewatering.

Using Sedimat II model, with a 3" orifice placed at elevation 7439.3 ft, the "peak effluent settleable concentration" by routing the 10-yr 24-hr event through the pond was only 0.03 mg/l. Therefore 3" orifice OK! See attached computer printout for results.

VII- Anti- Seepage Collar Design



Anti-Seep Collar design from EPA Technology Transfer Publication "Erosion and Sediment Control-Surface Mining in the Eastern U.S. Design."

• Determine length of pipe in saturated zone

$$L_s = y(z+4)\left[1 + \frac{\text{pipe slope}}{0.25 - \text{pipe slope}}\right]$$

L_s = length of pipe in saturated zone

y = Distance from upstream invert of pipe to highest normal water level

z = slope of upstream embankment as a ratio of 2 ft horizontal to 1 ft vertical

$y = 7445.5 - 7434 = 11.5'$

$z = 3$

pipe slope = 0.015 ft/ft.

$$L_s = 11.5(3+4)\left[1 + \frac{0.015}{0.25 - 0.015}\right]$$

$L_s = 85.6$ ft use 86 ft

To increase seepage path by 10% the revised seepage length becomes:

$$L_s + 2nV \geq 1.1 L_s$$

where V = Verticle projection of collar from pipe
n = number of collars

$V \geq \frac{0.05 L_s}{n}$ use $n = 1$ $V = \frac{0.05(86)}{1} = 4.3'$ collar would have to be 12' x 12'

Use $n = 2$ $V = \frac{0.05(86)}{2} = 2.15'$ ⟸ Use Collar 8'x8'

Collars should be spaced $14 \times V = 14 \times 2.15 = 30'$ ⟸

11/40


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID     PLATEAU MINING CO. - INFLOW HYDROGRAPH SED. POND 9
  2           ID     25-YEAR  24-HOUR  NOAA TYPE II DISTRIBUTION
  3           ID
*** FREE ***
  4           IT       6       0       0     240

  5           KK    B1-1
  6           BA    .125
  7           PB     2.6
  8           IN     30.
  9           PI      0.    .005    .006    .006    .006    .006    .006    .007    .007    .007
 10           PI    .008    .008    .009    .009     .01     .01     .01    .012    .015    .016
 11           PI    .018    .023   0.033    .046     .38    .072    .037    .027    .023    .018
 12           PI    .015    .013    .012    .011    .011     .01    .009    .009    .008    .008
 13           PI    .008    .008    .006    .006    .006    .005    .005    .005    .005
 14           LS       0     81.      0.
 15           UD    0.37

 16           KK   POND9SEDIMENT/DETENTION POND 9
 17           RS       1    ELEV  7445.5
 18           SV      0.    6.52    6.98    7.45    7.93    8.44    8.96
 19           SE   7435.  7445.5   7446.  7446.5   7447.  7447.5   7448.
 20           SQ      0.      0.    10.0    28.3    51.7    76.4    95.5
 21           SE   7435.  7445.5   7446.  7446.5   7447.  7447.5   7448.
 22           ZZ
1
                                                  ****
                    FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
          U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                                  ****



                  PLATEAU MINING CO. - INFLOW HYDROGRAPH SED. POND 9
                  25-YEAR  24-HOUR  NOAA TYPE II DISTRIBUTION


IT          HYDROGRAPH TIME DATA
                 NMIN          6  MINUTES IN COMPUTATION INTERVAL
                IDATE      1    0  STARTING DATE
                ITIME       0000  STARTING TIME
                   NQ        240  NUMBER OF HYDROGRAPH ORDINATES
               NDDATE      1    0  ENDING DATE
               NDTIME       2354  ENDING TIME

            COMPUTATION INTERVAL     .10 HOURS
                 TOTAL TIME BASE   23.90 HOURS

      ENGLISH UNITS
```

*** ** ***

```
            |
        **************
        *            *
5 KK    *     B1-1   *
        *            *
        **************

8 IN        TIME DATA FOR INPUT TIME SERIES
                JXMIN          30  TIME INTERVAL IN MINUTES
               JXDATE     1    0  STARTING DATE
               JXTIME          0  STARTING TIME

          SUBBASIN RUNOFF DATA

6 BA        SUBBASIN CHARACTERISTICS
                TAREA        .13  SUBBASIN AREA

            PRECIPITATION DATA

7 PB            STORM       2.60  BASIN TOTAL PRECIPITATION

9 PI          INCREMENTAL PRECIPITATION PATTERN
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
               .08    .08    .08    .08    .08    .01    .01    .01    .01    .01
               .01    .01    .01    .01    .01    .01    .01    .01    .01    .01
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00    .00
               .00    .00    .00    .00    .00    .00    .00    .00    .00

14 LS       SCS LOSS RATE
                STRTL        .47  INITIAL ABSTRACTION
               CRVNBR      81.00  CURVE NUMBER
                RTIMP        .00  PERCENT IMPERVIOUS AREA
```

15 UD SCS DIMENSIONLESS UNITGRAPH
TLAG .37 LAG

***

UNIT HYDROGRAPH
21 END-OF-PERIOD ORDINATES

19.	62.	120.	143.	135.	108.	71.	47.	33.	22.
15.	10.	7.	5.	3.	2.	2.	1.	1.	0.
0.									

****

HYDROGRAPH AT STATION B1-1

****

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1		0000	1	.00	.00	.00	0.	*	1		1200	121	.02	.02	.00	2.
1		0006	2	.00	.00	.00	0.	*	1		1206	122	.20	.15	.05	3.
1		0012	3	.00	.00	.00	0.	*	1		1212	123	.20	.13	.07	7.
1		0018	4	.00	.00	.00	0.	*	1		1218	124	.20	.11	.09	14.
1		0024	5	.00	.00	.00	0.	*	1		1224	125	.20	.10	.10	25.
1		0030	6	.00	.00	.00	0.	*	1		1230	126	.20	.09	.11	37.
1		0036	7	.00	.00	.00	0.	*	1		1236	127	.04	.02	.02	47.
1		0042	8	.00	.00	.00	0.	*	1		1242	128	.04	.02	.02	52.
1		0048	9	.00	.00	.00	0.	*	1		1248	129	.04	.02	.02	51.
1		0054	10	.00	.00	.00	0.	*	1		1254	130	.04	.01	.02	44.
1		0100	11	.00	.00	.00	0.	*	1		1300	131	.04	.01	.02	37.
1		0106	12	.00	.00	.00	0.	*	1		1306	132	.02	.01	.01	31.
1		0112	13	.00	.00	.00	0.	*	1		1312	133	.02	.01	.01	26.
1		0118	14	.00	.00	.00	0.	*	1		1318	134	.02	.01	.01	22.
1		0124	15	.00	.00	.00	0.	*	1		1324	135	.02	.01	.01	19.
1		0130	16	.00	.00	.00	0.	*	1		1330	136	.02	.01	.01	16.
1		0136	17	.00	.00	.00	0.	*	1		1336	137	.01	.01	.01	14.
1		0142	18	.00	.00	.00	0.	*	1		1342	138	.01	.01	.01	12.
1		0148	19	.00	.00	.00	0.	*	1		1348	139	.01	.01	.01	11.
1		0154	20	.00	.00	.00	0.	*	1		1354	140	.01	.00	.01	10.
1		0200	21	.00	.00	.00	0.	*	1		1400	141	.01	.00	.01	9.
1		0206	22	.00	.00	.00	0.	*	1		1406	142	.01	.00	.01	9.
1		0212	23	.00	.00	.00	0.	*	1		1412	143	.01	.00	.01	8.
1		0218	24	.00	.00	.00	0.	*	1		1418	144	.01	.00	.01	8.
1		0224	25	.00	.00	.00	0.	*	1		1424	145	.01	.00	.01	7.
1		0230	26	.00	.00	.00	0.	*	1		1430	146	.01	.00	.01	7.
1		0236	27	.00	.00	.00	0.	*	1		1436	147	.01	.00	.01	7.
1		0242	28	.00	.00	.00	0.	*	1		1442	148	.01	.00	.01	6.
1		0248	29	.00	.00	.00	0.	*	1		1448	149	.01	.00	.01	6.
1		0254	30	.00	.00	.00	0.	*	1		1454	150	.01	.00	.01	6.
1		0300	31	.00	.00	.00	0.	*	1		1500	151	.01	.00	.01	6.
1		0306	32	.00	.00	.00	0.	*	1		1506	152	.01	.00	.01	5.
1		0312	33	.00	.00	.00	0.	*	1		1512	153	.01	.00	.01	5.
1		0318	34	.00	.00	.00	0.	*	1		1518	154	.01	.00	.01	5.
1		0324	35	.00	.00	.00	0.	*	1		1524	155	.01	.00	.01	5.

14/40

1	0330	36	.00	.00	.00	0.	*	1	1530	156	.01	.00	.01	5.
1	0336	37	.00	.00	.00	0.	*	1	1536	157	.01	.00	.00	5.
1	0342	38	.00	.00	.00	0.	*	1	1542	158	.01	.00	.00	4.
1	0348	39	.00	.00	.00	0.	*	1	1548	159	.01	.00	.00	4.
1	0354	40	.00	.00	.00	0.	*	1	1554	160	.01	.00	.00	4.
1	0400	41	.00	.00	.00	0.	*	1	1600	161	.01	.00	.00	4.
1	0406	42	.00	.00	.00	0.	*	1	1606	162	.01	.00	.00	4.
1	0412	43	.00	.00	.00	0.	*	1	1612	163	.01	.00	.00	4.
1	0418	44	.00	.00	.00	0.	*	1	1618	164	.01	.00	.00	4.
1	0424	45	.00	.00	.00	0.	*	1	1624	165	.01	.00	.00	4.
1	0430	46	.00	.00	.00	0.	*	1	1630	166	.01	.00	.00	4.
1	0436	47	.00	.00	.00	0.	*	1	1636	167	.01	.00	.00	4.
1	0442	48	.00	.00	.00	0.	*	1	1642	168	.01	.00	.00	3.
1	0448	49	.00	.00	.00	0.	*	1	1648	169	.01	.00	.00	3.
1	0454	50	.00	.00	.00	0.	*	1	1654	170	.01	.00	.00	3.
1	0500	51	.00	.00	.00	0.	*	1	1700	171	.01	.00	.00	3.
1	0506	52	.00	.00	.00	0.	*	1	1706	172	.01	.00	.00	3.
1	0512	53	.00	.00	.00	0.	*	1	1712	173	.01	.00	.00	3.
1	0518	54	.00	.00	.00	0.	*	1	1718	174	.01	.00	.00	3.
1	0524	55	.00	.00	.00	0.	*	1	1724	175	.01	.00	.00	3.
1	0530	56	.00	.00	.00	0.	*	1	1730	176	.01	.00	.00	3.
1	0536	57	.00	.00	.00	0.	*	1	1736	177	.01	.00	.00	3.
1	0542	58	.00	.00	.00	0.	*	1	1742	178	.01	.00	.00	3.
1	0548	59	.00	.00	.00	0.	*	1	1748	179	.01	.00	.00	3.
1	0554	60	.00	.00	.00	0.	*	1	1754	180	.01	.00	.00	3.
1	0600	61	.00	.00	.00	0.	*	1	1800	181	.01	.00	.00	3.
1	0606	62	.00	.00	.00	0.	*	1	1806	182	.00	.00	.00	3.
1	0612	63	.00	.00	.00	0.	*	1	1812	183	.00	.00	.00	3.
1	0618	64	.00	.00	.00	0.	*	1	1818	184	.00	.00	.00	3.
1	0624	65	.00	.00	.00	0.	*	1	1824	185	.00	.00	.00	3.
1	0630	66	.00	.00	.00	0.	*	1	1830	186	.00	.00	.00	3.
1	0636	67	.00	.00	.00	0.	*	1	1836	187	.00	.00	.00	3.
1	0642	68	.00	.00	.00	0.	*	1	1842	188	.00	.00	.00	3.
1	0648	69	.00	.00	.00	0.	*	1	1848	189	.00	.00	.00	3.
1	0654	70	.00	.00	.00	0.	*	1	1854	190	.00	.00	.00	3.
1	0700	71	.00	.00	.00	0.	*	1	1900	191	.00	.00	.00	3.
1	0706	72	.01	.01	.00	0.	*	1	1906	192	.00	.00	.00	3.
1	0712	73	.01	.01	.00	0.	*	1	1912	193	.00	.00	.00	3.
1	0718	74	.01	.01	.00	0.	*	1	1918	194	.00	.00	.00	3.
1	0724	75	.01	.01	.00	0.	*	1	1924	195	.00	.00	.00	3.
1	0730	76	.01	.01	.00	0.	*	1	1930	196	.00	.00	.00	2.
1	0736	77	.01	.01	.00	0.	*	1	1936	197	.00	.00	.00	2.
1	0742	78	.01	.01	.00	0.	*	1	1942	198	.00	.00	.00	2.
1	0748	79	.01	.01	.00	0.	*	1	1948	199	.00	.00	.00	2.
1	0754	80	.01	.01	.00	0.	*	1	1954	200	.00	.00	.00	2.
1	0800	81	.01	.01	.00	0.	*	1	2000	201	.00	.00	.00	2.
1	0806	82	.01	.01	.00	0.	*	1	2006	202	.00	.00	.00	2.
1	0812	83	.01	.01	.00	0.	*	1	2012	203	.00	.00	.00	2.
1	0818	84	.01	.01	.00	0.	*	1	2018	204	.00	.00	.00	2.
1	0824	85	.01	.01	.00	0.	*	1	2024	205	.00	.00	.00	2.
1	0830	86	.01	.01	.00	0.	*	1	2030	206	.00	.00	.00	2.
1	0836	87	.01	.01	.00	0.	*	1	2036	207	.00	.00	.00	2.
1	0842	88	.01	.01	.00	0.	*	1	2042	208	.00	.00	.00	2.
1	0848	89	.01	.01	.00	0.	*	1	2048	209	.00	.00	.00	2.

15/40

1	0854	90	.01	.01	.00	0.	*	1	2054	210	.00	.00	.00	2.
1	0900	91	.01	.01	.00	0.	*	1	2100	211	.00	.00	.00	2.
1	0906	92	.01	.01	.00	0.	*	1	2106	212	.00	.00	.00	2.
1	0912	93	.01	.01	.00	0.	*	1	2112	213	.00	.00	.00	2.
1	0918	94	.01	.01	.00	0.	*	1	2118	214	.00	.00	.00	2.
1	0924	95	.01	.01	.00	0.	*	1	2124	215	.00	.00	.00	2.
1	0930	96	.01	.01	.00	0.	*	1	2130	216	.00	.00	.00	2.
1	0936	97	.01	.01	.00	0.	*	1	2136	217	.00	.00	.00	2.
1	0942	98	.01	.01	.00	0.	*	1	2142	218	.00	.00	.00	2.
1	0948	99	.01	.01	.00	0.	*	1	2148	219	.00	.00	.00	2.
1	0954	100	.01	.01	.00	0.	*	1	2154	220	.00	.00	.00	2.
1	1000	101	.01	.01	.00	0.	*	1	2200	221	.00	.00	.00	2.
1	1006	102	.01	.01	.00	0.	*	1	2206	222	.00	.00	.00	2.
1	1012	103	.01	.01	.00	0.	*	1	2212	223	.00	.00	.00	2.
1	1018	104	.01	.01	.00	0.	*	1	2218	224	.00	.00	.00	2.
1	1024	105	.01	.01	.00	0.	*	1	2224	225	.00	.00	.00	2.
1	1030	106	.01	.01	.00	0.	*	1	2230	226	.00	.00	.00	2.
1	1036	107	.01	.01	.00	0.	*	1	2236	227	.00	.00	.00	2.
1	1042	108	.01	.01	.00	0.	*	1	2242	228	.00	.00	.00	2.
1	1048	109	.01	.01	.00	0.	*	1	2248	229	.00	.00	.00	2.
1	1054	110	.01	.01	.00	0.	*	1	2254	230	.00	.00	.00	2.
1	1100	111	.01	.01	.00	0.	*	1	2300	231	.00	.00	.00	2.
1	1106	112	.02	.02	.00	0.	*	1	2306	232	.00	.00	.00	2.
1	1112	113	.02	.02	.00	0.	*	1	2312	233	.00	.00	.00	2.
1	1118	114	.02	.02	.00	0.	*	1	2318	234	.00	.00	.00	2.
1	1124	115	.02	.02	.00	1.	*	1	2324	235	.00	.00	.00	2.
1	1130	116	.02	.02	.00	1.	*	1	2330	236	.00	.00	.00	2.
1	1136	117	.02	.02	.00	1.	*	1	2336	237	.00	.00	.00	2.
1	1142	118	.02	.02	.00	1.	*	1	2342	238	.00	.00	.00	2.
1	1148	119	.02	.02	.00	1.	*	1	2348	239	.00	.00	.00	2.
1	1154	120	.02	.02	.00	2.	*	1	2354	240	.00	.00	.00	2.
							*							

****

TOTAL RAINFALL = 2.60, TOTAL LOSS = 1.59, TOTAL EXCESS = 1.01

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	23.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 52.	12.70		11.	3.	3.	3.
		(INCHES)	.832	1.005	1.005	1.005
		(AC-FT)	6.	7.	7.	7.

CUMULATIVE AREA = .13 SQ MI

*** ***

```
          **************
          *            *
16 KK     *    POND9   *     SEDIMENT/DETENTION POND 9
          *            *
          **************

            HYDROGRAPH ROUTING DATA

17 RS          STORAGE ROUTING
                    NSTPS          1  NUMBER OF SUBREACHES
                     ITYP       ELEV  TYPE OF INITIAL CONDITION
                   RSVRIC    7445.50  INITIAL CONDITION
                        X        .00 WORKING R AND D COEFFICIENT

18 SV          STORAGE          .0       6.5       7.0       7.4       7.9       8.4       9.0

19 SE         ELEVATION    7435.00   7445.50   7446.00   7446.50   7447.00   7447.50   7448.00

20 SQ         DISCHARGE         0.        0.       10.       28.       52.       76.       96.

21 SE         ELEVATION    7435.00   7445.50   7446.00   7446.50   7447.00   7447.50   7448.00

                                                    ***

                                  COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      6.52      6.98      7.45      7.93      8.44      8.96
          OUTFLOW        .00       .00     10.00     28.30     51.70     76.40     95.50
        ELEVATION    7435.00   7445.50   7446.00   7446.50   7447.00   7447.50   7448.00

*****************************************************************************************************************************

                                        HYDROGRAPH AT STATION    POND9

*****************************************************************************************************************************
```

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	6.5	7445.5	*	1		0800	81	0.	6.5	7445.5	*	1		1600	161	5.	6.7	7445.7
1		0006	2	0.	6.5	7445.5	*	1		0806	82	0.	6.5	7445.5	*	1		1606	162	5.	6.7	7445.7
1		0012	3	0.	6.5	7445.5	*	1		0812	83	0.	6.5	7445.5	*	1		1612	163	5.	6.7	7445.7
1		0018	4	0.	6.5	7445.5	*	1		0818	84	0.	6.5	7445.5	*	1		1618	164	5.	6.7	7445.7
1		0024	5	0.	6.5	7445.5	*	1		0824	85	0.	6.5	7445.5	*	1		1624	165	4.	6.7	7445.7
1		0030	6	0.	6.5	7445.5	*	1		0830	86	0.	6.5	7445.5	*	1		1630	166	4.	6.7	7445.7
1		0036	7	0.	6.5	7445.5	*	1		0836	87	0.	6.5	7445.5	*	1		1636	167	4.	6.7	7445.7
1		0042	8	0.	6.5	7445.5	*	1		0842	88	0.	6.5	7445.5	*	1		1642	168	4.	6.7	7445.7
1		0048	9	0.	6.5	7445.5	*	1		0848	89	0.	6.5	7445.5	*	1		1648	169	4.	6.7	7445.7
1		0054	10	0.	6.5	7445.5	*	1		0854	90	0.	6.5	7445.5	*	1		1654	170	4.	6.7	7445.7
1		0100	11	0.	6.5	7445.5	*	1		0900	91	0.	6.5	7445.5	*	1		1700	171	4.	6.7	7445.7
1		0106	12	0.	6.5	7445.5	*	1		0906	92	0.	6.5	7445.5	*	1		1706	172	4.	6.7	7445.7
1		0112	13	0.	6.5	7445.5	*	1		0912	93	0.	6.5	7445.5	*	1		1712	173	4.	6.7	7445.7
1		0118	14	0.	6.5	7445.5	*	1		0918	94	0.	6.5	7445.5	*	1		1718	174	4.	6.7	7445.7
1		0124	15	0.	6.5	7445.5	*	1		0924	95	0.	6.5	7445.5	*	1		1724	175	4.	6.7	7445.7

1	0130	16	0.	6.5	7445.5	*	1	0930	96	0.	6.5	7445.5	*	1	1730	176	3.	6.7	7445.7
1	0136	17	0.	6.5	7445.5	*	1	0936	97	0.	6.5	7445.5	*	1	1736	177	3.	6.7	7445.7
1	0142	18	0.	6.5	7445.5	*	1	0942	98	0.	6.5	7445.5	*	1	1742	178	3.	6.7	7445.7
1	0148	19	0.	6.5	7445.5	*	1	0948	99	0.	6.5	7445.5	*	1	1748	179	3.	6.7	7445.7
1	0154	20	0.	6.5	7445.5	*	1	0954	100	0.	6.5	7445.5	*	1	1754	180	3.	6.7	7445.7
1	0200	21	0.	6.5	7445.5	*	1	1000	101	0.	6.5	7445.5	*	1	1800	181	3.	6.7	7445.7
1	0206	22	0.	6.5	7445.5	*	1	1006	102	0.	6.5	7445.5	*	1	1806	182	3.	6.7	7445.7
1	0212	23	0.	6.5	7445.5	*	1	1012	103	0.	6.5	7445.5	*	1	1812	183	3.	6.7	7445.7
1	0218	24	0.	6.5	7445.5	*	1	1018	104	0.	6.5	7445.5	*	1	1818	184	3.	6.7	7445.7
1	0224	25	0.	6.5	7445.5	*	1	1024	105	0.	6.5	7445.5	*	1	1824	185	3.	6.7	7445.7
1	0230	26	0.	6.5	7445.5	*	1	1030	106	0.	6.5	7445.5	*	1	1830	186	3.	6.7	7445.7
1	0236	27	0.	6.5	7445.5	*	1	1036	107	0.	6.5	7445.5	*	1	1836	187	3.	6.7	7445.7
1	0242	28	0.	6.5	7445.5	*	1	1042	108	0.	6.5	7445.5	*	1	1842	188	3.	6.7	7445.6
1	0248	29	0.	6.5	7445.5	*	1	1048	109	0.	6.5	7445.5	*	1	1848	189	3.	6.7	7445.6
1	0254	30	0.	6.5	7445.5	*	1	1054	110	0.	6.5	7445.5	*	1	1854	190	3.	6.7	7445.6
1	0300	31	0.	6.5	7445.5	*	1	1100	111	0.	6.5	7445.5	*	1	1900	191	3.	6.7	7445.6
1	0306	32	0.	6.5	7445.5	*	1	1106	112	0.	6.5	7445.5	*	1	1906	192	3.	6.6	7445.6
1	0312	33	0.	6.5	7445.5	*	1	1112	113	0.	6.5	7445.5	*	1	1912	193	3.	6.6	7445.6
1	0318	34	0.	6.5	7445.5	*	1	1118	114	0.	6.5	7445.5	*	1	1918	194	3.	6.6	7445.6
1	0324	35	0.	6.5	7445.5	*	1	1124	115	0.	6.5	7445.5	*	1	1924	195	3.	6.6	7445.6
1	0330	36	0.	6.5	7445.5	*	1	1130	116	0.	6.5	7445.5	*	1	1930	196	3.	6.6	7445.6
1	0336	37	0.	6.5	7445.5	*	1	1136	117	0.	6.5	7445.5	*	1	1936	197	3.	6.6	7445.6
1	0342	38	0.	6.5	7445.5	*	1	1142	118	0.	6.5	7445.5	*	1	1942	198	3.	6.6	7445.6
1	0348	39	0.	6.5	7445.5	*	1	1148	119	1.	6.5	7445.5	*	1	1948	199	3.	6.6	7445.6
1	0354	40	0.	6.5	7445.5	*	1	1154	120	1.	6.6	7445.5	*	1	1954	200	3.	6.6	7445.6
1	0400	41	0.	6.5	7445.5	*	1	1200	121	1.	6.6	7445.5	*	1	2000	201	3.	6.6	7445.6
1	0406	42	0.	6.5	7445.5	*	1	1206	122	1.	6.6	7445.6	*	1	2006	202	3.	6.6	7445.6
1	0412	43	0.	6.5	7445.5	*	1	1212	123	2.	6.6	7445.6	*	1	2012	203	2.	6.6	7445.6
1	0418	44	0.	6.5	7445.5	*	1	1218	124	3.	6.7	7445.7	*	1	2018	204	2.	6.6	7445.6
1	0424	45	0.	6.5	7445.5	*	1	1224	125	6.	6.8	7445.8	*	1	2024	205	2.	6.6	7445.6
1	0430	46	0.	6.5	7445.5	*	1	1230	126	10.	7.0	7446.0	*	1	2030	206	2.	6.6	7445.6
1	0436	47	0.	6.5	7445.5	*	1	1236	127	19.	7.2	7446.2	*	1	2036	207	2.	6.6	7445.6
1	0442	48	0.	6.5	7445.5	*	1	1242	128	27.	7.4	7446.5	*	1	2042	208	2.	6.6	7445.6
1	0448	49	0.	6.5	7445.5	*	1	1248	129	35.	7.6	7446.7	*	1	2048	209	2.	6.6	7445.6
1	0454	50	0.	6.5	7445.5	*	1	1254	130	39.	7.7	7446.7	*	1	2054	210	2.	6.6	7445.6
1	0500	51	0.	6.5	7445.5	*	1	1300	131	40.	7.7	7446.7	*	1	2100	211	2.	6.6	7445.6
1	0506	52	0.	6.5	7445.5	*	1	1306	132	38.	7.6	7446.7	*	1	2106	212	2.	6.6	7445.6
1	0512	53	0.	6.5	7445.5	*	1	1312	133	35.	7.6	7446.6	*	1	2112	213	2.	6.6	7445.6
1	0518	54	0.	6.5	7445.5	*	1	1318	134	31.	7.5	7446.6	*	1	2118	214	2.	6.6	7445.6
1	0524	55	0.	6.5	7445.5	*	1	1324	135	28.	7.4	7446.5	*	1	2124	215	2.	6.6	7445.6
1	0530	56	0.	6.5	7445.5	*	1	1330	136	25.	7.4	7446.4	*	1	2130	216	2.	6.6	7445.6
1	0536	57	0.	6.5	7445.5	*	1	1336	137	22.	7.3	7446.3	*	1	2136	217	2.	6.6	7445.6
1	0542	58	0.	6.5	7445.5	*	1	1342	138	20.	7.2	7446.3	*	1	2142	218	2.	6.6	7445.6
1	0548	59	0.	6.5	7445.5	*	1	1348	139	17.	7.2	7446.2	*	1	2148	219	2.	6.6	7445.6
1	0554	60	0.	6.5	7445.5	*	1	1354	140	16.	7.1	7446.2	*	1	2154	220	2.	6.6	7445.6
1	0600	61	0.	6.5	7445.5	*	1	1400	141	14.	7.1	7446.1	*	1	2200	221	2.	6.6	7445.6
1	0606	62	0.	6.5	7445.5	*	1	1406	142	13.	7.0	7446.1	*	1	2206	222	2.	6.6	7445.6
1	0612	63	0.	6.5	7445.5	*	1	1412	143	11.	7.0	7446.0	*	1	2212	223	2.	6.6	7445.6
1	0618	64	0.	6.5	7445.5	*	1	1418	144	10.	7.0	7446.0	*	1	2218	224	2.	6.6	7445.6
1	0624	65	0.	6.5	7445.5	*	1	1424	145	10.	7.0	7446.0	*	1	2224	225	2.	6.6	7445.6
1	0630	66	0.	6.5	7445.5	*	1	1430	146	9.	6.9	7446.0	*	1	2230	226	2.	6.6	7445.6
1	0636	67	0.	6.5	7445.5	*	1	1436	147	9.	6.9	7445.9	*	1	2236	227	2.	6.6	7445.6
1	0642	68	0.	6.5	7445.5	*	1	1442	148	9.	6.9	7445.9	*	1	2242	228	2.	6.6	7445.6
1	0648	69	0.	6.5	7445.5	*	1	1448	149	8.	6.9	7445.9	*	1	2248	229	2.	6.6	7445.6

18/40

1	0654	70	0.	6.5	7445.5	*	1	1454	150	8.	6.9	7445.9	*	1	2254	230	2.	6.6	7445.6
1	0700	71	0.	6.5	7445.5	*	1	1500	151	7.	6.9	7445.9	*	1	2300	231	2.	6.6	7445.6
1	0706	72	0.	6.5	7445.5	*	1	1506	152	7.	6.8	7445.9	*	1	2306	232	2.	6.6	7445.6
1	0712	73	0.	6.5	7445.5	*	1	1512	153	7.	6.8	7445.8	*	1	2312	233	2.	6.6	7445.6
1	0718	74	0.	6.5	7445.5	*	1	1518	154	7.	6.8	7445.8	*	1	2318	234	2.	6.6	7445.6
1	0724	75	0.	6.5	7445.5	*	1	1524	155	6.	6.8	7445.8	*	1	2324	235	2.	6.6	7445.6
1	0730	76	0.	6.5	7445.5	*	1	1530	156	6.	6.8	7445.8	*	1	2330	236	2.	6.6	7445.6
1	0736	77	0.	6.5	7445.5	*	1	1536	157	6.	6.8	7445.8	*	1	2336	237	2.	6.6	7445.6
1	0742	78	0.	6.5	7445.5	*	1	1542	158	6.	6.8	7445.8	*	1	2342	238	2.	6.6	7445.6
1	0748	79	0.	6.5	7445.5	*	1	1548	159	5.	6.8	7445.8	*	1	2348	239	2.	6.6	7445.6
1	0754	80	0.	6.5	7445.5	*	1	1554	160	5.	6.8	7445.8	*	1	2354	240	2.	6.6	7445.6
						*							*						

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	23.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 40.	13.00		11.	3.	3.	3.
		(INCHES)	.822	.994	.994	.994
		(AC-FT)	5.	7.	7.	7.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	23.90-HR
(AC-FT)	(HR)				
8.	13.00	7.	7.	7.	7.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	23.90-HR
+ (FEET)	(HR)				
7445.75	13.00	7445.95	7445.64	7445.64	7445.64

CUMULATIVE AREA = .13 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT									
+		B1-1	52.	12.70	11.	3.	3.	.13		
	ROUTED TO									
+		POND9	40.	13.00	11.	3.	3.	.13		
+									7446.75	13.00

*** NORMAL END OF HEC-1 ***

HYDROGRAPH COMPUTATION FORM

STREAM AND STATION Diversion Ditch No. 9 and 60-inch Culvert

REMARKS Peak Discharge From 25-year 24-hour Event

DR. AREA 0.8563 SQ. MI. T_c 0.39 HR. RUNOFF CONDITION NO. II

RUNOFF CURVE NO. 76. STORM DISTRIB CURVE —. HYDRO. FAM. NO. 3

STORM DURATION 24 HR. RAINFALL: POINT 2.6 IN. AREAL — IN.

Q 0.756 IN. COMPUTED T_p 0.26 HR. T_o 12.9 HR.

(T_o/T_p): COMPUTED 50 : USED 50 . REVISED T_p 0.26

$q_p = \frac{484\ A}{\text{REV. } T_p}$ = 1594.0 CFS. Qq_p = 1205.1 CFS.

t(COLUMN) = (t/T_p) REV. T_p q(COLUMN) = $(qc/q_p)\ Qq_p$

*Note: time since storm began would be equal to t + 11.1

LINE NO.	t * HOURS	q CFS	LINE NO.	t HOURS	q CFS	LINE NO.	t HOURS	q CFS
1	0 (t+11.1 → 11.1)	0	21	11.7 22.8	18.4	41		
2	0.6 11.7	1.0	22	12.3 23.4	18.1	42		
3	1.2 12.3	8.4	23	12.9 24.0	17.7	43		
4	1.8 12.9	57.1	24	13.5 24.6	3.4	44		
5	2.3 13.4	117.1	25	14.0 25.1	0.0	45		
6	2.9 14.0	77.4	26			46		
7	3.5 14.6	55.4	27			47		
8	4.1 15.2	45.2	28			48		
9	4.7 15.8	38.8	29			49		
10	5.3 16.4	34.3	30			50		
11	5.9 17.0	31.1	31			51		
12	6.4 17.5	28.8	32			52		
13	7.0 18.1	26.4	33			53		
14	7.6 18.7	24.2	34			54		
15	8.2 19.3	22.3	35			55		
16	8.8 19.9	20.8	36			56		
17	9.4 20.5	19.9	37			57		
18	9.9 21.0	19.5	38			58		
19	10.5 21.6	19.2	39			59		
20	11.1 22.2	18.8	40			60		

21/40

PLATEAU MINE CO. SEDIMENT POND 9 STAGE-VOLUME 24 AUG 87

z, (ft) STAGE	A term	B term	C term	VOL FT3	VOL AF
1	16560	852	14.083	17426.08	0.400047
0	0	0	0	0	0
0.5	8280	213	1.760375	8494.760	0.195012
1	16560	852	14.083	17426.08	0.400047
1.5	24840	1917	47.53012	26804.53	0.615347
2	33120	3408	112.664	36640.66	0.841153
2.5	41400	5325	220.0468	46945.04	1.077709
3	49680	7668	380.241	57728.24	1.325258
3.5	57960	10437	603.8086	69000.80	1.584040
4	66240	13632	901.312	80773.31	1.854300
4.5	74520	17253	1283.313	93056.31	2.136279
5	82800	21300	1760.375	105860.3	2.430219
5.5	91080	25773	2343.059	119196.0	2.736364
6	99360	30672	3041.928	133073.9	3.054957
6.5	107640	35997	3867.543	147504.5	3.386238
7	115920	41748	4830.469	162498.4	3.730451
7.5	124200	47925	5941.265	178066.2	4.087838
8	132480	54528	7210.496	194218.4	4.458643
8.5	140760	61557	8648.722	210965.7	4.843106
9	149040	69012	10266.50	228318.5	5.241471
9.5	157320	76893	12074.41	246287.4	5.653980
10	165600	85200	14083	264883	6.080876
10.5	173880	93933	16302.83	284115.8	6.522402
11	182160	103092	18744.47	303996.4	6.978798
11.5	190440	112677	21418.48	324535.4	7.450309
12	198720	122688	24335.42	345743.4	7.937176
12.5	207000	133125	27505.85	367630.8	8.439643
13	215280	143988	30940.35	390208.3	8.957951
13.5	223560	155277	34649.46	413486.4	9.492343
14	231840	166992	38643.75	437475.7	10.04306
14.5	240120	179133	42933.78	462186.7	10.61034
15	248400	191700	47530.12	487630.1	11.19444
15.5	256680	204693	52443.33	513816.3	11.79559
16	264960	218112	57683.96	540755.9	12.41404
16.5	273240	231957	63262.59	568459.5	13.05003
17	281520	246228	69189.77	596937.7	13.70380
17.5	289800	260925	75476.07	626201.0	14.37559
18	298080	276048	82132.05	656260.0	15.06565
18.5	306360	291597	89168.27	687125.2	15.77422
19	314640	307572	96595.29	718807.2	16.50154
19.5	322920	323973	104423.6	751316.6	17.24785

```
1 ***************************************************************
                        -- SEDPC --
              SEDIMOT II MODEL FOR THE IBM PC/XT
                   CONVERTED BY JESSE MAYES
                 VERSION 1.10 NOVEMBER 17.1983
***************************************************************


***************************************************************
***************************************************************

      UNIVERSITY OF KENTUCKY COMPUTER MODEL
      OF SURFACE MINE HYDROLOGY AND SEDIMENTOLOGY
      FOR MORE INFORMATION CONTACT THE AGRICULTURAL
      ENGINEERING DEPARTMENT

      THE UK MODEL IS A DESIGN MODEL DEVELOPED TO PREDICT
      THE HYDRAULIC AND SEDIMENT RESPONSE FROM SURFACE
      MINED LANDS FOR A SPECIFIED RAINFALL EVENT (SINGLE STORM)

      VERSION DATE 9-23-83

      DISCLAIMER: NEITHER THE UNIVERSITY NOR ANY OF ITS EMPLOYEES
      ACCEPT ANY RESPONSIBILITY OR LEGAL LIABILITY FOR THE
      CONCLUSIONS DRAWN FROM THE RESULTS OF THIS MODEL

***************************************************************
***************************************************************


***************************************************************
*                                                             *
*     THE FOLLOWING VALUES ARE NOW PREDICTED BY SEDIMOT II.   *
*     THEY CAN BE FOUND IN SUMMARY TABLES.                    *
*      1. PERIOD OF SIGNIFICANT CONCENTRATION                 *
*      2. VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION    *
*         DURING PERIOD OF SIGNIFICANT CONCENTRATION          *
*      3. VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION    *
*         DURING PEAK 24 HOUR PERIOD                          *
*      4. ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION         *
*         DURING PERIOD OF SIGNIFICANT CONCENTRATION          *
*      5. ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION         *
*         DURING PEAK 24 HOUR PERIOD                          *
*                                                             *
*     ALL CONCENTRATIONS ARE IN ML/L.                         *
*                                                             *
***************************************************************
```

****

WATERSHED IDENTIFICATION CODE

PLATEAU MINING CO. SEDIMENT POND 9 10-YR 24-HR

****

1

INPUT PARTICLE SIZE-PERCENT FINER DISTRIBUTIONS

SIZE,MM	38.100	19.100	9.520	4.760	2.380	1.190
	.590	.297	.149	.074	.037	.019
	.009	.002	.000			
PCT FINER NO. 1	100.000	96.000	87.000	79.000	76.000	73.000
	71.000	67.000	49.000	30.000	12.000	7.000
	3.000	1.000	.000			
CT FINER NO. 2	100.000	99.000	90.000	78.000	66.000	58.000
	49.000	42.000	32.000	30.000	12.000	7.000
	3.000	1.000	.000			

**********INPUT VALUES**********

STORM DURATION	=	24.00	HOURS
PRECIPATION DEPTH	=	2.10	INCHES
SPECIFIC GRAVITY	=	2.65	
LOAD RATE EXPONENT FACTOR	=	1.50	
SUBMERGED BULK SPECIFIC GRAVITY	=	1.45	

1

* *
JUNCTION 1, BRANCH 1, STRUCTURE 1
* *

*** HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS ***

WATER SHED	AREA ACRES	CURVE NUMBER	TC HR	TT HR	ROUTING COEFFICIENTS K-HRS	X	UNIT HYDRO
1	35.20	75.00	.370	.000	.000	.00	3.0

*** SEDIMENT INPUT VALUES FOR SUBWATERSHEDS ***

WATER SHED	SEG NUM	SOIL K	LENGTH FEET	SLOPE PCT	CP VALUE	PART OPT	SURF COND
1	1	.28	118.0	54.00	.200	1.0	.0

* * * * * * * * * * * * *
NULL STRUCTURE
* * * * * * * * * * * * *

1

* *
JUNCTION 1, BRANCH 1, STRUCTURE 2
* *

****
ZERO SUBWATERSHEDS ABOVE STRUCTURE
****

**** SUMMARY TABLE OF STRUCTURE INPUT VALUES *****

TOTAL SEDIMENT YIELD	=	411.7330	TONS
TOTAL RUNOFF VOLUME	=	1.2643	AC-FT
PEAK RUNOFF DISCHARGE	=	4.40	CFS
TOTAL DRAINAGE AREA	=	35.20	ACRES
PEAK CONCENTRATION	=	342016.00	MG/L
PEAK SETTLEABLE CONCENTRATION	=	213.32	ML/L
PEAK SETTLEABLE CONCENTRATION	=	309308.00	MG/L
PERIOD OF SIGNIFICANT CONCENTRATION	=	16.40	HRS
VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION DURING PERIOD OF SIGNIFICANT CONCENTRATION	=	135.53	ML/L
VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION DURING PEAK 24 HOUR PERIOD	=	135.53	ML/L
ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION DURING PERIOD OF SIGNIFICANT CONCENTRATION	=	89.99	ML/L
ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION DURING PEAK 24 HOUR PERIOD	=	61.49	ML/L

* * * * * * * * * * * *
NULL STRUCTURE
* * * * * * * * * * * *

* *
JUNCTION 1, BRANCH 2, STRUCTURE 1
* *

*** HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS ***

WATER SHED	AREA ACRES	CURVE NUMBER	TC HR	TT HR	ROUTING COEFFICIENTS K-HRS	X	UNIT HYDRO
1	28.10	90.00	.300	.000	.000	.00	1.0

*** SEDIMENT INPUT VALUES FOR SUBWATERSHEDS ***

WATER SHED	SEG NUM	SOIL K	LENGTH FEET	SLOPE PCT	CP VALUE	PART OPT	SURF COND
1	1	.28	205.0	16.00	1.000	1.0	.0

* * * * * * * * * * * *
NULL STRUCTURE
* * * * * * * * * * * *

1

* *
JUNCTION 1, BRANCH 3, STRUCTURE 1
* *

*** HYDRAULIC INPUT VALUES FOR SUBWATERSHEDS ***

WATER SHED	AREA ACRES	CURVE NUMBER	TC HR	TT HR	ROUTING COEFFICIENTS K-HRS	X	UNIT HYDRO
1	16.70	70.00	.330	.000	.000	.00	1.0

*** SEDIMENT INPUT VALUES FOR SUBWATERSHEDS ***

WATER SHED	SEG NUM	SOIL K	LENGTH FEET	SLOPE PCT	CP VALUE	PART OPT	SURF COND
1	1	.28	118.0	16.00	1.000	2.0	.0

* * * COMPUTED VALUES FOR INDIVIDUAL WATERSHEDS * * *

WATERSHED	PEAK FLOW (CFS)	RUNOFF (INCHES)	SEDIMENT TONS	DIAM (MM)	DELIVERY RATIO 1	DELIVERY RATIO 2
1	2.69	.28	89.70	.175	.686	1.000

NOTE: SEDIMENT DOES NOT INCLUDE POSSIBLE DEPOSITION BY DELIVERY RATIO 2

***** SUMMARY TABLE FOR TOTAL WATERSHED *****

RUNOFF VOLUME	=	.3888	ACRE-FT
PEAK DISCHARGE	=	2.6931	CFS
AREA	=	16.7000	ACRES
TIME OF PEAK DISCHARGE	=	12.20	HRS
BETA	=	1.0000	
RAINFALL EROSITIVITY FACTOR	=	24.21	EI UNIT
PEAK CONCENTRATION	=	297738.00	MG/L
PEAK SETTLEABLE CONCENTRATION	=	191.75	ML/L
PEAK SETTLEABLE CONCENTRATION	=	278039.00	MG/L
TOTAL SEDIMENT YIELD	=	89.6994	TONS
REPRESENTATIVE PARTICLE SIZE	=	.1747	MM
TIME OF PEAK CONCENTRATION	=	12.20	HRS
PERIOD OF SIGNIFICANT CONCENTRATION	=	13.00	HRS
VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION DURING PERIOD OF SIGNIFICANT CONCENTRATION	=	100.58	ML/L
VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION DURING PEAK 24 HOUR PERIOD	=	100.58	ML/L
ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION DURING PERIOD OF SIGNIFICANT CONCENTRATION	=	69.16	ML/L
ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION DURING PEAK 24 HOUR PERIOD	=	37.46	ML/L

* * * * * * * * * * * *
NULL STRUCTURE
* * * * * * * * * * * *

1

* *
JUNCTION 2, BRANCH 1, STRUCTURE 1
* *

****
ZERO SUBWATERSHEDS ABOVE STRUCTURE
****

**** SUMMARY TABLE OF STRUCTURE INPUT VALUES *****

TOTAL SEDIMENT YIELD	=	1878.7700	TONS
TOTAL RUNOFF VOLUME	=	4.4156	AC-FT
PEAK RUNOFF DISCHARGE	=	32.00	CFS
TOTAL DRAINAGE AREA	=	80.00	ACRES
PEAK CONCENTRATION	=	504738.00	MG/L
PEAK SETTLEABLE CONCENTRATION	=	326.62	ML/L
PEAK SETTLEABLE CONCENTRATION	=	473592.00	MG/L
PERIOD OF SIGNIFICANT CONCENTRATION	=	20.50	HRS
VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION DURING PERIOD OF SIGNIFICANT CONCENTRATION	=	175.08	ML/L
VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION DURING PEAK 24 HOUR PERIOD	=	175.08	ML/L
ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION DURING PERIOD OF SIGNIFICANT CONCENTRATION	=	81.55	ML/L
ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION DURING PEAK 24 HOUR PERIOD	=	69.66	ML/L

***** GENERATED DATA FOR INPUT INTO STRUCTURE 1 *****
(INCLUDES VALUES FROM PREVIOUS STRUCTURE)

*** PARTICLE SIZE DISTRIBUTION OF SEDIMENT ***

SIZE,MM	38.1000	19.1000	9.5200	4.7600	2.3600	1.1900
PERCENT FINER	100.0000	100.0000	98.5593	91.9506	89.2900	86.2552
SIZE,MM	.5900	.2970	.1490	.0740	.0370	.0190
PERCENT FINER	83.9762	80.1854	64.6200	40.7746	16.3098	9.5141
SIZE,MM	.0090	.0020	.0001			
PERCENT FINER	4.0775	1.3592	.0000			

*** HYDROGRAPH AND SEDIMENT GRAPH ***
(TWO CONSECUTIVE VALUES PER LINE)

TIME (HR)	DISCHARGE (CFS)	SED DISC (MG/L)	******* *	TIME (HR)	DISCHARGE (CFS)	SED DISC (MG/L)

.00	.000	.000	*	.10	.000	.000
.20	.000	.000	*	.30	.000	.000
.40	.000	.000	*	.50	.000	.000
.60	.000	.000	*	.70	.000	.000
.80	.000	.000	*	.90	.000	.000
1.00	.000	.000	*	1.10	.000	.000
1.20	.000	.000	*	1.30	.000	.000
1.40	.000	.000	*	1.50	.000	.000
1.60	.000	.000	*	1.70	.000	.000
1.80	.000	.000	*	1.90	.000	.000
2.00	.000	.000	*	2.10	.000	.000
2.20	.000	.000	*	2.30	.000	.000
2.40	.000	.000	*	2.50	.000	.000
2.60	.000	.000	*	2.70	.000	.000
2.80	.000	.000	*	2.90	.000	.000
3.00	.000	.000	*	3.10	.000	.000
3.20	.000	.000	*	3.30	.000	.000
3.40	.000	.000	*	3.50	.000	.000
3.60	.000	.000	*	3.70	.000	.000
3.80	.000	.000	*	3.90	.000	.000
4.00	.000	.000	*	4.10	.000	.000
4.20	.000	.000	*	4.30	.000	.000
4.40	.000	.000	*	4.50	.000	.000
4.60	.000	.000	*	4.70	.000	.000
4.80	.000	.000	*	4.90	.000	.000
5.00	.000	.000	*	5.10	.000	.000
5.20	.000	.000	*	5.30	.000	.000
5.40	.000	.000	*	5.50	.000	.000
5.60	.000	.000	*	5.70	.000	.000
5.80	.000	.000	*	5.90	.000	.000
6.00	.000	.000	*	6.10	.000	.000
6.20	.000	.000	*	6.30	.000	.000
6.40	.000	.000	*	6.50	.000	.000
6.60	.000	.000	*	6.70	.000	.000
6.80	.000	.000	*	6.90	.000	.000
7.00	.000	.000	*	7.10	.000	.000
7.20	.000	.000	*	7.30	.000	.000
7.40	.000	.000	*	7.50	.000	.000
7.60	.000	.000	*	7.70	.013	14438.500
7.80	.020	18169.700	*	7.90	.028	21422.900
8.00	.036	24341.500	*	8.10	.046	27311.600
8.20	.059	31066.200	*	8.30	.076	35189.600
8.40	.092	38593.800	*	8.50	.106	41410.800
8.60	.121	44126.800	*	8.70	.138	47035.400
8.80	.156	49993.900	*	8.90	.173	52550.800
9.00	.188	54788.500	*	9.10	.205	57144.800
9.20	.228	60212.000	*	9.30	.255	63633.600
9.40	.279	66399.400	*	9.50	.298	68644.400
9.60	.320	71008.900	*	9.70	.349	74113.900
9.80	.384	77576.300	*	9.90	.412	80312.200
10.00	.435	82487.800	*	10.10	.465	85201.400
10.20	.521	89594.900	*	10.30	.593	95802.500

10.40	.648	99923.900	*	10.50	.687	102776.000
10.60	.738	106421.000	*	10.70	.840	113217.000
10.80	.973	121461.000	*	10.90	1.070	127059.000
11.00	1.136	130725.000	*	11.10	1.236	136088.000
11.20	1.469	147650.000	*	11.30	1.784	161832.000
11.40	2.007	170977.000	*	11.50	2.149	176560.000
11.60	3.287	214938.000	*	11.70	8.165	323633.000
11.80	16.066	428726.000	*	11.90	22.659	481191.000
12.00	28.040	502249.000	*	12.10	32.000	504737.000
12.20	29.704	457255.000	*	12.30	22.408	398431.000
12.40	17.611	354478.000	*	12.50	15.708	335696.000
12.60	14.076	317964.000	*	12.70	11.985	298116.000
12.80	9.725	272599.000	*	12.90	8.387	256992.000
13.00	7.746	246919.000	*	13.10	7.292	239008.000
13.20	6.779	231873.000	*	13.30	6.219	224963.000
13.40	5.876	220238.000	*	13.50	5.710	217207.000
13.60	5.569	214620.000	*	13.70	5.336	211396.000
13.80	5.038	207656.000	*	13.90	4.842	204776.000
14.00	4.739	202612.000	*	14.10	4.630	200461.000
14.20	4.409	197396.000	*	14.30	4.111	193678.000
14.40	3.905	190462.000	*	14.50	3.787	187627.000
14.60	3.693	185052.000	*	14.70	3.616	182765.000
14.80	3.552	180710.000	*	14.90	3.505	178863.000
15.00	3.466	177238.000	*	15.10	3.432	175730.000
15.20	3.400	174340.000	*	15.30	3.368	172981.000
15.40	3.337	171616.000	*	15.50	3.305	170232.000
15.60	3.272	168840.000	*	15.70	3.239	167439.000
15.80	3.206	166028.000	*	15.90	3.172	164604.000
16.00	3.137	163178.000	*	16.10	3.068	161165.000
16.20	2.866	155983.000	*	16.30	2.570	151210.000
16.40	2.357	146242.000	*	16.50	2.233	142169.000
16.60	2.139	136772.000	*	16.70	2.064	135994.000
16.80	2.006	132700.000	*	16.90	1.967	131923.000
17.00	1.941	130568.000	*	17.10	1.922	129547.000
17.20	1.907	128796.000	*	17.30	1.895	128157.000
17.40	1.884	127585.000	*	17.50	1.874	127065.000
17.60	1.866	126585.000	*	17.70	1.858	126165.000
17.80	1.851	125783.000	*	17.90	1.844	125419.000
18.00	1.838	125098.000	*	18.10	1.833	124811.000
18.20	1.828	124548.000	*	18.30	1.824	124317.000
18.40	1.820	124100.000	*	18.50	1.817	123913.000
18.60	1.814	123742.000	*	18.70	1.811	123593.000
18.80	1.809	123453.000	*	18.90	1.807	123318.000
19.00	1.805	123201.000	*	19.10	1.804	123105.000
19.20	1.802	123005.000	*	19.30	1.801	122919.000
19.40	1.800	122848.000	*	19.50	1.799	122793.000
19.60	1.799	122732.000	*	19.70	1.795	122706.000
19.80	1.799	122661.000	*	19.90	1.799	122656.000
20.00	1.799	122650.000	*	20.10	1.783	122185.000
20.20	1.698	120007.000	*	20.30	1.563	116627.000
20.40	1.469	114018.000	*	20.50	1.416	112132.000
20.60	1.379	110540.000	*	20.70	1.347	109193.000

20.80	1.324	108110.000	*	20.90	1.309	107333.000
21.00	1.300	106766.000	*	21.10	1.294	106357.000
21.20	1.285	106074.000	*	21.30	1.285	105839.000
21.40	1.282	105613.000	*	21.50	1.278	105405.000
21.60	1.275	105197.000	*	21.70	1.272	105006.000
21.80	1.270	104811.000	*	21.90	1.267	104621.000
22.00	1.264	104456.000	*	22.10	1.262	104302.000
22.20	1.259	104138.000	*	22.30	1.257	103978.000
22.40	1.255	103851.000	*	22.50	1.253	103721.000
22.60	1.251	103588.000	*	22.70	1.250	103474.000
22.80	1.248	103371.000	*	22.90	1.247	103273.000
23.00	1.245	103178.000	*	23.10	1.244	103088.000
23.20	1.243	103011.000	*	23.30	1.242	102945.000
23.40	1.241	102883.000	*	23.50	1.241	102833.000
23.60	1.240	102780.000	*	23.70	1.240	102739.000
23.80	1.239	102710.000	*	23.90	1.239	102685.000
24.00	1.239	102679.000	*	24.10	1.204	101542.000
24.20	1.030	96655.000	*	24.30	.753	91339.100
24.40	.557	89735.400	*	24.50	.449	87379.000
24.60	.366	85344.800	*	24.70	.298	84242.400
24.80	.243	84658.400	*	24.90	.213	81381.700
25.00	.192	77454.700	*	25.10	.177	74204.600
25.20	.165	71892.200	*	25.30	.155	69786.900
25.40	.146	67828.100	*	25.50	.137	65799.700
25.60	.128	63667.400	*	25.70	.120	61670.800
25.80	.112	59455.900	*	25.90	.104	57568.000
26.00	.096	55413.300	*	26.10	.089	53373.300
26.20	.082	51267.400	*	26.30	.076	49228.100
26.40	.069	47300.500	*	26.50	.063	44935.900
26.60	.057	42868.200	*	26.70	.052	41233.300
26.80	.047	38765.300	*	26.90	.042	36591.000
27.00	.037	34619.200	*	27.10	.033	32093.800
27.20	.028	30545.600	*	27.30	.025	28143.300
27.40	.021	25907.000	*	27.50	.018	24048.000
27.60	.015	20984.500	*	27.70	.012	19914.500
27.80	.009	15683.800	*	27.90	.007	14906.600
28.00	.005	12776.600	*	28.10	.004	10345.300
28.20	.003	7865.350	*	28.30	.001	.000

* *

POND RESULTS

* *

***** CONTROL VARIABLES OPTIONS *****

FLOW	FRACTN	ISDO	NRHP	NSP	NCSTR
1	0	1	500	7	2

***** BASIN GEOMETRY *****

STAGE (FT)	AREA (ACRES)	AVERAGE DEPTH (FT)	DISCHARGE (CFS)	CAPACITY (ACRES-FT)
.00	.380	.00	.00	.00
4.30	.566	3.88	.00	2.03
6.00	.650	5.38	.31	3.07
7.00	.700	6.22	.39	3.74
9.00	.810	7.84	.51	5.25
10.50	.900	9.00	.59	6.53
11.00	.930	9.38	10.61	6.99

***** STORM EVENT SUMMARY *****

TURBULENCE FACTOR	=	1.00	
PERMANENT POOL CAPACITY	=	2.034	ACRE-FT
DEAD STORAGE	=	50.00	PERCENT
TIME INCREMENT OUTFLOW	=	.10	HRS
VISCOSITY	=	.009	CM**2/SEC
INFLOW RUNOFF VOLUME	=	4.416	ACRE-FT
OUTFLOW ROUTED VOLUME	=	1.610	ACRE-FT
STORM VOLUME DISCHARGED (PLUG FLOW)	=	1.610	ACRE-FT
POND VOLUME AT PEAK STAGE	=	5.896	ACRE-FT
PEAK STAGE	=	9.752	FT
PEAK INFLOW RATE	=	32.000	CFS
PEAK DISCHARGE RATE	=	.550	CFS
PEAK INFLOW SEDIMENT CONCENTRATION	=	504738.00	MG/L
PEAK EFFLUENT SEDIMENT CONCENTRATION	=	23678.40	MG/L
PEAK EFFLUENT SETTLEABLE CONCENTRATION	=	.0000	ML/L
PEAK EFFLUENT SETTLEABLE CONCENTRATION	=	.04	MG/L
STORM AVERAGE EFFLUENT CONCENTRATION	=	4355.17	MG/L
AVERAGE EFFLUENT SEDIMENT CONCENTRATION	=	4355.17	MG/L
BASIN TRAP EFFICIENCY	=	99.49	PERCENT
DETENTION TIME OF FLOW WITH SEDIMENT	=	16.21	HRS
DETENTION TIME FROM HYDROGRAPH CENTERS	=	16.21	HRS
DETENTION TIME INCLUDING STORED FLOW	=	16.21	HRS
SEDIMENT LOAD DISCHARGED	=	9.52	TONS
PERIOD OF SIGNIFICANT CONCENTRATION	=	41.90	HRS
VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION DURING PERIOD OF SIGNIFICANT CONCENTRATION	=	.00	ML/L
VOLUME WEIGHTED AVERAGE SETTLEABLE CONCENTRATION DURING PEAK 24 HOUR PERIOD	=	.00	ML/L
ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION DURING PERIOD OF SIGNIFICANT CONCENTRATION	=	.00	ML/L
ARITHMETIC AVERAGE SETTLEABLE CONCENTRATION DURING PEAK 24 HOUR PERIOD	=	.00	ML/L

*** PARTICLE SIZE DISTRIBUTION OF SEDIMENT ***

SIZE,MM	38.1000	19.1000	9.5200	4.7600	2.3800	1.1900
PERCENT FINER	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
SIZE,MM	.5900	.2970	.1490	.0740	.0370	.0190
PERCENT FINER	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
IZE,MM	.0090	.0020	.0001			
ERCENT FINER	100.0000	100.0000	.0000			

*** HYDROGRAPH AND SEDIMENT GRAPH ***
(TWO CONSECUTIVE VALUES PER LINE)

TIME (HR)	DISCHARGE (CFS)	SED DISC (MG/L)	******* *	TIME (HR)	DISCHARGE (CFS)	SED DISC (MG/L)
.00	.000	.000	*	.10	.000	.000
.20	.000	.000	*	.30	.000	.000
.40	.000	.000	*	.50	.000	.000
.60	.000	.000	*	.70	.000	.000
.80	.000	.000	*	.90	.000	.000
1.00	.000	.000	*	1.10	.000	.000
1.20	.000	.000	*	1.30	.000	.000
1.40	.000	.000	*	1.50	.000	.000
1.60	.000	.000	*	1.70	.000	.000
1.80	.000	.000	*	1.90	.000	.000
2.00	.000	.000	*	2.10	.000	.000
2.20	.000	.000	*	2.30	.000	.000
2.40	.000	.000	*	2.50	.000	.000
2.60	.000	.000	*	2.70	.000	.000
2.80	.000	.000	*	2.90	.000	.000
3.00	.000	.000	*	3.10	.000	.000
3.20	.000	.000	*	3.30	.000	.000
3.40	.000	.000	*	3.50	.000	.000
3.60	.000	.000	*	3.70	.000	.000
3.80	.000	.000	*	3.90	.000	.000
4.00	.000	.000	*	4.10	.000	.000
4.20	.000	.000	*	4.30	.000	.000
4.40	.000	.000	*	4.50	.000	.000
4.60	.000	.000	*	4.70	.000	.000
4.80	.000	.000	*	4.90	.000	.000
5.00	.000	.000	*	5.10	.000	.000
5.20	.000	.000	*	5.30	.000	.000
5.40	.000	.000	*	5.50	.000	.000
5.60	.000	.000	*	5.70	.000	.000
5.80	.000	.000	*	5.90	.000	.000
6.00	.000	.000	*	6.10	.000	.000
6.20	.000	.000	*	6.30	.000	.000
6.40	.000	.000	*	6.50	.000	.000
6.60	.000	.000	*	6.70	.000	.000
6.80	.000	.000	*	6.90	.000	.000
7.00	.000	.000	*	7.10	.000	.000
7.20	.000	.000	*	7.30	.000	.000
7.40	.000	.000	*	7.50	.000	.000
7.60	.000	.000	*	7.70	.000	.000
7.80	.000	.000	*	7.90	.000	.001
8.00	.000	.002	*	8.10	.000	.005
8.20	.000	.009	*	8.30	.001	.019
8.40	.001	.035	*	8.50	.001	.061
8.60	.001	.099	*	8.70	.002	.152
8.80	.002	.226	*	8.90	.002	.325

9.00	.003	.453	*	9.10	.003	.613
9.20	.004	.819	*	9.30	.004	1.091
9.40	.005	1.440	*	9.50	.006	1.867
9.60	.007	2.377	*	9.70	.007	3.000
9.80	.008	3.781	*	9.90	.009	4.738
10.00	.010	5.856	*	10.10	.011	7.158
10.20	.013	8.786	*	10.30	.014	10.967
10.40	.015	13.767	*	10.50	.017	17.082
10.60	.019	20.955	*	10.70	.021	25.893
10.80	.023	32.699	*	10.90	.025	41.604
11.00	.028	52.167	*	11.10	.031	64.599
11.20	.034	81.398	*	11.30	.038	106.707
11.40	.043	141.974	*	11.50	.048	184.844
11.60	.054	261.808	*	11.70	.068	610.222
11.80	.098	2234.140	*	11.90	.146	6428.510
12.00	.208	12606.100	*	12.10	.282	18950.400
12.20	.329	23086.600	*	12.30	.354	23678.400
12.40	.373	22242.400	*	12.50	.389	20633.700
12.60	.399	19287.400	*	12.70	.407	18078.800
12.80	.414	16935.070	*	12.90	.420	15906.600
13.00	.425	15045.900	*	13.10	.429	14323.200
13.20	.434	13687.400	*	13.30	.438	13105.700
13.40	.441	12573.600	*	13.50	.445	12095.200
13.60	.448	11662.600	*	13.70	.452	11262.900
.80	.455	10887.800	*	13.90	.458	10539.400
14.00	.461	10220.300	*	14.10	.463	9925.710
14.20	.466	9646.430	*	14.30	.468	9376.690
14.40	.471	9119.390	*	14.50	.473	8878.980
14.60	.475	8654.700	*	14.70	.477	8444.280
14.80	.479	8246.440	*	14.90	.481	8060.340
15.00	.483	7885.070	*	15.10	.485	7719.270
15.20	.487	7561.390	*	15.30	.489	7410.210
15.40	.491	7264.920	*	15.50	.493	7125.000
15.60	.495	6990.010	*	15.70	.496	6859.690
15.80	.498	6734.030	*	15.90	.500	6613.180
16.00	.502	6497.240	*	16.10	.503	6385.630
16.20	.505	6275.730	*	16.30	.506	6165.810
16.40	.508	6059.280	*	16.50	.509	5960.240
16.60	.510	5868.840	*	16.70	.511	5763.650
16.80	.512	5703.600	*	16.90	.512	5628.090
17.00	.513	5556.730	*	17.10	.514	5489.140
17.20	.515	5424.950	*	17.30	.515	5363.730
17.40	.516	5304.960	*	17.50	.517	5248.170
17.60	.517	5193.070	*	17.70	.518	5139.480
17.80	.519	5087.250	*	17.90	.519	5036.260
18.00	.520	4986.470	*	18.10	.521	4937.950
18.20	.521	4890.760	*	18.30	.522	4844.970
18.40	.523	4800.550	*	18.50	.523	4757.370
18.60	.524	4715.210	*	18.70	.525	4673.920
.80	.525	4633.430	*	18.90	.526	4593.660
19.00	.527	4554.580	*	19.10	.527	4516.170
19.20	.528	4478.510	*	19.30	.529	4441.700

19.40	.529	4405.830	*	19.50	.530	4370.910
19.60	.531	4336.900	*	19.70	.531	4303.630
19.80	.532	4270.980	*	19.90	.533	4238.890
20.00	.533	4207.320	*	20.10	.534	4176.030
20.20	.535	4144.290	*	20.30	.535	4111.840
20.40	.536	4080.160	*	20.50	.536	4050.810
20.60	.537	4023.950	*	20.70	.537	3999.100
20.80	.537	3975.890	*	20.90	.538	3954.020
21.00	.538	3933.280	*	21.10	.539	3913.460
21.20	.539	3894.390	*	21.30	.539	3875.910
21.40	.540	3857.910	*	21.50	.540	3840.330
21.60	.541	3823.110	*	21.70	.541	3806.220
21.80	.541	3789.630	*	21.90	.542	3773.320
22.00	.542	3757.270	*	22.10	.542	3741.460
22.20	.543	3725.880	*	22.30	.543	3710.500
22.40	.544	3695.320	*	22.50	.544	3680.320
22.60	.544	3665.500	*	22.70	.545	3650.850
22.80	.545	3636.350	*	22.90	.545	3622.010
23.00	.546	3607.810	*	23.10	.546	3593.750
23.20	.546	3579.840	*	23.30	.547	3566.100
23.40	.547	3552.540	*	23.50	.547	3539.180
23.60	.548	3526.030	*	23.70	.548	3513.070
23.80	.549	3500.260	*	23.90	.549	3487.580
24.00	.549	3475.020	*	24.10	.550	3462.270
.20	.550	3448.140	*	24.30	.550	3432.050
24.40	.550	3415.910	*	24.50	.550	3401.720
24.60	.550	3389.620	*	24.70	.550	3379.080
24.80	.550	3369.750	*	24.90	.550	3361.480
25.00	.549	3354.190	*	25.10	.549	3347.740
25.20	.549	3342.010	*	25.30	.549	3336.850
25.40	.549	3332.180	*	25.50	.548	3327.910
25.60	.548	3324.000	*	25.70	.548	3320.420
25.80	.548	3317.120	*	25.90	.548	3314.100
26.00	.547	3311.330	*	26.10	.547	3308.770
26.20	.547	3306.410	*	26.30	.547	3304.240
26.40	.546	3302.250	*	26.50	.546	3300.410
26.60	.546	3298.720	*	26.70	.546	3297.170
26.80	.545	3295.750	*	26.90	.545	3294.450
27.00	.545	3293.270	*	27.10	.545	3292.200
27.20	.544	3291.220	*	27.30	.544	3290.340
27.40	.544	3289.550	*	27.50	.543	3288.830
27.60	.543	3288.190	*	27.70	.543	3287.630
27.80	.543	3287.130	*	27.90	.542	3286.700
28.00	.542	3286.340	*	28.10	.542	3285.030
28.20	.542	3285.790	*	28.30	.541	3285.600
28.40	.541	3285.460	*	28.50	.541	3285.380
28.60	.540	3285.350	*	28.70	.540	3285.380
28.80	.540	3285.450	*	28.90	.540	3285.580
29.00	.539	3285.760	*	29.10	.539	3285.960
.20	.539	3286.250	*	29.30	.539	3286.560
29.40	.538	3286.910	*	29.50	.538	3287.300
29.60	.538	3287.720	*	29.70	.537	3288.180

29.80	.537	3288.660	*	29.90	.537	3289.180
30.00	.537	3289.740	*	30.10	.536	3290.320
30.20	.536	3290.930	*	30.30	.536	3291.560
30.40	.535	3292.230	*	30.50	.535	3292.920
30.60	.535	3293.640	*	30.70	.535	3294.370
30.80	.534	3295.130	*	30.90	.534	3295.920
31.00	.534	3296.720	*	31.10	.534	3297.540
31.20	.533	3298.380	*	31.30	.533	3299.240
31.40	.533	3300.120	*	31.50	.532	3301.010
31.60	.532	3301.920	*	31.70	.532	3302.850
31.80	.532	3303.790	*	31.90	.531	3304.750
32.00	.531	3305.720	*	32.10	.531	3306.690
32.20	.531	3307.690	*	32.30	.530	3308.690
32.40	.530	3309.700	*	32.50	.530	3310.730
32.60	.529	3311.760	*	32.70	.529	3312.810
32.80	.529	3313.860	*	32.90	.529	3314.920
33.00	.528	3315.990	*	33.10	.528	3317.060
33.20	.528	3318.140	*	33.30	.528	3319.230
33.40	.527	3320.320	*	33.50	.527	3321.420
33.60	.527	3322.520	*	33.70	.526	3323.630
33.80	.526	3324.740	*	33.90	.526	3325.860
34.00	.526	3326.980	*	34.10	.525	3328.100
34.20	.525	3329.230	*	34.30	.525	3330.360
34.40	.525	3331.490	*	34.50	.524	3332.630
.60	.524	3333.770	*	34.70	.524	3334.920
34.80	.523	3336.070	*	34.90	.523	3337.220
35.00	.523	3338.370	*	35.10	.523	3339.530
35.20	.522	3340.690	*	35.30	.522	3341.850
35.40	.522	3343.010	*	35.50	.522	3344.180
35.60	.521	3345.350	*	35.70	.521	3346.520
35.80	.521	3347.690	*	35.90	.520	3348.860
36.00	.520	3350.040	*	36.10	.520	3351.210
36.20	.520	3352.390	*	36.30	.519	3353.570
36.40	.519	3354.740	*	36.50	.519	3355.920
36.60	.519	3357.100	*	36.70	.518	3358.280
36.80	.518	3359.460	*	36.90	.518	3360.640
37.00	.518	3361.820	*	37.10	.517	3363.000
37.20	.517	3364.190	*	37.30	.517	3365.370
37.40	.516	3366.550	*	37.50	.516	3367.730
37.60	.516	3368.910	*	37.70	.516	3370.090
37.80	.515	3371.270	*	37.90	.515	3372.450
38.00	.515	3373.620	*	38.10	.515	3374.800
38.20	.514	3375.980	*	38.30	.514	3377.160
38.40	.514	3378.330	*	38.50	.514	3379.510
38.60	.513	3380.690	*	38.70	.513	3381.860
38.80	.513	3383.040	*	38.90	.513	3384.210
39.00	.512	3385.380	*	39.10	.512	3386.560
39.20	.512	3387.730	*	39.30	.511	3388.900
39.40	.511	3390.060	*	39.50	.511	3391.230
.60	.511	3392.400	*	39.70	.510	3393.560
.80	.510	3394.720	*	39.90	.510	3395.890
40.00	.510	3397.050	*	40.10	.509	3398.210

40.20	.509	3399.360	*	40.30	.509	3400.520
40.40	.508	3401.670	*	40.50	.508	3402.820
40.60	.508	3403.970	*	40.70	.507	3405.120
40.80	.507	3406.260	*	40.90	.507	3407.400
41.00	.506	3408.540	*	41.10	.506	3409.680
41.20	.506	3410.810	*	41.30	.505	3411.940
41.40	.505	3413.070	*	41.50	.505	3414.200
41.60	.504	3415.320	*	41.70	.504	3416.440
41.80	.504	3417.560	*	41.90	.503	3418.680
42.00	.503	3419.790	*	42.10	.503	3420.900
42.20	.502	3422.010	*	42.30	.502	3423.120
42.40	.502	3424.220	*	42.50	.501	3425.320
42.60	.501	3426.420	*	42.70	.501	3427.520
42.80	.500	3428.610	*	42.90	.500	3429.700
43.00	.500	3430.790	*	43.10	.499	3431.870
43.20	.499	3432.960	*	43.30	.499	3434.030
43.40	.498	3435.110	*	43.50	.498	3436.180
43.60	.498	3437.250	*	43.70	.497	3438.320
43.80	.497	3439.390	*	43.90	.497	3440.450
44.00	.496	3441.510	*	44.10	.496	3442.570
44.20	.496	3443.620	*	44.30	.495	3444.670
44.40	.495	3445.720	*	44.50	.495	3446.770
44.60	.494	3447.810	*	44.70	.494	3448.850
.80	.494	3449.890	*	44.90	.493	3450.920
.00	.493	3451.950	*	45.10	.493	3452.980
45.20	.492	3454.010	*	45.30	.492	3455.030
45.40	.492	3456.050	*	45.50	.491	3457.070
45.60	.491	3458.090	*	45.70	.491	3459.110
45.80	.490	3460.120	*	45.90	.490	3461.130
46.00	.490	3462.160	*	46.10	.490	3463.200
46.20	.489	3464.290	*	46.30	.489	3465.430
46.40	.489	3466.630	*	46.50	.488	3467.880
46.60	.488	3469.170	*	46.70	.488	3470.490
46.80	.487	3471.820	*	46.90	.487	3473.160
47.00	.487	3474.520	*	47.10	.486	3475.890
47.20	.486	3477.260	*	47.30	.486	3478.640
47.40	.485	3480.020	*	47.50	.485	3481.400
47.60	.485	3482.780	*	47.70	.484	3484.170
47.80	.484	3485.560	*	47.90	.484	3486.950
48.00	.483	3488.340	*	48.10	.483	3489.730
48.20	.483	3491.120	*	48.30	.482	3492.520
48.40	.482	3493.910	*	48.50	.482	3495.300
48.60	.482	3496.700	*	48.70	.481	3498.090
48.80	.481	3499.490	*	48.90	.481	3500.880
49.00	.480	3502.280	*	49.10	.480	3503.670
49.20	.480	3505.060	*	49.30	.479	3506.450
49.40	.479	3507.840	*	49.50	.479	3509.230
49.60	.478	3510.610	*	49.70	.478	3512.000
.80	.478	3513.390	*	49.90	.477	3514.770

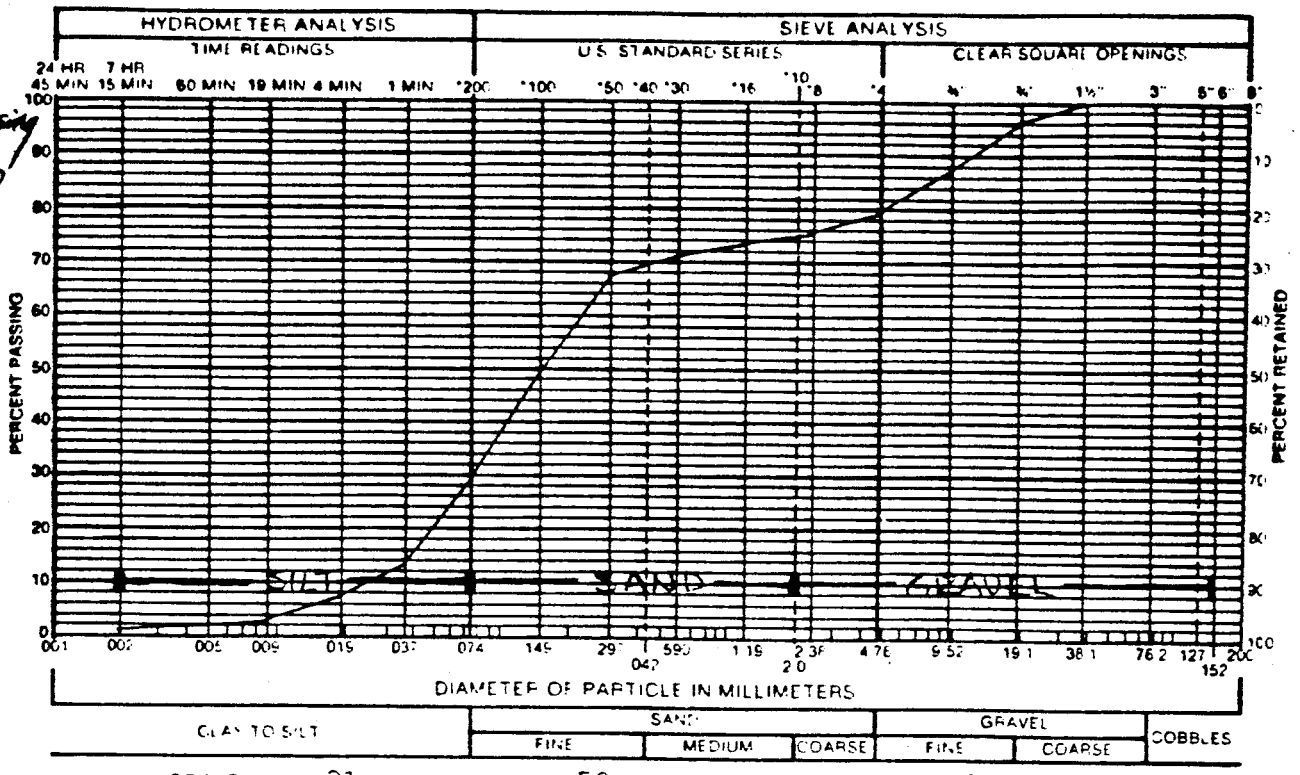
*** RUN COMPLETED ****

CA-2-79

Gradation Analysis from Soil Sample Taken From Watershed for Sediment Pond 2

chen and associates, inc.

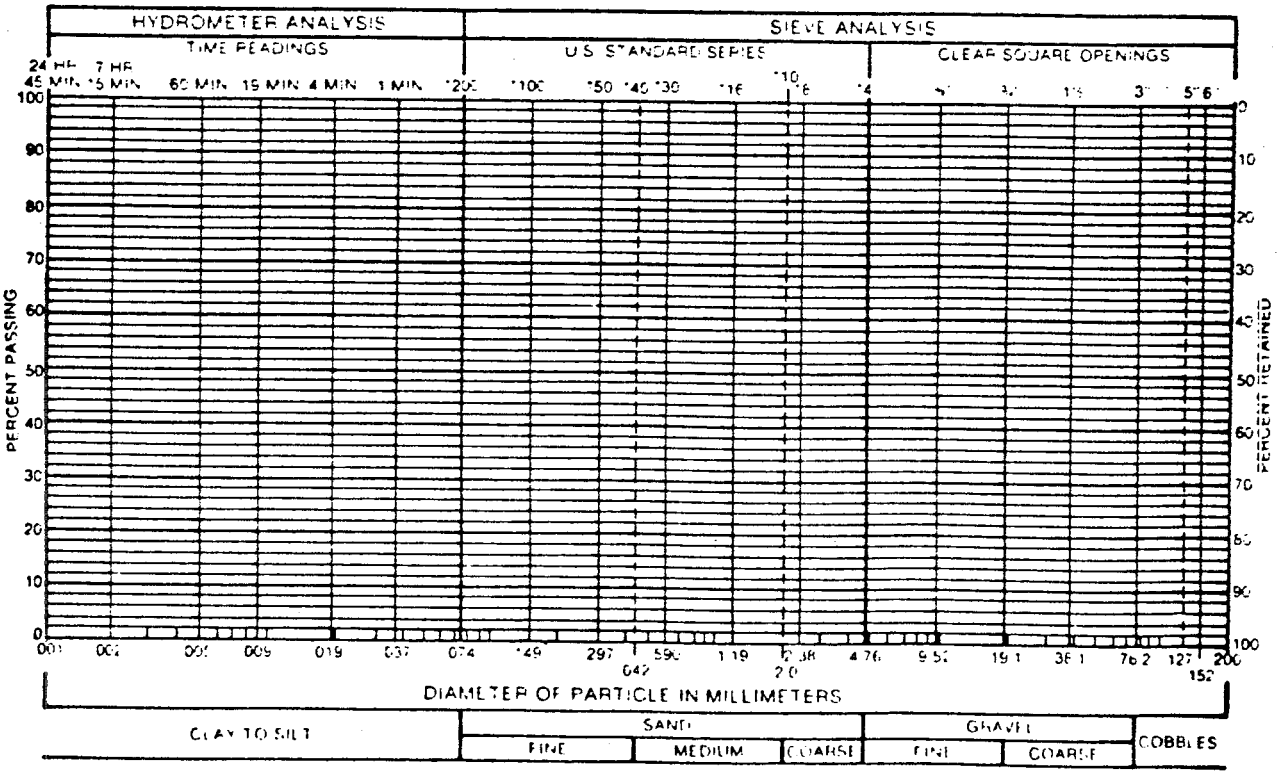
Size mm	% Passing
8.1	100
9.1	96
1.52	87
.76	79
.38	76
.19	73
.59	71
.297	67
.149	49
.074	30
.037	12
.019	7
.009	3
.002	1
.001	0



GRAVEL 21 % SAND 50% SILT AND CLAY 29 %

LIQUID LIMIT – % PLASTICITY INDEX – %

SAMPLE OF Clayey Gravelly Sand FROM Plateau



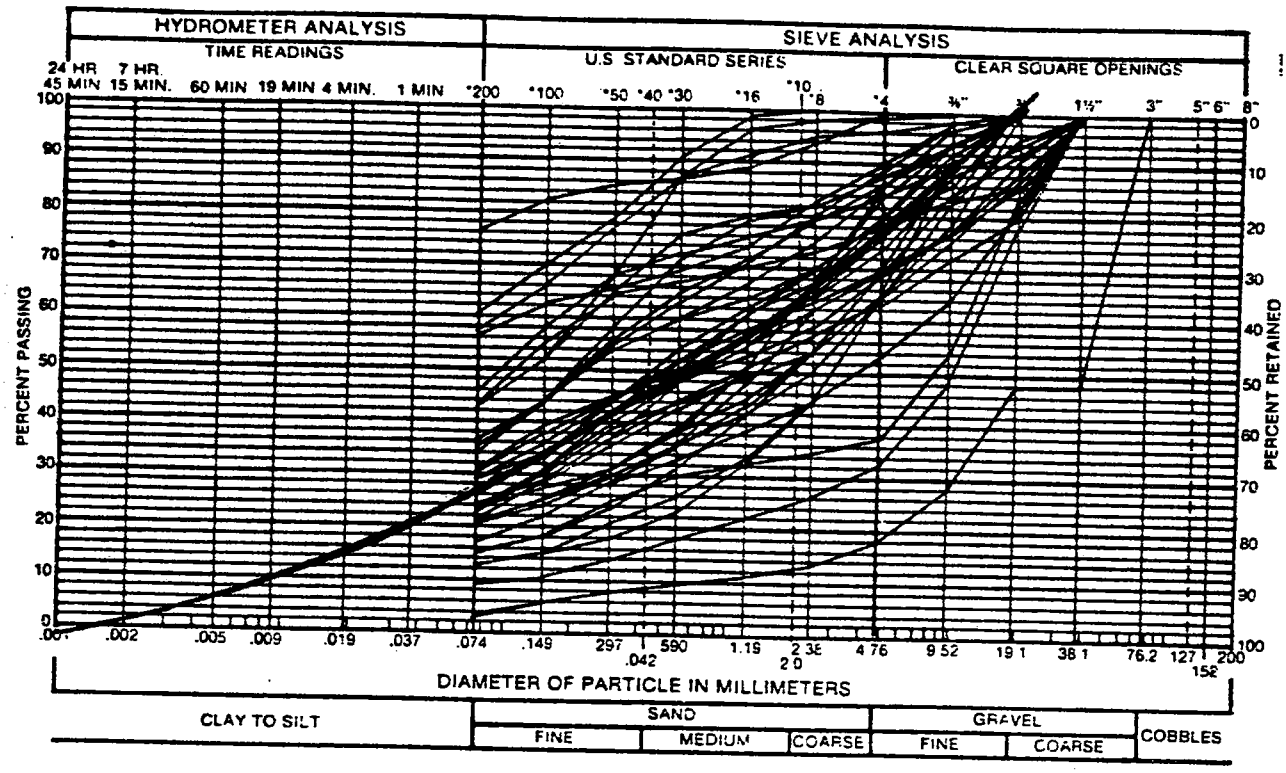
GRAVEL % SAND % SILT AND CLAY %

LIQUID LIMIT % PLASTICITY INDEX %

SAMPLE OF FROM

Coal Refuse Gradation Analyses.

chen and associates, inc.



Coal Refuse

Size mm	% Passing
19.1	100
9.52	90
4.76	78
2.38	66
1.19	58
0.59	49
0.297	42
0.149	32
0.074	26
0.037	12
0.019	7
0.009	3
0.002	1
0.0001	0.0

#511385	chen and associates, inc.	SUMMARY OF GRADATION TEST RESULTS	Figure 8

South east inlet ditch to Pond 9
(see sheet 5 of 9 of construction drawings)

DESCRIPTION (from downstream to upstream end)

D30 C – Riprap inlet down southeast corner of Pond 9

D30 B – Earth channel with flat (10:1) side slopes for truck crossing

D30 A – Riprap channel from earth channel to existing access road

C150 B – New culvert under existing access road

D80 A – Riprap channel from access road to toe of existing hill

C80 A – downspout from riprap channel to existing ditch 7E

HYDROLOGY

Pond 9 is sized to recieve runoff from much of the coal refuse area which is presently tributary to Pond 5. As the coal refuse pile is expanded it is anticipated that the tributary area to Pond 9 will increase to the limits shown on the attached maps A, B, & C.

Total future area tributary to Pond 9 = 80 acres
(see sediment Pond 9 design calculations)

S.E. corner of Pond 9 (inlet ditch)

tributary area characteristics: (including contribution from Ditch 74B)

	AREA (acres)	CN	S (inches)	Q (for P = 2.1 inches) inches
Disturbed	26.0	90	1.11	1.18
Undisturbed	35.2	75	3.33	0.43
Coal Refuse	7.8	70	4.29	0.28
TOTAL	69.0			

$$\text{Vol weighted } Q \Rightarrow \frac{26.0(1.18) + 35.2(.43) + 7.8(.28)}{66.6} = 0.696$$

$\Rightarrow$ Vol weighted $\underline{CN = 81}$

"HYDRO" $\Rightarrow$ Peak 10 yr runoff = 29.8 cfs see sheet 2

PROJECT : PLATEAU MINING CO SE CORNER OF POND 9 FUTURE 10-YR 24-HR

AREA= 69.0 ACRES
AVERAGE BASIN SLOPE= 26.6 PERCENT
CURVE NUMBER= 81.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 9130. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .3891 HOURS QPCFS= 134.10 CFS QPIN= 1.9274 INCHES
C3= 9.5000 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.74	.4606	.0000	.0000	.0	.00
10.82	.4711	.0000	.0000	6.7	.00
10.90	.4815	.0000	.0000	41.7	.00
10.97	.4920	.0002	.0002	89.0	.00
11.05	.5056	.0006	.0003	123.1	.01
11.13	.5210	.0011	.0006	134.1	.04
11.21	.5364	.0019	.0008	125.6	.09
11.28	.5517	.0028	.0009	106.0	.16
11.36	.5671	.0039	.0011	82.9	.25
11.44	.5825	.0052	.0013	61.2	.37
11.52	.6227	.0094	.0042	43.1	.52
11.60	.7469	.0294	.0200	29.3	.88
11.67	.8711	.0588	.0294	19.3	1.99
11.75	.9953	.0964	.0376	12.4	4.31
11.83	1.1195	.1412	.0448	7.8	7.95
11.91	1.2437	.1923	.0511	4.8	12.73
11.98	1.3679	.2490	.0567	2.9	18.28
12.06	1.4112	.2699	.0210	1.7	23.95
12.14	1.4348	.2816	.0116	1.0	28.17
12.22	1.4583	.2934	.0118	.6	29.80
12.30	1.4818	.3054	.0120	.3	28.91
12.37	1.5054	.3175	.0121	.2	26.40
12.45	1.5289	.3298	.0123	.1	23.23
12.53	1.5481	.3399	.0101	.0	20.12
12.61	1.5602	.3464	.0064	.0	17.37
12.69	1.5723	.3528	.0065	.0	14.97

HYDROGRAPH PEAK= 29.80 cfs
TIME TO PEAK= 12.22 hours
RUNOFF VOLUME= 3.84 Acre-Feet

PROJECT : PLATEAU MINING CO. CULVERT 80A 10-YR 24-HR

AREA= 46.0 ACRES
AVERAGE BASIN SLOPE= 49.0 PERCENT
CURVE NUMBER= 77.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 8600. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .3090 HOURS QPCFS= 112.56 CFS QPIN= 2.4271 INCHES
C3= 11.9632 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.49	.5933	.0000	.0000	.0	.00
11.56	.6846	.0025	.0025	5.6	.01
11.62	.7833	.0109	.0084	35.0	.13
11.68	.8819	.0247	.0139	74.7	.56
11.74	.9805	.0436	.0188	103.3	1.48
11.80	1.0792	.0669	.0234	112.6	2.97
11.87	1.1778	.0944	.0275	105.5	5.02
11.93	1.2764	.1258	.0313	89.0	7.50
11.99	1.3751	.1606	.0349	69.6	10.26
12.05	1.4077	.1729	.0123	51.4	13.03
12.11	1.4264	.1801	.0072	36.2	15.04
12.17	1.4451	.1874	.0073	24.6	15.71
12.24	1.4638	.1948	.0074	16.2	15.12
12.30	1.4825	.2023	.0075	10.4	13.79
12.36	1.5012	.2099	.0076	6.5	12.05
12.42	1.5199	.2177	.0077	4.0	10.43
12.48	1.5385	.2255	.0078	2.4	9.06
12.55	1.5506	.2306	.0051	1.5	8.00
12.61	1.5602	.2347	.0041	.9	7.14
12.67	1.5698	.2388	.0041	.5	6.39
12.73	1.5794	.2429	.0042	.3	5.70
12.79	1.5890	.2471	.0042	.2	5.08
12.85	1.5986	.2513	.0042	.0	4.55

HYDROGRAPH PEAK= 15.71 cfs
TIME TO PEAK= 12.17 Hours
RUNOFF VOLUME= 1.93 Acre-Feet

HANSEN ALLEN & LUCE inc

CLIENT Plateau Mining Co
PROJECT Sediment Pond 9
FEATURE Riprap chute in SE corner
PROJECT NO. 2-5-2

SHEET 4 OF 12
COMPUTED GJP
CHECKED
DATE SEP 8, 1987

DITCH D80C Riprap inlet channel to Pond 9

Design Flow ⇒ 10yr 24hr = 29cfs (see sheet 1)

$$\text{slope} = \frac{48-35}{55.2} = 0.24 \text{ ft/ft}$$

OSM STEEP CHANNEL METHOD
Ref: "Surface Mining Water Diversion Design Manual" SEPT. 1982, OSM

Fig. 5.4 p. 5.17 trapezoidal b = 6' 2:1 side slopes

Q = 30cfs ⇒ D_{50} = 1.1 ft

CHECK SHIELDS CRITERIA

$\tau_0 = \gamma R S$

$\tau_c = .047(\gamma_s - \gamma)\, d_s$

use Mannings w/ $n = .0395\, D_{50}^{1/6}$, b = 6', z = 2:1

w/ D_{50} = 1.5' ⇒ n = .042 ⇒ Y_0 = 0.45'

$\tau_0 = 62.4(.39).24 = 5.85$

$$d_s = \frac{5.85}{.047(103)} = 1.2' \Rightarrow \text{need } 1.2 \times 1.5 = 1.8' \text{ min}$$

~~use~~ D_{50} = 2.0'

Try <u>10' bottom</u> width, trapezoidal 2:1 side slopes

OSM "Surface Mining ..." Fig 5.5 p 5.18
Q = 30cfs
b = 10' z = 2:1 s_0 = 0.24 ⇒ D_{50} = 0.75' (9")

Check Shields Criteria
try D_{50} = 1' ⇒ mannings n = .04 ⇒ b = 10' Y_0 = 0.33', R = 0.310

$\tau_0 = 62.4(.310).24 = 4.64$

$$d_s = \frac{4.64}{.047(103)} = 0.96' \text{ w/ } 1.5\text{ SF} \Rightarrow D_{50} = 1.4'$$

use <u>D_{50} = 1.5' (18")</u>

⇒ n = .042 ⇒ 0.34' = Y_0, R = .32, τ_0 = 4.79, d_s = 0.99'

$$\therefore SF = \frac{1.5}{0.99} = \underline{1.5} \text{ ok}$$

V_0 = 8.0 fps F_r = 2.5 Y_c = 0.6' V_c = 4.2 fps ∴

HANSEN ALLEN & LUCE inc

CLIENT Plateau Mining Company
PROJECT Sediment Pond 9
FEATURE Ditch Design
PROJECT NO. 2-5-2

SHEET 5 OF 12
COMPUTED CJP
CHECKED
DATE SEP 9, 1987

DITCH D80B

Ditch to SE corner of Pond 9 - use flat side slopes to allow trucks to cross just upstream of Pond 9

$Q_{10yr} = 29$ cfs

try 10' bottom width with flat side slopes

w/ 5:1 sides, $n = .03$, $Q = 29$ cfs, $b = 10'$ ⇒ $Y_o = 0.67'$ ok

$V_o = 3.25$ fps $Fr = 0.78$ ok

w/ 10:1 sides $n = .03$ $Q = 30$ cfs $b = 10'$ ⇒ $Y_o = 0.63'$ ← USE THIS

$V_o = 2.9$ fps $Fr = 0.77$ OK

Culvert C80 B (see p. 6 of Sep 18, 1987 calculation sheets)

Design flow = 30 cfs
Pipe slope = 22%
flow depth = 1.05'
flow velocity = 15.3 fps

Outlet erosion protection:

Shield criteria for critical shear stress:
ref. "Applied Hydrology and Sedimentology for Disturbed Lands" p 188 (the "Red Book")

(1) $\tau_c = .047\,(\gamma_s - \gamma)\,D = .047\,\gamma\,(SG-1)\,D$

where:
τ_c = critical shear stress
.047 = shields constant for fully turbulent flow (after Geesler)
γ_s = unit weight of particle
SG = specific gravity of particle
D = is representative particle diameter

ref. "Sediment Transport Technology" p. 288

$U_* = \sqrt{\frac{\tau_o}{\rho}}$ and $\frac{U}{U_*} = \sqrt{\frac{8}{f}}$ U_* = friction velocity

(2) $\therefore\ \tau_o = \frac{1}{8}\,\rho\, f\, U^2$

where:
τ_o = shear stress
ρ = density (1.936 lb-sec²/ft⁴)
f = Darcy-Weisbach friction factor
U = velocity

ref. "Final Phase I Report, Development of Design Manual for Water Diversions on Surface Mining Operations" prepared for OSM by Simons & Li, 1981
p. 7.21 shows use of shield criteria with the above method for calculating shear stress from velocity. In the middle of page 7.21 it says "For a cobble bed stream, the Darcy-Weisbach f is about 0.06." During the 1983 Salt Lake County flood restoration work Simons & Li Associates (who prepared the report from which above method was taken) suggested the use of f = 0.066 for riprap design with a D_{50} = 1.5'.

Culvert C80B (cont.)

Solving equations (1) and (2) above for D:

(3) $$D = \frac{\tau_o}{.047(SG-1)\gamma}$$ for incipient motion

for culver C80B and $D_{50} = 18''$

$$\tau_o = \tfrac{1}{8} \rho f V^2 = \tfrac{1}{8}(1.936)(.066)(15.3)^2$$

$$\tau_o = 3.74 \quad \text{if } SG = 2.65,\ \gamma = 62.4$$

(3) $$\therefore\ D = \frac{3.74}{.047(2.65-1)\gamma} = 0.77'$$

$$\text{Safety Factor} = \frac{D_{50}}{D} = \frac{1.5}{.77} = \underline{1.9} \text{ ok}$$

---

check using EPA, 1976 rock riprap culvert outlet

ref "Erosion and Sediment Control, Surface Mining in Eastern U.S., Vol 2 DESIGN" EPA October 1976 pp 35-40 nomographs are for full flowing pipes. A conservative assumption would be that the pipe is flowing full at the 15.3 fps outlet velocity

$$15.3 \text{ fps} \Rightarrow Q = VA = 15.3 \text{ fps } (\overset{30''\text{CMP}}{4.9 \text{ ft}^2}) = \underline{75 \text{ cfs}}$$

assume minimal tailwater (conservative assumption for riprap size) Figure 1-15 p. 37

$$Q = 75 \text{ cfs},\ d = 30'' \Rightarrow d_{50} = 1.06' < 1.5' \text{ ok}$$

$$\therefore\ D_{50} = 1.5' \text{ OK}$$

DITCH D80A riprap channel from earth channel to toe of existing hill (culvert 80B in located in this reach)

Maximum slope = 6.5%
minimum slope = 5.0%
Design flow = 30 cfs (same as D80C to provide for future flows as coal refuse pile is expanded)

Try 6' bottom width, 2:1 side slopes trapezoidal

riprap design:

try $D_{50} = 9''$ ⇒ mannings $n = .0395\, D_{50}^{1/6} = .038$

⇒ normal depth $= Y_0 = 0.64'$, $A = 4.62\,ft^2$ $P = 8.84\,ft$

$V_0 = \frac{30}{4.62} = 6.5$ fps

riprap design:

SHIELDS CRITERIA:

$T_c = .047\,(\gamma_s - \gamma)\,d_s$

$T_0 = \gamma R S = 62.4\left(\frac{4.62}{8.84}\right).065 = 2.12$

$\therefore\ d_s = \frac{2.12}{.047\,(103)} = 0.44'$

$\therefore\ D_{50} = 9''\ (.75') \Rightarrow SF = \frac{.75}{.44} = 1.7$ OK

USE $D_{50} = 9''$ riprap (6' bottom width, 2:1 sides)

flow depth w/ min slope ($S_0 = .05$ ft/ft)

$b = 6'$, $z = 2:1$, $n = .038$, $S_0 = .05$ ⇒ $Y_0 = 0.69'$, $V_0 = 5.9$ fps

USE channel Depth = 1.0' (w/ 1 − .67 = .33' freeboard)

Culvert C80A Downspout from existing ditch 7E to toe of hill

Design flow = 15.7 cfs (see sheet 3 for printout)
Pipe Slope = 25.2%

Inlet Control:
ref. FHWA HEC 5

24" CMP projecting entrance ⇒ $H_w/D = 1.3$

∴ required head water depth = 1.3(2) = 2.6' H_w

Open channel flow in pipe:

$$Q_{Full\ flow} = \frac{1.49}{.024}(3.14)\left(\frac{3.14}{6.28}\right)^{2/3}\sqrt{.252} = 61.6\text{ cfs}$$

ref. "Urban Storm Drainage Criteria Manual" Fig 8-1

$$\frac{Q}{Q_F} = \frac{15.7}{61.6} = 0.25 \Rightarrow \frac{d}{D} = .38 \Rightarrow d = 0.76'$$

$$\Rightarrow \frac{a}{A} = .36 \Rightarrow a = .36(3.14) = 1.13\text{ ft}^2 \Rightarrow V_o = \frac{15.7}{1.13} = 13.9\text{ fps}$$

Outlet Erosion Protection:

SHIELDS CRITERIA:

$$\tau_o = \tfrac{1}{8}\rho\delta U^2 \quad \text{for } D_{50} = 18'' \quad \tau_o = \tfrac{1}{8}(1.936)(.066)(13.9)^2 = 3.09$$

$$d_s = \frac{3.09}{\tau_c} = \frac{3.09}{.047(\gamma_s - \gamma)} = 0.64'$$

for $D_{50} = 18''$ (1.5') $SF = \frac{1.5}{.64} = 2.4$ ok

use 18" D_{50} riprap at culvert outlet

Ditch 7 4/B (new ditch along east side of Pond 9)

10yr-24hr flow = 2.9cfs

(see attached map and "HYDRO" run)

DITCH DESIGN

Try $S_o = 0.6\%$, triangular 2:1 sides, earth $n = .03$

$\Rightarrow Y_o = 0.85'$ $V_o = 2.0$ fps

With $S_o = 0.5\%$, triangular 2:1 sides, earth $n = .03$

$Y_o = 0.9$ $V_o = 1.9$ fps $P = 3.92$ $A = 1.54$ $F_r = 0.5$

Culvert outlet

0.3cfs $\phi = 18''$ 3.1% slope CMP $n = .024$

$Q_f = K\sqrt{S_f} = \frac{1.37}{.024}\sqrt{.031} = 10$ cfs

$\frac{a}{Q_f} = \frac{.3}{10} = 0.03 \Rightarrow \frac{d}{D} = .16 \Rightarrow Y_o = 0.24'$

$\frac{a}{A} = .105$ $a = .105(1.77) = 0.18$ $V_{out} = 1.6$ fps

∴ do not need outlet protection for culvert

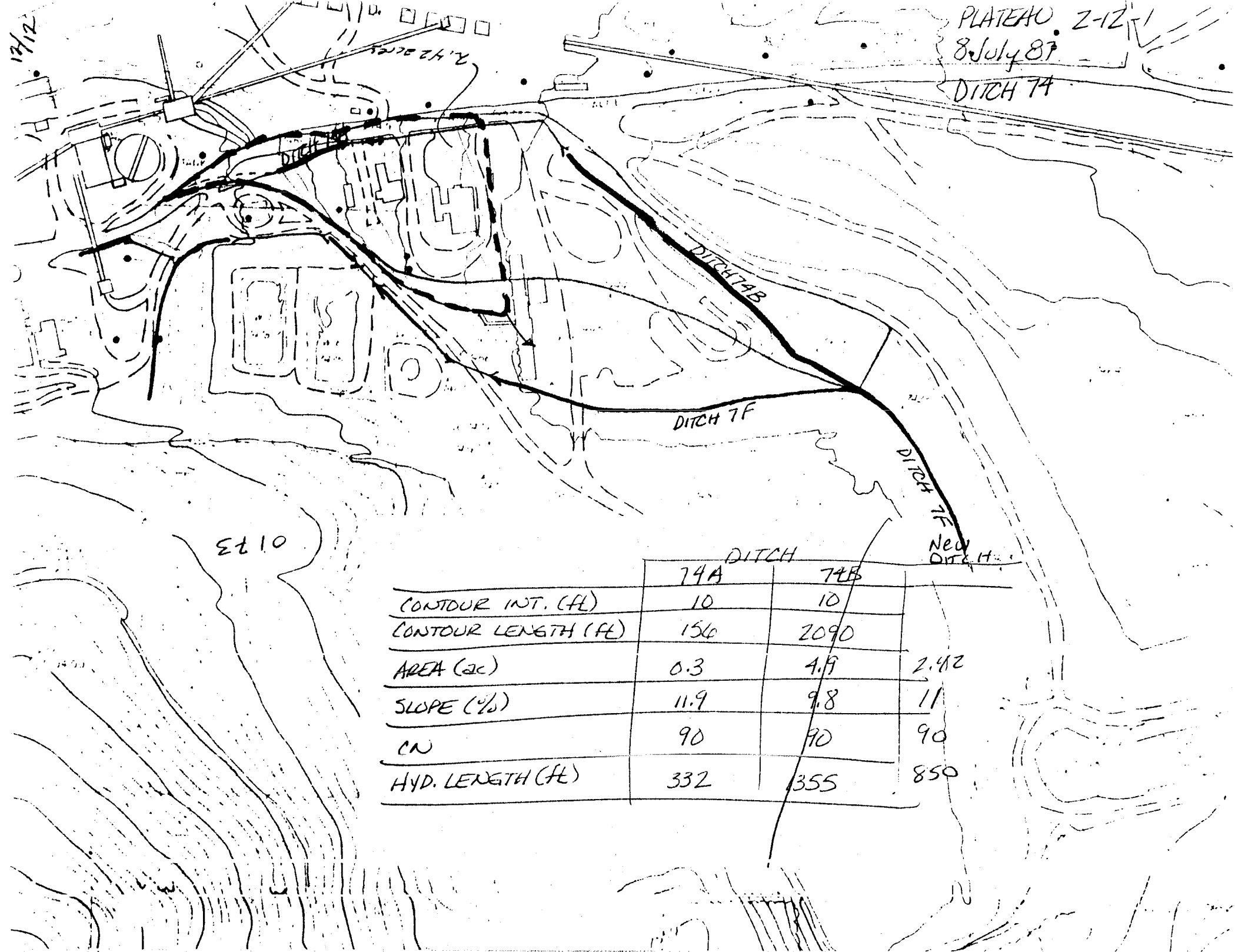
PROJECT : PLATEAU MINING CO NEW DITCH 74 10-YR 24-HR

AREA= 2.4 ACRES
AVERAGE BASIN SLOPE= 11.0 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 850. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0656 HOURS QPCFS= 27.89 CFS QPIN=11.4300 INCHES
C3= 56.3383 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2215	.0000	.0000	.0	.00
7.27	.2223	.0000	.0000	2.7	.00
7.28	.2230	.0000	.0000	13.7	.00
7.30	.2238	.0000	.0000	24.3	.00
7.31	.2245	.0000	.0000	27.9	.00
7.33	.2253	.0000	.0000	25.3	.00
7.35	.2260	.0000	.0000	19.7	.00
7.36	.2268	.0000	.0000	13.8	.00
7.38	.2276	.0000	.0000	9.0	.00
7.40	.2283	.0000	.0000	5.5	.00
7.41	.2291	.0000	.0000	3.2	.00
7.43	.2298	.0000	.0000	1.8	.00
7.45	.2306	.0000	.0000	1.0	.00
7.46	.2313	.0000	.0000	.5	.00
7.48	.2321	.0000	.0000	.3	.00
7.49	.2329	.0001	.0000	.1	.00
7.51	.2335	.0001	.0000	.0	.00
11.91	1.2430	.4868	.0190	.0	2.70
11.92	1.2692	.5079	.0192	.0	2.73
11.94	1.2954	.5272	.0193	.0	2.76
11.96	1.3215	.5467	.0195	.0	2.79
11.97	1.3477	.5664	.0196	.0	2.82
11.99	1.3739	.5861	.0198	.0	2.84
12.00	1.3938	.6013	.0151	.0	2.86
12.02	1.3987	.6051	.0038	.0	2.79
12.04	1.4037	.6089	.0038	.0	2.53
12.05	1.4086	.6127	.0038	.0	2.14
12.07	1.4136	.6165	.0028	.0	1.72
12.09	1.4186	.6203	.0038	.0	1.35
12.10	1.4235	.6241	.0038	.0	1.06

HYDROGRAPH PEAK= 2.86 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .24 Acre-Feet



	DITCH 74A	DITCH 74B	
CONTOUR INT. (ft)	10	10	
CONTOUR LENGTH (ft)	156	2090	
AREA (ac)	0.3	4.19	2.42
SLOPE (%)	11.9	9.8	11
CN	90	90	90
HYD. LENGTH (ft)	332	355	850

SECTION 611 (CONT.)

RIPRAP GRADATIONS

Riprap Designation	% Smaller Than Given Size By Weight	Intermediate Rock Dimension (Inches)	Mean Rock Diameter D_{50} (Inches)
Type V	70-100	8	
	50-70	6	
	35-50	4	4
	2-10	2	
Type VL	70-100	12	
	50-70	9	
	35-50	6	6
	2-10	2	
Type L	70-100	14	
	50-70	12	
	35-50	9	9
	2-10	3	
Type M	70-100	21	
	50-70	18	
	35-50	12	12
	2-10	4	
Type H	70-100	30	
	50-70	24	
	35-50	18	18
	2-10	6	
Type VH	100	30	
	50-70	27	
	35-50	24	24
	2-10	9	

SECTION 611 (CONT.)

The Type II granular filter shall consist of hard, durable, and rough angular fragments of screened or broken stone, gravel, or slag conforming to the following gradation:

U.S. Standard Sieve Size	Percent Passing By Weight
3"	90-100
3/4"	35-90
No. 4	0-30
No. 16	0-15
No. 200	0-3

611.03 Construction Method: The subgrade on which the granular filter is to be placed shall be uniformly graded and compacted. Grading tolerance for the subgrade and the surface of the granular filter shall be plus or minus two-tenths of a foot.

The riprap shall be dumped into place so as to secure a rock mass with a minimum thickness at least equal to the maximum rock size as designated by the gradation requirements of Section 611.02 and to the height as specified on the plans. The rock shall be manipulated to secure a regular surface of graded sizes and mass stability.

611.04 Measurement and Payment: The granular filter and loose riprap shall be measured and paid for by the cubic yard for the sizes specified and accepted in-place, computed from the specified thicknesses as designated in the specifications and on the plans and from the measured surface area. The accepted quantities of these items shall be paid for at the contract unit price per cubic yard for granular filter and loose riprap for the individual types specified. Payment shall be full compensation for all labor, equipment, materials, and incidentals necessary to complete this item, including channel excavation, furnishing, hauling, stockpiling, and placing.

RECEIVED
APR 28 1989
DIVISION OF
OIL, GAS & MINING

EXHIBIT 49

DIVERSION DITCH AND CULVERT PEAK FLOW CALCULATIONS

PROJECT : Plateau Mining Company - Ditch #7G Flow Calculation

AREA= 14.0 ACRES
AVERAGE BASIN SLOPE= 25.0 PERCENT
CURVE NUMBER= 70.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1600. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1372 HOURS QPCFS= 77.14 CFS QPIN= 5.4644 INCHES
C3= 26.9341 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.64	.8155	.0000	.0000	.0	.00
11.67	.8593	.0000	.0000	3.9	.00
11.69	.9031	.0005	.0005	24.0	.00
11.72	.9469	.0018	.0014	51.2	.02
11.75	.9907	.0040	.0022	70.8	.07
11.78	1.0346	.0071	.0030	77.1	.17
11.80	1.0784	.0109	.0038	72.3	.33
11.83	1.1222	.0154	.0046	61.0	.56
11.86	1.1660	.0208	.0053	47.7	.84
11.89	1.2098	.0268	.0061	35.2	1.15
11.91	1.2536	.0336	.0068	24.8	1.50
11.94	1.2974	.0410	.0074	16.8	1.85
11.97	1.3412	.0491	.0081	11.1	2.22
12.00	1.3850	.0579	.0088	7.1	2.59
12.02	1.3992	.0609	.0030	4.5	2.93
12.05	1.4075	.0626	.0018	2.8	3.13
12.08	1.4158	.0644	.0018	1.7	3.11
12.11	1.4241	.0662	.0018	1.0	2.89
12.13	1.4324	.0681	.0018	.6	2.56
12.16	1.4407	.0699	.0019	.3	2.20
12.19	1.4490	.0718	.0019	.2	1.87
12.21	1.4573	.0737	.0019	.1	1.60
12.24	1.4656	.0757	.0019	.0	1.39

HYDROGRAPH PEAK= 3.13 cfs
TIME TO PEAK= 12.05 Hours
RUNOFF VOLUME= .33 Acre-Feet

PROJECT : PLATEAU - 2-12-1 AREA TRIBUTARY TO CULVERT 9-B 10 YR, 24 HR

AREA= 2.0 ACRES
AVERAGE BASIN SLOPE= 37.3 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1050. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0698 HOURS QPCFS= 21.67 CFS QPIN=10.7441 INCHES
C3= 52.9576 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.54	.6504	.0000	.0000	.0	.00
11.55	.6782	.0000	.0000	2.1	.00
11.57	.7061	.0005	.0004	10.6	.00
11.59	.7339	.0013	.0009	18.9	.00
11.60	.7618	.0026	.0013	21.7	.02
11.62	.7896	.0044	.0017	19.6	.04
11.64	.8175	.0065	.0022	15.3	.08
11.66	.8453	.0091	.0026	10.7	.11
11.67	.8732	.0120	.0030	7.0	.16
11.69	.9010	.0154	.0033	4.3	.20
11.71	.9289	.0191	.0037	2.5	.25
11.73	.9567	.0232	.0041	1.4	.29
11.74	.9846	.0277	.0045	.8	.34
11.76	1.0125	.0325	.0048	.4	.38
11.78	1.0403	.0377	.0052	.2	.42
11.80	1.0682	.0432	.0055	.1	.47
11.81	1.0960	.0490	.0058	.0	.51
11.83	1.1239	.0551	.0062	.0	.55
11.85	1.1517	.0616	.0065	.0	.59
11.87	1.1796	.0684	.0068	.0	.63
11.88	1.2074	.0755	.0071	.0	.67
11.90	1.2353	.0829	.0074	.0	.71
11.92	1.2631	.0905	.0077	.0	.74
11.94	1.2910	.0985	.0080	.0	.78
11.95	1.3188	.1067	.0082	.0	.81
11.97	1.3467	.1152	.0085	.0	.85
11.99	1.3745	.1240	.0088	.0	.88
12.01	1.3942	.1303	.0064	.0	.91
12.02	1.3995	.1321	.0017	.0	.90
12.04	1.4048	.1338	.0017	.0	.83
12.06	1.4100	.1356	.0017	.0	.71
12.08	1.4153	.1373	.0018	.0	.57
12.09	1.4206	.1391	.0018	.0	.45
12.11	1.4259	.1408	.0018	.0	.36

HYDROGRAPH PEAK= .91 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .07 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #10A Flow Calculation

AREA= 17.6 ACRES
AVERAGE BASIN SLOPE= 10.0 PERCENT
CURVE NUMBER= 83.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2200. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR
USER INPUT TIME OF CONCENTRATION= .34 HOURS

TP= .2267 HOURS QPCFS= 58.72 CFS QPIN= 3.3087 INCHES
CN= 16.3086 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
0.29	.4082	.0000	.0000	.0	.00
0.34	.4126	.0000	.0000	2.9	.00
0.38	.4169	.0000	.0000	18.2	.00
0.43	.4213	.0000	.0000	39.0	.00
0.47	.4257	.0001	.0000	53.9	.00
0.52	.4307	.0002	.0000	58.7	.00
0.56	.4368	.0004	.0001	55.0	.00
0.61	.4429	.0005	.0002	46.4	.01
0.65	.4490	.0007	.0002	36.3	.02
0.70	.4551	.0010	.0002	26.8	.03
0.74	.4612	.0013	.0003	18.9	.04
0.79	.4673	.0016	.0003	12.8	.05
0.83	.4734	.0019	.0003	8.4	.07
0.88	.4795	.0023	.0004	5.4	.08
0.93	.4856	.0027	.0004	3.4	.09
0.97	.4917	.0032	.0004	2.1	.10
1.02	.4988	.0037	.0006	1.3	.12
1.06	.5077	.0045	.0008	.8	.13
1.11	.5167	.0053	.0008	.4	.15
1.15	.5256	.0062	.0009	.3	.18
11.20	.5345	.0072	.0010	.2	.21
11.24	.5435	.0082	.0010	.0	.24
11.83	1.1241	.1848	.0315	.0	6.17
11.88	1.1965	.2184	.0336	.0	7.41
11.92	1.2688	.2539	.0355	.0	8.59
11.97	1.3412	.2912	.0373	.0	9.70
12.01	1.3963	.3208	.0296	.0	10.70
12.06	1.4100	.3283	.0075	.0	11.41
12.10	1.4237	.3358	.0075	.0	11.48
12.15	1.4374	.3434	.0076	.0	10.84
12.19	1.4512	.3511	.0077	.0	9.68
12.24	1.4649	.3588	.0077	.0	8.32
12.29	1.4786	.3666	.0078	.0	7.00
12.33	1.4923	.3744	.0078	.0	5.88

PROJECT : Plateau Mining Company - Ditch #10A Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.38	1.5060	.3822	.0079	.0	5.00

HYDROGRAPH PEAK= 11.48 cfs
TIME TO PEAK= 12.10 Hours
RUNOFF VOLUME= 1.12 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #10B Flow Calculation

AREA= 19.1 ACRES
AVERAGE BASIN SLOPE= 10.0 PERCENT
CURVE NUMBER= 83.6
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2400. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR
USER INPUT TIME OF CONCENTRATION= .35 HOURS

TP= .2333 HOURS QPCFS= 61.90 CFS QPIN= 3.2142 INCHES
CP= 15.8426 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.13	.3923	.0000	.0000	.0	.00
10.17	.3968	.0000	.0000	3.1	.00
10.22	.4014	.0000	.0000	19.2	.00
10.27	.4059	.0000	.0000	41.1	.00
10.31	.4104	.0002	.0000	56.8	.00
10.36	.4149	.0003	.0000	61.9	.00
10.41	.4194	.0004	.0001	58.0	.01
10.45	.4239	.0005	.0001	48.9	.02
10.50	.4284	.0007	.0002	38.3	.02
10.55	.4347	.0009	.0002	28.3	.03
10.59	.4409	.0012	.0003	19.9	.04
10.64	.4472	.0015	.0003	13.5	.05
10.69	.4535	.0018	.0004	8.9	.06
10.73	.4598	.0022	.0004	5.7	.08
10.78	.4660	.0027	.0004	3.6	.09
10.83	.4723	.0031	.0005	2.2	.11
10.87	.4786	.0036	.0005	1.3	.12
10.92	.4849	.0042	.0005	.8	.14
10.97	.4911	.0047	.0006	.5	.15
11.01	.4982	.0054	.0007	.3	.17
11.06	.5074	.0064	.0010	.2	.19
11.11	.5167	.0074	.0010	.0	.21
11.81	1.0838	.1802	.0326	.0	6.13
11.85	1.1583	.2151	.0349	.0	7.59
11.90	1.2327	.2521	.0370	.0	8.98
11.95	1.3072	.2910	.0389	.0	10.30
11.99	1.3817	.3317	.0407	.0	11.51
12.04	1.4044	.3444	.0127	.0	12.54
12.09	1.4185	.3524	.0080	.0	12.98
12.13	1.4326	.3605	.0081	.0	12.58
12.18	1.4467	.3686	.0081	.0	11.47
12.23	1.4609	.3768	.0082	.0	9.99
12.27	1.4750	.3850	.0082	.0	8.46
12.32	1.4891	.3933	.0083	.0	7.10

PROJECT : Plateau Mining Company - Ditch #10B Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.37	1.5032	.4016	.0083	.0	5.99

HYDROGRAPH PEAK= 12.98 cfs
TIME TO PEAK= 12.09 Hours
RUNOFF VOLUME= 1.26 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #10C Flow Calculation

AREA= 19.4 ACRES
AVERAGE BASIN SLOPE= 10.0 PERCENT
CURVE NUMBER= 84.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2680. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR
USER INPUT TIME OF CONCENTRATION= .36 HOURS

TE= .2400 HOURS QPCFS= 61.13 CFS QPIN= 3.1249 INCHES
CE= 15.4026 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
9.98	.3789	.0000	.0000	.0	.00
10.03	.3832	.0000	.0000	3.1	.00
10.08	.3878	.0000	.0000	19.0	.00
10.13	.3925	.0000	.0000	40.6	.00
10.18	.3971	.0001	.0000	56.1	.00
10.22	.4017	.0002	.0000	61.1	.00
10.27	.4064	.0003	.0001	57.3	.00
10.32	.4110	.0005	.0001	48.3	.01
10.37	.4156	.0006	.0002	37.8	.02
10.42	.4203	.0008	.0002	27.9	.03
10.46	.4249	.0010	.0002	19.7	.03
10.51	.4300	.0012	.0002	13.4	.04
10.56	.4365	.0016	.0003	8.8	.05
10.61	.4429	.0020	.0004	5.6	.06
10.66	.4494	.0024	.0004	3.5	.08
10.70	.4558	.0028	.0005	2.2	.09
10.75	.4623	.0033	.0005	1.3	.11
10.80	.4687	.0039	.0005	.8	.13
10.85	.4752	.0044	.0006	.5	.14
10.90	.4816	.0051	.0006	.3	.16
10.94	.4881	.0057	.0007	.2	.18
10.99	.4945	.0064	.0007	.0	.20
11.81	1.0859	.1904	.0346	.0	6.34
11.86	1.1625	.2274	.0370	.0	7.88
11.90	1.2391	.2665	.0392	.0	9.36
11.95	1.3157	.3077	.0412	.0	10.75
12.00	1.3923	.3508	.0430	.0	12.03
12.05	1.4068	.3591	.0084	.0	13.09
12.10	1.4213	.3675	.0084	.0	13.47
12.14	1.4359	.3760	.0085	.0	12.94
12.19	1.4504	.3845	.0085	.0	11.70
12.24	1.4649	.3931	.0086	.0	10.12
12.29	1.4794	.4018	.0086	.0	8.54
12.34	1.4939	.4105	.0087	.0	7.15

PROJECT : Plateau Mining Company - Ditch #10C Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.38	1.5084	.4192	.0088	.0	6.05

HYDROGRAPH PEAK= 13.47 cfs
TIME TO PEAK= 12.10 Hours
RUNOFF VOLUME= 1.32 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #10D Flow Calculation

AREA= 22.8 ACRES
AVERAGE BASIN SLOPE= 10.0 PERCENT
CURVE NUMBER= 85.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 3340. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR
USER INPUT TIME OF CONCENTRATION= .38 HOURS

TP= .2533 HOURS QPCFS= 68.06 CFS QPIN= 2.9604 INCHES
CB= 14.5919 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
9.63	.3519	.0000	.0000	.0	.00
9.68	.3557	.0000	.0000	3.4	.00
9.73	.3595	.0000	.0000	21.1	.00
9.78	.3634	.0000	.0000	45.2	.00
9.83	.3672	.0001	.0000	62.5	.00
9.88	.3710	.0002	.0000	68.1	.00
9.93	.3749	.0003	.0000	63.8	.00
9.98	.3787	.0004	.0001	53.8	.01
10.03	.3832	.0005	.0001	42.1	.02
10.08	.3881	.0007	.0002	31.1	.02
10.13	.3930	.0009	.0002	21.9	.03
10.18	.3979	.0011	.0002	14.9	.04
10.23	.4028	.0014	.0003	9.8	.05
10.29	.4077	.0016	.0003	6.3	.06
10.34	.4126	.0019	.0003	3.9	.07
10.39	.4175	.0023	.0003	2.4	.09
10.44	.4223	.0026	.0004	1.5	.10
10.49	.4272	.0030	.0004	.9	.11
10.54	.4336	.0035	.0005	.5	.12
10.59	.4404	.0041	.0006	.3	.14
10.64	.4472	.0048	.0007	.2	.15
10.69	.4540	.0055	.0007	.0	.18
11.81	1.0816	.2130	.0390	.0	7.68
11.86	1.1625	.2546	.0416	.0	9.68
11.91	1.2434	.2986	.0440	.0	11.60
11.96	1.3242	.3448	.0462	.0	13.39
12.01	1.3947	.3867	.0419	.0	15.00
12.06	1.4100	.3960	.0093	.0	16.24
12.11	1.4254	.4054	.0094	.0	16.56
12.16	1.4407	.4148	.0094	.0	15.78
12.21	1.4560	.4243	.0095	.0	14.19
12.26	1.4713	.4338	.0096	.0	12.24
12.31	1.4867	.4435	.0096	.0	10.31
12.36	1.5020	.4531	.0097	.0	8.65

PROJECT : Plateau Mining Company - Ditch #10D Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
2.41	1.5173	.4629	.0097	.0	7.33

HYDROGRAPH PEAK= 16.56 cfs
TIME TO PEAK= 12.11 Hours
RUNOFF VOLUME= 1.65 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #UT15 Flow Calculation

AREA= 7.8 ACRES
AVERAGE BASIN SLOPE= 62.6 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1070. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0547 HOURS QPCFS= 107.84 CFS QPIN=13.7103 INCHES
C3= 67.5780 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.54	.6606	.0000	.0000	.0	.00
11.56	.6897	.0002	.0002	21.8	.00
11.58	.7188	.0008	.0006	82.6	.03
11.60	.7479	.0019	.0011	107.8	.09
11.61	.7770	.0035	.0016	91.1	.21
11.63	.8061	.0056	.0021	60.6	.37
11.65	.8352	.0081	.0025	34.7	.55
11.67	.8643	.0111	.0030	17.9	.73
11.69	.8934	.0144	.0034	8.5	.93
11.71	.9225	.0182	.0038	3.9	1.12
11.72	.9516	.0224	.0042	1.7	1.30
11.74	.9807	.0270	.0046	.7	1.49
11.76	1.0098	.0320	.0050	.3	1.67
11.78	1.0389	.0374	.0054	.1	1.84
11.80	1.0680	.0431	.0057	.0	2.01
11.81	1.0971	.0492	.0061	.0	2.18
11.83	1.1262	.0557	.0065	.0	2.34
11.85	1.1553	.0625	.0068	.0	2.50
11.87	1.1844	.0696	.0071	.0	2.66
11.89	1.2135	.0771	.0075	.0	2.81
11.91	1.2426	.0848	.0078	.0	2.96
11.92	1.2717	.0929	.0081	.0	3.10
11.94	1.3008	.1013	.0084	.0	3.24
11.96	1.3299	.1101	.0087	.0	3.38
11.98	1.3590	.1191	.0090	.0	3.52
12.00	1.3881	.1283	.0093	.0	3.65
12.02	1.3970	.1313	.0029	.0	3.63
12.03	1.4025	.1331	.0018	.0	3.18
12.05	1.4080	.1349	.0018	.0	2.47
12.07	1.4136	.1367	.0018	.0	1.81
12.09	1.4191	.1386	.0018	.0	1.34
12.11	1.4246	.1404	.0018	.0	1.07

HYDROGRAPH PEAK= 3.65 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .28 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #UT16 Flow Calculation

AREA= 4.3 ACRES
AVERAGE BASIN SLOPE= 33.6 PERCENT
CURVE NUMBER= 80.9
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 800. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0528 HOURS QPCFS= 61.56 CFS QPIN=14.1965 INCHES
C3= 69.9747 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.81	.4706	.0000	.0000	.0	.00
10.83	.4728	.0000	.0000	10.6	.00
10.85	.4750	.0000	.0000	43.3	.00
10.86	.4773	.0000	.0000	61.1	.00
10.88	.4795	.0000	.0000	55.7	.00
10.90	.4817	.0000	.0000	40.1	.00
10.91	.4839	.0000	.0000	24.8	.00
10.93	.4861	.0000	.0000	13.8	.00
10.95	.4884	.0001	.0000	7.1	.00
10.96	.4906	.0001	.0000	3.5	.00
10.98	.4928	.0002	.0000	1.6	.00
11.00	.4950	.0002	.0000	.7	.00
11.01	.4980	.0003	.0000	.3	.00
11.03	.5013	.0004	.0000	.1	.01
11.05	.5045	.0004	.0000	.0	.01
11.90	1.2386	.1878	.0112	.0	2.73
11.92	1.2650	.1993	.0115	.0	2.80
11.94	1.2913	.2110	.0117	.0	2.87
11.95	1.3177	.2229	.0119	.0	2.94
11.97	1.3440	.2351	.0122	.0	3.00
11.99	1.3704	.2475	.0124	.0	3.07
12.00	1.3931	.2584	.0109	.0	3.11
12.02	1.3981	.2608	.0024	.0	3.01
12.04	1.4031	.2633	.0024	.0	2.58
12.05	1.4081	.2657	.0024	.0	2.00
12.07	1.4131	.2681	.0024	.0	1.48
12.09	1.4181	.2706	.0024	.0	1.11
12.10	1.4231	.2730	.0025	.0	.89

HYDROGRAPH PEAK= 3.11 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .24 Acre-Feet

DITCH NO. 27

10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .3 ACRES
AVERAGE BASIN SLOPE= .8 PERCENT
INCREMENT OF RAINFALL EXCESS= .0370 HOURS
CURVE NUMBER= 86.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 484. FEET

TP= .1853 HOURS QPCFS= 1.35 CFS QPIN= 4.0467 INCHES C3= 19.9
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
9.40	.3195	.0000	.0000	.0	.00
9.44	.3218	.0000	.0000	.1	.00
9.47	.3242	.0000	.0000	.4	.00
9.51	.3266	.0000	.0000	.9	.00
9.55	.3293	.0001	.0000	1.2	.00
9.58	.3320	.0001	.0000	1.3	.00
9.62	.3346	.0001	.0000	1.3	.00
9.66	.3373	.0002	.0001	1.1	.00
9.69	.3400	.0002	.0001	.8	.00
9.73	.3426	.0003	.0001	.6	.00
9.77	.3453	.0004	.0001	.4	.00
9.80	.3480	.0005	.0001	.3	.00
9.84	.3506	.0006	.0001	.2	.00
9.88	.3533	.0007	.0001	.1	.00
9.92	.3559	.0008	.0001	.1	.00
11.84	1.0827	.2460	.0298	.0	.18
11.88	1.1389	.2770	.0310	.0	.20
11.91	1.1952	.3092	.0322	.0	.22
11.95	1.2514	.3425	.0332	.0	.23
11.99	1.3077	.3767	.0342	.0	.25
12.02	1.3332	.3926	.0159	.0	.26
12.06	1.3438	.3992	.0067	.0	.26
12.10	1.3545	.4060	.0067	.0	.25
12.14	1.3651	.4127	.0067	.0	.23
12.17	1.3758	.4195	.0068	.0	.20
12.21	1.3865	.4263	.0068	.0	.16
12.25	1.3971	.4331	.0068	.0	.14
12.28	1.4078	.4400	.0069	.0	.11

HYDROGRAPH PEAK= .26 cfs
TIME TO PEAK= 12.05 Hours

DITCH NO. 28
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .8 ACRES
AVERAGE BASIN SLOPE= .8 PERCENT
INCREMENT OF RAINFALL EXCESS= .0710 HOURS
CURVE NUMBER= 86.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1103. FEET

TP= .3582 HOURS QPCFS= 1.60 CFS QPIN= 2.0937 INCHES C3= 10.3
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
9.37	.3178	.0000	.0000	.0	.00
9.44	.3224	.0000	.0000	.1	.00
9.51	.3270	.0000	.0000	.5	.00
9.59	.3321	.0001	.0001	1.1	.00
9.66	.3372	.0002	.0001	1.5	.00
9.73	.3423	.0003	.0001	1.6	.00
9.80	.3475	.0005	.0002	1.5	.00
9.87	.3526	.0006	.0002	1.3	.00
9.94	.3577	.0009	.0002	1.0	.00
10.01	.3630	.0011	.0003	.8	.00
10.08	.3695	.0015	.0004	.5	.00
10.15	.3761	.0019	.0004	.4	.00
10.22	.3826	.0023	.0005	.2	.00
10.30	.3891	.0028	.0005	.2	.00
10.37	.3957	.0034	.0006	.1	.00
11.79	1.0007	.2030	.0521	.0	.14
11.86	1.1087	.2602	.0572	.0	.21
11.93	1.2166	.3218	.0616	.0	.28
12.00	1.3245	.3872	.0654	.0	.36
12.07	1.3462	.4007	.0136	.0	.42
12.14	1.3666	.4136	.0129	.0	.46
12.21	1.3871	.4267	.0130	.0	.47
12.28	1.4075	.4398	.0131	.0	.43
12.35	1.4280	.4530	.0133	.0	.38
12.43	1.4484	.4664	.0134	.0	.33
12.50	1.4689	.4799	.0135	.0	.28
12.57	1.4799	.4872	.0073	.0	.24
12.64	1.4904	.4942	.0070	.0	.20

HYDROGRAPH PEAK= .47 cfs
TIME TO PEAK= 12.18 Hours

DITCH NO. 29
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .5 ACRES
AVERAGE BASIN SLOPE= .8 PERCENT
INCREMENT OF RAINFALL EXCESS= .0530 HOURS
CURVE NUMBER= 86.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 753. FEET

TP= .2639 HOURS QPCFS= 1.49 CFS QPIN= 2.8415 INCHES C3= 14.0
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
9.38	.3184	.0000	.0000	.0	.00
9.43	.3218	.0000	.0000	.1	.00
9.49	.3252	.0000	.0000	.5	.00
9.54	.3289	.0000	.0000	1.0	.00
9.59	.3327	.0001	.0001	1.4	.00
9.65	.3365	.0002	.0001	1.5	.00
9.70	.3403	.0003	.0001	1.4	.00
9.75	.3441	.0004	.0001	1.2	.00
9.81	.3480	.0005	.0001	.9	.00
9.86	.3518	.0006	.0001	.7	.00
9.91	.3556	.0008	.0002	.5	.00
9.96	.3594	.0009	.0002	.3	.00
10.02	.3636	.0011	.0002	.2	.00
10.07	.3684	.0014	.0003	.1	.00
10.12	.3733	.0017	.0003	.1	.00
11.77	.9704	.1878	.0383	.0	.13
11.82	1.0509	.2290	.0412	.0	.18
11.87	1.1315	.2729	.0439	.0	.23
11.93	1.2120	.3191	.0462	.0	.27
11.98	1.2926	.3675	.0484	.0	.31
12.03	1.3349	.3937	.0262	.0	.35
12.08	1.3502	.4033	.0096	.0	.37
12.14	1.3655	.4129	.0096	.0	.36
12.19	1.3807	.4226	.0097	.0	.34
12.24	1.3960	.4324	.0098	.0	.30
12.30	1.4113	.4422	.0098	.0	.25
12.35	1.4265	.4521	.0099	.0	.21
12.40	1.4418	.4621	.0100	.0	.18

HYDROGRAPH PEAK= .37 cfs
TIME TO PEAK= 12.10 Hours

DITCH NO. 30
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .9 ACRES
AVERAGE BASIN SLOPE= .8 PERCENT
INCREMENT OF RAINFALL EXCESS= .0838 HOURS
CURVE NUMBER= 86.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1344. FEET

TP= .4195 HOURS QPCFS= 1.68 CFS QPIN= 1.7876 INCHES C3= 8.
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
9.39	.3187	.0000	.0000	.0	.00
9.47	.3240	.0000	.0000	.1	.00
9.55	.3298	.0001	.0000	.5	.00
9.64	.3359	.0002	.0001	1.1	.00
9.72	.3419	.0003	.0001	1.5	.00
9.80	.3479	.0005	.0002	1.7	.00
9.89	.3540	.0007	.0002	1.6	.00
9.97	.3600	.0010	.0003	1.3	.00
10.06	.3672	.0013	.0004	1.0	.00
10.14	.3749	.0018	.0005	.8	.00
10.22	.3826	.0023	.0005	.5	.00
10.31	.3903	.0029	.0006	.4	.00
10.39	.3980	.0036	.0007	.2	.00
10.48	.4057	.0043	.0007	.2	.00
10.56	.4155	.0054	.0010	.1	.00
11.73	.9187	.1628	.0557	.0	.09
11.82	1.0460	.2264	.0636	.0	.15
11.90	1.1734	.2966	.0702	.0	.24
11.98	1.3008	.3725	.0758	.0	.34
12.07	1.3454	.4002	.0277	.0	.43
12.15	1.3695	.4155	.0152	.0	.50
12.23	1.3936	.4309	.0154	.0	.52
12.32	1.4178	.4464	.0156	.0	.50
12.40	1.4419	.4621	.0157	.0	.46
12.49	1.4660	.4780	.0159	.0	.40
12.57	1.4804	.4875	.0095	.0	.34
12.65	1.4928	.4957	.0083	.0	.29
12.74	1.5052	.5040	.0083	.0	.24

HYDROGRAPH PEAK= .52 cfs
TIME TO PEAK= 12.24 Hours

DITCH NO. 32
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .7 ACRES
AVERAGE BASIN SLOPE= 42.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0142 HOURS
CURVE NUMBER= 70.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 310. FEET

TP= .0285 HOURS QPCFS= 17.79 CFS QPIN=26.3272 INCHES C3=129.7
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.69	.8498	.0000	.0000	.0	.00
11.70	.8714	.0000	.0000	8.7	.00
11.71	.8930	.0003	.0002	17.8	.00
11.73	.9145	.0008	.0005	12.6	.01
11.74	.9361	.0014	.0007	5.8	.02
11.76	.9577	.0023	.0009	2.1	.03
11.77	.9793	.0034	.0011	.6	.04
11.79	1.0009	.0047	.0013	.2	.05
11.80	1.0225	.0061	.0015	.0	.06
11.91	1.1951	.0247	.0030	.0	.13
11.93	1.2167	.0278	.0031	.0	.14
11.94	1.2383	.0311	.0033	.0	.14
11.96	1.2599	.0346	.0035	.0	.15
11.97	1.2815	.0382	.0036	.0	.16
11.98	1.3031	.0420	.0038	.0	.17
12.00	1.3247	.0460	.0040	.0	.18
12.01	1.3298	.0470	.0010	.0	.16
12.03	1.3339	.0477	.0008	.0	.11
12.04	1.3380	.0485	.0008	.0	.07
12.06	1.3421	.0493	.0008	.0	.05
12.07	1.3462	.0501	.0008	.0	.04
12.08	1.3503	.0509	.0008	.0	.04

HYDROGRAPH PEAK= .18 cfs
TIME TO PEAK= 12.00 Hours

DITCH NO. 33
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= 10.0 ACRES
AVERAGE BASIN SLOPE= 21.3 PERCENT
INCREMENT OF RAINFALL EXCESS= .0290 HOURS
CURVE NUMBER= 70.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1550. FEET

TP= .1450 HOURS QPCFS= 52.33 CFS QPIN= 5.1736 INCHES C3= 25.5
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.69	.8503	.0000	.0000	.0	.00
11.72	.8943	.0003	.0003	2.6	.00
11.74	.9384	.0015	.0012	16.3	.01
11.77	.9825	.0036	.0020	34.8	.04
11.80	1.0266	.0064	.0029	48.0	.10
11.83	1.0707	.0101	.0037	52.3	.20
11.86	1.1147	.0146	.0045	49.0	.35
11.89	1.1588	.0198	.0052	41.4	.53
11.92	1.2029	.0258	.0060	32.3	.74
11.95	1.2470	.0325	.0067	23.9	.98
11.98	1.2911	.0399	.0074	16.8	1.22
12.01	1.3277	.0466	.0067	11.4	1.47
12.04	1.3361	.0481	.0016	7.5	1.68
12.06	1.3444	.0497	.0016	4.8	1.79
12.09	1.3528	.0514	.0016	3.0	1.76
12.12	1.3611	.0530	.0017	1.9	1.62
12.15	1.3695	.0547	.0017	1.1	1.43
12.18	1.3778	.0564	.0017	.7	1.23
12.21	1.3862	.0581	.0017	.4	1.05
12.24	1.3945	.0599	.0017	.2	.91
12.27	1.4029	.0616	.0018	.1	.81
12.30	1.4113	.0634	.0018	.1	.74

HYDROGRAPH PEAK= 1.80 cfs
TIME TO PEAK= 12.07 Hours

DITCH NO. 34
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .7 ACRES
AVERAGE BASIN SLOPE= 65.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0175 HOURS
CURVE NUMBER= 83.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 360. FEET

TP= .0176 HOURS QPCFS= 29.72 CFS QPIN=42.7196 INCHES C3=210.5
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.50	.4080	.0000	.0000	.0	.00
10.52	.4102	.0000	.0000	29.7	.00
10.53	.4125	.0000	.0000	9.7	.00
10.55	.4147	.0000	.0000	1.1	.00
10.57	.4170	.0000	.0000	.1	.00
11.88	1.1473	.1953	.0121	.0	.49
11.90	1.1739	.2077	.0124	.0	.50
11.92	1.2005	.2203	.0126	.0	.51
11.93	1.2271	.2332	.0129	.0	.52
11.95	1.2537	.2463	.0131	.0	.53
11.97	1.2803	.2597	.0134	.0	.54
11.99	1.3069	.2733	.0136	.0	.55
12.00	1.3274	.2840	.0107	.0	.46
12.02	1.3325	.2866	.0026	.0	.20
12.04	1.3375	.2893	.0026	.0	.12
12.06	1.3425	.2919	.0027	.0	.11
12.07	1.3476	.2946	.0027	.0	.11
12.09	1.3526	.2973	.0027	.0	.11

HYDROGRAPH PEAK= .56 cfs
TIME TO PEAK= 11.98 Hours

DITCH NO. 35
10 YEAR-24HOUR PEAK DISCHARGE

AREA= .3 ACRES
AVERAGE BASIN SLOPE= 91.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0127 HOURS
CURVE NUMBER= 84.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 310. FEET

TP= .0127 HOURS QPCFS= 18.42 CFS QPIN=58.9245 INCHES C3=290.4
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.20	.3802	.0000	.0000	.0	.00
10.21	.3814	.0000	.0000	18.4	.00
10.22	.3826	.0000	.0000	6.0	.00
10.24	.3837	.0000	.0000	.7	.00
10.25	.3849	.0000	.0000	.0	.00
11.91	1.1932	.2428	.0097	.0	.24
11.93	1.2125	.2527	.0099	.0	.25
11.94	1.2319	.2627	.0100	.0	.25
11.95	1.2512	.2729	.0101	.0	.25
11.96	1.2705	.2832	.0103	.0	.26
11.98	1.2898	.2936	.0104	.0	.26
11.99	1.3091	.3041	.0105	.0	.26
12.00	1.3264	.3136	.0096	.0	.25
12.01	1.3301	.3157	.0020	.0	.10
12.03	1.3338	.3177	.0020	.0	.06
12.04	1.3374	.3197	.0020	.0	.05
12.05	1.3411	.3218	.0020	.0	.05
12.07	1.3447	.3238	.0020	.0	.05

HYDROGRAPH PEAK= .26 cfs
TIME TO PEAK= 11.98 Hours

DITCH NO. 36
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .3 ACRES
AVERAGE BASIN SLOPE= 92.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0120 HOURS
CURVE NUMBER= 87.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 165. FEET

TP= .0069 HOURS QPCFS= 28.62 CFS QPIN=******* INCHES C3=538.0
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
9.07	.2986	.0000	.0000	.0	.00
9.08	.2994	.0000	.0000	14.2	.00
9.10	.3001	.0000	.0000	.3	.00
9.11	.3009	.0000	.0000	.0	.00
11.93	1.2167	.3492	.0112	.0	.16
11.94	1.2349	.3605	.0113	.0	.16
11.95	1.2531	.3719	.0114	.0	.17
11.96	1.2714	.3834	.0115	.0	.17
11.98	1.2898	.3950	.0116	.0	.17
11.99	1.3073	.4067	.0117	.0	.17
12.00	1.3260	.4184	.0117	.0	.17
12.01	1.3295	.4207	.0022	.0	.04
12.02	1.3329	.4229	.0022	.0	.03
12.04	1.3364	.4252	.0023	.0	.03
12.05	1.3398	.4274	.0023	.0	.03
12.06	1.3433	.4297	.0023	.0	.03
12.07	1.3468	.4320	.0023	.0	.03

HYDROGRAPH PEAK= .19 cfs
TIME TO PEAK= 11.99 Hours

DITCH NO. 37
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .9 ACRES
AVERAGE BASIN SLOPE= 60.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0154 HOURS
CURVE NUMBER= 74.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 490. FEET

TP= .0308 HOURS QPCFS= 21.62 CFS QPIN=24.3669 INCHES C3=120.1
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.58	.6888	.0000	.0000	.0	.00
11.60	.7122	.0000	.0000	10.6	.00
11.61	.7356	.0003	.0003	21.6	.00
11.63	.7590	.0009	.0006	15.2	.01
11.64	.7824	.0018	.0009	6.9	.03
11.66	.8058	.0029	.0012	2.5	.04
11.67	.8292	.0044	.0015	.8	.06
11.69	.8526	.0061	.0017	.2	.08
11.70	.8760	.0081	.0020	.1	.09
11.90	1.1803	.0572	.0058	.0	.28
11.92	1.2037	.0625	.0054	.0	.29
11.93	1.2271	.0681	.0056	.0	.30
11.95	1.2505	.0739	.0058	.0	.32
11.97	1.2740	.0799	.0060	.0	.33
11.98	1.2974	.0861	.0062	.0	.34
12.00	1.3208	.0925	.0064	.0	.35
12.01	1.3294	.0949	.0024	.0	.32
12.03	1.3339	.0961	.0012	.0	.23
12.04	1.3383	.0974	.0013	.0	.14
12.06	1.3427	.0986	.0013	.0	.10
12.07	1.3472	.0999	.0013	.0	.08
12.09	1.3516	.1012	.0013	.0	.06

HYDROGRAPH PEAK= .35 cfs
TIME TO PEAK= 11.99 Hours

DITCH NO. 38
10 YEAR-24HOUR PEAK DISCHARGE

AREA= 1.6 ACRES
AVERAGE BASIN SLOPE= 54.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0163 HOURS
CURVE NUMBER= 81.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 640. FEET

TP= .0366 HOURS QPCFS= 36.68 CFS QPIN=23.0227 INCHES C3=113.47
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.97	.4682	.0000	.0000	.0	.00
10.99	.4702	.0000	.0000	18.0	.00
11.00	.4725	.0000	.0000	36.7	.00
11.02	.4755	.0000	.0000	25.8	.00
11.04	.4786	.0000	.0000	11.8	.00
11.05	.4817	.0001	.0000	4.2	.00
11.07	.4847	.0001	.0000	1.3	.00
11.08	.4878	.0001	.0000	.4	.00
11.10	.4909	.0002	.0001	.1	.00
11.90	1.1726	.1623	.0100	.0	.94
11.92	1.1974	.1725	.0102	.0	.97
11.93	1.2222	.1830	.0105	.0	.99
11.95	1.2469	.1937	.0107	.0	1.02
11.96	1.2717	.2046	.0109	.0	1.04
11.98	1.2965	.2157	.0111	.0	1.06
12.00	1.3213	.2271	.0113	.0	1.08
12.01	1.3296	.2310	.0040	.0	.97
12.03	1.3345	.2332	.0022	.0	.67
12.05	1.3392	.2354	.0022	.0	.42
12.06	1.3439	.2376	.0022	.0	.29
12.08	1.3486	.2398	.0022	.0	.24
12.09	1.3533	.2420	.0022	.0	.22

HYDROGRAPH PEAK= 1.09 cfs
TIME TO PEAK= 11.95 Hours

DITCH NO. 39
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .1 ACRES
AVERAGE BASIN SLOPE= 23.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0120 HOURS
CURVE NUMBER= 90.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 63. FEET

TP= .0057 HOURS QPCFS= 16.04 CFS QPIN=******* INCHES C3=653.16
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.50	.2220	.0000	.0000	.0	.00
7.51	.2224	.0000	.0000	4.1	.00
7.52	.2229	.0000	.0000	.0	.00
11.93	1.2167	.4697	.0131	.0	.05
11.94	1.2349	.4829	.0132	.0	.05
11.95	1.2531	.4962	.0133	.0	.05
11.96	1.2714	.5095	.0134	.0	.06
11.98	1.2896	.5230	.0135	.0	.06
11.99	1.3079	.5365	.0135	.0	.06
12.00	1.3260	.5501	.0135	.0	.06
12.01	1.3295	.5527	.0026	.0	.01
12.02	1.3329	.5553	.0026	.0	.01
12.04	1.3364	.5578	.0026	.0	.01
12.05	1.3398	.5604	.0026	.0	.01
12.06	1.3433	.5630	.0026	.0	.01
12.07	1.3468	.5656	.0026	.0	.01

HYDROGRAPH PEAK= .06 cfs
TIME TO PEAK= 11.99 Hours

DITCH NO. 40
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .2 ACRES
AVERAGE BASIN SLOPE= 64.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0120 HOURS
CURVE NUMBER= 90.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 140. FEET

TP= .0064 HOURS QPCFS= 17.65 CFS QPIN=******* INCHES C3=575.214
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.50	.2220	.0000	.0000	.0	.00
7.51	.2224	.0000	.0000	7.2	.00
7.52	.2229	.0000	.0000	.1	.00
11.93	1.2167	.4697	.0131	.0	.10
11.94	1.2349	.4829	.0132	.0	.10
11.95	1.2531	.4962	.0133	.0	.10
11.96	1.2714	.5095	.0134	.0	.10
11.98	1.2896	.5230	.0135	.0	.10
11.99	1.3079	.5365	.0135	.0	.10
12.00	1.3260	.5501	.0135	.0	.10
12.01	1.3295	.5527	.0026	.0	.02
12.02	1.3329	.5553	.0026	.0	.02
12.04	1.3364	.5578	.0026	.0	.02
12.05	1.3398	.5604	.0026	.0	.02
12.06	1.3433	.5630	.0026	.0	.02
12.07	1.3468	.5656	.0026	.0	.02

HYDROGRAPH PEAK= .11 cfs
TIME TO PEAK= 11.99 Hours

PROJECT : Plateau Mining Company - Ditch #41 Flow Calculation

AREA= 1.9 ACRES
AVERAGE BASIN SLOPE= 13.0 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 420. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR
USER INPUT TIME OF CONCENTRATION= .18 HOURS

TP= .1200 HOURS QPCFS= 11.97 CFS QPIN= 6.2498 INCHES
CP= 30.8051 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2215	.0000	.0000	.0	.00
7.27	.2226	.0000	.0000	.6	.00
7.30	.2237	.0000	.0000	3.7	.00
7.32	.2248	.0000	.0000	7.9	.00
7.34	.2259	.0000	.0000	11.0	.00
7.37	.2270	.0000	.0000	12.0	.00
7.39	.2281	.0000	.0000	11.2	.00
7.42	.2292	.0000	.0000	9.5	.00
7.44	.2303	.0000	.0000	7.4	.00
7.46	.2314	.0000	.0000	5.5	.00
7.49	.2325	.0000	.0000	3.9	.00
7.51	.2336	.0001	.0000	2.6	.00
7.54	.2345	.0001	.0000	1.7	.00
7.56	.2354	.0002	.0000	1.1	.00
7.58	.2363	.0002	.0000	.7	.00
7.61	.2372	.0002	.0000	.4	.00
7.63	.2381	.0002	.0000	.3	.00
7.66	.2390	.0002	.0000	.2	.00
7.68	.2399	.0003	.0000	.0	.00
11.88	1.2009	.4583	.0273	.0	1.95
11.90	1.2392	.4860	.0277	.0	2.00
11.93	1.2775	.5140	.0280	.0	2.04
11.95	1.3158	.5424	.0284	.0	2.08
11.98	1.3541	.5712	.0287	.0	2.12
12.00	1.3923	.6002	.0290	.0	2.15
12.02	1.3996	.6057	.0055	.0	2.17
12.05	1.4068	.6113	.0056	.0	2.12
12.07	1.4141	.6168	.0056	.0	1.95
12.10	1.4213	.6224	.0056	.0	1.72
12.12	1.4286	.6280	.0056	.0	1.45
12.14	1.4359	.6336	.0056	.0	1.20
12.17	1.4431	.6392	.0056	.0	.99

HYDROGRAPH PEAK= 2.17 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .19 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #42A Flow Calculation

AREA= .4 ACRES
AVERAGE BASIN SLOPE= 11.0 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 260. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR
USER INPUT TIME OF CONCENTRATION= .17 HOURS

TP= .1133 HOURS QPCFS= 2.67 CFS QPIN= 6.6174 INCHES
CN= 32.6172 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2217	.0000	.0000	.0	.00
7.28	.2227	.0000	.0000	.1	.00
7.30	.2238	.0000	.0000	.8	.00
7.32	.2248	.0000	.0000	1.8	.00
7.34	.2259	.0000	.0000	2.5	.00
7.37	.2269	.0000	.0000	2.7	.00
7.39	.2280	.0000	.0000	2.5	.00
7.41	.2290	.0000	.0000	2.1	.00
7.43	.2301	.0000	.0000	1.7	.00
7.46	.2311	.0000	.0000	1.2	.00
7.48	.2322	.0000	.0000	.9	.00
7.50	.2332	.0001	.0000	.6	.00
7.53	.2341	.0001	.0000	.4	.00
7.55	.2349	.0001	.0000	.2	.00
7.57	.2358	.0002	.0000	.2	.00
7.59	.2366	.0002	.0000	.0	.00
11.88	1.1965	.4552	.0257	.0	.41
11.90	1.2327	.4813	.0261	.0	.42
11.92	1.2689	.5077	.0264	.0	.43
11.95	1.3051	.5345	.0267	.0	.44
11.97	1.3412	.5615	.0270	.0	.44
11.99	1.3774	.5888	.0273	.0	.45
12.01	1.3963	.6032	.0144	.0	.46
12.04	1.4032	.6085	.0052	.0	.45
12.06	1.4100	.6137	.0052	.0	.42
12.08	1.4169	.6190	.0053	.0	.38
12.10	1.4238	.6243	.0053	.0	.33
12.13	1.4306	.6295	.0053	.0	.27
12.15	1.4375	.6348	.0053	.0	.22

HYDROGRAPH PEAK= .46 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .04 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #42B Flow Calculation

AREA= .8 ACRES
AVERAGE BASIN SLOPE= 11.0 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 460. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR
USER INPUT TIME OF CONCENTRATION= .18 HOURS

TI= .1200 HOURS QPCFS= 5.04 CFS QPIN= 6.2498 INCHES
CI= 30.8051 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2215	.0000	.0000	.0	.00
7.27	.2226	.0000	.0000	.3	.00
7.30	.2237	.0000	.0000	1.6	.00
7.32	.2248	.0000	.0000	3.3	.00
7.34	.2259	.0000	.0000	4.6	.00
7.37	.2270	.0000	.0000	5.0	.00
7.39	.2281	.0000	.0000	4.7	.00
7.42	.2292	.0000	.0000	4.0	.00
7.44	.2303	.0000	.0000	3.1	.00
7.46	.2314	.0000	.0000	2.3	.00
7.49	.2325	.0000	.0000	1.6	.00
7.51	.2336	.0001	.0000	1.1	.00
7.54	.2345	.0001	.0000	.7	.00
7.56	.2354	.0002	.0000	.5	.00
7.58	.2363	.0002	.0000	.3	.00
7.61	.2372	.0002	.0000	.2	.00
7.63	.2381	.0002	.0000	.1	.00
7.66	.2390	.0002	.0000	.0	.00
11.88	1.2009	.4583	.0273	.0	.82
11.90	1.2392	.4860	.0277	.0	.84
11.93	1.2775	.5140	.0280	.0	.86
11.95	1.3158	.5424	.0284	.0	.88
11.98	1.3541	.5712	.0287	.0	.89
12.00	1.3923	.6002	.0290	.0	.91
12.02	1.3996	.6057	.0055	.0	.91
12.05	1.4068	.6113	.0056	.0	.89
12.07	1.4141	.6168	.0056	.0	.82
12.10	1.4213	.6224	.0056	.0	.72
12.12	1.4286	.6280	.0056	.0	.61
12.14	1.4359	.6336	.0056	.0	.50
12.17	1.4431	.6392	.0056	.0	.41

HYDROGRAPH PEAK= .91 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .08 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #42C Flow Calculation

AREA= .9 ACRES
AVERAGE BASIN SLOPE= 10.0 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 750. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR
USER INPUT TIME OF CONCENTRATION= .20 HOURS

TI= .1333 HOURS QPCFS= 5.10 CFS QPIN= 5.6248 INCHES
CI= 27.7246 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2217	.0000	.0000	.0	.00
7.28	.2229	.0000	.0000	.3	.00
7.31	.2242	.0000	.0000	1.6	.00
7.33	.2254	.0000	.0000	3.4	.00
7.36	.2266	.0000	.0000	4.7	.00
7.39	.2279	.0000	.0000	5.1	.00
7.41	.2291	.0000	.0000	4.8	.00
7.44	.2303	.0000	.0000	4.0	.00
7.47	.2316	.0000	.0000	3.2	.00
7.49	.2328	.0000	.0000	2.3	.00
7.52	.2339	.0001	.0000	1.6	.00
7.55	.2349	.0001	.0000	1.1	.00
7.57	.2359	.0002	.0000	.7	.00
7.60	.2369	.0002	.0000	.5	.00
7.63	.2379	.0002	.0000	.3	.00
7.65	.2389	.0002	.0000	.2	.00
7.68	.2399	.0003	.0000	.1	.00
7.71	.2409	.0003	.0000	.0	.00
11.87	1.1795	.4430	.0300	.0	.89
11.89	1.2220	.4736	.0305	.0	.92
11.92	1.2646	.5046	.0310	.0	.95
11.95	1.3072	.5360	.0314	.0	.97
11.97	1.3497	.5679	.0319	.0	.99
12.00	1.3923	.6001	.0323	.0	1.01
12.03	1.4004	.6063	.0062	.0	1.02
12.05	1.4084	.6125	.0062	.0	.99
12.08	1.4165	.6187	.0062	.0	.92
12.11	1.4246	.6249	.0062	.0	.81
12.13	1.4326	.6311	.0062	.0	.68
12.16	1.4407	.6373	.0062	.0	.57
12.19	1.4487	.6435	.0062	.0	.47

HYDROGRAPH PEAK= 1.02 cfs
TIME TO PEAK= 12.03 Hours
RUNOFF VOLUME= .09 Acre-Feet

PROJECT : Plateau Mining Company - Upper Ditch No. 43

AREA= 1.7 ACRES
AVERAGE BASIN SLOPE= 9.3 PERCENT
CURVE NUMBER= 82.
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 735. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0849 HOURS QPCFS= 15.14 CFS QPIN= 8.8331 INCHES
C3= 43.5382 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.56	.4368	.0000	.0000	.0	.00
10.58	.4390	.0000	.0000	.8	.00
10.60	.4413	.0000	.0000	4.7	.00
10.61	.4436	.0000	.0000	10.1	.00
10.63	.4459	.0000	.0000	13.9	.00
10.65	.4482	.0000	.0000	15.1	.00
10.66	.4505	.0001	.0000	14.2	.00
10.68	.4527	.0001	.0000	12.0	.00
10.70	.4550	.0001	.0000	9.4	.00
10.72	.4573	.0002	.0000	6.9	.00
10.73	.4596	.0002	.0000	4.9	.00
10.75	.4619	.0002	.0000	3.3	.00
10.77	.4642	.0003	.0000	2.2	.00
10.78	.4664	.0003	.0001	1.4	.00
10.80	.4687	.0004	.0001	.9	.00
10.82	.4710	.0005	.0001	.5	.00
10.83	.4733	.0005	.0001	.3	.00
10.85	.4756	.0006	.0001	.2	.00
10.87	.4778	.0007	.0001	.1	.01
10.88	.4801	.0008	.0001	.1	.01
11.92	1.2658	.2262	.0127	.0	1.12
11.94	1.2929	.2391	.0129	.0	1.15
11.95	1.3200	.2523	.0132	.0	1.18
11.97	1.3471	.2657	.0134	.0	1.21
11.99	1.3742	.2794	.0137	.0	1.24
12.01	1.3940	.2895	.0101	.0	1.26
12.02	1.3991	.2922	.0026	.0	1.27
12.04	1.4043	.2948	.0027	.0	1.22
12.06	1.4094	.2975	.0027	.0	1.11
12.07	1.4145	.3001	.0027	.0	.97
12.09	1.4197	.3028	.0027	.0	.82
12.11	1.4248	.3055	.0027	.0	.68
12.12	1.4300	.3082	.0027	.0	.56

HYDROGRAPH PEAK= 1.27 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .10 Acre-Feet

PROJECT : Plateau Mining Company - Ditch No. 44 Design

AREA= 2.2 ACRES
AVERAGE BASIN SLOPE= 10.8 PERCENT
CURVE NUMBER= 80.
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1015. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1087 HOURS QPCFS= 15.02 CFS QPIN= 6.8982 INCHES
C3= 34.0010 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.00	.4961	.0000	.0000	.0	.00
11.02	.5004	.0000	.0000	.8	.00
11.05	.5047	.0000	.0000	4.7	.00
11.07	.5090	.0000	.0000	10.0	.00
11.09	.5133	.0001	.0000	13.8	.00
11.11	.5176	.0001	.0001	15.0	.00
11.13	.5218	.0002	.0001	14.1	.00
11.15	.5261	.0003	.0001	11.9	.00
11.18	.5304	.0004	.0001	9.3	.00
11.20	.5347	.0005	.0001	6.9	.00
11.22	.5390	.0006	.0001	4.8	.01
11.24	.5433	.0007	.0001	3.3	.01
11.26	.5476	.0009	.0002	2.2	.01
11.29	.5519	.0011	.0002	1.4	.01
11.31	.5562	.0012	.0002	.9	.01
11.33	.5605	.0014	.0002	.5	.01
11.35	.5648	.0016	.0002	.3	.01
11.37	.5691	.0019	.0002	.2	.01
11.39	.5734	.0021	.0002	.1	.02
11.42	.5776	.0023	.0002	.1	.02
11.89	1.2231	.1622	.0136	.0	1.09
11.92	1.2578	.1763	.0140	.0	1.14
11.94	1.2925	.1908	.0145	.0	1.19
11.96	1.3272	.2057	.0149	.0	1.24
11.98	1.3620	.2210	.0153	.0	1.29
12.00	1.3931	.2351	.0141	.0	1.34
12.02	1.3997	.2381	.0030	.0	1.37
12.05	1.4063	.2411	.0030	.0	1.34
12.07	1.4129	.2442	.0030	.0	1.25
12.09	1.4194	.2472	.0031	.0	1.10
12.11	1.4260	.2503	.0031	.0	.93
12.13	1.4326	.2534	.0031	.0	.78
12.15	1.4392	.2565	.0031	.0	.64

HYDROGRAPH PEAK= 1.37 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .11 Acre-Feet

PROJECT : Plateau Mining Company - Ditch No. 45 Design - 10 Yr 6 Hr

AREA= 1.6 ACRES
AVERAGE BASIN SLOPE= 22.6 PERCENT
CURVE NUMBER= 76.
DESIGN STORM= 1.50 INCHES
STORM DURATION= 6.0 HOURS
HYDRAULIC LENGTH= 635. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0583 HOURS QPCFS= 21.29 CFS QPIN=12.8726 INCHES
C3= 63.4489 ITERATIONS= 8 SCS 6-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
2.25	.6173	.0000	.0000	.0	.00
2.26	.6335	.0000	.0000	2.0	.00
2.27	.6497	.0001	.0001	10.4	.00
2.29	.6659	.0004	.0003	18.5	.00
2.30	.6820	.0008	.0004	21.3	.01
2.32	.6982	.0014	.0006	19.3	.01
2.33	.7144	.0021	.0007	15.0	.02
2.35	.7306	.0030	.0009	10.5	.04
2.36	.7468	.0041	.0010	6.8	.05
2.38	.7630	.0052	.0012	4.2	.07
2.39	.7791	.0066	.0013	2.4	.08
2.41	.7953	.0081	.0015	1.4	.10
2.42	.8115	.0097	.0016	.8	.12
2.43	.8277	.0115	.0018	.4	.13
2.45	.8439	.0134	.0019	.2	.15
2.46	.8601	.0154	.0020	.1	.17
2.48	.8762	.0176	.0022	.1	.18
2.49	.8924	.0199	.0023	.0	.20
2.51	.9023	.0214	.0015	.0	.21
2.52	.9067	.0220	.0007	.0	.22
2.54	.9111	.0227	.0007	.0	.20
2.55	.9155	.0234	.0007	.0	.18
2.57	.9198	.0241	.0007	.0	.15
2.58	.9242	.0248	.0007	.0	.13
2.60	.9286	.0255	.0007	.0	.11
2.61	.9329	.0263	.0007	.0	.10

HYDROGRAPH PEAK= .22 cfs
TIME TO PEAK= 2.52 Hours
RUNOFF VOLUME= .03 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #46 Flow Calculation

AREA= .5 ACRES
AVERAGE BASIN SLOPE= 70.3 PERCENT
CURVE NUMBER= 78.0
DESIGN STORM= .90 INCHES
STORM DURATION= 6.0 HOURS
HYDRAULIC LENGTH= 230. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0195 HOURS QPCFS= 18.97 CFS QPIN=38.3918 INCHES
C3=189.2331 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
2.98	.5474	.0000	.0000	.0	.00
3.00	.5863	.0002	.0002	16.0	.00
3.01	.6021	.0005	.0003	14.1	.00
3.02	.6095	.0007	.0002	4.3	.00
3.04	.6168	.0010	.0002	.8	.00
3.05	.6242	.0013	.0003	.1	.00
3.07	.6315	.0016	.0003	.0	.01
3.08	.6389	.0019	.0004	.0	.01
3.10	.6463	.0023	.0004	.0	.01
3.11	.6536	.0028	.0004	.0	.01
3.12	.6610	.0032	.0005	.0	.02
3.14	.6650	.0035	.0003	.0	.01
3.15	.6688	.0037	.0003	.0	.01
3.17	.6726	.0040	.0003	.0	.00
3.18	.6764	.0043	.0003	.0	.00
3.19	.6801	.0046	.0003	.0	.01
3.21	.6839	.0049	.0003	.0	.01

HYDROGRAPH PEAK= .02 cfs
TIME TO PEAK= 3.12 Hours
RUNOFF VOLUME= .00 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #47 Flow Calculation

AREA= 15.3 ACRES
AVERAGE BASIN SLOPE= 80.0 PERCENT
CURVE NUMBER= 75.6
DESIGN STORM= .90 INCHES
STORM DURATION= 6.0 HOURS
HYDRAULIC LENGTH= 1610. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0676 HOURS QPCFS= 171.18 CFS QPIN=11.0951 INCHES
C3= 54.6876 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
3.08	.6401	.0000	.0000	.0	.00
3.10	.6486	.0000	.0000	15.2	.00
3.12	.6571	.0000	.0000	80.1	.00
3.13	.6637	.0001	.0000	145.5	.00
3.15	.6681	.0002	.0000	171.0	.01
3.17	.6724	.0002	.0000	158.3	.02
3.18	.6768	.0003	.0000	126.1	.03
3.20	.6812	.0004	.0000	90.5	.04
3.22	.6856	.0005	.0001	60.1	.05
3.23	.6900	.0006	.0001	37.7	.06
3.25	.6944	.0007	.0001	22.6	.07
3.27	.6977	.0008	.0001	13.0	.08
3.28	.7009	.0009	.0001	7.3	.09
3.30	.7041	.0010	.0001	4.0	.09
3.31	.7073	.0012	.0001	2.1	.10
3.33	.7105	.0013	.0001	1.1	.10
3.35	.7137	.0014	.0001	.6	.10
3.36	.7170	.0015	.0001	.3	.11
3.38	.7199	.0017	.0001	.1	.11
3.40	.7224	.0018	.0001	.0	.11
3.55	.7445	.0029	.0001	.0	.12
3.56	.7469	.0031	.0001	.0	.12
3.58	.7493	.0032	.0001	.0	.12
3.59	.7517	.0034	.0001	.0	.13
3.61	.7540	.0035	.0002	.0	.13
3.63	.7563	.0037	.0001	.0	.13
3.64	.7579	.0038	.0001	.0	.13
3.66	.7596	.0039	.0001	.0	.13
3.68	.7613	.0040	.0001	.0	.13
3.69	.7629	.0041	.0001	.0	.12
3.71	.7646	.0042	.0001	.0	.12
3.73	.7663	.0044	.0001	.0	.11
3.74	.7679	.0045	.0001	.0	.11

HYDROGRAPH PEAK= .13 cfs
TIME TO PEAK= 3.64 Hours
RUNOFF VOLUME= .02 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #48 Flow Calculation

AREA= 6.0 ACRES
AVERAGE BASIN SLOPE= 78.4 PERCENT
CURVE NUMBER= 76.0
DESIGN STORM= .90 INCHES
STORM DURATION= 6.0 HOURS
HYDRAULIC LENGTH= 1240. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0570 HOURS QPCFS= 79.61 CFS QPIN=13.1590 INCHES
C3= 64.8608 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
3.06	.6295	.0000	.0000	.0	.00
3.08	.6388	.0000	.0000	13.7	.00
3.10	.6480	.0000	.0000	56.0	.00
3.12	.6572	.0002	.0001	79.0	.00
3.13	.6640	.0003	.0001	72.1	.02
3.15	.6688	.0004	.0001	51.8	.02
3.17	.6735	.0006	.0001	32.0	.03
3.19	.6783	.0007	.0001	17.8	.03
3.21	.6830	.0008	.0001	9.2	.04
3.22	.6878	.0010	.0002	4.5	.04
3.24	.6925	.0012	.0002	2.1	.04
3.26	.6966	.0013	.0002	.9	.05
3.28	.7001	.0015	.0001	.4	.05
3.29	.7035	.0016	.0001	.2	.05
3.31	.7070	.0018	.0002	.0	.05
3.53	.7418	.0037	.0002	.0	.06
3.54	.7444	.0039	.0002	.0	.06
3.56	.7469	.0041	.0002	.0	.06
3.58	.7495	.0042	.0002	.0	.06
3.60	.7521	.0044	.0002	.0	.06
3.62	.7546	.0046	.0002	.0	.06
3.63	.7568	.0048	.0002	.0	.06
3.65	.7586	.0049	.0001	.0	.06
3.67	.7604	.0051	.0001	.0	.06
3.69	.7622	.0052	.0001	.0	.05
3.70	.7640	.0053	.0001	.0	.05
3.72	.7658	.0055	.0001	.0	.05
3.74	.7676	.0056	.0001	.0	.05

HYDROGRAPH PEAK= .06 cfs
TIME TO PEAK= 3.63 Hours
RUNOFF VOLUME= .01 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #49 Flow Calculation

AREA= 13.2 ACRES
AVERAGE BASIN SLOPE= 66.6 PERCENT
CURVE NUMBER= 76.0
DESIGN STORM= .90 INCHES
STORM DURATION= 6.0 HOURS
HYDRAULIC LENGTH= 1560. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0714 HOURS QPCFS= 139.80 CFS QPIN=10.5034 INCHES
C3= 51.7710 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
3.07	.6309	.0000	.0000	.0	.00
3.08	.6399	.0000	.0000	12.4	.00
3.10	.6489	.0000	.0000	65.4	.00
3.12	.6580	.0002	.0001	118.8	.00
3.14	.6643	.0003	.0001	139.7	.02
3.15	.6690	.0004	.0001	129.3	.04
3.17	.6736	.0006	.0001	103.0	.05
3.19	.6782	.0007	.0001	73.9	.06
3.21	.6829	.0008	.0001	49.1	.07
3.22	.6875	.0010	.0002	30.8	.08
3.24	.6922	.0011	.0002	18.5	.09
3.26	.6963	.0013	.0002	10.7	.10
3.27	.6997	.0014	.0001	6.0	.10
3.29	.7030	.0016	.0001	3.3	.11
3.31	.7064	.0017	.0002	1.7	.11
3.33	.7098	.0019	.0002	.9	.11
3.34	.7132	.0021	.0002	.5	.11
3.36	.7166	.0022	.0002	.2	.12
3.38	.7198	.0024	.0002	.1	.12
3.40	.7224	.0025	.0001	.0	.12
3.54	.7432	.0038	.0002	.0	.12
3.55	.7457	.0040	.0002	.0	.12
3.57	.7482	.0042	.0002	.0	.12
3.59	.7507	.0043	.0002	.0	.13
3.61	.7533	.0045	.0002	.0	.13
3.62	.7558	.0047	.0002	.0	.13
3.64	.7576	.0048	.0001	.0	.13
3.66	.7593	.0050	.0001	.0	.13
3.68	.7611	.0051	.0001	.0	.13
3.69	.7629	.0052	.0001	.0	.12
3.71	.7646	.0054	.0001	.0	.12
3.73	.7664	.0055	.0001	.0	.11
3.75	.7681	.0057	.0001	.0	.11

HYDROGRAPH PEAK= .13 cfs
TIME TO PEAK= 3.64 Hours
RUNOFF VOLUME= .02 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #50 Flow Calculation

AREA= 17.8 ACRES
AVERAGE BASIN SLOPE= 62.7 PERCENT
CURVE NUMBER= 76.3
DESIGN STORM= .90 INCHES
STORM DURATION= 6.0 HOURS
HYDRAULIC LENGTH= 2540. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1051 HOURS QPCFS= 128.07 CFS QPIN= 7.1352 INCHES
C3= 35.1692 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
3.03	.6108	.0000	.0000	.0	.00
3.05	.6217	.0000	.0000	6.4	.00
3.07	.6326	.0000	.0000	39.8	.00
3.09	.6435	.0002	.0001	85.0	.00
3.11	.6544	.0003	.0002	117.6	.00
3.13	.6634	.0006	.0002	128.1	.02
3.15	.6690	.0007	.0002	120.0	.04
3.17	.6746	.0009	.0002	101.3	.07
3.20	.6802	.0011	.0002	79.2	.09
3.22	.6858	.0013	.0002	58.4	.11
3.24	.6914	.0016	.0002	41.2	.13
3.26	.6964	.0018	.0002	28.0	.14
3.28	.7005	.0020	.0002	18.4	.15
3.30	.7046	.0022	.0002	11.8	.16
3.32	.7087	.0024	.0002	7.4	.17
3.34	.7128	.0026	.0002	4.6	.17
3.36	.7169	.0029	.0002	2.8	.18
3.38	.7205	.0031	.0002	1.7	.18
3.41	.7237	.0033	.0002	1.0	.18
3.43	.7269	.0035	.0002	.6	.18
3.45	.7301	.0037	.0002	.3	.18
3.47	.7333	.0039	.0002	.2	.18
3.49	.7364	.0041	.0002	.1	.18
3.51	.7395	.0043	.0002	.0	.18
3.53	.7426	.0046	.0002	.0	.18
3.55	.7456	.0048	.0002	.0	.18
3.57	.7486	.0050	.0002	.0	.18
3.59	.7516	.0053	.0002	.0	.19
3.62	.7547	.0055	.0002	.0	.19
3.64	.7572	.0057	.0002	.0	.19
3.66	.7593	.0059	.0002	.0	.19
3.68	.7614	.0061	.0002	.0	.19
3.70	.7635	.0062	.0002	.0	.19
3.72	.7657	.0064	.0002	.0	.18
3.74	.7678	.0066	.0002	.0	.17

PROJECT : Plateau Mining Company - Ditch #52 Flow Calcualations

AREA= 1.6 ACRES
AVERAGE BASIN SLOPE= 74.3 PERCENT
CURVE NUMBER= 77.8
DESIGN STORM= .90 INCHES
STORM DURATION= 6.0 HOURS
HYDRAULIC LENGTH= 395. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0292 HOURS QPCFS= 41.47 CFS QPIN=25.7057 INCHES
C3=126.7033 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
2.98	.5423	.0000	.0000	.0	.00
3.00	.5972	.0002	.0002	34.4	.00
3.02	.6080	.0005	.0002	31.8	.02
3.04	.6188	.0008	.0003	10.2	.02
3.06	.6296	.0012	.0004	2.1	.03
3.08	.6404	.0017	.0005	.3	.03
3.11	.6512	.0022	.0005	.0	.04
3.13	.6618	.0028	.0006	.0	.04
3.15	.6673	.0032	.0003	.0	.04
3.17	.6729	.0035	.0004	.0	.03
3.19	.6784	.0039	.0004	.0	.03
3.21	.6840	.0043	.0004	.0	.03
3.23	.6895	.0048	.0004	.0	.03
3.25	.6950	.0052	.0004	.0	.03

HYDROGRAPH PEAK= .04 cfs
TIME TO PEAK= 3.13 Hours
RUNOFF VOLUME= .00 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #50 Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
3.76	.7699	.0068	.0002	.0	.17
3.78	.7720	.0070	.0002	.0	.17

HYDROGRAPH PEAK= .19 cfs
TIME TO PEAK= 3.66 Hours
RUNOFF VOLUME= .03 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #53 Flow Calculation

AREA= 1.2 ACRES
AVERAGE BASIN SLOPE= 78.4 PERCENT
CURVE NUMBER= 77.5
DESIGN STORM= .90 INCHES
STORM DURATION= 6.0 HOURS
HYDRAULIC LENGTH= 395. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0287 HOURS QPCFS= 31.67 CFS QPIN=26.1697 INCHES
C3=128.9903 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
2.99	.5656	.0000	.0000	.0	.00
3.01	.6014	.0001	.0001	26.2	.00
3.03	.6120	.0003	.0002	24.3	.00
3.05	.6226	.0006	.0003	7.8	.01
3.07	.6332	.0009	.0003	1.6	.02
3.09	.6439	.0013	.0004	.3	.02
3.11	.6545	.0018	.0005	.0	.03
3.13	.6633	.0023	.0005	.0	.03
3.15	.6688	.0026	.0003	.0	.02
3.17	.6742	.0029	.0003	.0	.02
3.19	.6797	.0033	.0003	.0	.02
3.21	.6852	.0036	.0004	.0	.02
3.23	.6906	.0040	.0004	.0	.02
3.25	.6957	.0044	.0004	.0	.02

HYDROGRAPH PEAK= .03 cfs
TIME TO PEAK= 3.13 Hours
RUNOFF VOLUME= .00 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #57 Flow Calculation

AREA= 16.3 ACRES
AVERAGE BASIN SLOPE= 65.2 PERCENT
CURVE NUMBER= 76.9
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2087. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0865 HOURS QPCFS= 142.43 CFS QPIN= 8.6658 INCHES
CP= 42.7138 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.49	.5929	.0000	.0000	.0	.00
11.51	.6109	.0000	.0000	7.1	.00
11.53	.6385	.0005	.0004	44.2	.00
11.54	.6662	.0014	.0009	94.6	.03
11.56	.6938	.0028	.0014	130.8	.10
11.58	.7214	.0047	.0019	142.4	.22
11.60	.7490	.0070	.0023	133.4	.42
11.61	.7767	.0097	.0028	112.6	.67
11.63	.8043	.0129	.0032	88.1	.98
11.65	.8319	.0165	.0036	65.0	1.33
11.67	.8595	.0205	.0040	45.8	1.70
11.68	.8872	.0249	.0044	31.1	2.08
11.70	.9148	.0297	.0048	20.5	2.47
11.72	.9424	.0349	.0052	13.2	2.86
11.74	.9700	.0404	.0055	8.3	3.25
11.75	.9977	.0463	.0059	5.1	3.64
11.77	1.0253	.0526	.0062	3.1	4.02
11.79	1.0529	.0591	.0066	1.8	4.38
11.80	1.0805	.0661	.0069	1.1	4.75
11.82	1.1082	.0733	.0072	.6	5.10
11.84	1.1358	.0809	.0076	.4	5.44
11.86	1.1634	.0888	.0079	.2	5.78
11.87	1.1910	.0969	.0082	.1	6.11
11.89	1.2187	.1054	.0085	.0	6.43
11.91	1.2463	.1142	.0088	.0	6.74
11.93	1.2739	.1232	.0090	.0	7.05
11.94	1.3015	.1326	.0093	.0	7.35
11.96	1.3292	.1421	.0096	.0	7.64
11.98	1.3568	.1520	.0099	.0	7.92
11.99	1.3844	.1621	.0101	.0	8.20
12.01	1.3960	.1665	.0043	.0	8.43
12.03	1.4013	.1684	.0020	.0	8.41
12.05	1.4065	.1704	.0020	.0	7.98
12.06	1.4117	.1724	.0020	.0	7.19
12.08	1.4170	.1744	.0020	.0	6.20

PROJECT : Plateau Mining Company - Ditch #57 Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.10	1.4222	.1764	.0020	.0	5.20
12.12	1.4274	.1784	.0020	.0	4.31

HYDROGRAPH PEAK= 8.43 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .68 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #58 Flow Calculation

AREA= 27.5 ACRES
AVERAGE BASIN SLOPE= 69.3 PERCENT
CURVE NUMBER= 75.9
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2623. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1038 HOURS QPCFS= 200.38 CFS QPIN= 7.2259 INCHES
CN= 35.6166 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.52	.6271	.0000	.0000	.0	.00
11.54	.6602	.0002	.0002	10.1	.00
11.56	.6934	.0011	.0009	62.2	.02
11.58	.7265	.0026	.0015	133.0	.09
11.60	.7596	.0047	.0021	183.9	.27
11.62	.7927	.0075	.0028	200.4	.56
11.65	.8259	.0108	.0034	187.7	.98
11.67	.8590	.0148	.0039	158.4	1.50
11.69	.8921	.0193	.0045	123.9	2.12
11.71	.9253	.0243	.0050	91.4	2.79
11.73	.9584	.0299	.0056	64.4	3.50
11.75	.9915	.0360	.0061	43.8	4.23
11.77	1.0246	.0426	.0066	28.8	4.97
11.79	1.0578	.0497	.0071	18.5	5.70
11.81	1.0909	.0572	.0076	11.6	6.42
11.83	1.1240	.0653	.0080	7.2	7.13
11.85	1.1572	.0737	.0085	4.3	7.83
11.87	1.1903	.0826	.0089	2.6	8.50
11.89	1.2234	.0920	.0093	1.5	9.16
11.91	1.2565	.1017	.0098	.9	9.81
11.94	1.2897	.1119	.0102	.5	10.43
11.96	1.3228	.1224	.0106	.3	11.04
11.98	1.3559	.1334	.0109	.2	11.63
12.00	1.3891	.1447	.0113	.0	12.21
12.02	1.3980	.1478	.0031	.0	12.69
12.04	1.4042	.1500	.0022	.0	12.69
12.06	1.4105	.1522	.0022	.0	12.00
12.08	1.4168	.1544	.0022	.0	10.75
12.10	1.4231	.1567	.0022	.0	9.24
12.12	1.4293	.1589	.0023	.0	7.75
12.14	1.4356	.1612	.0023	.0	6.44
12.16	1.4419	.1635	.0023	.0	5.40

HYDROGRAPH PEAK= 12.69 cfs
TIME TO PEAK= 12.04 Hours
RUNOFF VOLUME= 1.06 Acre-Feet

PROJECT : Plateau Mining Company - Design Flow Ditch #59 7/23/87

AREA= 12.2 ACRES
AVERAGE BASIN SLOPE= 60.1 PERCENT
CURVE NUMBER= 76.8
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2400. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1011 HOURS QPCFS= 91.26 CFS QPIN= 7.4180 INCHES
C3= 36.5635 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.51	.6027	.0000	.0000	.0	.00
11.53	.6350	.0003	.0003	4.6	.00
11.55	.6672	.0013	.0010	28.3	.01
11.57	.6995	.0029	.0016	60.6	.05
11.59	.7318	.0052	.0023	83.8	.14
11.61	.7640	.0080	.0029	91.3	.29
11.63	.7963	.0115	.0035	85.5	.49
11.65	.8286	.0155	.0040	72.2	.73
11.67	.8609	.0201	.0046	56.4	1.02
11.69	.8931	.0252	.0051	41.6	1.33
11.71	.9254	.0309	.0056	29.4	1.65
11.73	.9577	.0370	.0062	19.9	1.98
11.75	.9899	.0437	.0067	13.1	2.32
11.77	1.0222	.0508	.0071	8.4	2.65
11.79	1.0545	.0584	.0076	5.3	2.97
11.81	1.0868	.0665	.0081	3.3	3.29
11.83	1.1190	.0750	.0085	2.0	3.60
11.85	1.1513	.0839	.0089	1.2	3.91
11.87	1.1836	.0932	.0093	.7	4.20
11.89	1.2158	.1030	.0098	.4	4.49
11.91	1.2481	.1131	.0101	.2	4.77
11.93	1.2804	.1237	.0105	.1	5.04
11.95	1.3126	.1346	.0109	.0	5.31
11.97	1.3449	.1459	.0113	.0	5.57
11.99	1.3772	.1575	.0116	.0	5.82
12.01	1.3956	.1643	.0068	.0	6.04
12.03	1.4017	.1666	.0023	.0	6.11
12.05	1.4078	.1689	.0023	.0	5.89
12.07	1.4139	.1712	.0023	.0	5.37
12.09	1.4200	.1735	.0023	.0	4.68
12.11	1.4261	.1758	.0023	.0	3.95
12.13	1.4322	.1782	.0023	.0	3.29
12.15	1.4384	.1805	.0024	.0	2.74

HYDROGRAPH PEAK= 6.11 cfs
TIME TO PEAK= 12.03 Hours
RUNOFF VOLUME= .50 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #60 Flow Calculation

AREA= 3.4 ACRES
AVERAGE BASIN SLOPE= 42.3 PERCENT
CURVE NUMBER= 78.7
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1190. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0649 HOURS QPCFS= 39.59 CFS QPIN=11.5479 INCHES
C3= 56.9193 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.22	.5394	.0000	.0000	.0	.00
11.24	.5426	.0000	.0000	3.8	.00
11.25	.5458	.0000	.0000	19.4	.00
11.27	.5490	.0000	.0000	34.5	.00
11.29	.5522	.0000	.0000	39.6	.00
11.30	.5554	.0000	.0000	35.8	.00
11.32	.5586	.0001	.0000	27.9	.00
11.34	.5618	.0002	.0000	19.6	.00
11.35	.5651	.0002	.0000	12.7	.00
11.37	.5683	.0003	.0000	7.8	.00
11.38	.5715	.0003	.0000	4.6	.00
11.40	.5747	.0004	.0000	2.6	.00
11.42	.5779	.0005	.0000	1.4	.01
11.43	.5811	.0006	.0000	.8	.01
11.45	.5843	.0007	.0000	.4	.01
11.47	.5875	.0008	.0001	.2	.02
11.48	.5907	.0009	.0001	.1	.02
11.50	.5939	.0010	.0001	.0	.02
11.92	1.2650	.1527	.0097	.0	1.81
11.94	1.2909	.1626	.0099	.0	1.87
11.95	1.3168	.1727	.0101	.0	1.93
11.97	1.3427	.1831	.0104	.0	1.98
11.99	1.3687	.1937	.0106	.0	2.03
12.00	1.3927	.2038	.0100	.0	2.08
12.02	1.3976	.2058	.0021	.0	2.09
12.03	1.4026	.2079	.0021	.0	1.95
12.05	1.4075	.2100	.0021	.0	1.68
12.07	1.4124	.2121	.0021	.0	1.36
12.08	1.4173	.2142	.0021	.0	1.07
12.10	1.4222	.2163	.0021	.0	.85
12.12	1.4271	.2184	.0021	.0	.69

HYDROGRAPH PEAK= 2.09 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .16 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #61 Partial Flow Calculation

AREA= 8.0 ACRES
AVERAGE BASIN SLOPE= 53.9 PERCENT
CURVE NUMBER= 77.5
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1307. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0659 HOURS QPCFS= 91.79 CFS QPIN=11.3784 INCHES
CN= 56.0841 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.42	.5779	.0000	.0000	.0	.00
11.43	.5810	.0000	.0000	8.2	.00
11.45	.5842	.0000	.0000	42.9	.00
11.47	.5874	.0000	.0000	78.0	.00
11.48	.5906	.0000	.0000	91.7	.00
11.50	.5937	.0000	.0000	84.9	.00
11.51	.6154	.0004	.0004	67.6	.00
11.53	.6411	.0012	.0008	48.5	.03
11.55	.6667	.0025	.0012	32.2	.08
11.56	.6924	.0041	.0017	20.2	.17
11.58	.7181	.0062	.0021	12.1	.29
11.59	.7437	.0087	.0025	7.0	.45
11.61	.7694	.0115	.0028	3.9	.62
11.63	.7951	.0147	.0032	2.1	.81
11.64	.8207	.0183	.0036	1.1	1.00
11.66	.8464	.0223	.0039	.6	1.19
11.67	.8720	.0266	.0043	.3	1.38
11.69	.8977	.0312	.0046	.2	1.57
11.71	.9234	.0362	.0050	.0	1.75
11.92	1.2570	.1278	.0087	.0	3.80
11.93	1.2827	.1367	.0089	.0	3.93
11.95	1.3083	.1458	.0091	.0	4.06
11.96	1.3340	.1552	.0094	.0	4.19
11.98	1.3596	.1648	.0096	.0	4.31
12.00	1.3853	.1746	.0098	.0	4.43
12.01	1.3958	.1787	.0041	.0	4.50
12.03	1.4007	.1806	.0019	.0	4.35
12.04	1.4056	.1825	.0019	.0	3.89
12.06	1.4104	.1844	.0019	.0	3.26
12.08	1.4153	.1864	.0019	.0	2.62
12.09	1.4202	.1883	.0019	.0	2.08
12.11	1.4250	.1902	.0019	.0	1.67

HYDROGRAPH PEAK= 4.50 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .35 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #62 Flow Calculation

AREA= 12.4 ACRES
AVERAGE BASIN SLOPE= 58.9 PERCENT
CURVE NUMBER= 76.4
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1520. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0717 HOURS QPCFS= 130.78 CFS QPIN=10.4590 INCHES
CN= 51.5526 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.50	.5970	.0000	.0000	.0	.00
11.52	.6199	.0000	.0000	6.6	.00
11.53	.6428	.0002	.0002	40.6	.00
11.54	.6657	.0007	.0005	86.8	.01
11.56	.6886	.0016	.0009	120.1	.04
11.57	.7115	.0028	.0012	130.8	.11
11.59	.7343	.0042	.0015	122.5	.22
11.60	.7572	.0060	.0018	103.4	.37
11.62	.7801	.0081	.0021	80.9	.55
11.63	.8030	.0105	.0024	59.7	.76
11.65	.8259	.0131	.0027	42.1	.99
11.66	.8488	.0161	.0029	28.6	1.23
11.67	.8717	.0193	.0032	18.8	1.47
11.69	.8946	.0228	.0035	12.1	1.72
11.70	.9175	.0265	.0037	7.6	1.97
11.72	.9403	.0305	.0040	4.7	2.22
11.73	.9632	.0347	.0042	2.8	2.46
11.75	.9861	.0392	.0045	1.7	2.70
11.76	1.0090	.0440	.0047	1.0	2.93
11.77	1.0319	.0490	.0050	.6	3.16
11.79	1.0548	.0542	.0052	.3	3.39
11.80	1.0777	.0596	.0054	.2	3.61
11.82	1.1006	.0653	.0057	.1	3.83
11.83	1.1235	.0711	.0059	.0	4.04
11.93	1.2837	.1181	.0073	.0	5.42
11.95	1.3066	.1256	.0075	.0	5.60
11.96	1.3295	.1333	.0077	.0	5.78
11.97	1.3523	.1411	.0079	.0	5.95
11.99	1.3752	.1492	.0080	.0	6.13
12.00	1.3934	.1557	.0065	.0	6.28
12.02	1.3977	.1572	.0016	.0	6.35
12.03	1.4021	.1588	.0016	.0	6.15
12.05	1.4064	.1604	.0016	.0	5.66
12.06	1.4108	.1620	.0016	.0	4.96

PROJECT : Plateau Mining Company - Ditch #62 Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
2.08	1.4151	.1636	.0016	.0	4.19
2.09	1.4194	.1652	.0016	.0	3.48
2.10	1.4238	.1668	.0016	.0	2.88

HYDROGRAPH PEAK= 6.35 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .50 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #63 Partial Flow Calculation

AREA= 15.2 ACRES
AVERAGE BASIN SLOPE= 61.6 PERCENT
CURVE NUMBER= 75.8
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1326. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0656 HOURS QPCFS= 175.31 CFS QPIN=11.4378 INCHES
C3= 56.3771 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.51	.6147	.0000	.0000	.0	.00
11.53	.6403	.0000	.0000	15.6	.00
11.54	.6658	.0002	.0002	81.9	.00
11.56	.6913	.0009	.0006	148.9	.03
11.58	.7168	.0019	.0010	175.1	.10
11.59	.7423	.0033	.0014	162.2	.24
11.61	.7679	.0050	.0018	129.2	.44
11.62	.7934	.0072	.0021	92.7	.70
11.64	.8189	.0096	.0025	61.7	.99
11.66	.8444	.0125	.0028	38.7	1.30
11.67	.8699	.0156	.0032	23.2	1.63
11.69	.8955	.0191	.0035	13.4	1.96
11.70	.9210	.0230	.0038	7.5	2.30
11.72	.9465	.0271	.0041	4.1	2.63
11.74	.9720	.0315	.0044	2.2	2.95
11.75	.9975	.0363	.0047	1.1	3.27
11.77	1.0231	.0413	.0050	.6	3.58
11.78	1.0486	.0467	.0053	.3	3.88
11.80	1.0741	.0523	.0056	.2	4.18
11.82	1.0996	.0582	.0059	.0	4.48
11.51	.6147	.0000	.0000	.0	.00
11.53	.6403	.0000	.0000	15.6	.00
11.54	.6658	.0002	.0002	81.9	.00
11.56	.6913	.0009	.0006	148.9	.03
11.58	.7168	.0019	.0010	175.1	.10
11.59	.7423	.0033	.0014	162.2	.24
11.61	.7679	.0050	.0018	129.2	.44
11.62	.7934	.0072	.0021	92.7	.70
11.64	.8189	.0096	.0025	61.7	.99
11.66	.8444	.0125	.0028	38.7	1.30
11.67	.8699	.0156	.0032	23.2	1.63
11.69	.8955	.0191	.0035	13.4	1.96
11.70	.9210	.0230	.0038	7.5	2.30
11.72	.9465	.0271	.0041	4.1	2.63
11.74	.9720	.0315	.0044	2.2	2.95

PROJECT : Plateau Mining Company - Ditch #63 Partial Flow Calculation (Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.75	.9975	.0363	.0047	1.1	3.27
11.77	1.0231	.0413	.0050	.6	3.58
11.78	1.0486	.0467	.0053	.3	3.88
11.80	1.0741	.0523	.0056	.2	4.18
11.82	1.0996	.0582	.0059	.0	4.48
11.83	1.1251	.0644	.0062	.0	4.76
11.85	1.1507	.0708	.0064	.0	5.04
11.86	1.1762	.0775	.0067	.0	5.31
11.88	1.2017	.0845	.0070	.0	5.58
11.90	1.2272	.0917	.0072	.0	5.85
11.91	1.2527	.0991	.0074	.0	6.10
11.93	1.2783	.1068	.0077	.0	6.35
11.94	1.3038	.1147	.0079	.0	6.60
11.96	1.3293	.1229	.0082	.0	6.84
11.98	1.3548	.1313	.0084	.0	7.08
11.99	1.3804	.1399	.0086	.0	7.31
12.01	1.3949	.1449	.0050	.0	7.48
12.02	1.3997	.1465	.0017	.0	7.33
12.04	1.4045	.1482	.0017	.0	6.69
12.06	1.4094	.1499	.0017	.0	5.69
12.07	1.4142	.1516	.0017	.0	4.61
12.09	1.4190	.1533	.0017	.0	3.66
12.10	1.4239	.1551	.0017	.0	2.94

HYDROGRAPH PEAK= 7.48 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .58 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #64 Flow Calculation

AREA= .3 ACRES
AVERAGE BASIN SLOPE= 11.8 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 410. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0354 HOURS QPCFS= 6.63 CFS QPIN=21.2128 INCHES
C3=104.5578 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2215	.0000	.0000	.0	.00
7.27	.2223	.0000	.0000	3.2	.00
7.28	.2231	.0000	.0000	6.6	.00
7.30	.2239	.0000	.0000	4.7	.00
7.32	.2248	.0000	.0000	2.1	.00
7.34	.2256	.0000	.0000	.8	.00
7.35	.2264	.0000	.0000	.2	.00
7.37	.2272	.0000	.0000	.0	.00
11.88	1.2024	.4594	.0201	.0	.35
11.90	1.2306	.4798	.0204	.0	.36
11.92	1.2589	.5003	.0206	.0	.36
11.93	1.2871	.5211	.0208	.0	.36
11.95	1.3153	.5421	.0210	.0	.37
11.97	1.3435	.5632	.0211	.0	.37
11.99	1.3717	.5845	.0213	.0	.37
12.00	1.3937	.6013	.0168	.0	.36
12.02	1.3991	.6053	.0041	.0	.29
12.04	1.4044	.6094	.0041	.0	.19
12.06	1.4098	.6135	.0041	.0	.12
12.08	1.4151	.6176	.0041	.0	.09
12.09	1.4205	.6217	.0041	.0	.08

HYDROGRAPH PEAK= .37 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .03 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #65 Flow Calculations

AREA= .2 ACRES
AVERAGE BASIN SLOPE= 11.1 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 310. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0291 HOURS QPCFS= 5.71 CFS QPIN=25.7310 INCHES
C3=126.8279 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2218	.0000	.0000	.0	.00
7.27	.2225	.0000	.0000	2.8	.00
7.29	.2232	.0000	.0000	5.7	.00
7.30	.2238	.0000	.0000	4.0	.00
7.31	.2245	.0000	.0000	1.8	.00
7.33	.2252	.0000	.0000	.7	.00
7.34	.2259	.0000	.0000	.2	.00
7.36	.2265	.0000	.0000	.0	.00
11.90	1.2388	.4857	.0168	.0	.25
11.92	1.2620	.5027	.0170	.0	.26
11.93	1.2853	.5198	.0171	.0	.26
11.95	1.3086	.5370	.0172	.0	.26
11.96	1.3318	.5544	.0174	.0	.26
11.98	1.3551	.5719	.0175	.0	.26
11.99	1.3783	.5895	.0176	.0	.27
12.01	1.3941	.6015	.0120	.0	.25
12.02	1.3985	.6049	.0034	.0	.20
12.03	1.4029	.6082	.0034	.0	.13
12.05	1.4073	.6116	.0034	.0	.08
12.06	1.4117	.6150	.0034	.0	.06
12.08	1.4161	.6184	.0034	.0	.05

HYDROGRAPH PEAK= .27 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .02 Acre-Feet

PROJECT : Plateau Mining Computers - Ditch # 66 Flow Calculations

AREA= .3 ACRES
AVERAGE BASIN SLOPE= 11.8 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 310. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0283 HOURS QPCFS= 7.22 CFS QPIN=26.5299 INCHES
C3=130.7659 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.24	.2210	.0000	.0000	.0	.00
7.27	.2223	.0000	.0000	7.2	.00
7.29	.2236	.0000	.0000	2.3	.00
7.32	.2249	.0000	.0000	.3	.00
7.35	.2262	.0000	.0000	.0	.00
11.82	1.0999	.3873	.0307	.0	.30
11.85	1.1450	.4187	.0313	.0	.31
11.87	1.1901	.4506	.0319	.0	.31
11.90	1.2353	.4831	.0325	.0	.32
11.93	1.2804	.5162	.0330	.0	.32
11.96	1.3255	.5497	.0335	.0	.33
11.99	1.3706	.5837	.0340	.0	.33
12.01	1.3967	.6036	.0199	.0	.23
12.04	1.4053	.6101	.0065	.0	.10
12.07	1.4138	.6166	.0066	.0	.07
12.10	1.4224	.6232	.0066	.0	.06
12.13	1.4309	.6298	.0066	.0	.06
12.16	1.4395	.6364	.0066	.0	.06

HYDROGRAPH PEAK= .33 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .03 Acre-Feet

PROJECT : Plateau Mining Company - Ditch # 67 Flow Calculations

AREA= .3 ACRES
AVERAGE BASIN SLOPE= 11.6 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 470. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0398 HOURS QPCFS= 5.89 CFS QPIN=18.8554 INCHES
CN= 92.9380 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2220	.0000	.0000	.0	.00
7.28	.2229	.0000	.0000	2.9	.00
7.30	.2238	.0000	.0000	5.9	.00
7.32	.2248	.0000	.0000	4.2	.00
7.34	.2257	.0000	.0000	1.9	.00
7.36	.2266	.0000	.0000	.7	.00
7.38	.2275	.0000	.0000	.2	.00
7.40	.2284	.0000	.0000	.0	.00
11.87	1.1916	.4517	.0225	.0	.35
11.89	1.2234	.4745	.0228	.0	.35
11.91	1.2551	.4976	.0231	.0	.36
11.93	1.2869	.5210	.0233	.0	.36
11.95	1.3186	.5445	.0236	.0	.37
11.97	1.3504	.5684	.0238	.0	.37
11.99	1.3821	.5924	.0240	.0	.37
12.01	1.3964	.6033	.0109	.0	.34
12.03	1.4024	.6079	.0046	.0	.24
12.05	1.4084	.6125	.0046	.0	.15
12.07	1.4144	.6171	.0046	.0	.10
12.09	1.4204	.6217	.0046	.0	.08
12.11	1.4265	.6263	.0046	.0	.08

HYDROGRAPH PEAK= .37 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .03 Acre-Feet

PROJECT : Plateau Mining Company - Ditch # 68 Flow Calculation

AREA= .3 ACRES
AVERAGE BASIN SLOPE= 11.9 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 480. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0399 HOURS QPCFS= 6.44 CFS QPIN=18.7787 INCHES
C3= 92.5600 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2215	.0000	.0000	.0	.00
7.27	.2224	.0000	.0000	3.2	.00
7.29	.2234	.0000	.0000	6.4	.00
7.31	.2243	.0000	.0000	4.5	.00
7.33	.2252	.0000	.0000	2.1	.00
7.35	.2261	.0000	.0000	.7	.00
7.37	.2270	.0000	.0000	.2	.00
7.39	.2280	.0000	.0000	.0	.00
11.86	1.1723	.4379	.0225	.0	.38
11.88	1.2042	.4607	.0228	.0	.38
11.90	1.2360	.4837	.0230	.0	.39
11.92	1.2679	.5070	.0233	.0	.39
11.94	1.2998	.5305	.0235	.0	.40
11.96	1.3316	.5543	.0238	.0	.40
11.98	1.3635	.5783	.0240	.0	.41
12.00	1.3929	.6006	.0223	.0	.41
12.02	1.3989	.6052	.0046	.0	.34
12.04	1.4050	.6098	.0046	.0	.22
12.06	1.4110	.6145	.0046	.0	.14
12.08	1.4170	.6191	.0046	.0	.10
12.10	1.4231	.6237	.0046	.0	.09

HYDROGRAPH PEAK= .41 cfs
TIME TO PEAK= 11.98 Hours
RUNOFF VOLUME= .03 Acre-Feet

PROJECT : Plateau Mining Company - Ditch # 69 Flow Calculation

AREA= .6 ACRES
AVERAGE BASIN SLOPE= 9.1 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 710. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0625 HOURS QPCFS= 6.66 CFS QPIN=12.0060 INCHES
CN= 59.1775 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2222	.0000	.0000	.0	.00
7.28	.2229	.0000	.0000	.6	.00
7.29	.2236	.0000	.0000	3.3	.00
7.31	.2243	.0000	.0000	5.8	.00
7.33	.2251	.0000	.0000	6.7	.00
7.34	.2258	.0000	.0000	6.0	.00
7.36	.2265	.0000	.0000	4.7	.00
7.37	.2272	.0000	.0000	3.3	.00
7.39	.2279	.0000	.0000	2.1	.00
7.40	.2287	.0000	.0000	1.3	.00
7.42	.2294	.0000	.0000	.8	.00
7.44	.2301	.0000	.0000	.4	.00
7.45	.2308	.0000	.0000	.2	.00
7.47	.2315	.0000	.0000	.1	.00
7.48	.2323	.0000	.0000	.0	.00
11.90	1.2368	.4842	.0180	.0	.61
11.92	1.2617	.5024	.0182	.0	.62
11.93	1.2866	.5208	.0184	.0	.63
11.95	1.3116	.5393	.0185	.0	.63
11.96	1.3365	.5579	.0186	.0	.64
11.98	1.3614	.5767	.0188	.0	.64
12.00	1.3864	.5956	.0189	.0	.65
12.01	1.3959	.6029	.0073	.0	.65
12.03	1.4006	.6065	.0036	.0	.61
12.04	1.4053	.6101	.0036	.0	.54
12.06	1.4101	.6137	.0036	.0	.44
12.07	1.4148	.6174	.0036	.0	.35
12.09	1.4195	.6210	.0036	.0	.27

HYDROGRAPH PEAK= .65 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .05 Acre-Feet

PROJECT : Plateau Mining Company - Ditch # 70 (Upper) Flow Calculation

AREA= 3.5 ACRES
AVERAGE BASIN SLOPE= 12.8 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1300. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0854 HOURS QPCFS= 30.98 CFS QPIN= 8.7768 INCHES
C3= 43.2607 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2222	.0000	.0000	.0	.00
7.28	.2230	.0000	.0000	1.6	.00
7.30	.2237	.0000	.0000	9.6	.00
7.31	.2245	.0000	.0000	20.6	.00
7.33	.2253	.0000	.0000	28.4	.00
7.35	.2261	.0000	.0000	31.0	.00
7.37	.2269	.0000	.0000	29.0	.00
7.38	.2277	.0000	.0000	24.5	.00
7.40	.2285	.0000	.0000	19.2	.00
7.42	.2293	.0000	.0000	14.1	.00
7.43	.2301	.0000	.0000	10.0	.00
7.45	.2308	.0000	.0000	6.8	.00
7.47	.2316	.0000	.0000	4.5	.00
7.49	.2324	.0000	.0000	2.9	.00
7.50	.2332	.0001	.0000	1.8	.00
7.52	.2338	.0001	.0000	1.1	.00
7.54	.2345	.0001	.0000	.7	.00
7.55	.2351	.0001	.0000	.4	.00
7.57	.2358	.0002	.0000	.2	.00
7.59	.2364	.0002	.0000	.1	.00
7.61	.2371	.0002	.0000	.0	.00
11.91	1.2513	.4948	.0198	.0	3.85
11.93	1.2786	.5148	.0200	.0	3.90
11.95	1.3059	.5350	.0202	.0	3.94
11.96	1.3331	.5554	.0204	.0	3.99
11.98	1.3604	.5759	.0205	.0	4.03
12.00	1.3877	.5966	.0207	.0	4.07
12.01	1.3966	.6034	.0068	.0	4.09
12.03	1.4018	.6074	.0039	.0	3.99
12.05	1.4069	.6113	.0040	.0	3.71
12.07	1.4121	.6153	.0040	.0	3.28
12.08	1.4173	.6193	.0040	.0	2.79
12.10	1.4224	.6232	.0040	.0	2.31
12.12	1.4276	.6272	.0040	.0	1.90

PROJECT : Plateau Mining Company - Ditch # 70 (Upper) Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS

HYDROGRAPH PEAK= 4.09 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .34 Acre-Feet

PROJECT : Plateau Mining Company - Ditch # 70 (Lower) Flow Calculation

AREA= 4.9 ACRES
AVERAGE BASIN SLOPE= 14.6 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1550. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0921 HOURS QPCFS= 40.24 CFS QPIN= 8.1432 INCHES
C3= 40.1378 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2219	.0000	.0000	.0	.00
7.28	.2227	.0000	.0000	2.0	.00
7.29	.2236	.0000	.0000	12.5	.00
7.31	.2244	.0000	.0000	26.7	.00
7.33	.2253	.0000	.0000	36.9	.00
7.35	.2261	.0000	.0000	40.2	.00
7.37	.2270	.0000	.0000	37.7	.00
7.39	.2278	.0000	.0000	31.8	.00
7.40	.2287	.0000	.0000	24.9	.00
7.42	.2295	.0000	.0000	18.4	.00
7.44	.2304	.0000	.0000	12.9	.00
7.46	.2312	.0000	.0000	8.8	.00
7.48	.2321	.0000	.0000	5.8	.00
7.50	.2330	.0001	.0000	3.7	.00
7.52	.2337	.0001	.0000	2.3	.00
7.53	.2344	.0001	.0000	1.4	.00
7.55	.2351	.0001	.0000	.9	.00
7.57	.2358	.0002	.0000	.5	.00
7.59	.2365	.0002	.0000	.3	.00
7.61	.2372	.0002	.0000	.2	.00
7.63	.2379	.0002	.0000	.1	.00
7.64	.2385	.0002	.0000	.0	.00
11.90	1.2311	.4801	.0212	.0	5.30
11.92	1.2605	.5016	.0214	.0	5.38
11.94	1.2899	.5232	.0216	.0	5.45
11.95	1.3193	.5451	.0219	.0	5.52
11.97	1.3487	.5671	.0221	.0	5.59
11.99	1.3781	.5894	.0222	.0	5.65
12.01	1.3952	.6024	.0130	.0	5.70
12.03	1.4008	.6066	.0043	.0	5.62
12.05	1.4063	.6109	.0043	.0	5.31
12.06	1.4119	.6151	.0043	.0	4.78
12.08	1.4175	.6194	.0043	.0	4.12
12.10	1.4230	.6237	.0043	.0	3.44

PROJECT : Plateau Mining Company - Ditch # 70 (Lower) Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.12	1.4286	.6280	.0043	.0	2.83

HYDROGRAPH PEAK= 5.70 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .48 Acre-Feet

PROJECT : Plateau Mining Company - Culvert 70C 10 YR. 24 HR
(Also design flow for Ditch 70c)

AREA= 5.3 ACRES
AVERAGE BASIN SLOPE= 13.9 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1700. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1016 HOURS QPCFS= 39.44 CFS QPIN= 7.3796 INCHES
C3= 36.3740 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2218	.0000	.0000	.0	.00
7.28	.2228	.0000	.0000	2.0	.00
7.30	.2237	.0000	.0000	12.3	.00
7.32	.2247	.0000	.0000	26.2	.00
7.34	.2256	.0000	.0000	36.2	.00
7.36	.2265	.0000	.0000	39.4	.00
7.38	.2275	.0000	.0000	36.9	.00
7.40	.2284	.0000	.0000	31.2	.00
7.42	.2294	.0000	.0000	24.4	.00
7.44	.2303	.0000	.0000	18.0	.00
7.46	.2312	.0000	.0000	12.7	.00
7.48	.2322	.0000	.0000	8.6	.00
7.50	.2331	.0001	.0000	5.7	.00
7.52	.2339	.0001	.0000	3.6	.00
7.54	.2346	.0001	.0000	2.3	.00
7.56	.2354	.0002	.0000	1.4	.00
7.58	.2362	.0002	.0000	.9	.00
7.60	.2369	.0002	.0000	.5	.00
7.62	.2377	.0002	.0000	.3	.00
7.64	.2385	.0002	.0000	.2	.00
7.66	.2393	.0003	.0000	.1	.00
7.68	.2400	.0003	.0000	.0	.00
1 .89	1.2176	.4703	.0233	.0	5.64
1 .91	1.2500	.4939	.0236	.0	5.73
1 .93	1.2824	.5177	.0238	.0	5.83
1 .95	1.3149	.5417	.0241	.0	5.91
1 .97	1.3473	.5661	.0243	.0	6.00
1 .99	1.3798	.5906	.0245	.0	6.08
12.01	1.3961	.6030	.0124	.0	6.13
12.03	1.4022	.6077	.0047	.0	6.03
12.05	1.4084	.6124	.0047	.0	5.68
12.07	1.4145	.6172	.0047	.0	5.09
12.09	1.4207	.6219	.0047	.0	4.37
12.11	1.4268	.6266	.0047	.0	3.64

PROJECT : Plateau Mining Company - Culvert 70C 10 YR. 24 HR
(Continued) (Also design flow for Ditch 70C)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.13	1.4329	.6313	.0047	.0	3.00

HYDROGRAPH PEAK= 6.13 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .52 Acre-Feet

PROJECT : Plateau Mining Company - Ditch # 71BFlow Characteristics

AREA= .7 ACRES
AVERAGE BASIN SLOPE= 17.7 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 400. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0283 HOURS QPCFS= 18.70 CFS QPIN=26.4986 INCHES
C3=130.6115 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2218	.0000	.0000	.0	.00
7.27	.2225	.0000	.0000	9.2	.00
7.28	.2232	.0000	.0000	18.7	.00
7.30	.2238	.0000	.0000	13.1	.00
7.31	.2245	.0000	.0000	5.9	.00
7.33	.2251	.0000	.0000	2.1	.00
7.34	.2258	.0000	.0000	.7	.00
7.36	.2264	.0000	.0000	.2	.00
7.37	.2271	.0000	.0000	.0	.00
11.31	1.2549	.4974	.0165	.0	.81
11.33	1.2776	.5141	.0166	.0	.82
11.34	1.3002	.5309	.0168	.0	.83
11.36	1.3229	.5477	.0169	.0	.83
11.37	1.3456	.5647	.0170	.0	.84
11.38	1.3682	.5819	.0171	.0	.85
12.00	1.3909	.5991	.0172	.0	.85
12.01	1.3963	.6032	.0042	.0	.74
12.03	1.4006	.6065	.0033	.0	.49
12.04	1.4049	.6098	.0033	.0	.30
12.06	1.4092	.6131	.0033	.0	.21
12.07	1.4135	.6164	.0033	.0	.18
12.08	1.4178	.6197	.0033	.0	.17

HYDROGRAPH PEAK= .85 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .07 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #72A (North Interceptor Ditch)

AREA= 4.7 ACRES
AVERAGE BASIN SLOPE= 21.0 PERCENT
CURVE NUMBER= 84.0
DESIGN STORM= 2.60 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1300. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0834 HOURS QPCFS= 42.61 CFS QPIN= 8.9912 INCHES
C3= 44.3178 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
8.98	.3803	.0000	.0000	.0	.00
8.99	.3816	.0000	.0000	2.1	.00
9.01	.3829	.0000	.0000	13.2	.00
9.03	.3843	.0000	.0000	28.3	.00
9.04	.3857	.0000	.0000	39.1	.00
9.06	.3871	.0000	.0000	42.6	.00
9.08	.3885	.0000	.0000	39.9	.00
9.09	.3898	.0000	.0000	33.7	.00
9.11	.3912	.0000	.0000	26.4	.00
9.13	.3926	.0000	.0000	19.4	.00
9.14	.3940	.0000	.0000	13.7	.00
9.16	.3954	.0001	.0000	9.3	.00
9.18	.3968	.0001	.0000	6.1	.00
9.19	.3982	.0002	.0000	3.9	.00
9.21	.3996	.0002	.0000	2.5	.00
9.23	.4009	.0002	.0000	1.5	.00
9.24	.4023	.0002	.0000	.9	.00
9.26	.4037	.0003	.0000	.6	.00
9.28	.4051	.0003	.0000	.3	.00
9.29	.4065	.0003	.0000	.2	.00
9.31	.4079	.0004	.0000	.1	.00
9.33	.4093	.0004	.0000	.0	.00
1 .91	1.5484	.4436	.0202	.0	5.25
1 .93	1.5813	.4640	.0204	.0	5.34
1 .94	1.6143	.4847	.0207	.0	5.43
1 .96	1.6472	.5057	.0209	.0	5.52
1 .98	1.6802	.5269	.0212	.0	5.60
1 .99	1.7132	.5483	.0214	.0	5.69
12.01	1.7280	.5580	.0097	.0	5.74
12.03	1.7343	.5621	.0041	.0	5.64
12.04	1.7405	.5663	.0041	.0	5.30
12.06	1.7468	.5704	.0041	.0	4.74
12.08	1.7530	.5745	.0041	.0	4.06
12.09	1.7593	.5786	.0041	.0	3.39

PROJECT : Plateau Mining Company - Ditch #72A (North Interceptor Ditch)
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
2.11	1.7655	.5828	.0041	.0	2.79

HYDROGRAPH PEAK= 5.74 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .47 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #72D Partial Flow Calculation

AREA= 3.0 ACRES
AVERAGE BASIN SLOPE= 31.0 PERCENT
CURVE NUMBER= 76.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 840. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0622 HOURS QPCFS= 36.46 CFS QPIN=12.0528 INCHES
C3= 59.4082 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.51	.6174	.0000	.0000	.0	.00
11.53	.6422	.0000	.0000	3.5	.00
11.55	.6670	.0004	.0004	17.9	.00
11.56	.6919	.0011	.0007	31.7	.01
11.58	.7167	.0022	.0011	36.5	.03
11.59	.7416	.0037	.0015	33.0	.06
11.61	.7664	.0055	.0018	25.7	.11
11.62	.7912	.0077	.0022	18.0	.16
11.64	.8161	.0102	.0025	11.7	.22
11.65	.8409	.0130	.0028	7.2	.28
11.67	.8657	.0162	.0032	4.2	.35
11.69	.8906	.0196	.0035	2.4	.41
11.70	.9154	.0234	.0038	1.3	.48
11.72	.9402	.0275	.0041	.7	.54
11.73	.9651	.0319	.0044	.4	.60
11.75	.9899	.0365	.0047	.2	.67
11.76	1.0147	.0415	.0049	.0	.73
11.92	1.2631	.1052	.0075	.0	1.26
11.93	1.2879	.1129	.0077	.0	1.31
11.95	1.3127	.1209	.0079	.0	1.36
11.97	1.3376	.1290	.0081	.0	1.40
11.98	1.3624	.1373	.0084	.0	1.45
12.00	1.3872	.1459	.0086	.0	1.49
12.01	1.3960	.1490	.0031	.0	1.51
12.03	1.4008	.1507	.0017	.0	1.45
12.04	1.4055	.1523	.0017	.0	1.28
12.06	1.4102	.1540	.0017	.0	1.06
12.07	1.4149	.1557	.0017	.0	.84
12.09	1.4196	.1574	.0017	.0	.67
12.11	1.4243	.1591	.0017	.0	.54

HYDROGRAPH PEAK= 1.51 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .12 Acre-Feet

PROJECT : Plateau Mining Company - Ditch # 73 Flow Calculation

AREA= 4.9 ACRES
AVERAGE BASIN SLOPE= 21.1 PERCENT
CURVE NUMBER= 70.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1300. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1265 HOURS QPCFS= 29.29 CFS QPIN= 5.9273 INCHES
C3= 29.2156 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.64	.8188	.0000	.0000	.0	.00
11.67	.8592	.0000	.0000	1.5	.00
11.69	.8995	.0004	.0004	9.1	.00
11.72	.9399	.0016	.0012	19.4	.00
11.74	.9803	.0034	.0019	26.9	.02
11.77	1.0207	.0060	.0026	29.3	.05
11.79	1.0611	.0093	.0033	27.4	.11
11.82	1.1015	.0132	.0039	23.2	.18
11.84	1.1419	.0177	.0046	18.1	.27
11.87	1.1823	.0229	.0052	13.4	.37
11.89	1.2227	.0287	.0058	9.4	.49
11.92	1.2630	.0351	.0064	6.4	.60
11.94	1.3034	.0421	.0070	4.2	.72
11.97	1.3438	.0496	.0075	2.7	.84
11.99	1.3842	.0577	.0081	1.7	.96
12.02	1.3984	.0607	.0030	1.0	1.07
12.05	1.4061	.0623	.0016	.6	1.13
12.07	1.4137	.0640	.0016	.4	1.12
12.10	1.4214	.0656	.0017	.2	1.04
12.12	1.4290	.0673	.0017	.1	.92
12.15	1.4367	.0690	.0017	.0	.79
12.17	1.4443	.0708	.0017	.0	.67
12.20	1.4520	.0725	.0017	.0	.57

HYDROGRAPH PEAK= 1.13 cfs
TIME TO PEAK= 12.05 Hours
RUNOFF VOLUME= .11 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #74A Flow Calculation

AREA= .3 ACRES
AVERAGE BASIN SLOPE= 11.9 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 332. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0342 HOURS QPCFS= 6.63 CFS QPIN=21.9307 INCHES
C3=108.0964 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2218	.0000	.0000	.0	.00
7.27	.2225	.0000	.0000	2.5	.00
7.29	.2232	.0000	.0000	6.4	.00
7.30	.2239	.0000	.0000	5.8	.00
7.32	.2246	.0000	.0000	3.3	.00
7.33	.2252	.0000	.0000	1.5	.00
7.34	.2259	.0000	.0000	.6	.00
7.36	.2266	.0000	.0000	.2	.00
7.37	.2273	.0000	.0000	.0	.00
11.91	1.2473	.4919	.0172	.0	.35
11.92	1.2710	.5093	.0174	.0	.35
11.94	1.2948	.5268	.0175	.0	.35
11.95	1.3185	.5445	.0177	.0	.35
11.97	1.3422	.5622	.0178	.0	.36
11.98	1.3660	.5801	.0179	.0	.36
12.00	1.3897	.5982	.0180	.0	.36
12.01	1.3963	.6032	.0050	.0	.33
12.03	1.4008	.6067	.0034	.0	.25
12.04	1.4053	.6101	.0034	.0	.16
12.06	1.4098	.6135	.0034	.0	.11
12.07	1.4143	.6170	.0034	.0	.09
12.09	1.4188	.6204	.0035	.0	.08

HYDROGRAPH PEAK= .36 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .03 Acre-Feet

PROJECT : Plateau Mining Company - Ditch 74B Flow Calculation

AREA= 2.4 ACRES
AVERAGE BASIN SLOPE= 11.0 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 850. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0673 HOURS QPCFS= 27.21 CFS QPIN=11.1515 INCHES
C3= 54.9657 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2215	.0000	.0000	.0	.00
7.27	.2223	.0000	.0000	2.4	.00
7.28	.2230	.0000	.0000	12.7	.00
7.30	.2238	.0000	.0000	23.1	.00
7.31	.2245	.0000	.0000	27.2	.00
7.33	.2253	.0000	.0000	25.2	.00
7.35	.2260	.0000	.0000	20.1	.00
7.36	.2268	.0000	.0000	14.4	.00
7.38	.2276	.0000	.0000	9.6	.00
7.40	.2283	.0000	.0000	6.0	.00
7.41	.2291	.0000	.0000	3.6	.00
7.43	.2298	.0000	.0000	2.1	.00
7.45	.2306	.0000	.0000	1.2	.00
7.46	.2313	.0000	.0000	.6	.00
7.48	.2321	.0000	.0000	.3	.00
7.49	.2329	.0001	.0000	.2	.00
7.51	.2335	.0001	.0000	.0	.00
1.91	1.2430	.4888	.0190	.0	2.70
1.92	1.2692	.5079	.0192	.0	2.73
1.94	1.2954	.5272	.0193	.0	2.76
1.96	1.3215	.5467	.0195	.0	2.79
1.97	1.3477	.5664	.0196	.0	2.81
1.99	1.3739	.5861	.0198	.0	2.84
2.00	1.3938	.6013	.0151	.0	2.85
2.02	1.3987	.6051	.0038	.0	2.79
2.04	1.4037	.6089	.0038	.0	2.56
2.05	1.4086	.6127	.0038	.0	2.18
2.07	1.4136	.6165	.0038	.0	1.76
2.09	1.4186	.6203	.0038	.0	1.39
2.10	1.4235	.6241	.0038	.0	1.10

HYDROGRAPH PEAK= 2.85 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .24 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #75B Flow Calculations

AREA= .8 ACRES
AVERAGE BASIN SLOPE= 8.6 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 440. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0438 HOURS QPCFS= 13.81 CFS QPIN=17.1148 INCHES
C3= 84.3587 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2220	.0000	.0000	.0	.00
7.27	.2227	.0000	.0000	2.8	.00
7.29	.2233	.0000	.0000	10.6	.00
7.30	.2240	.0000	.0000	13.8	.00
7.32	.2247	.0000	.0000	11.7	.00
7.33	.2254	.0000	.0000	7.8	.00
7.35	.2260	.0000	.0000	4.4	.00
7.36	.2267	.0000	.0000	2.3	.00
7.38	.2274	.0000	.0000	1.1	.00
7.39	.2281	.0000	.0000	.5	.00
7.41	.2287	.0000	.0000	.2	.00
7.42	.2294	.0000	.0000	.0	.00
1 .90	1.2404	.4868	.0169	.0	.91
1 .92	1.2637	.5039	.0170	.0	.92
1 .93	1.2870	.5210	.0172	.0	.93
1 .95	1.3103	.5383	.0173	.0	.93
1 .96	1.3336	.5558	.0174	.0	.94
1 .98	1.3569	.5733	.0175	.0	.95
1 .99	1.3802	.5910	.0177	.0	.96
12.01	1.3944	.6018	.0108	.0	.94
12.02	1.3988	.6052	.0034	.0	.86
12.04	1.4033	.6085	.0034	.0	.69
12.05	1.4077	.6119	.0034	.0	.51
12.07	1.4121	.6153	.0034	.0	.37
12.08	1.4165	.6187	.0034	.0	.28

HYDROGRAPH PEAK= .96 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .08 Acre-Feet

PROJECT : Plateau Mining Company - Ditch # 76 Flow Calculations

AREA= 1.0 ACRES
AVERAGE BASIN SLOPE= 31.7 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 440. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0378 HOURS QPCFS= 20.03 CFS QPIN=19.8625 INCHES
C3= 97.9022 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.54	.6512	.0000	.0000	.0	.00
11.55	.6813	.0000	.0000	9.8	.00
11.57	.7114	.0006	.0005	20.0	.00
11.59	.7416	.0016	.0011	14.1	.02
11.61	.7717	.0032	.0016	6.4	.04
11.63	.8018	.0053	.0021	2.3	.07
11.65	.8320	.0078	.0025	.7	.10
11.67	.8621	.0108	.0030	.2	.12
11.69	.8922	.0143	.0035	.0	.15
11.88	1.1935	.0719	.0075	.0	.37
11.89	1.2237	.0798	.0078	.0	.39
11.91	1.2538	.0879	.0082	.0	.41
11.93	1.2839	.0964	.0085	.0	.43
11.95	1.3141	.1053	.0088	.0	.45
11.97	1.3442	.1145	.0092	.0	.47
11.99	1.3743	.1239	.0095	.0	.48
12.01	1.3946	.1305	.0065	.0	.47
12.03	1.4003	.1323	.0019	.0	.37
12.05	1.4060	.1342	.0019	.0	.24
12.06	1.4117	.1361	.0019	.0	.16
12.08	1.4174	.1380	.0019	.0	.12
12.10	1.4232	.1399	.0019	.0	.11

HYDROGRAPH PEAK= .48 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .04 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #77 Flow Calculations

AREA= 1.0 ACRES
AVERAGE BASIN SLOPE= 6.9 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 790. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0781 HOURS QPCFS= 9.68 CFS QPIN= 9.5986 INCHES
C3= 47.3114 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2216	.0000	.0000	.0	.00
7.27	.2223	.0000	.0000	.5	.00
7.28	.2230	.0000	.0000	3.0	.00
7.30	.2238	.0000	.0000	6.4	.00
7.31	.2245	.0000	.0000	8.9	.00
7.33	.2252	.0000	.0000	9.7	.00
7.34	.2259	.0000	.0000	9.1	.00
7.36	.2266	.0000	.0000	7.7	.00
7.38	.2274	.0000	.0000	6.0	.00
7.39	.2281	.0000	.0000	4.4	.00
7.41	.2288	.0000	.0000	3.1	.00
7.42	.2295	.0000	.0000	2.1	.00
7.44	.2303	.0000	.0000	1.4	.00
7.45	.2310	.0000	.0000	.9	.00
7.47	.2317	.0000	.0000	.6	.00
7.49	.2324	.0000	.0000	.3	.00
7.50	.2331	.0001	.0000	.2	.00
7.52	.2337	.0001	.0000	.1	.00
7.53	.2343	.0001	.0000	.0	.00
11.91	1.2449	.4902	.0181	.0	1.10
11.92	1.2699	.5084	.0183	.0	1.12
11.94	1.2948	.5268	.0184	.0	1.13
11.95	1.3197	.5454	.0186	.0	1.14
11.97	1.3447	.5641	.0187	.0	1.15
11.99	1.3696	.5829	.0188	.0	1.16
12.00	1.3927	.6005	.0176	.0	1.17
12.02	1.3975	.6041	.0036	.0	1.17
12.03	1.4022	.6077	.0036	.0	1.13
12.05	1.4069	.6113	.0036	.0	1.03
12.06	1.4116	.6149	.0036	.0	.90
12.08	1.4164	.6186	.0036	.0	.76
12.10	1.4211	.6222	.0036	.0	.63

HYDROGRAPH PEAK= 1.17 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .10 Acre-Feet

PROJECT : Plateau Mining Company - Ditch #78 Flow Calculations

AREA= .4 ACRES
AVERAGE BASIN SLOPE= 11.5 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 390. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0344 HOURS QPCFS= 8.79 CFS QPIN=21.7962 INCHES
CN=107.4336 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.26	.2220	.0000	.0000	.0	.00
7.28	.2228	.0000	.0000	4.3	.00
7.29	.2236	.0000	.0000	8.8	.00
7.31	.2244	.0000	.0000	6.2	.00
7.33	.2252	.0000	.0000	2.8	.00
7.35	.2260	.0000	.0000	1.0	.00
7.36	.2268	.0000	.0000	.3	.00
7.38	.2276	.0000	.0000	.0	.00
11.89	1.2148	.4683	.0197	.0	.46
11.91	1.2422	.4882	.0199	.0	.46
11.92	1.2697	.5083	.0201	.0	.47
11.94	1.2971	.5286	.0203	.0	.47
11.96	1.3246	.5490	.0205	.0	.47
11.97	1.3521	.5696	.0206	.0	.48
11.99	1.3795	.5904	.0208	.0	.48
12.01	1.3951	.6023	.0119	.0	.45
12.03	1.4003	.6063	.0040	.0	.34
12.04	1.4055	.6102	.0040	.0	.21
12.06	1.4107	.6142	.0040	.0	.14
12.08	1.4159	.6182	.0040	.0	.11
12.10	1.4211	.6222	.0040	.0	.10

HYDROGRAPH PEAK= .48 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .04 Acre-Feet

SELECTED CULVERT FLOW DESIGN DATA

Culvert Number	Downspout Number	Disturbed Area ac.	Undisturbed Area ac.	Total Area mi²	Weighted CN	Design Storm in.	S in.	Time of Excess Rainfall (T_e) in.	Runoff (Q) in.	Hydrograph Family No.	Hydraulic Length (H_l) ft.	Average Watershed Slope (Y) percent	Watershed Lag (L) hr.	T_p hr.	Computed T_e/T_p	Used T_e/T_p	Revised T_p hr.	484 AQ (T_p) rev.	Peak Flow (q) cfs
1A*	-	0.0	11.1	0.0173	75	2.1	3.33	12.4	0.431	4	1,340	80.0	0.05	0.06	206	50	0.25	14.4	0.07
1A*	-	0.0	8.5	0.0133	75	2.1	3.33	12.4	0.431	4	1,200	80.0	0.05	0.05	248	50	0.25	11.1	0.52
2A*	-	0.0	0.81	0.0133	75	2.1	3.33	12.4	0.431	4	480	91.0	0.02	0.02	620	50	0.25	1.1	0.05
2A*	-	0.0	9.42	0.0147	75	2.1	3.33	12.4	0.431	4	1,350	85.0	0.05	0.06	206	50	0.25	12.3	0.57
5A	4	1.0	14.1	0.0236	76	2.6	3.16	12.9	0.756	4	1,840	69.2	0.07	0.08	161	50	0.26	33.2	1.5
5B	5	2.4	40.0	0.0663	76	2.6	3.16	12.9	0.756	4	3,250	69.0	0.11	0.12	108	50	0.26	93.3	4.3
55A	2	3.1	0.7	0.0059	87	2.6	1.49	16.7	1.395	3	400	14.0	0.03	0.05	309	75	0.22	18.0	1.1
56A	1	1.8	0.0	0.0028	90	2.6	1.11	17.5	1.621	2	470	2.0	0.09	0.10	182	75	0.23	9.5	0.0

* Flows shown are partial flows for the culverts identified, other flow contributes to the total flow as identified in the Culvert Peak Flow Design Data Table.

HANSEN ALLEN & LUCE INC

CLIENT PLATTEN
PROJECT
FEATURE CULVERT 2C
PROJECT NO. 2-12-1

SHEET 1 OF
COMPUTED DEH
CHECKED
DATE 30 July 87

CULVERT 2C

From previous calculations (for Box #3) made in December 1983, the following was extracted.

Area - dist. = 0 ac
undist. = 22.25 ac = 0.0348 mi²

CN = 75
P = 2.1
S = 3.33
Time of Excess Rainfall = 12.4 hr
Q = 0.431 in
Hyd. Family = 4
Hyd. Length = 1520 ft
Slope = 76%
Watershed Lag = 0.06 hr
Tp = 0.07
To/Tp = 177 (computed) Used To/Tp = 50
Revised Tp = 0.25 hr

484 Q/Tp revised = 29.0

Qpeak = 1.35 cfs

PROJECT : Plateau Mining Company - Culvert #4A Flow Calculation

AREA= 24.3 ACRES
AVERAGE BASIN SLOPE= 76.5 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1710. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0720 HOURS QPCFS= 255.23 CFS QPIN=10.4160 INCHES
CP= 51.3404 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.53	.6498	.0000	.0000	.0	.00
11.55	.6728	.0000	.0000	12.8	.00
11.56	.6958	.0003	.0002	79.3	.00
11.58	.7188	.0008	.0005	169.4	.03
11.59	.7417	.0017	.0009	234.3	.10
11.61	.7647	.0028	.0011	255.2	.23
11.62	.7877	.0042	.0014	239.1	.45
11.64	.8107	.0060	.0017	201.8	.73
11.65	.8337	.0080	.0020	157.8	1.07
11.66	.8567	.0102	.0023	116.5	1.46
11.68	.8796	.0128	.0025	82.1	1.89
11.69	.9026	.0156	.0028	55.7	2.33
11.71	.9256	.0187	.0031	36.7	2.78
11.72	.9486	.0220	.0033	23.6	3.24
11.74	.9716	.0256	.0036	14.8	3.69
11.75	.9946	.0294	.0038	9.1	4.14
11.77	1.0175	.0334	.0041	5.5	4.59
11.78	1.0405	.0377	.0043	3.3	5.03
11.79	1.0635	.0422	.0045	1.9	5.46
11.81	1.0865	.0470	.0047	1.1	5.89
11.82	1.1095	.0519	.0050	.7	6.31
11.84	1.1325	.0571	.0052	.4	6.72
11.85	1.1554	.0625	.0054	.2	7.12
11.87	1.1784	.0681	.0056	.1	7.52
11.88	1.2014	.0739	.0058	.0	7.90
11.89	1.2244	.0799	.0060	.0	8.29
11.91	1.2474	.0862	.0062	.0	8.66
11.92	1.2704	.0926	.0064	.0	9.03
11.94	1.2933	.0992	.0066	.0	9.39
11.95	1.3163	.1060	.0068	.0	9.74
11.97	1.3393	.1129	.0070	.0	10.09
11.98	1.3623	.1201	.0072	.0	10.43
12.00	1.3853	.1274	.0073	.0	10.77
12.01	1.3953	.1307	.0033	.0	11.04
12.02	1.3997	.1321	.0014	.0	11.00

PROJECT : Plateau Mining Company - Culvert #4A Flow Calculation (Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.04	1.4040	.1336	.0014	.0	10.44
12.05	1.4084	.1350	.0014	.0	9.40
12.07	1.4127	.1364	.0014	.0	8.11
12.08	1.4171	.1379	.0015	.0	6.80
12.10	1.4215	.1394	.0015	.0	5.64

HYDROGRAPH PEAK= 11.04 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .87 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #10A Flow Calculations

AREA= .9 ACRES
AVERAGE BASIN SLOPE= 34.4 PERCENT
CURVE NUMBER= 77.3
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 350. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TI= .0282 HOURS QPCFS= 24.12 CFS QPIN=26.5755 INCHES
CI=130.9904 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.46	.5859	.0000	.0000	.0	.00
11.49	.5915	.0000	.0000	24.1	.00
11.51	.6163	.0003	.0003	7.8	.00
11.54	.6614	.0018	.0015	.9	.04
11.57	.7064	.0046	.0028	.0	.08
11.82	1.1118	.0795	.0122	.0	.39
11.85	1.1568	.0925	.0130	.0	.42
11.88	1.2018	.1063	.0138	.0	.45
11.91	1.2469	.1210	.0146	.0	.47
11.94	1.2919	.1363	.0154	.0	.50
11.97	1.3370	.1524	.0161	.0	.52
11.99	1.3820	.1692	.0168	.0	.54
12.02	1.3989	.1757	.0065	.0	.30
12.05	1.4074	.1790	.0033	.0	.15
12.08	1.4159	.1824	.0033	.0	.11
12.11	1.4245	.1857	.0034	.0	.11
12.13	1.4330	.1891	.0034	.0	.11
12.16	1.4416	.1925	.0034	.0	.11

HYDROGRAPH PEAK= .54 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .04 Acre-Feet

PROJECT : Plateau Mining Company - Culvert 10B Flow Calculations

AREA= 1.4 ACRES
AVERAGE BASIN SLOPE= 36.9 PERCENT
CURVE NUMBER= 77.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 500. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0366 HOURS QPCFS= 28.95 CFS QPIN=20.5081 INCHES
C3=101.0845 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.50	.5962	.0000	.0000	.0	.00
11.52	.6254	.0003	.0003	14.2	.00
11.54	.6546	.0011	.0008	29.0	.02
11.56	.6837	.0024	.0014	20.4	.05
11.57	.7129	.0043	.0019	9.3	.08
11.59	.7421	.0067	.0024	3.3	.12
11.61	.7713	.0096	.0029	1.0	.16
11.63	.8005	.0129	.0034	.3	.20
11.65	.8297	.0168	.0038	.0	.24
11.89	1.2090	.1040	.0089	.0	.65
11.90	1.2382	.1132	.0092	.0	.68
11.92	1.2674	.1227	.0096	.0	.70
11.94	1.2966	.1326	.0099	.0	.73
11.96	1.3258	.1428	.0102	.0	.75
11.98	1.3549	.1533	.0105	.0	.78
11.99	1.3841	.1640	.0108	.0	.80
12.01	1.3963	.1686	.0046	.0	.73
12.03	1.4018	.1707	.0021	.0	.53
12.05	1.4073	.1728	.0021	.0	.33
12.07	1.4129	.1749	.0021	.0	.23
12.09	1.4184	.1770	.0021	.0	.18
12.10	1.4239	.1791	.0021	.0	.17

HYDROGRAPH PEAK= .80 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .06 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #72B Adjacent Watershed Flow

AREA= 3.0 ACRES
AVERAGE BASIN SLOPE= 31.0 PERCENT
CURVE NUMBER= 76.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 840. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0622 HOURS QPCFS= 36.46 CFS QPIN=12.0528 INCHES
C3= 59.4082 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.51	.6174	.0000	.0000	.0	.00
11.53	.6422	.0000	.0000	3.5	.00
11.55	.6670	.0004	.0004	17.9	.00
11.56	.6919	.0011	.0007	31.7	.01
11.58	.7167	.0022	.0011	36.5	.03
11.59	.7416	.0037	.0015	33.0	.06
11.61	.7664	.0055	.0018	25.7	.11
11.62	.7912	.0077	.0022	18.0	.16
11.64	.8161	.0102	.0025	11.7	.22
11.65	.8409	.0130	.0028	7.2	.28
11.67	.8657	.0162	.0032	4.2	.35
11.69	.8906	.0196	.0035	2.4	.41
11.70	.9154	.0234	.0038	1.3	.48
11.72	.9402	.0275	.0041	.7	.54
11.73	.9651	.0319	.0044	.4	.60
11.75	.9899	.0365	.0047	.2	.67
11.76	1.0147	.0415	.0049	.0	.73
11.92	1.2631	.1052	.0075	.0	1.26
11.93	1.2879	.1129	.0077	.0	1.31
11.95	1.3127	.1209	.0079	.0	1.36
11.97	1.3376	.1290	.0081	.0	1.40
11.98	1.3624	.1373	.0084	.0	1.45
12.00	1.3872	.1459	.0086	.0	1.49
12.01	1.3960	.1490	.0031	.0	1.51
12.03	1.4008	.1507	.0017	.0	1.45
12.04	1.4055	.1523	.0017	.0	1.28
12.06	1.4102	.1540	.0017	.0	1.06
12.07	1.4149	.1557	.0017	.0	.84
12.09	1.4196	.1574	.0017	.0	.67
12.11	1.4243	.1591	.0017	.0	.54

HYDROGRAPH PEAK= 1.51 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .12 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #16G Partial Flow Calculation

AREA= 1.0 ACRES
AVERAGE BASIN SLOPE= 25.3 PERCENT
CURVE NUMBER= 82.5
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 375. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0340 HOURS QPCFS= 22.25 CFS QPIN=22.0623 INCHES
C3=108.7450 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.45	.4235	.0000	.0000	.0	.00
10.46	.4249	.0000	.0000	8.3	.00
10.48	.4264	.0000	.0000	21.5	.00
10.49	.4278	.0000	.0000	19.3	.00
10.51	.4296	.0000	.0000	11.2	.00
10.52	.4315	.0000	.0000	5.1	.00
10.54	.4335	.0000	.0000	2.0	.00
10.55	.4355	.0000	.0000	.7	.00
10.57	.4375	.0000	.0000	.2	.00
10.58	.4395	.0001	.0000	.0	.00
11.91	1.2530	.2328	.0113	.0	.75
11.93	1.2766	.2443	.0115	.0	.76
11.94	1.3002	.2560	.0117	.0	.77
11.96	1.3238	.2679	.0119	.0	.79
11.97	1.3473	.2799	.0120	.0	.80
11.99	1.3709	.2921	.0122	.0	.81
12.00	1.3927	.3036	.0114	.0	.82
12.02	1.3972	.3059	.0024	.0	.73
12.03	1.4017	.3083	.0024	.0	.53
12.05	1.4061	.3107	.0024	.0	.34
12.06	1.4106	.3131	.0024	.0	.24
12.08	1.4151	.3155	.0024	.0	.19
12.09	1.4195	.3179	.0024	.0	.17

HYDROGRAPH PEAK= .82 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .06 Acre-Feet

CULVERT NO. UT16A
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .7 ACRES
AVERAGE BASIN SLOPE= .8 PERCENT
INCREMENT OF RAINFALL EXCESS= .0286 HOURS
CURVE NUMBER= 90.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 420. FEET

TP= .1430 HOURS QPCFS= 3.91 CFS QPIN= 5.2458 INCHES C3= 25.6
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.49	.2217	.0000	.0000	.0	.00
7.52	.2228	.0000	.0000	.2	.00
7.55	.2238	.0000	.0000	1.2	.00
7.58	.2248	.0000	.0000	2.6	.00
7.61	.2259	.0000	.0000	3.6	.00
7.64	.2269	.0000	.0000	3.9	.00
7.66	.2279	.0000	.0000	3.7	.00
7.69	.2290	.0000	.0000	3.1	.00
7.72	.2300	.0001	.0000	2.4	.00
7.75	.2310	.0001	.0000	1.8	.00
7.78	.2320	.0001	.0000	1.3	.00
7.81	.2331	.0001	.0000	.9	.00
7.84	.2341	.0001	.0000	.6	.00
7.86	.2351	.0001	.0000	.4	.00
7.89	.2362	.0002	.0000	.2	.00
7.92	.2372	.0002	.0000	.1	.00
7.95	.2382	.0002	.0000	.1	.00
11.84	1.0833	.3760	.0294	.0	.64
11.87	1.1268	.4059	.0300	.0	.67
11.90	1.1702	.4365	.0305	.0	.69
11.93	1.2137	.4675	.0311	.0	.71
11.95	1.2572	.4991	.0316	.0	.74
11.98	1.3007	.5312	.0321	.0	.75
12.01	1.3294	.5526	.0215	.0	.77
12.04	1.3377	.5588	.0062	.0	.77
12.07	1.3459	.5650	.0062	.0	.73
12.10	1.3541	.5712	.0062	.0	.67
12.13	1.3624	.5774	.0062	.0	.58
12.15	1.3706	.5837	.0062	.0	.48
12.18	1.3789	.5899	.0063	.0	.40

HYDROGRAPH PEAK= .77 cfs
TIME TO PEAK= 12.02 Hours

CULVERT NO. UT16B
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= .5 ACRES
AVERAGE BASIN SLOPE= .8 PERCENT
INCREMENT OF RAINFALL EXCESS= .0275 HOURS
CURVE NUMBER= 90.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 400. FEET

TP= .1375 HOURS QPCFS= 2.64 CFS QPIN= 5.4546 INCHES C3= 26.88
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.48	.2211	.0000	.0000	.0	.00
7.5	.2223	.0000	.0000	.1	.00
7.53	.2233	.0000	.0000	.8	.00
7.56	.2243	.0000	.0000	1.8	.00
7.59	.2252	.0000	.0000	2.4	.00
7.62	.2262	.0000	.0000	2.6	.00
7.65	.2272	.0000	.0000	2.5	.00
7.67	.2282	.0000	.0000	2.1	.00
7.70	.2292	.0000	.0000	1.6	.00
7.73	.2302	.0001	.0000	1.2	.00
7.76	.2312	.0001	.0000	.8	.00
7.78	.2322	.0001	.0000	.6	.00
7.8	.2332	.0001	.0000	.4	.00
7.84	.2342	.0001	.0000	.2	.00
7.87	.2351	.0001	.0000	.2	.00
7.89	.2361	.0002	.0000	.1	.00
11.85	1.1019	.3887	.0285	.0	.43
11.88	1.1437	.4177	.0290	.0	.44
11.9	1.1855	.4473	.0296	.0	.46
11.94	1.2273	.4773	.0300	.0	.47
11.96	1.2691	.5078	.0305	.0	.48
11.99	1.3109	.5388	.0309	.0	.49
12.02	1.3311	.5538	.0151	.0	.50
12.05	1.3390	.5598	.0059	.0	.49
12.07	1.3469	.5657	.0060	.0	.47
12.10	1.3548	.5717	.0060	.0	.42
12.13	1.3627	.5777	.0060	.0	.36
12.16	1.3707	.5837	.0060	.0	.30
12.18	1.3786	.5897	.0060	.0	.25

HYDROGRAPH PEAK= .50 cfs
TIME TO PEAK= 12.02 Hours

CULVERT NO. UT16C
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= 1.2 ACRES
AVERAGE BASIN SLOPE= .8 PERCENT
INCREMENT OF RAINFALL EXCESS= .0302 HOURS
CURVE NUMBER= 90.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRALLIC LENGTH= 450. FEET

TP= .1511 HOURS QPCFS= 6.11 CFS QPIN= 4.9641 INCHES C3= 24.46
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.49	.2215	.0000	.0000	.0	.00
7.52	.2227	.0000	.0000	.3	.00
7.55	.2238	.0000	.0000	1.9	.00
7.58	.2249	.0000	.0000	4.1	.00
7.61	.2260	.0000	.0000	5.6	.00
.64	.2271	.0000	.0000	6.1	.00
.67	.2281	.0000	.0000	5.7	.00
7.70	.2292	.0000	.0000	4.8	.00
7.73	.2303	.0001	.0000	3.8	.00
7.76	.2314	.0001	.0000	2.8	.00
7.79	.2325	.0001	.0000	2.0	.00
7.82	.2336	.0001	.0000	1.3	.00
7.85	.2347	.0001	.0000	.9	.00
7.88	.2358	.0002	.0000	.6	.00
7.91	.2368	.0002	.0000	.4	.00
7.94	.2379	.0002	.0000	.2	.00
7.97	.2390	.0003	.0000	.1	.00
8.00	.2401	.0003	.0000	.1	.00
11.84	1.0804	.3740	.0309	.0	1.03
11.87	1.1263	.4056	.0316	.0	1.08
11.90	1.1722	.4378	.0323	.0	1.13
11.93	1.2181	.4707	.0329	.0	1.17
11.96	1.2640	.5041	.0334	.0	1.20
11.99	1.3099	.5380	.0339	.0	1.24
12.02	1.3316	.5543	.0163	.0	1.26
12.05	1.3403	.5608	.0065	.0	1.25
12.08	1.3490	.5674	.0065	.0	1.18
12.11	1.3577	.5739	.0066	.0	1.06
12.14	1.3664	.5805	.0066	.0	.92
.17	1.3751	.5871	.0066	.0	.77
12.20	1.3838	.5937	.0066	.0	.63

HYDROGRAPH PEAK= 1.26 cfs
TIME TO PEAK= 12.03 Hours

CULVERTS 18D & 18E

PROJECT : Plateau Mining Company - Sediment Trap #20 10 YR. 24 HR.

AREA= 3.6 ACRES
AVERAGE BASIN SLOPE= 23.0 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 600. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0568 HOURS QPCFS= 47.92 CFS QPIN=13.2011 INCHES
C3= 65.0681 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.53	.6465	.0000	.0000	.0	.00
11.55	.6767	.0000	.0000	9.7	.00
11.57	.7069	.0005	.0005	36.7	.00
11.59	.7371	.0015	.0010	47.9	.03
11.61	.7674	.0030	.0015	40.5	.07
11.63	.7976	.0049	.0020	26.9	.14
11.65	.8278	.0074	.0025	15.4	.22
11.67	.8580	.0104	.0030	7.9	.31
11.68	.8883	.0138	.0034	3.8	.40
11.70	.9185	.0177	.0039	1.7	.49
11.72	.9487	.0220	.0043	.7	.58
11.74	.9789	.0267	.0047	.3	.67
11.76	1.0092	.0319	.0052	.1	.76
11.78	1.0394	.0375	.0056	.0	.84
11.53	.6465	.0000	.0000	.0	.00
11.55	.6767	.0000	.0000	9.7	.00
11.57	.7069	.0005	.0005	36.7	.00
11.59	.7371	.0015	.0010	47.9	.03
11.61	.7674	.0030	.0015	40.5	.07
11.63	.7976	.0049	.0020	26.9	.14
11.65	.8278	.0074	.0025	15.4	.22
11.67	.8580	.0104	.0030	7.9	.31
11.68	.8883	.0138	.0034	3.8	.40
11.70	.9185	.0177	.0039	1.7	.49
11.72	.9487	.0220	.0043	.7	.58
11.74	.9789	.0267	.0047	.3	.67
11.76	1.0092	.0319	.0052	.1	.76
11.78	1.0394	.0375	.0056	.0	.84
11.80	1.0696	.0435	.0060	.0	.92
11.82	1.0998	.0498	.0064	.0	1.00
11.84	1.1300	.0566	.0067	.0	1.08
11.85	1.1603	.0637	.0071	.0	1.16
11.87	1.1905	.0711	.0075	.0	1.23
11.89	1.2207	.0790	.0078	.0	1.30
11.91	1.2509	.0871	.0082	.0	1.38

CULVERTS 18D & 18E

PROJECT : Plateau Mining Company - Sediment Trap #20 10 YR. 24 HR.
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.93	1.2812	.0956	.0085	.0	1.44
11.95	1.3114	.1045	.0088	.0	1.51
11.97	1.3416	.1137	.0092	.0	1.58
11.99	1.3718	.1231	.0095	.0	1.64
12.01	1.3941	.1303	.0072	.0	1.68
12.02	1.3999	.1322	.0019	.0	1.59
12.04	1.4056	.1341	.0019	.0	1.32
12.06	1.4113	.1360	.0019	.0	.99
12.08	1.4171	.1379	.0019	.0	.72
12.10	1.4228	.1398	.0019	.0	.55
12.12	1.4285	.1417	.0019	.0	.46

HYDROGRAPH PEAK= 1.68 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .13 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #23B Flow Calculations
Not including flow from Culvert 23A

AREA= 37.9 ACRES
AVERAGE BASIN SLOPE= 72.3 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2450. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0988 HOURS QPCFS= 290.24 CFS QPIN= 7.5946 INCHES
C3= 37.4336 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.53	.6489	.0000	.0000	.0	.00
11.55	.6804	.0000	.0000	14.6	.00
11.57	.7119	.0006	.0005	90.2	.01
11.59	.7434	.0017	.0011	192.7	.08
11.61	.7750	.0034	.0017	266.4	.25
11.63	.8065	.0056	.0022	290.2	.56
11.65	.8380	.0084	.0027	271.9	1.04
11.67	.8695	.0116	.0033	229.5	1.66
11.69	.9010	.0154	.0038	179.5	2.40
11.71	.9326	.0196	.0042	132.5	3.23
11.73	.9641	.0244	.0047	93.4	4.11
11.75	.9956	.0295	.0052	63.4	5.03
11.77	1.0271	.0352	.0056	41.8	5.96
11.79	1.0587	.0412	.0061	26.8	6.90
11.81	1.0902	.0477	.0065	16.8	7.82
11.83	1.1217	.0547	.0069	10.4	8.73
11.85	1.1532	.0620	.0073	6.3	9.63
11.87	1.1847	.0697	.0077	3.8	10.50
11.89	1.2163	.0778	.0081	2.2	11.36
11.91	1.2478	.0863	.0085	1.3	12.19
11.93	1.2793	.0951	.0088	.7	13.01
11.95	1.3108	.1043	.0092	.4	13.80
11.97	1.3424	.1139	.0096	.2	14.58
11.99	1.3739	.1238	.0099	.1	15.34
12.01	1.3948	.1305	.0068	.0	16.02
12.03	1.4008	.1325	.0020	.0	16.36
12.05	1.4067	.1345	.0020	.0	15.92
12.07	1.4127	.1364	.0020	.0	14.66
12.09	1.4187	.1384	.0020	.0	12.87
12.11	1.4246	.1404	.0020	.0	10.92
12.13	1.4306	.1424	.0020	.0	9.11
12.15	1.4366	.1445	.0020	.0	7.60

HYDROGRAPH PEAK= 16.36 cfs
TIME TO PEAK= 12.03 Hours
RUNOFF VOLUME= 1.36 Acre-Feet

PROJECT : Plateau Mining Company - Culvert 25B 10 YR. 24 HR.

AREA= 51.2 ACRES
AVERAGE BASIN SLOPE= 54.9 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2800. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1261 HOURS QPCFS= 307.05 CFS QPIN= 5.9474 INCHES
C3= 29.3147 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.53	.6352	.0000	.0000	.0	.00
11.55	.6754	.0000	.0000	15.4	.00
11.58	.7157	.0007	.0007	95.4	.01
11.60	.7560	.0023	.0016	203.8	.10
11.63	.7962	.0048	.0025	281.9	.34
11.65	.8365	.0082	.0034	307.1	.82
11.68	.8767	.0125	.0042	287.6	1.57
11.70	.9170	.0175	.0050	242.8	2.58
11.73	.9572	.0233	.0058	189.9	3.79
11.75	.9975	.0299	.0066	140.1	5.16
11.78	1.0377	.0372	.0073	98.8	6.63
11.80	1.0780	.0452	.0080	67.1	8.15
11.83	1.1182	.0539	.0087	44.2	9.70
11.85	1.1585	.0632	.0094	28.3	11.24
11.88	1.1987	.0732	.0100	17.8	12.76
11.90	1.2390	.0839	.0106	11.0	14.25
11.93	1.2792	.0951	.0112	6.6	15.71
11.95	1.3195	.1069	.0118	4.0	17.13
11.98	1.3597	.1193	.0124	2.3	18.50
12.00	1.3938	.1302	.0109	1.4	19.81
12.03	1.4014	.1327	.0025	.8	20.77
12.06	1.4090	.1352	.0025	.5	20.75
12.08	1.4166	.1377	.0025	.3	19.52
12.11	1.4243	.1403	.0026	.1	17.40
12.13	1.4319	.1429	.0026	.0	14.93
12.16	1.4395	.1455	.0026	.0	12.54
12.18	1.4471	.1481	.0026	.0	10.49

HYDROGRAPH PEAK= 20.77 cfs
TIME TO PEAK= 12.03 Hours
RUNOFF VOLUME= 1.84 Acre-Feet

PROJECT : Plateau Mining Company - Culvert 26B 10 YR. 24 Hr.

AREA= 12.2 ACRES
AVERAGE BASIN SLOPE= 58.2 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1200. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0622 HOURS QPCFS= 148.38 CFS QPIN=12.0610 INCHES
C3= 59.4486 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.53	.6491	.0000	.0000	.0	.00
11.55	.6739	.0000	.0000	14.1	.00
11.57	.6987	.0003	.0003	72.7	.00
11.58	.7235	.0010	.0006	129.1	.03
11.60	.7483	.0020	.0010	148.4	.10
11.61	.7731	.0033	.0013	134.4	.22
11.63	.7979	.0050	.0017	104.6	.39
11.64	.8227	.0070	.0020	73.4	.59
11.66	.8476	.0093	.0023	47.7	.82
11.67	.8724	.0120	.0026	29.3	1.06
11.69	.8972	.0149	.0030	17.2	1.31
11.71	.9220	.0182	.0033	9.7	1.56
11.72	.9468	.0217	.0036	5.3	1.81
11.74	.9716	.0256	.0038	2.8	2.06
11.75	.9964	.0297	.0041	1.5	2.31
11.77	1.0212	.0341	.0044	.8	2.54
11.78	1.0460	.0388	.0047	.4	2.78
11.80	1.0708	.0437	.0049	.2	3.01
11.81	1.0957	.0489	.0052	.0	3.23
11.92	1.2693	.0923	.0069	.0	4.69
11.94	1.2941	.0994	.0071	.0	4.88
11.95	1.3189	.1068	.0073	.0	5.07
11.97	1.3438	.1143	.0076	.0	5.26
11.99	1.3686	.1221	.0078	.0	5.44
12.00	1.3925	.1298	.0077	.0	5.61
12.02	1.3972	.1313	.0015	.0	5.68
12.03	1.4019	.1329	.0015	.0	5.35
12.05	1.4066	.1344	.0015	.0	4.63
12.06	1.4113	.1360	.0016	.0	3.78
12.08	1.4160	.1375	.0016	.0	2.98
12.09	1.4207	.1391	.0016	.0	2.36
12.11	1.4254	.1407	.0016	.0	1.92

HYDROGRAPH PEAK= 5.68 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .44 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #33A Flow Calculation

AREA= 5.7 ACRES
AVERAGE BASIN SLOPE= 30.6 PERCENT
CURVE NUMBER= 70.0
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1085. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0909 HOURS QPCFS= 47.41 CFS QPIN= 8.2487 INCHES
C3= 40.6579 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.67	.8306	.0000	.0000	.0	.00
11.69	.8583	.0000	.0000	2.4	.00
11.71	.8859	.0002	.0002	14.7	.00
11.73	.9136	.0007	.0005	31.5	.00
11.75	.9412	.0016	.0009	43.5	.02
11.77	.9688	.0028	.0012	47.4	.04
11.78	.9965	.0044	.0016	44.4	.08
11.80	1.0241	.0063	.0019	37.5	.14
11.82	1.0517	.0085	.0022	29.3	.21
11.84	1.0794	.0110	.0025	21.6	.29
11.86	1.1070	.0138	.0028	15.2	.37
11.87	1.1347	.0169	.0031	10.4	.47
11.89	1.1623	.0203	.0034	6.8	.56
11.91	1.1899	.0240	.0037	4.4	.66
11.93	1.2176	.0280	.0040	2.7	.75
11.95	1.2452	.0322	.0043	1.7	.85
11.97	1.2729	.0368	.0045	1.0	.94
11.98	1.3005	.0416	.0048	.6	1.04
12.00	1.3264	.0463	.0047	.4	1.13
12.02	1.3316	.0473	.0010	.2	1.21
12.04	1.3369	.0483	.0010	.1	1.22
12.06	1.3421	.0493	.0010	.0	1.17
12.07	1.3474	.0503	.0010	.0	1.05
2.09	1.3526	.0513	.0010	.0	.91
2.11	1.3578	.0524	.0010	.0	.77
2.13	1.3631	.0534	.0010	.0	.64
2.15	1.3683	.0545	.0011	.0	.55

HYDROGRAPH PEAK= 1.22 cfs
TIME TO PEAK= 12.04 Hours
RUNOFF VOLUME= .11 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #33B Flow Calculation

AREA= 8.5 ACRES
AVERAGE BASIN SLOPE= 37.8 PERCENT
CURVE NUMBER= 71.6
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1240. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0871 HOURS QPCFS= 73.77 CFS QPIN= 8.6063 INCHES
C3= 42.4204 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.64	.7821	.0000	.0000	.0	.00
11.66	.8086	.0000	.0000	3.7	.00
11.68	.8351	.0004	.0004	22.9	.00
11.69	.8616	.0012	.0007	49.0	.01
11.71	.8881	.0022	.0011	67.7	.04
11.73	.9146	.0036	.0014	73.8	.09
11.75	.9411	.0053	.0017	69.1	.17
11.76	.9676	.0073	.0020	58.3	.27
11.78	.9940	.0097	.0023	45.6	.38
11.80	1.0205	.0123	.0026	33.7	.51
11.82	1.0470	.0153	.0029	23.7	.65
11.83	1.0735	.0185	.0032	16.1	.80
11.85	1.1000	.0220	.0035	10.6	.94
11.87	1.1265	.0258	.0038	6.8	1.09
11.89	1.1530	.0299	.0041	4.3	1.24
11.90	1.1795	.0343	.0044	2.6	1.39
11.92	1.2060	.0389	.0046	1.6	1.53
11.94	1.2325	.0438	.0049	1.0	1.67
11.96	1.2590	.0489	.0051	.6	1.81
11.97	1.2854	.0543	.0054	.3	1.95
11.99	1.3119	.0600	.0056	.2	2.09
12.01	1.3284	.0636	.0036	.1	2.21
12.03	1.3334	.0647	.0011	.0	2.28
12.04	1.3384	.0659	.0011	.0	2.23
12.06	1.3434	.0670	.0011	.0	2.06
12.08	1.3484	.0682	.0012	.0	1.82
12.10	1.3535	.0693	.0012	.0	1.55
12.11	1.3585	.0705	.0012	.0	1.30
12.13	1.3635	.0717	.0012	.0	1.09

HYDROGRAPH PEAK= 2.28 cfs
TIME TO PEAK= 12.03 Hours
RUNOFF VOLUME= .20 Acre-Feet

CULVERT NO. 35A
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= 20.3 ACRES
AVERAGE BASIN SLOPE= 70.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0163 HOURS
CURVE NUMBER= 75.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1910. FEET

TP= .0818 HOURS QPCFS= 188.04 CFS QPIN= 9.1725 INCHES C3= 45.0
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.55	.6523	.0000	.0000	.0	.00
11.57	.6771	.0001	.0001	9.3	.00
11.59	.7019	.0005	.0004	58.0	.01
11.61	.7266	.0013	.0008	124.2	.04
11.63	.7514	.0025	.0012	172.2	.13
11.65	.7762	.0040	.0015	188.0	.27
11.67	.8010	.0058	.0018	176.6	.48
11.69	.8257	.0080	.0022	149.4	.75
11.71	.8505	.0105	.0025	117.1	1.07
11.73	.8753	.0132	.0028	86.6	1.42
11.75	.9001	.0163	.0031	61.2	1.79
11.77	.9249	.0197	.0034	41.7	2.17
11.79	.9496	.0234	.0037	27.5	2.56
11.81	.9744	.0274	.0040	17.7	2.96
11.83	.9992	.0317	.0043	11.1	3.35
11.85	1.0240	.0363	.0045	6.9	3.73
11.87	1.0487	.0411	.0048	4.2	4.11
11.89	1.0735	.0462	.0051	2.5	4.48
11.91	1.0983	.0515	.0053	1.5	4.85
11.93	1.1231	.0571	.0056	.9	5.21
11.95	1.1478	.0630	.0059	.5	5.56
11.97	1.1726	.0691	.0061	.3	5.91
11.99	1.1974	.0754	.0063	.2	6.24
12.01	1.2222	.0820	.0066	.1	6.58
12.03	1.2469	.0888	.0068	.0	6.90
12.05	1.2717	.0958	.0070	.0	7.22
12.07	1.2965	.1031	.0073	.0	7.53
12.09	1.3213	.1106	.0075	.0	7.84
12.11	1.3298	.1132	.0026	.0	8.09
12.13	1.3345	.1147	.0015	.0	8.08
12.15	1.3392	.1161	.0015	.0	7.66
12.17	1.3439	.1176	.0015	.0	6.88
12.19	1.3486	.1191	.0015	.0	5.93
12.21	1.3533	.1206	.0015	.0	4.98
12.23	1.3580	.1221	.0015	.0	4.14

HYDROGRAPH PEAK= 8.12 cfs
TIME TO PEAK= 12.02 Hours

CULVERT NO.37A
10 YEAR-24 HOUR PEAK DISCHARGE

AREA= 5.5 ACRES
AVERAGE BASIN SLOPE= 48.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .0127 HOURS
CURVE NUMBER= 75.
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 840. FEET

TP= .0509 HOURS QPCFS= 81.74 CFS QPIN=14.7390 INCHES C3= 72.6
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.54	.6334	.0000	.0000	.0	.00
11.56	.6527	.0000	.0000	7.7	.00
11.57	.6720	.0001	.0001	39.9	.00
11.58	.6913	.0005	.0003	71.0	.01
11.60	.7106	.0010	.0006	81.7	.03
11.61	.7299	.0018	.0008	74.1	.06
11.62	.7492	.0028	.0010	57.8	.11
11.63	.7686	.0040	.0012	40.6	.18
11.65	.7879	.0054	.0014	26.5	.26
.66	.8072	.0070	.0016	16.3	.34
.67	.8265	.0088	.0018	9.5	.43
11.68	.8458	.0108	.0020	5.4	.52
11.70	.8651	.0130	.0022	3.0	.60
11.71	.8844	.0154	.0024	1.6	.69
11.72	.9037	.0180	.0026	.8	.78
11.73	.9230	.0207	.0028	.4	.86
11.75	.9423	.0236	.0029	.2	.95
11.76	.9616	.0267	.0031	.1	1.03
11.77	.9809	.0300	.0033	.1	1.11
11.94	1.2319	.0874	.0053	.0	2.06
11.95	1.2512	.0928	.0055	.0	2.12
11.96	1.2705	.0984	.0056	.0	2.19
11.98	1.2898	.1041	.0057	.0	2.25
11.99	1.3091	.1100	.0059	.0	2.31
12.00	1.3284	.1154	.0054	.0	2.37
12.01	1.3301	.1165	.0011	.0	2.37
12.03	1.3338	.1177	.0012	.0	2.21
12.04	1.3374	.1188	.0012	.0	1.91
12.05	1.3411	.1200	.0012	.0	1.55
12.07	1.3447	.1212	.0012	.0	1.22
12.08	1.3484	.1223	.0012	.0	.97
12.09	1.3521	.1235	.0012	.0	.79

HYDROGRAPH PEAK= 2.39 cfs
TIME TO PEAK= 12.01 Hours

PROJECT : Plateau Mining Company - Culvert #38A Flow Calculation

AREA= 2.0 ACRES
AVERAGE BASIN SLOPE= 43.0 PERCENT
CURVE NUMBER= 82.1
DESIGN STORM= 2.00 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 475. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TI= .0389 HOURS QPCFS= 38.54 CFS QPIN=19.3006 INCHES
CI= 95.1327 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.71	.4353	.0000	.0000	.0	.00
10.74	.4389	.0000	.0000	31.9	.00
10.77	.4424	.0000	.0000	29.5	.00
10.80	.4460	.0000	.0000	9.4	.00
10.82	.4495	.0000	.0000	1.9	.00
10.85	.4531	.0001	.0000	.3	.00
10.88	.4566	.0002	.0000	.0	.00
11.82	1.0578	.1380	.0163	.0	1.14
11.85	1.1000	.1550	.0170	.0	1.20
11.88	1.1422	.1728	.0178	.0	1.26
11.91	1.1844	.1912	.0185	.0	1.31
11.93	1.2266	.2104	.0191	.0	1.36
11.96	1.2688	.2301	.0198	.0	1.41
11.99	1.3110	.2505	.0204	.0	1.46
12.02	1.3311	.2605	.0100	.0	1.15
12.05	1.3391	.2645	.0040	.0	.66
12.07	1.3471	.2685	.0040	.0	.39
12.10	1.3551	.2725	.0040	.0	.31
12.13	1.3631	.2766	.0040	.0	.30
12.16	1.3711	.2807	.0041	.0	.30

HYDROGRAPH PEAK= 1.46 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .11 Acre-Feet

PROJECT : PLATEAU- 2-12-1 - AREA TRIBUTARY TO CULVERT 46B, 10 YR, 24 HR

AREA= 13.2 ACRES
AVERAGE BASIN SLOPE= 66.4 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1260. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0605 HOURS QPCFS= 164.91 CFS QPIN=12.3895 INCHES
C3= 61.0678 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.53	.6454	.0000	.0000	.0	.00
11.55	.6696	.0000	.0000	15.7	.00
11.56	.6938	.0002	.0002	80.8	.00
11.58	.7179	.0008	.0006	143.5	.03
11.59	.7421	.0017	.0009	164.9	.09
11.61	.7662	.0029	.0012	149.3	.21
11.62	.7904	.0044	.0015	116.3	.38
11.64	.8145	.0063	.0019	81.6	.58
11.65	.8387	.0084	.0022	53.0	.82
11.67	.8628	.0109	.0025	32.5	1.08
11.68	.8870	.0137	.0028	19.1	1.34
11.70	.9111	.0167	.0030	10.8	1.60
11.71	.9353	.0200	.0033	5.9	1.87
11.73	.9594	.0236	.0036	3.1	2.13
11.74	.9836	.0275	.0039	1.6	2.39
11.76	1.0078	.0317	.0041	.8	2.65
11.77	1.0319	.0361	.0044	.4	2.89
11.79	1.0561	.0407	.0047	.2	3.14
11.80	1.0802	.0456	.0049	.1	3.38
11.82	1.1044	.0508	.0052	.0	3.61
11.93	1.2734	.0934	.0068	.0	5.14
11.94	1.2976	.1004	.0070	.0	5.34
11.96	1.3218	.1076	.0072	.0	5.54
11.97	1.3459	.1150	.0074	.0	5.73
11.99	1.3701	.1226	.0076	.0	5.92
12.00	1.3927	.1298	.0073	.0	6.10
12.02	1.3972	.1313	.0015	.0	6.15
12.03	1.4018	.1328	.0015	.0	5.77
12.05	1.4064	.1343	.0015	.0	4.99
12.06	1.4110	.1359	.0015	.0	4.06
12.08	1.4155	.1374	.0015	.0	3.21
12.09	1.4201	.1389	.0015	.0	2.54
12.11	1.4247	.1404	.0015	.0	2.07

HYDROGRAPH PEAK= 6.15 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .47 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #54A 10 YR> 24 HR.

AREA= 1.2 ACRES
AVERAGE BASIN SLOPE= 8.6 PERCENT
CURVE NUMBER= 90.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 460. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0454 HOURS QPCFS= 19.99 CFS QPIN=16.5168 INCHES
C3= 81.4115 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
7.25	.2215	.0000	.0000	.0	.00
7.26	.2222	.0000	.0000	4.0	.00
7.28	.2229	.0000	.0000	15.3	.00
7.30	.2236	.0000	.0000	20.0	.00
7.31	.2243	.0000	.0000	16.9	.00
7.33	.2250	.0000	.0000	11.2	.00
7.34	.2257	.0000	.0000	6.4	.00
7.36	.2264	.0000	.0000	3.3	.00
7.37	.2271	.0000	.0000	1.6	.00
7.39	.2278	.0000	.0000	.7	.00
7.40	.2285	.0000	.0000	.3	.00
7.42	.2292	.0000	.0000	.1	.00
7.43	.2299	.0000	.0000	.0	.00
11.91	1.2505	.4942	.0176	.0	1.37
11.93	1.2747	.5119	.0177	.0	1.38
11.94	1.2988	.5298	.0179	.0	1.39
11.96	1.3230	.5478	.0180	.0	1.41
11.97	1.3471	.5659	.0181	.0	1.42
11.99	1.3713	.5842	.0183	.0	1.43
12.00	1.3929	.6006	.0164	.0	1.43
12.02	1.3975	.6041	.0035	.0	1.36
12.03	1.4020	.6076	.0035	.0	1.13
12.05	1.4066	.6111	.0035	.0	.85
12.06	1.4112	.6146	.0035	.0	.61
12.08	1.4158	.6181	.0035	.0	.45
12.09	1.4204	.6216	.0035	.0	.36

HYDROGRAPH PEAK= 1.43 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .12 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #57A 10 YR. 24 HR.

AREA= 1.8 ACRES
AVERAGE BASIN SLOPE= 69.5 PERCENT
CURVE NUMBER= 83.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 500. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0221 HOURS QPCFS= 61.65 CFS QPIN=33.9648 INCHES
C3=167.4122 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.29	.4080	.0000	.0000	.0	.00
10.31	.4102	.0000	.0000	61.6	.00
10.33	.4123	.0000	.0000	19.8	.00
10.36	.4144	.0000	.0000	2.2	.00
10.38	.4166	.0000	.0000	.2	.00
10.40	.4187	.0000	.0000	.0	.00
11.86	1.1641	.2031	.0162	.0	1.34
11.88	1.1993	.2197	.0167	.0	1.38
11.90	1.2346	.2369	.0171	.0	1.42
11.92	1.2698	.2544	.0175	.0	1.46
11.95	1.3051	.2724	.0180	.0	1.50
11.97	1.3403	.2908	.0184	.0	1.53
11.99	1.3755	.3095	.0188	.0	1.56
12.01	1.3958	.3205	.0110	.0	1.09
12.03	1.4025	.3241	.0036	.0	.49
12.06	1.4092	.3278	.0037	.0	.32
12.08	1.4158	.3315	.0037	.0	.31
12.10	1.4225	.3351	.0037	.0	.31
12.12	1.4292	.3388	.0037	.0	.31

HYDROGRAPH PEAK= 1.56 cfs
TIME TO PEAK= 11.99 Hours
RUNOFF VOLUME= .11 Acre-Feet

PROJECT : Plateau Mining Company - Design Flow Culvert #59A 7/23/87

AREA= 12.9 ACRES
AVERAGE BASIN SLOPE= 60.1 PERCENT
CURVE NUMBER= 76.7
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2400. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1014 HOURS QPCFS= 96.21 CFS QPIN= 7.3962 INCHES
C3= 36.4558 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.50	.5940	.0000	.0000	.0	.00
11.52	.6246	.0000	.0000	4.8	.00
11.54	.6570	.0008	.0007	29.9	.00
11.56	.6893	.0021	.0014	63.9	.03
11.58	.7217	.0041	.0020	88.3	.10
11.60	.7541	.0067	.0026	96.2	.23
11.62	.7864	.0099	.0032	90.1	.42
11.64	.8188	.0137	.0038	76.1	.66
11.66	.8512	.0181	.0044	59.5	.94
11.68	.8835	.0230	.0049	43.9	1.26
11.70	.9159	.0284	.0054	30.9	1.59
11.72	.9483	.0344	.0059	21.0	1.94
11.74	.9806	.0408	.0064	13.8	2.29
11.76	1.0130	.0477	.0069	8.9	2.64
11.78	1.0454	.0551	.0074	5.6	2.99
11.80	1.0777	.0630	.0079	3.4	3.33
11.82	1.1101	.0713	.0083	2.1	3.66
11.84	1.1425	.0801	.0088	1.2	3.99
11.86	1.1748	.0893	.0092	.7	4.30
11.88	1.2072	.0989	.0096	.4	4.61
11.90	1.2396	.1088	.0100	.2	4.91
11.92	1.2719	.1192	.0104	.1	5.20
11.94	1.3043	.1300	.0108	.0	5.48
11.97	1.3367	.1411	.0111	.0	5.76
11.99	1.3690	.1526	.0115	.0	6.03
12.01	1.3940	.1617	.0091	.0	6.28
12.03	1.4002	.1640	.0023	.0	6.41
12.05	1.4063	.1663	.0023	.0	6.27
12.07	1.4124	.1686	.0023	.0	5.80
12.09	1.4186	.1709	.0023	.0	5.10
12.11	1.4247	.1732	.0023	.0	4.34
12.13	1.4308	.1755	.0023	.0	3.62
12.15	1.4370	.1779	.0023	.0	3.01

HYDROGRAPH PEAK= 6.41 cfs
TIME TO PEAK= 12.03 Hours
RUNOFF VOLUME= .53 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #63A 10 YR. 24 HR.

AREA= 129.1 ACRES
AVERAGE BASIN SLOPE= 70.3 PERCENT
CURVE NUMBER= 76.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 3200. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1205 HOURS QPCFS= 810.46 CFS QPIN= 6.2257 INCHES
C3= 30.6865 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.52	.6204	.0000	.0000	.0	.00
11.54	.6588	.0002	.0002	40.7	.00
11.56	.6973	.0013	.0011	251.7	.10
11.59	.7357	.0033	.0020	538.0	.48
11.61	.7742	.0062	.0028	744.0	1.38
11.64	.8126	.0098	.0037	810.5	2.94
11.66	.8511	.0143	.0044	759.2	5.18
11.69	.8895	.0195	.0052	640.8	8.01
11.71	.9280	.0254	.0060	501.2	11.30
11.73	.9664	.0321	.0067	369.9	14.91
11.76	1.0049	.0395	.0074	260.7	18.72
11.78	1.0433	.0475	.0080	177.0	22.63
11.81	1.0818	.0562	.0087	116.6	26.55
1 .83	1.1202	.0655	.0093	74.8	30.45
1 .85	1.1587	.0754	.0099	47.0	34.28
1 .88	1.1971	.0859	.0105	28.9	38.02
1 .90	1.2356	.0970	.0111	17.5	41.66
1 .93	1.2740	.1086	.0116	10.5	45.21
1 .95	1.3125	.1208	.0122	6.2	48.65
1 .97	1.3509	.1335	.0127	3.6	51.98
12.00	1.3894	.1467	.0132	2.1	55.22
12.02	1.3990	.1500	.0034	1.2	57.94
12.05	1.4063	.1526	.0026	.7	58.33
12.07	1.4136	.1552	.0026	.4	55.40
12.09	1.4209	.1578	.0026	.2	49.78
12.12	1.4282	.1605	.0026	.1	42.89
12.14	1.4355	.1631	.0026	.0	36.03
12.17	1.4427	.1658	.0027	.0	30.05
12.19	1.4500	.1685	.0027	.0	25.27

HYDROGRAPH PEAK= 58.33 cfs
TIME TO PEAK= 12.05 Hours
RUNOFF VOLUME= 5.01 Acre-Feet

PROJECT : Plateau Mining Company - Culvert #72B Adjacent Watershed Flow

AREA= 3.0 ACRES
AVERAGE BASIN SLOPE= 31.0 PERCENT
CURVE NUMBER= 76.0
DESIGN STORM= 2.10 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 840. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0622 HOURS QPCFS= 36.46 CFS QPIN=12.0528 INCHES
C3= 59.4082 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
11.51	.6174	.0000	.0000	.0	.00
11.53	.6422	.0000	.0000	3.5	.00
11.55	.6670	.0004	.0004	17.9	.00
11.56	.6919	.0011	.0007	31.7	.01
11.58	.7167	.0022	.0011	36.5	.03
11.59	.7416	.0037	.0015	33.0	.06
11.61	.7664	.0055	.0018	25.7	.11
11.62	.7912	.0077	.0022	18.0	.16
11.64	.8161	.0102	.0025	11.7	.22
11.65	.8409	.0130	.0028	7.2	.28
11.67	.8657	.0162	.0032	4.2	.35
11.69	.8906	.0196	.0035	2.4	.41
11.70	.9154	.0234	.0038	1.3	.48
11.72	.9402	.0275	.0041	.7	.54
11.73	.9651	.0319	.0044	.4	.60
11.75	.9899	.0365	.0047	.2	.67
11.76	1.0147	.0415	.0049	.0	.73
11.92	1.2631	.1052	.0075	.0	1.26
11.93	1.2879	.1129	.0077	.0	1.31
11.95	1.3127	.1209	.0079	.0	1.36
11.97	1.3376	.1290	.0081	.0	1.40
11.98	1.3624	.1373	.0084	.0	1.45
12.00	1.3872	.1459	.0086	.0	1.49
12.01	1.3960	.1490	.0031	.0	1.51
12.03	1.4008	.1507	.0017	.0	1.45
12.04	1.4055	.1523	.0017	.0	1.28
12.06	1.4102	.1540	.0017	.0	1.06
12.07	1.4149	.1557	.0017	.0	.84
12.09	1.4196	.1574	.0017	.0	.67
12.11	1.4243	.1591	.0017	.0	.54

HYDROGRAPH PEAK= 1.51 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= .12 Acre-Feet

RECEIVED
APR 28 1989
DIVISION OF
OIL, GAS & MINING

EXHIBIT 50

RECLAMATION CHANNEL CALCULATIONS

Design Calculations for Channel 6 & 7

HANSEN ALLEN & LUCE INC

CLIENT: PLATEAU
PROJECT: CHANNEL RECLAMATION
FEATURE: Channels 6, 7, 25C
PROJECT NO. 2-7-5

SHEET 1 OF 4
COMPUTED DEH
CHECKED
DATE 21 MAR

MODIFICATIONS TO RECLAMATION DESIGN FOR:

1. Channel through Pond 7
2. Channel through Pond 6
3. Channel 25C (Area slightly reduced - No changes made herein)

due to changed area created by design of new channels 25F + 81

CHANNEL 7

AREA INCREASED DUE TO CHANNEL 81 DESIGN

NEW CHARACTERISTICS:

PLANIMETER RDG: 3985
AREA = 55.8ac (was 33.2 - 68% Increase)
Contour Interval = 50'
Contour Length = 12,960

$$\text{Slope} = \frac{100 * 50 * 12960}{43560 * 55.8} = 26.7\%$$

CN = 75
P = 2.95 in
HYD. LENGTH = 4360 ft

Q_{100} = 41.4 cfs (Up from 26.5 cfs)

Assume D_{50} req'd = 1.0' $n = .04$, $b = 5$, $m = 3$, $S = 0.06$

$$\frac{Qn}{1.49 S^{1/2}} = 4.55$$

Y	$AR^{2/3}$
1.0	6.35
0.8	4.16
0.82	4.35
0.84	4.56 ⇒

A = 6.32
P = 10.3
R = 0.61
V = 6.6

$\phi = 42°$, SG = 2.65

for S.F. = 1.2, D_{50} = 0.84

USE D_{50} = 1.0', SF = 1.41 ok

Check Side Slope S.F.: $y = .84$, $S = .06$, $c = .86$, $\tau = 2.70$, $\eta = 0.55$
$m = 3$, $\phi = 42$, $\beta = 36.86$, $\eta' = 0.45$, SF = 1.29 - ok

Channel depth = 0.84 + 0.75 = 1.59 (USE 1.75' depth)

RIPRAP TYPE M	% Passing by Wt	Size (in)
	70-100	21
USE 12" TYPE II	50-70	18
GRANULAR BEDDING	35-70	12

D_{max} = 21" = 1.75'

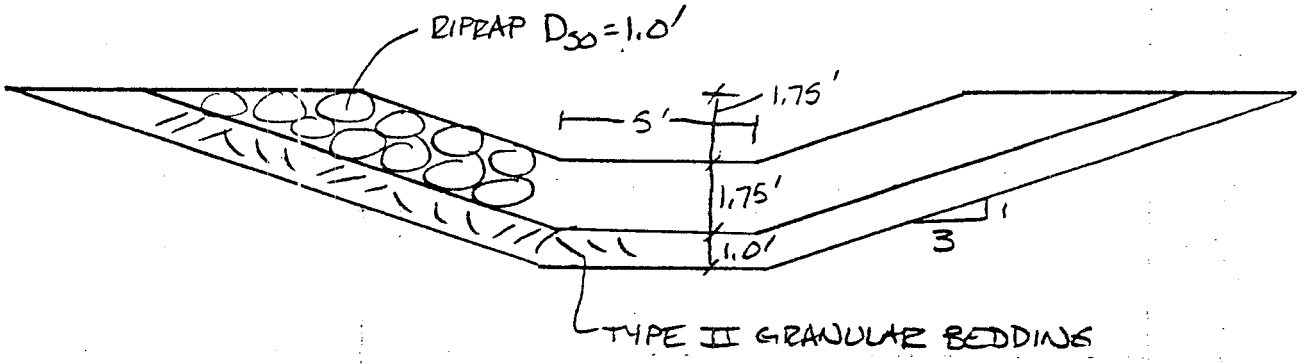
PROJECT : Plateau Mining Co. - Reclaimed Channel 7 100-Yr Flow Calc.

AREA= 55.8 ACRES
AVERAGE BASIN SLOPE= 26.7 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 4360. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .2577 HOURS QPCFS= 163.75 CFS QPIN= 2.9103 INCHES
C3= 14.3447 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.82	.6628	.0000	.0000	.0	.00
10.87	.6726	.0000	.0000	8.2	.00
10.93	.6823	.0000	.0000	50.9	.00
10.98	.6920	.0002	.0001	108.7	.00
11.03	.7044	.0004	.0002	150.3	.02
11.08	.7187	.0008	.0004	163.8	.04
11.13	.7330	.0013	.0005	153.4	.08
11.18	.7473	.0019	.0006	129.5	.14
11.24	.7615	.0026	.0007	101.3	.21
11.29	.7758	.0035	.0008	74.7	.30
11.34	.7901	.0044	.0009	52.7	.41
11.39	.8044	.0055	.0011	35.8	.52
11.44	.8187	.0066	.0012	23.6	.63
11.49	.8330	.0079	.0013	15.1	.75
11.54	.9355	.0201	.0122	9.5	.96
11.60	1.0511	.0397	.0197	5.8	1.69
11.65	1.1666	.0652	.0255	3.5	3.40
11.70	1.2822	.0959	.0307	2.1	6.28
11.75	1.3977	.1315	.0356	1.2	10.19
11.80	1.5133	.1715	.0400	.7	14.87
11.85	1.6288	.2155	.0440	.4	19.99
11.91	1.7444	.2633	.0478	.2	25.28
11.96	1.8599	.3146	.0513	.1	30.55
12.01	1.9596	.3613	.0468	.0	35.58
12.06	1.9815	.3719	.0106	.0	39.73
12.11	2.0034	.3826	.0107	.0	41.44
12.16	2.0253	.3934	.0108	.0	40.15
12.21	2.0471	.4043	.0109	.0	36.55
12.27	2.0690	.4153	.0110	.0	31.85
12.32	2.0909	.4264	.0111	.0	27.11
12.37	2.1128	.4376	.0112	.0	22.94
12.42	2.1347	.4489	.0113	.0	19.63

HYDROGRAPH PEAK= 41.44 cfs
TIME TO PEAK= 12.11 Hours
RUNOFF VOLUME= 4.31 Acre-Feet



CHANNEL 6

RDG = 2.50 ; Increased Area = 3.5ac , Old Area = 285ac

New Area is only a 1% Increase. -

Don't Recalculate Channel - Leave as is. (Flow Calc. confirms increase is nominal)

CHANNEL 25C

Since Area is decreased, totalling 55.8 - 33.2 = 22.6
3.5
26.1 ac

OUT OF A TOTAL OF 719ac, accounts for a 3½% decrease - Leave as designed.

Check Channel 6 Design $S = 9\%$, $b = 8'$, $n = .015$ $Q = 187$ cfs, $m = 3$

$\frac{Qn}{1.49S^{1/2}} = 18.88$

Y	$AR^{2/3}$	
2.0	34.3	
1.5	19.04	A = 18.2
1.45	18.42	P = 17.3
1.47	18.90 ⇒	R = 1.05
		V = 10.3

with 1' freeboard - D = 2.47' < 2.50' as Designed - ✓

with D_{50} = 2.5, S.F. = 1.27 ✓ as Designed

PROJECT : Plateau Mining Co. - Reclaimed Pond 6 100-Yr Flow Calculatior

AREA= 288.5 ACRES
AVERAGE BASIN SLOPE= 45.4 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 8400. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .3339 HOURS QPCFS= 653.34 CFS QPIN= 2.2458 INCHES
C3= 11.0695 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.82	.6622	.0000	.0000	.0	.00
10.89	.6748	.0000	.0000	32.8	.00
10.95	.6874	.0001	.0001	202.9	.00
11.02	.7018	.0004	.0002	433.7	.04
11.09	.7203	.0008	.0005	599.8	.12
11.15	.7388	.0015	.0007	653.3	.30
11.22	.7574	.0024	.0009	612.0	.60
11.29	.7759	.0035	.0011	516.6	1.03
11.35	.7944	.0047	.0012	404.1	1.57
11.42	.8129	.0061	.0014	298.2	2.20
11.49	.8314	.0078	.0016	210.1	2.89
11.55	.9570	.0233	.0155	142.7	4.08
11.62	1.1067	.0513	.0281	94.0	8.03
11.69	1.2565	.0887	.0374	60.3	17.56
11.75	1.4062	.1343	.0456	37.9	34.05
11.82	1.5560	.1873	.0530	23.3	57.05
11.89	1.7057	.2469	.0596	14.1	84.96
11.96	1.8554	.3125	.0656	8.4	115.82
12.02	1.9652	.3640	.0515	5.0	147.22
12.09	1.9936	.3778	.0138	2.9	173.70
12.16	2.0219	.3918	.0139	1.7	187.13
12.22	2.0503	.4059	.0141	1.0	184.90
12.29	2.0787	.4202	.0143	.5	170.78
12.36	2.1071	.4346	.0145	.3	150.79
12.42	2.1354	.4492	.0146	.2	130.03
12.49	2.1638	.4640	.0148	.0	111.64
12.56	2.1805	.4728	.0088	.0	96.75

HYDROGRAPH PEAK= 187.13 cfs
TIME TO PEAK= 12.16 Hours
RUNOFF VOLUME= 22.31 Acre-Feet

Design Calculations for Channels 4A, 25B, 53 and 63A;
and Culvert 46A

CHECK DESIGN OF CHANNEL 25B AT CULVERT OUTLET

CHARACTERISTICS OF CULVERT
$Q = 156.9$ cfs ; $S \sim 9.7\%$, $D = 60''$ (See Sheet 1A)

DOWNSTREAM CHANNEL CHARACTERISTICS

$b = 13.0'$, $D_{50} = 2.25'$, $m = 3$, depth $= 2.0'$, Riprap Thickness $= 4.0'$

Recalculate Riprap D_{50} reqd at culvert with a 5' bottom width.

$n = .044$, $S = 12\%$, $Q = 150.8$ cfs

$$\frac{Qn}{1.49 S^{1/2}} = 13.41$$

y	$AR^{2/3}$
1.0	6.35
1.5	14.09
1.4	12.27
1.46	13.35

$A = 13.7$
$P = 14.2$
$R = 0.96$
$V = 11.5$

Riprap $S = .12$, $\phi = 42°$, $y = 1.46$, $SG = 2.65$

for S.F. = 1.2, D_{50} Reqd = 3.21 ft

According to $S.F. = \dfrac{\cos\theta \tan\phi}{\sin\theta + \eta_b \tan\phi}$ $\quad \eta_b = \dfrac{21 R S}{(SG-1) D_{50}}$

ϕ = ∠ repose
θ = Channel Slope
SG = Specific Gravity

See Red Book "Applied Hyd. & Sed. for Dist. Areas"

for $D_{50} = 3.25'$, S.F. = 1.21

ROCK IS SO LARGE - TRY USING DENVER DESIGN

SECTION 5.6.2 - Reqd Rock Size: (In Vol 2)

Conditions Met? $\dfrac{Q}{D^{2.5}} \leq 6.0$?

$$\frac{157}{(5)^{2.5}} = 2.8 < 6.0 \text{ ok}$$

$$\frac{Q}{D^{1.5}} = \frac{156.9}{(5)^{1.5}} = 14.03$$

Tailwater Depth ~ 0.95' $\quad \dfrac{Y_t}{D} = \dfrac{0.95}{5} = 0.19$

From Fig 5-7.
Design Falls outside TYPE VII into Concrete Basin Range.

Additional Area Added to Channel 25B.

Planimeter Rdg		Acres
463		6.5
104		1.5
	TOTAL	8.0 ac

Add'l. Contour Length 11.95" * 200'/in = 2,390

Total Area = 180.4 + 8 = 188.4 (4% increase)

Contour Length = 86440 + 2390 = 88,830'

Slope = $\frac{50 * 100 * 88830}{43560 * 188.4}$ = 54.1%

Hyd. Length = 4600'
P = 2.95 in
CN = 75

Q_{100} = 156.9 cfs (4% increase)

Check Channel design
D_{50} = 2.0'; n = .044, b = 13; m = 3, S = .12

$\frac{Qn}{1.49 S^{1/2}}$ = 13.41

y	$AR^{2/3}$	
0.95	12.89	A = 15.4
0.97	13.37 ⇒	P = 19.1
		R = 0.81
		V = 10.2

Riprap Stability Check:
ϕ = 42, SG = 2.65 for SF = 1.2, D_{50} = 2.13

Increase Rock Size to 2.25' D_{50}; SF = 1.26 ✓

RIPRAP TYPE VH+ Use Gradation Shown on Reclamation Detail Sheets

D_{max} = 48" = 4'

PROJECT : Plateau Mining Co. - Reclaimed Channel 25B 100-Yr Flow Calc 3/

AREA= 188.4 ACRES
AVERAGE BASIN SLOPE= 54.0 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 4600. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1891 HOURS QPCFS= 753.28 CFS QPIN= 3.9651 INCHES
C3= 19.5441 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.82	.6620	.0000	.0000	.0	.00
10.86	.6692	.0000	.0000	37.8	.00
10.89	.6763	.0000	.0000	234.0	.00
10.93	.6834	.0000	.0000	500.1	.00
10.97	.6906	.0002	.0000	691.5	.03
11.01	.6984	.0003	.0001	753.3	.07
11.05	.7089	.0005	.0002	705.6	.14
11.08	.7194	.0008	.0003	595.6	.25
11.12	.7299	.0012	.0004	465.9	.41
11.16	.7404	.0016	.0004	343.8	.61
11.20	.7509	.0021	.0005	242.3	.85
11.24	.7614	.0026	.0005	164.5	1.11
11.27	.7719	.0032	.0006	108.4	1.40
11.31	.7824	.0039	.0007	69.5	1.69
11.35	.7928	.0046	.0007	43.7	1.99
11.39	.8033	.0054	.0008	26.9	2.30
11.42	.8138	.0062	.0008	16.3	2.60
11.46	.8243	.0071	.0009	9.7	2.91
11.50	.8348	.0081	.0010	5.7	3.21
11.54	.9193	.0178	.0097	3.3	3.84
11.58	1.0041	.0310	.0132	1.9	6.30
11.61	1.0889	.0475	.0165	1.1	11.88
11.65	1.1738	.0670	.0195	.6	20.78
11.69	1.2586	.0893	.0223	.4	32.40
11.73	1.3434	.1142	.0249	.2	45.85
11.76	1.4282	.1416	.0274	.1	60.28
11.80	1.5130	.1714	.0298	.0	75.01
11.84	1.5978	.2033	.0319	.0	89.57
11.88	1.6826	.2373	.0340	.0	103.68
11.92	1.7674	.2733	.0359	.0	117.18
11.95	1.8522	.3110	.0378	.0	130.01
11.99	1.9371	.3506	.0395	.0	142.13
12.03	1.9684	.3656	.0150	.0	152.58
12.07	1.9844	.3734	.0078	.0	156.92
12.11	2.0005	.3812	.0078	.0	151.91

PROJECT : Plateau Mining Co. - Reclaimed Channel 25B 100-Yr Flow Calc
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.14	2.0166	.3891	.0079	.0	138.65
12.18	2.0326	.3971	.0080	.0	120.88
12.22	2.0487	.4051	.0080	.0	102.39
12.26	2.0648	.4131	.0081	.0	85.77
12.29	2.0808	.4213	.0081	.0	72.24

HYDROGRAPH PEAK= 156.92 cfs
TIME TO PEAK= 12.07 Hours
RUNOFF VOLUME= 14.57 Acre-Feet

Check for Supercritical flow must modify Parameters

$D_a = \frac{1}{2}(D + y_n)$ Assume $n = 0.027$, $S = 9.7\%$

Pipe Flow Calc: $D = 60''$

$\frac{Qn}{1.49 S^{1/2}} = 9.12$

y	$AR^{2/3}$	
3	15.31	
2.5	11.39	
2.0	7.68	A = 8.3
2.1	8.39	R = 1.2
2.2	9.12 ⇒	V = 18.9

$D_a = 0.5(5 + 2.2) = 3.6$

$y_t / D_a = 0.95 / 3.6 = 0.26$

$Q / D_a^{(1.5)} = 156.9 / (3.6)^{1.5} = 22.97$

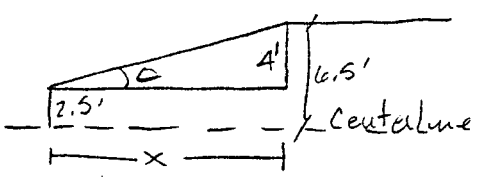
from Figure 5-7 - Design Still falls in Concrete Basin Range.

GROUT TYPE VH RIPRAP -

DOWNSTREAM CHANNEL ALREADY USING TYPE VH - DRAW DETAILS.

Expansion factor: from fig 5-9

$\frac{1}{2\tan\theta} = 2.6$ $\theta = \tan^{-1}\left(\frac{1}{2(2.6)}\right) = 10.9\%$



$\tan(10.9) = \frac{4}{x}$

$x = 20.8'$

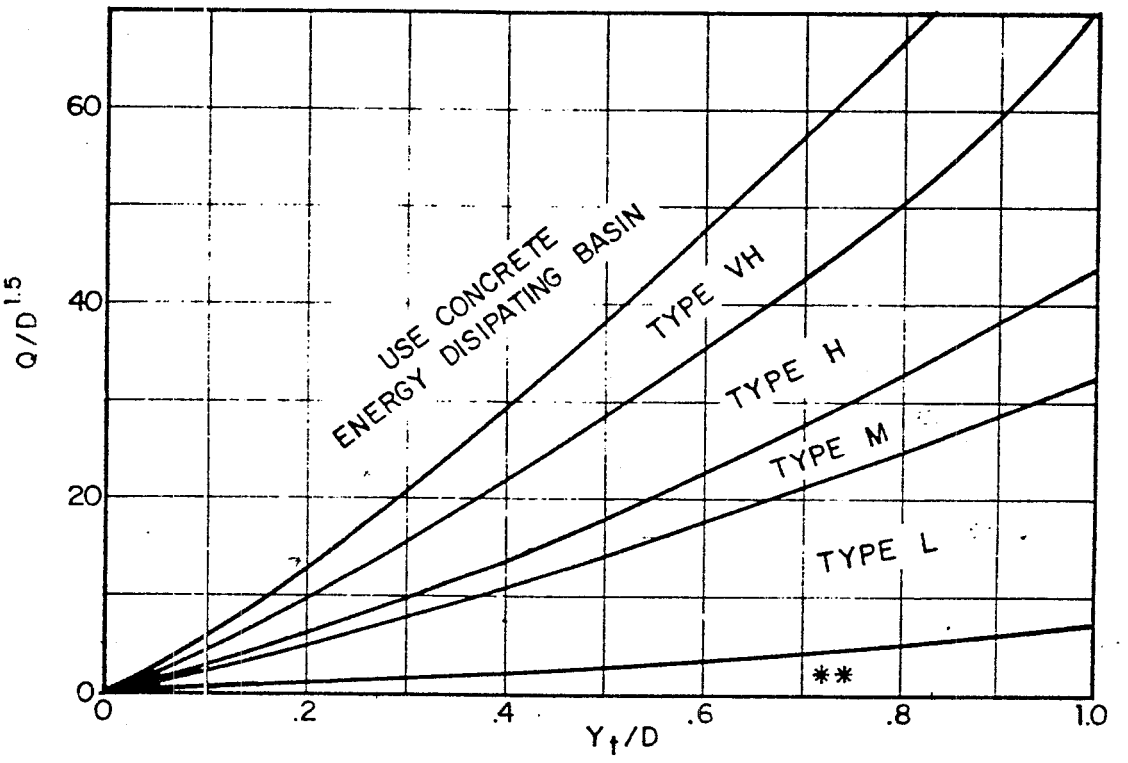
EXTEND RIPRAP DOWNSTREAM

Check using Eqn 5-9 $L = (1/(2\tan\theta))(A_t/y_t - W)$

$A_t = 156.9/10.2 = 15.38$ (10.2 is normal vel in downstream section)

$y_t = 0.97'$, $W = D = 5'$

$L = \left(\frac{1}{2\tan(10.9)}\right)\left(\frac{15.38}{0.97} - 5\right) = 28.2\text{ ft}$ USE $\underline{X = 30'}$



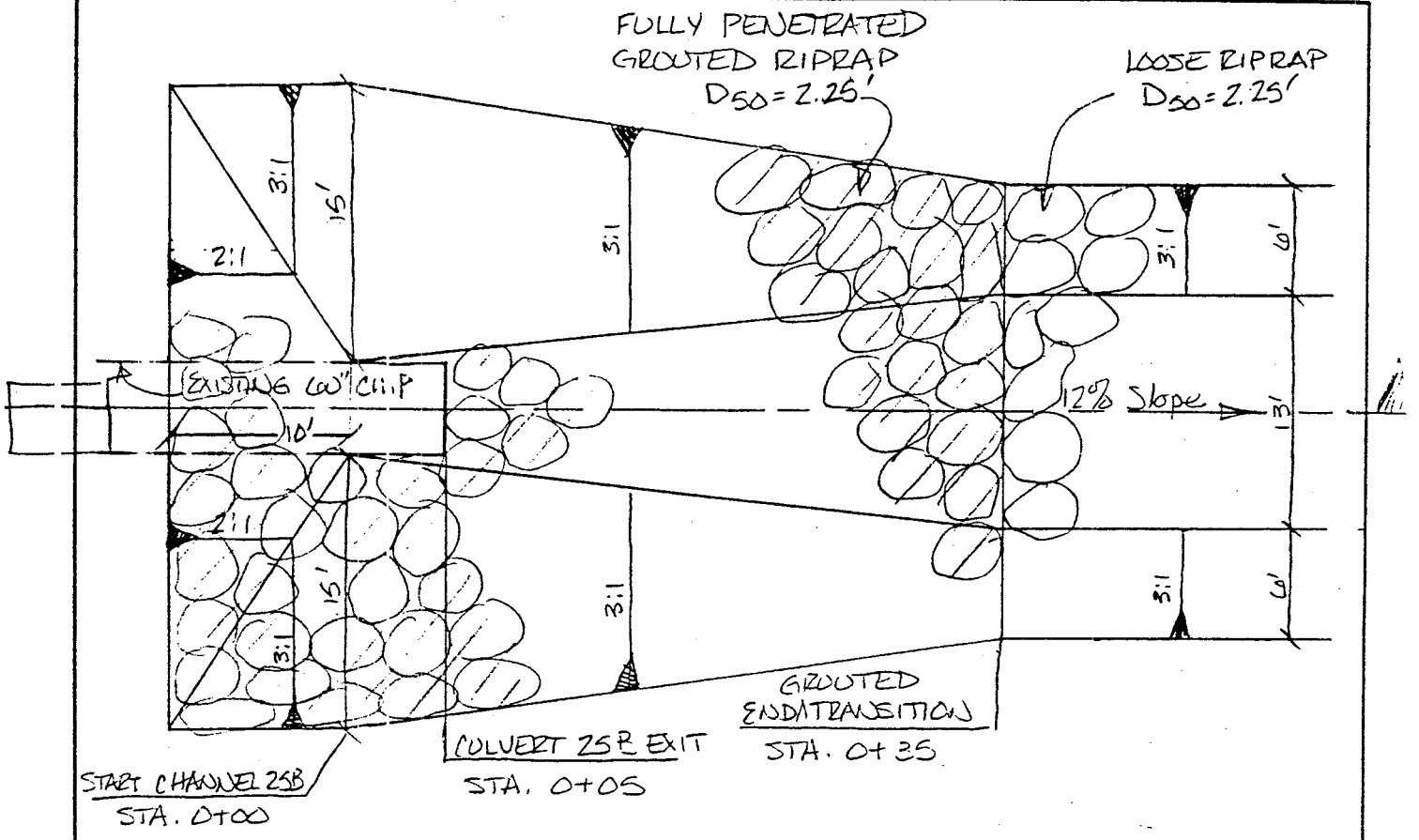
Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

FIGURE 5-7. RIPRAP EROSION PROTECTION AT CIRCULAR CONDUIT OUTLET.

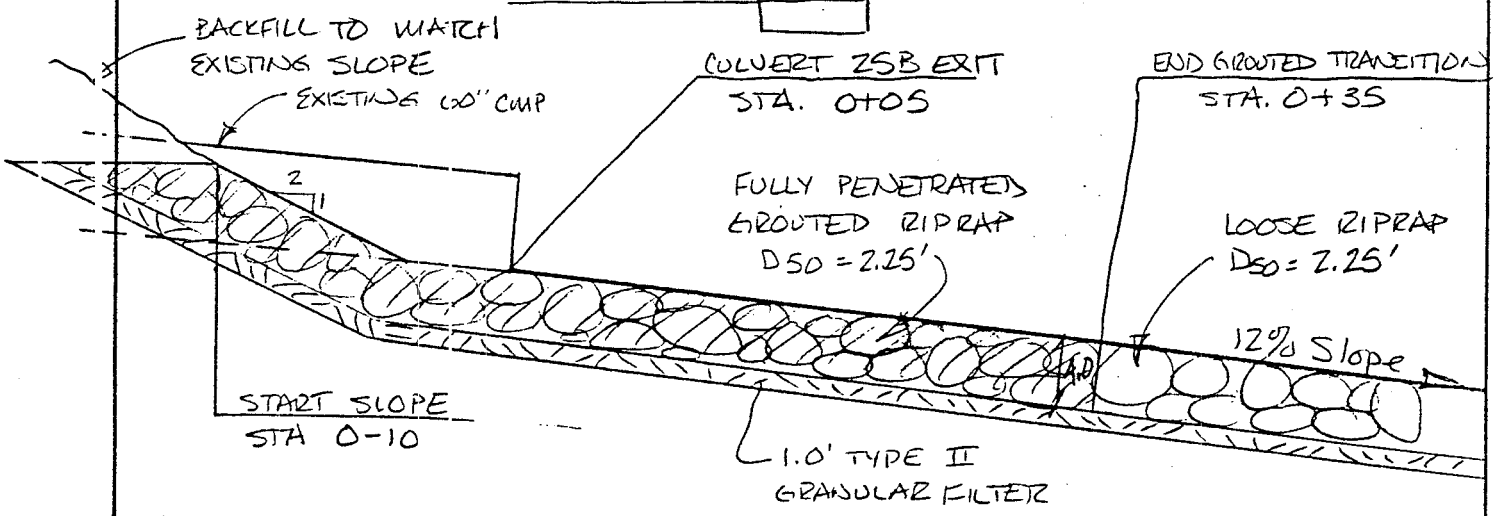
HANSEN ALLEN & LUCE inc

CLIENT: PLATEAU
PROJECT: CHANNEL RECLAMATION
FEATURE:
PROJECT NO.: 2-7-5

SHEET 7 OF 21
COMPUTED: DEH
CHECKED:
DATE: 25 MARCH



DETAIL



TYPICAL SECTION

Channel 4A DESIGN

Reclaimed Slope

Avg. Channel Slope = 3.1% Q_{100} = 21.5 cfs

Try Riprap Channel, Assume D_{50} = 1.0', n = .04, b = 5', m = 3

$\frac{Qn}{1.49 S^{1/2}}$ = 1.04

y	$AR^{2/3}$	
0.2	0.36	A = 2.26
0.3	0.71	P = 7.3
0.35	0.94	R = 0.31
0.37	1.03 ⟹	V = 9.5

Riprap: ϕ = 42°, S.G. = 2.65

for S.F. = 1.2, D_{50} = 3.1' TOO LARGE

Natural Channel width ~ 4' if channel widened to 10', n = 0.046, (based on D_{50} ~ 2.5')

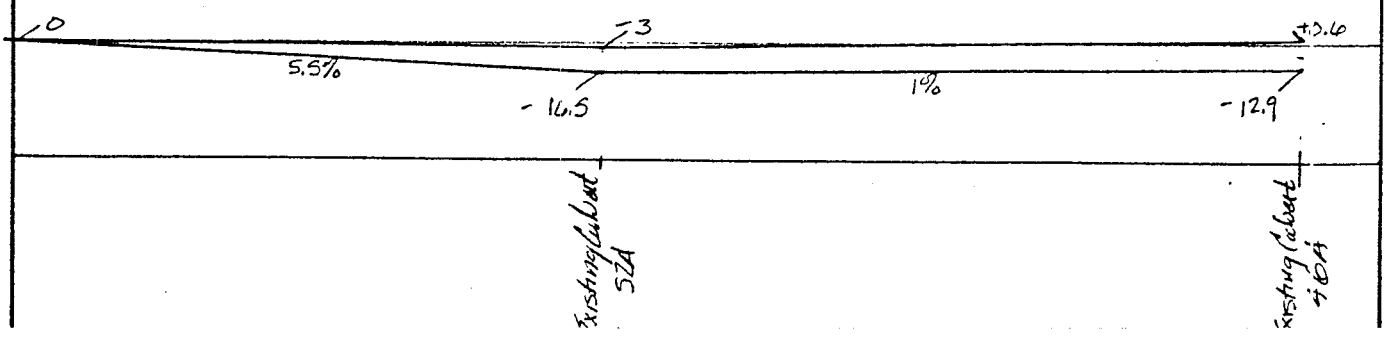
flow depth would be ~ 0.28 and D_{50} Riprap Size w/ SF = 1.2 would be 2.50'. Problem is channel design is much larger than natural channel, and riprap size is still extreme.

Check to see if drainage Area can be reduced.

Reroute diversion ditches 52 + 53 to East into drainage presently handled by ditch 46. Road fill would be required to redirect flow to East.

Grade Check.

Ditch #	Approximate Min S	Max S	Length
52	1%	1%	360'
53	1%	5.5%	300'



BY FILLING IN ROAD BASE, THE FLOW CAN BE RE-ROUTED AWAY FROM CULVERT 52A TO 46A.

Calculate 100yr flow based on Reduced Area

Planimeter Rdg.- 617
Area (ac) = 8.6ac
Contour Int. 50'
Contour Length = 5620
Hyd Length - 1,040 ft

$$\text{Avg Slope} = \frac{100 * 50 * 5620}{43560 * 8.6} = 75.0\%$$

Precip = 2.95in Q_{100} = 8.8cfs
ΔD = 0.01628

Recalculate flow/Riprap Characteristics

Try b=4', m=3, n=.04, S=.31

$$\frac{Qn}{1.49S^{1/2}} = 0.43$$

y	$AR^{2/3}$
0.3	0.58
0.25	0.42 ⇒

A = 1.2
P = 5.6
R = 0.21
V = 7.4

Riprap: ϕ=42°, SG=2.65

for S.F.=1.2, D_{50}=2.11' (n used is too Small)

Would have to Widen Channel.

Try b=6', m=2, n=0.045

$$\frac{Qn}{1.49S^{1/2}} = 0.48$$

y	$AR^{2/3}$
0.2	0.42
0.21	0.45
0.22	0.49 ⇒

A = 1.4
P = 7.0
R = 0.20
V = 6.2

Riprap: ϕ=42, SG=2.65

for S.F.=1.2, D_{50}= 1.86ft ⇒ 2.0' (24")

Channel depth = 1.0' (freeboard ~0.78') Riprap type VH

% Passing	Size
70-100	42
50-70	33
35-50	24
2-10	9

Dmax = 42" (3.5')

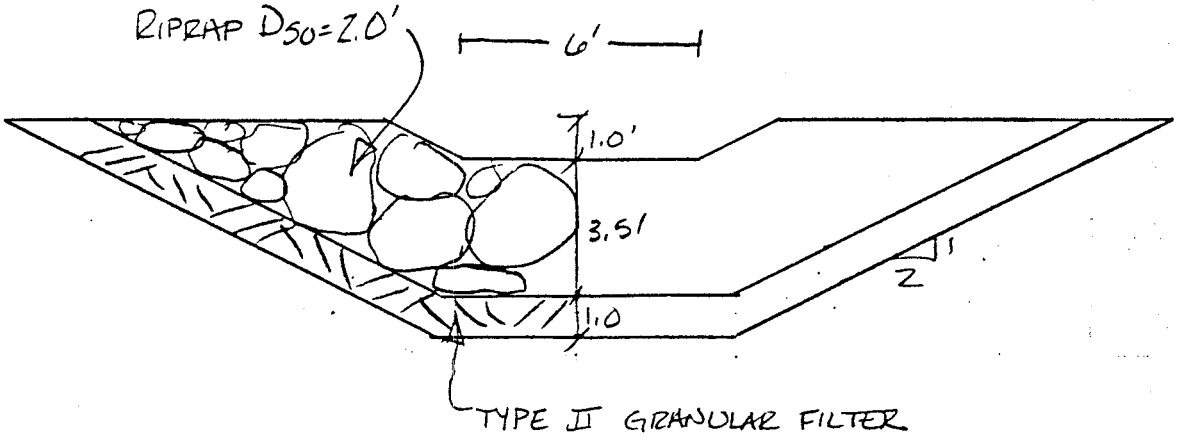
PROJECT : Plateau Mining Co. - Channel 4A 100-Yr Flow Calculation

AREA= 8.6 ACRES
AVERAGE BASIN SLOPE= 75.0 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1040. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0489 HOURS QPCFS= 133.13 CFS QPIN=15.3522 INCHES
CN= 75.6709 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.83	.6638	.0000	.0000	.0	.00
10.84	.6668	.0000	.0000	27.0	.00
10.86	.6699	.0000	.0000	102.0	.00
10.88	.6730	.0000	.0000	133.1	.00
10.89	.6761	.0000	.0000	112.5	.00
10.91	.6791	.0000	.0000	74.8	.00
10.93	.6822	.0000	.0000	42.8	.00
10.94	.6853	.0001	.0000	22.1	.00
10.96	.6884	.0001	.0000	10.6	.01
10.97	.6914	.0002	.0000	4.8	.01
10.99	.6945	.0002	.0000	2.0	.02
11.01	.6982	.0003	.0000	.8	.02
11.02	.7027	.0004	.0000	.3	.03
11.04	.7073	.0005	.0001	.1	.03
11.06	.7118	.0006	.0001	.0	.04
11.90	1.7381	.2606	.0154	.0	7.67
11.92	1.7746	.2764	.0158	.0	7.87
11.94	1.8112	.2925	.0161	.0	8.06
11.95	1.8477	.3090	.0164	.0	8.25
11.97	1.8842	.3257	.0168	.0	8.43
11.98	1.9207	.3428	.0171	.0	8.61
12.00	1.9561	.3597	.0169	.0	8.78
12.02	1.9630	.3630	.0033	.0	8.52
12.03	1.9699	.3663	.0033	.0	7.20
12.05	1.9769	.3697	.0033	.0	5.43
12.07	1.9838	.3730	.0034	.0	3.92
12.08	1.9907	.3764	.0034	.0	2.91
12.10	1.9976	.3798	.0034	.0	2.34

HYDROGRAPH PEAK= 8.78 cfs
TIME TO PEAK= 12.00 Hours
RUNOFF VOLUME= .67 Acre-Feet



TYPICAL SECTION — 6
STA. 0+00 TO STA. 3+50 — 4

Check Capacity on Culvert 46A with diverted Flows. (10 yr)

Qdesign for Culvert 52A = 0.07 Culvert Size = 15"
Qdesign for Culvert 46A = 0.00 Culvert Size = 15"
Qdesign for Culvert 46B = 6.2 Culvert Size = 30"

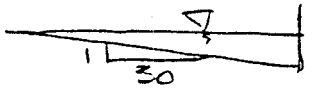
Min Capacity for Culvert 46A = 6.0 cfs >> 0.07+0.0 OK
Min Capacity for Culvert 46B = 53 cfs >> 6.2+0.07+0.0 OK

(Taken from "Surface Water & Sedimentation Control Facilities Maps A&B)

NOTE: Flows are not 100-yr flows due to continued maintenance obligation of County when road is transfered, - Need to Check 100 yr design (See Sheets 8A thru 8C)

Reclaimed ditch 53 design, Q = 0.07 cfs (based on Culvert 46A & 52A flows above)

Assume a 1% Slope for depth
2% Slope for erosion protection



$M_1 = 30$; $M_2 = 0$, $n = .03$
$S = .02$

$\frac{Qn}{1.49 S^{1/2}} = 0.010$

Y	$AR^{2/3}$
0.1	0.02
0.08	0.011

A = 0.10
P = 2.5
R = 0.04
V = 0.7 << 5 fps OK

CALCULATION OF 100 yr EVENTS

Area (ac) = 13.65 ac
CN = 75
Precipitation (in) = 2.95 in
Hyd. Length, (ft) = 1400'
Slope (%),
Contour Interval = 50'
Contour Length = 9,300'

$$S = \frac{50 * 100 * 9300}{43560 * 13.65} = 78.2\%$$

$Q_{100} = 13.7$ cfs

Check Roadway for Channel design $M_1 = 30$, $M_2 = 0$, $n = .03$, $S = .02$, $b = 0$

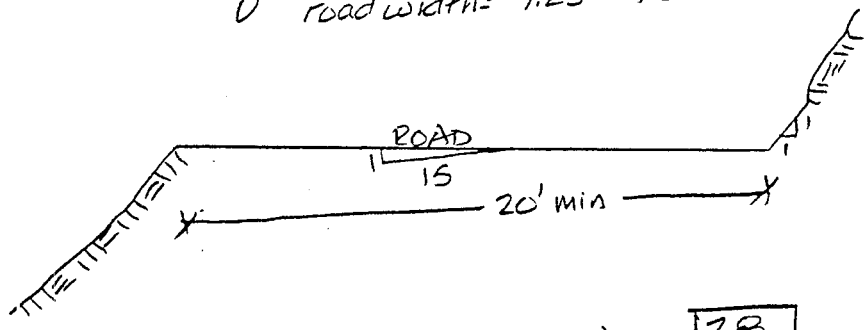
$$\frac{Q \cdot n}{1.49 S^{1/2}} = 1.96$$

Y	$AR^{2/3}$	
0.1	0.02	
0.5	1.46	
0.6	2.37	A = 4.7
0.52	1.62	P = 17.4
0.54	1.79	R = .27
0.56	1.97 ⇒	V = 2.9

Use ½' freeboard. Total depth = 1.06'
If $M_1 = 30$, then road must be 30' wide to have a 1.0' depth. Change M_1 to 15:

Y	$AR^{2/3}$	
0.7	1.75	A = 4.0
0.75	2.10	P = 11.7
0.73	1.95 ⇒	R = 0.34
		V = 3.4 < 5 fps ok

Reqd depth = 1.25' (0.5' freeboard)
road width = 1.25' * 15 = 18.75' USE 20' width



TYPICAL SECTION

PROJECT : Plateau Mining Company - Ditch 46 100-Yr Flow Calculation

AREA= 13.6 ACRES
AVERAGE BASIN SLOPE= 78.2 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1400. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0607 HOURS QPCFS= 170.11 CFS QPIN=12.3585 INCHES
C3= 60.9152 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.83	.6644	.0000	.0000	.0	.00
10.85	.6672	.0000	.0000	16.2	.00
10.86	.6701	.0000	.0000	83.3	.00
10.88	.6730	.0000	.0000	148.0	.00
10.89	.6758	.0000	.0000	170.1	.00
10.91	.6787	.0000	.0000	154.0	.00
10.92	.6816	.0000	.0000	120.0	.00
10.94	.6844	.0000	.0000	84.2	.00
10.95	.6873	.0001	.0000	54.7	.01
10.97	.6902	.0002	.0000	33.6	.02
10.98	.6930	.0002	.0000	19.7	.02
11.00	.6959	.0003	.0000	11.1	.03
11.01	.6999	.0003	.0000	6.1	.03
11.03	.7041	.0004	.0000	3.2	.04
11.04	.7084	.0005	.0000	1.7	.04
11.06	.7126	.0006	.0001	.9	.05
11.07	.7168	.0007	.0001	.4	.07
11.09	.7210	.0009	.0001	.2	.08
11.10	.7252	.0010	.0001	.1	.09
11.12	.7294	.0012	.0001	.0	.10
11.92	1.7847	.2808	.0148	.0	12.26
11 94	1.8188	.2959	.0151	.0	12.55
11 95	1.8528	.3113	.0154	.0	12.84
11 97	1.8868	.3269	.0156	.0	13.11
11 98	1.9208	.3429	.0159	.0	13.39
12 00	1.9548	.3590	.0162	.0	13.65
12 01	1.9621	.3625	.0035	.0	13.70
12 03	1.9685	.3657	.0031	.0	12.87
12 04	1.9750	.3688	.0031	.0	11.14
12 06	1.9814	.3719	.0031	.0	9.06
12 08	1.9879	.3750	.0031	.0	7.14
12.09	1.9943	.3782	.0031	.0	5.62
12.11	2.0008	.3813	.0032	.0	4.54

HYDROGRAPH PEAK= 13.70 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= 1.06 Acre-Feet

HANSEN ALLEN & LUCE INC

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE
PROJECT NO. 2-7-5

SHEET 14 OF 21
COMPUTED DEH
CHECKED
DATE 1 APR 88

CHECK CULVERT CAPACITIES.

Q_{100} = 13.7cfs.

EXISTING CMP = 15"
Inlet Capacity = 6cfs < 13.7

Redesign Culvert:

USE 24" CMP w/ HW to Depth Ratio = 1.5

Inlet Capacity = 17cfs > 13.7cfs - OK.

Headwater Depth = 36"

depth: $\frac{Qn}{1.49S^{1/2}} = 0.014$

y	$AR^{2/3}$
0.1	0.020
0.08	0.011
0.09	0.015 ⇒

A = 0.12
P = 2.8
R = 0.04
V = 0.6

USE Channel depth = 0.5'
No Lining Reqd.

CHANNEL 63A - DESIGN

Subtract out Area from Channel 4A now diverted
Planimeter = 4265 @ 30 Scale
Area = 1.19 ac
Hyd Length = 3150 ft (remains unchanged)
Slope
was 70.3%; Old Contour Length $= \frac{43560 * 127 * 70.3}{100 * 50} = 77,781'$
Contour Length of Area Subtracted = 2000'

New Slope = $\frac{100 * 50 * 75781}{43560 * 113.6} = 76.6\%$

P = 29.5"

$Q_{100} = 110.3$ cfs

Slope Into Culvert 63A is Approx 6.5% (10'/150')

Design Channel with, b = 10', m = 3, n = 0.04, S = 0.065

$\frac{Qn}{1.49S^{1/2}} = 11.65$

y	$AR^{2/3}$
1.0	11.17 ⇒
1.1	13.26

A = 13.0
P = 16.3
R = 0.8
V = 8.1

Riprap: $\phi = 42°$, SG = 2.65, S = .065

for S.F. = 1.2, D_{50} = 1.09' USE 1.25' D_{50} SF = 1.36

Channel depth = 2.0' (1.0' freeboard)

Riprap Type M

% Passing	Size (in)
70-100	21
50-70	18
35-50	12
2-10	4

$D_{max} = 21" = 1.75'$

PROJECT : Plateau Mining Co. - Channel 63A 100-Yr Flow Calculation

16/

AREA= 119.0 ACRES
AVERAGE BASIN SLOPE= 76.6 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 3150. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

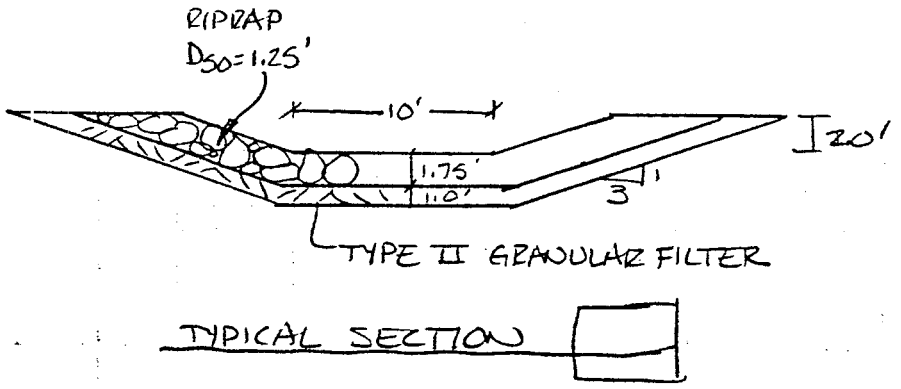
TF= .1173 HOURS QPCFS= 767.18 CFS QPIN= 6.3934 INCHES
CI= 31.5131 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.84	.6658	.0000	.0000	.0	.00
10.86	.6702	.0000	.0000	38.5	.00
10.89	.6746	.0000	.0000	238.3	.00
10.91	.6791	.0000	.0000	509.3	.00
10.93	.6835	.0000	.0000	704.3	.02
10.96	.6879	.0001	.0000	767.2	.04
10.98	.6924	.0002	.0000	718.7	.07
11.00	.6971	.0003	.0000	606.6	.10
11.03	.7036	.0004	.0001	474.5	.15
11.05	.7101	.0006	.0002	350.1	.21
11.07	.7166	.0007	.0002	246.8	.29
11.10	.7231	.0009	.0002	167.6	.39
11.12	.7296	.0012	.0002	110.4	.50
11.14	.7361	.0014	.0003	70.8	.61
11.17	.7426	.0017	.0003	44.5	.74
11.19	.7491	.0020	.0003	27.4	.86
11.21	.7556	.0023	.0003	16.6	.99
11.24	.7621	.0027	.0003	9.9	1.11
11.26	.7686	.0030	.0004	5.9	1.23
11.28	.7751	.0034	.0004	3.4	1.36
11.31	.7816	.0038	.0004	2.0	1.48
11.33	.7881	.0043	.0004	1.1	1.60
11.36	.7946	.0047	.0005	.6	1.72
11.38	.8011	.0052	.0005	.4	1.84
11.40	.8076	.0057	.0005	.2	1.96
11.43	.8142	.0062	.0005	.1	2.08
11.45	.8207	.0068	.0006	.0	2.20
11.89	1.7195	.2527	.0219	.0	88.47
11.92	1.7721	.2753	.0226	.0	93.07
11.94	1.8247	.2986	.0233	.0	97.49
11.97	1.8773	.3225	.0240	.0	101.75
11.99	1.9299	.3472	.0246	.0	105.85
12.01	1.9609	.3620	.0148	.0	109.39
12.04	1.9709	.3668	.0048	.0	110.30

PROJECT : Plateau Mining Co. - Channel 63A 100-Yr Flow Calculation
(Continued)

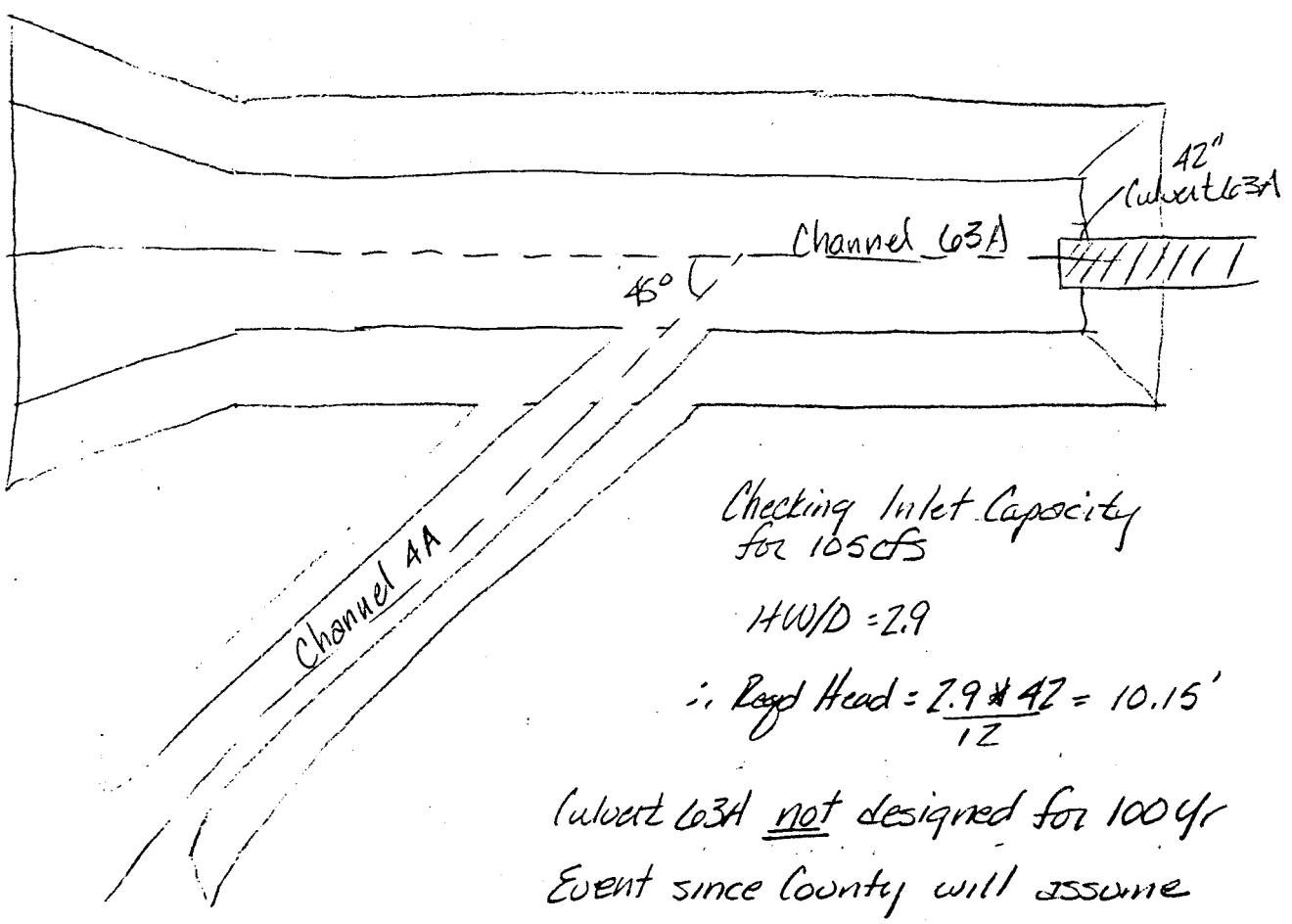
TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.06	1.9808	.3716	.0048	.0	106.10
12.08	1.9908	.3765	.0049	.0	96.73
12.11	2.0008	.3813	.0049	.0	84.22
12.13	2.0107	.3862	.0049	.0	71.05
12.15	2.0207	.3911	.0049	.0	59.04
12.18	2.0307	.3961	.0049	.0	49.12

HYDROGRAPH PEAK= 110.30 cfs
TIME TO PEAK= 12.04 Hours
RUNOFF VOLUME= 9.20 Acre-Feet



TYPICAL SECTION

SCHEMATIC OF JUNCTION BTWN 4A & 63A



Checking Inlet Capacity for 105 cfs

HW/D = 2.9

∴ Reqd Head = $\frac{2.9 * 42}{12}$ = 10.15'

Culvert 63A <u>not</u> designed for 100 yr Event since County will assume maintenance upon reclamation

Check Side Riprap Protection Needs for Junction.

Since normal flow depth is only 0.22' - No add'l protection (enlarged riprap) is required. If no flow exists in 63A, energy will be dissipated quickly.

Superelevation $\Delta y = \frac{V^2 T}{g R_o}$ $R_o \sim 60'$

8.8cfs under normal flow in 10' Channel @ 6.5% Slope
$n = .041$

$\frac{Qn}{1.49 S^{1/2}} = 1.03$

Y	$AR^{2/3}$
0.5	3.31
0.3	1.38
0.25	1.02

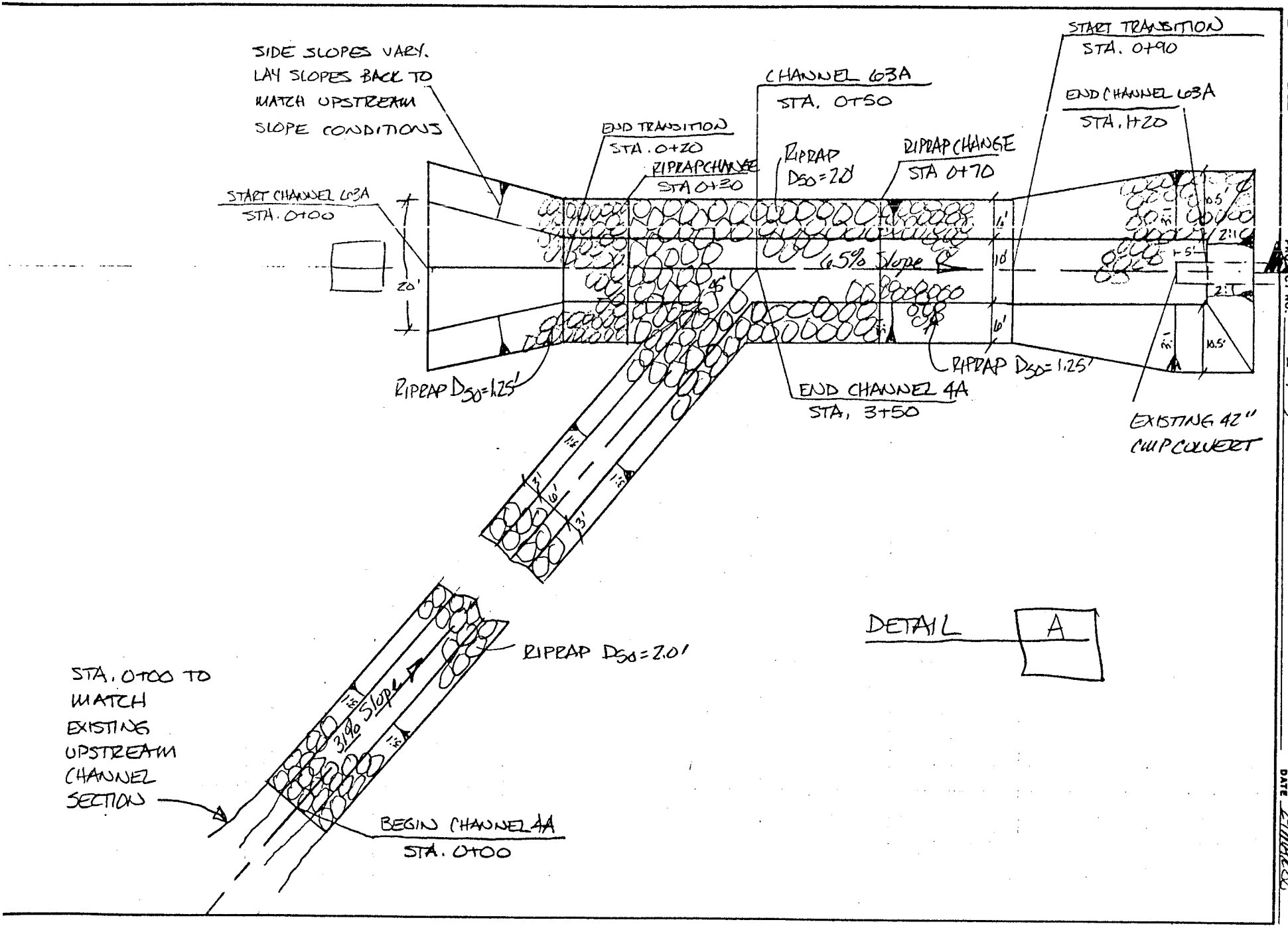
$\Rightarrow$ A = 2.7, P = 11.6, R = 0.2, V = 3.27

$T = b + 2my = 10 + 2(3).25 = 11.5'$

$\Delta y = (3.3)^2 11.5 / 60g = 0.065'$ Negligible

WITHIN JUNCTION:

EXTEND Channel 4A RIPRAP UPSTREAM 10' and DOWNSTREAM 20' INTO CHANNEL 63A.



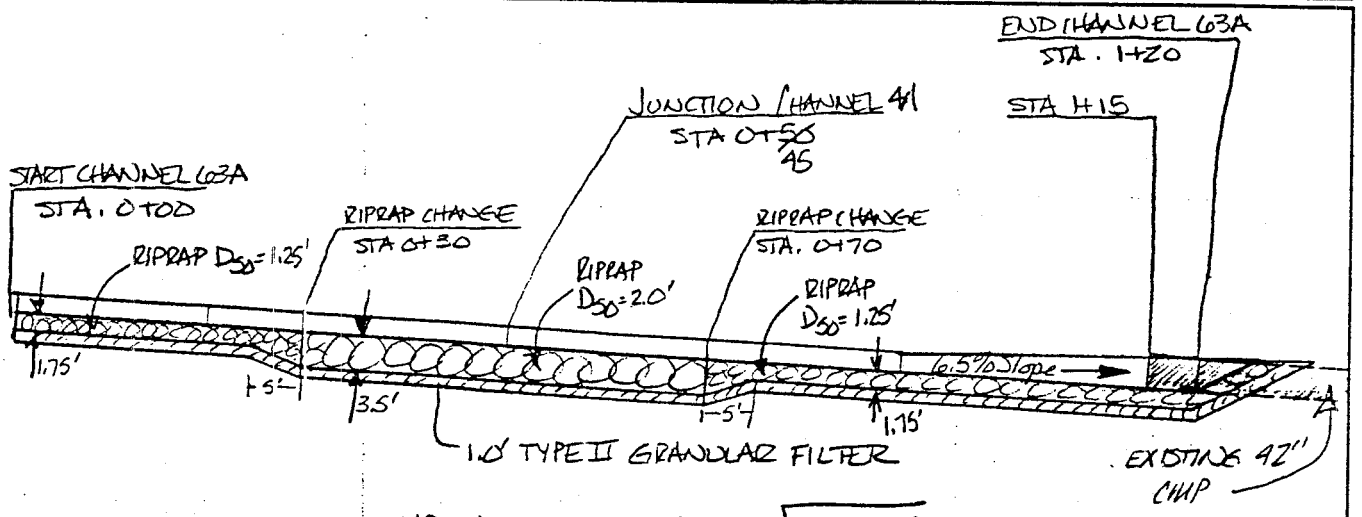
HANSEN ALLEN & LUCE INC

CLIENT
PROJECT PLANTING CHANNEL RECLAMATION
FEATURE
PROJECT NO. 2-7-5
SHEET 20 OF 21
COMPUTED DEF
CHECKED
DATE 29 MAR 88

HANSEN ALLEN & LUCE inc

CLIENT: PLATEAU
PROJECT: CHANNEL RECLAMATION
FEATURE:
PROJECT NO.: 2-7-5

SHEET 21 OF 21
COMPUTED: DEH
CHECKED:
DATE: 29 MAR 88



TYPICAL SECTION
STA. 0+00 TO STA. 1+20

Design Calculations for Channel 51

HANSEN ALLEN & LUCE inc

CLIENT Plateau
PROJECT Reclamation
FEATURE Channel 51
PROJECT NO. 2-7-5

SHEET 1 OF 3
COMPUTED DEH
CHECKED
DATE 24 May 88

Reclaimed Ditch 51 - (Moved to the West)

Overall Slope = 12/240' = 5%

Area = 49%*.02792 = 13.9 ac
Contour Int = 50'
Contour Length = 45.2*200 = 9040'
Slope = $\frac{100*50*9040}{43560*13.9}$ = 74.7%
Hydraulic Length = 1340'
CN = 75
P = 2.95 in $\qquad Q_{100}$ = 13.9 cfs

Try b = 5', m = 3, n = .04, S = .05

$\frac{Qn}{1.49S^{1/2}}$ = 1.67

Y	$AR^{2/3}$
0.5	1.76
0.49	1.70 ⇒
0.48	1.64

A = 3.2
P = 8.1
V = 4.4 fps

Since Velocity is on high side: Design Riprap

S = .05, ∡ = 42°, d = .5, SG = 2.65

for SF = 1.5, D_{50} = 0.52 ft Try D_{50} = 0.5' ⇒ SF = 1.44' ✗

Decrease Channel Width

Try b = 2', m = 3, n = .035, S = .05

$\frac{Qn}{1.49S^{1/2}}$ = 1.46

Y	$AR^{2/3}$
0.7	1.68
0.65	1.44 ⇒

A = 2.6
P = 6.1
V = 5.4

Riprap ⇒ S = .05, ∡ = 42°, d = 0.65, SG = 2.65

for SF = 1.5, D_{50} = 0.68 ⇒ D_{50} = 0.75'

Depth = 0.65 + 1.0 = 1.65' ⇒ USE 1.75'

TYPE "L" Riprap

% Smaller by wt	Rock Size (in)
70-100	15
50-70	12
35-50	9
2-10	3

USE 1.0' Type II Granular Filter. - D_{max} = 15"

PROJECT : Plateau Mining Company - Reclaimed Ditch 51 - 100 Yr Flow

AREA= 13.9 ACRES
AVERAGE BASIN SLOPE= 74.7 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1340. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0600 HOURS QPCFS= 175.34 CFS QPIN=12.5096 INCHES
C3= 61.6597 ITERATIONS= 8 SCS 24-hour

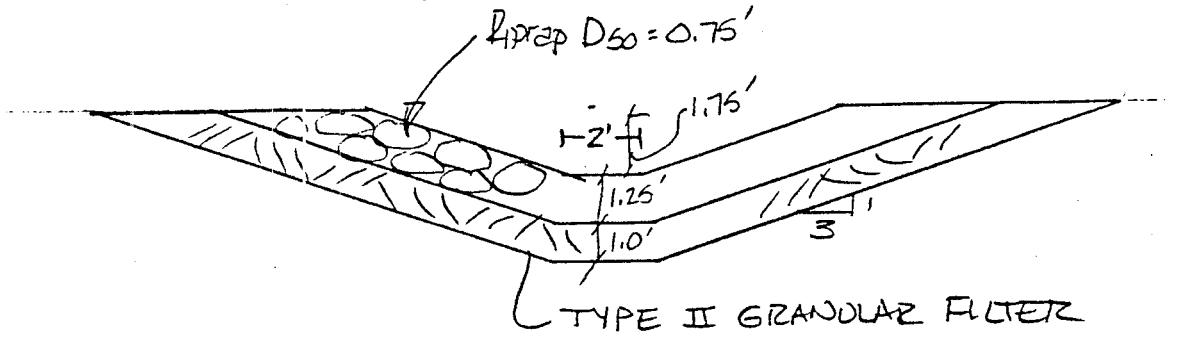
TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.84	.6653	.0000	.0000	.0	.00
10.85	.6681	.0000	.0000	16.7	.00
10.87	.6710	.0000	.0000	85.9	.00
10.88	.6738	.0000	.0000	152.5	.00
10.90	.6766	.0000	.0000	175.3	.00
10.91	.6794	.0000	.0000	158.8	.00
10.93	.6823	.0000	.0000	123.6	.00
10.94	.6851	.0001	.0000	86.7	.01
10.96	.6879	.0001	.0000	56.4	.01
10.97	.6908	.0002	.0000	34.6	.02
10.99	.6936	.0002	.0000	20.3	.02
11.00	.6965	.0003	.0000	11.4	.03
11.02	.7007	.0003	.0000	6.3	.03
11.03	.7048	.0004	.0000	3.3	.04
11.05	.7090	.0005	.0000	1.7	.05
11.06	.7131	.0006	.0001	.9	.06
11.08	.7173	.0008	.0001	.4	.07
11.09	.7215	.0009	.0001	.2	.08
11.11	.7256	.0010	.0001	.1	.09
11.12	.7298	.0012	.0001	.0	.10
11.92	1.7662	.2727	.0145	.0	12.34
11.93	1.7998	.2875	.0147	.0	12.63
11.95	1.8334	.3025	.0150	.0	12.92
11.96	1.8670	.3178	.0153	.0	13.21
11.98	1.9006	.3334	.0156	.0	13.48
11.99	1.9342	.3492	.0158	.0	13.75
12.01	1.9581	.3606	.0114	.0	13.94
12.02	1.9645	.3637	.0031	.0	13.65
12.04	1.9709	.3668	.0031	.0	12.45
12.05	1.9772	.3699	.0031	.0	10.54
12.07	1.9836	.3729	.0031	.0	8.47
12.08	1.9900	.3760	.0031	.0	6.66
12.10	1.9963	.3792	.0031	.0	5.29

HYDROGRAPH PEAK= 13.94 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= 1.08 Acre-Feet

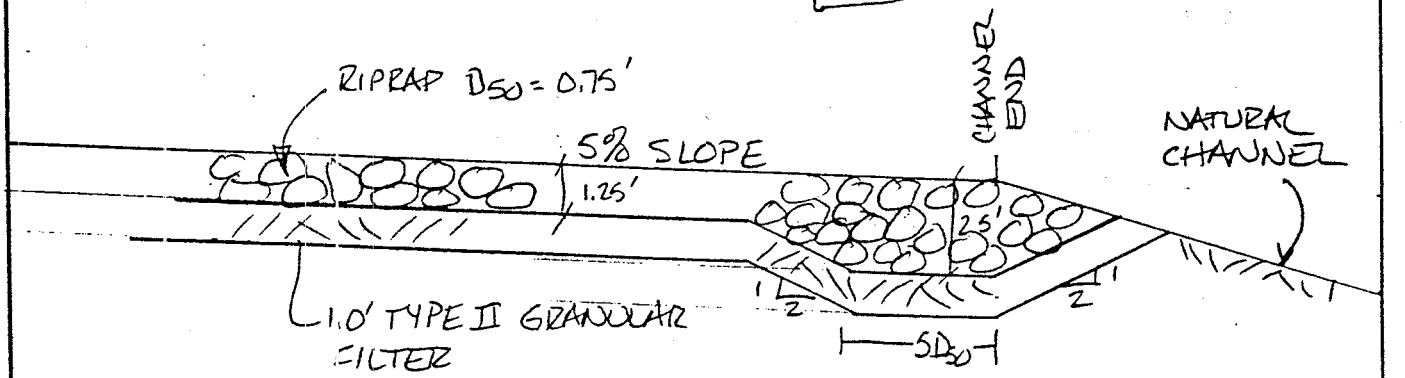
HANSEN ALLEN & LUCE inc

CLIENT Plateau
PROJECT Reclamation
FEATURE
PROJECT NO. 2-7-5

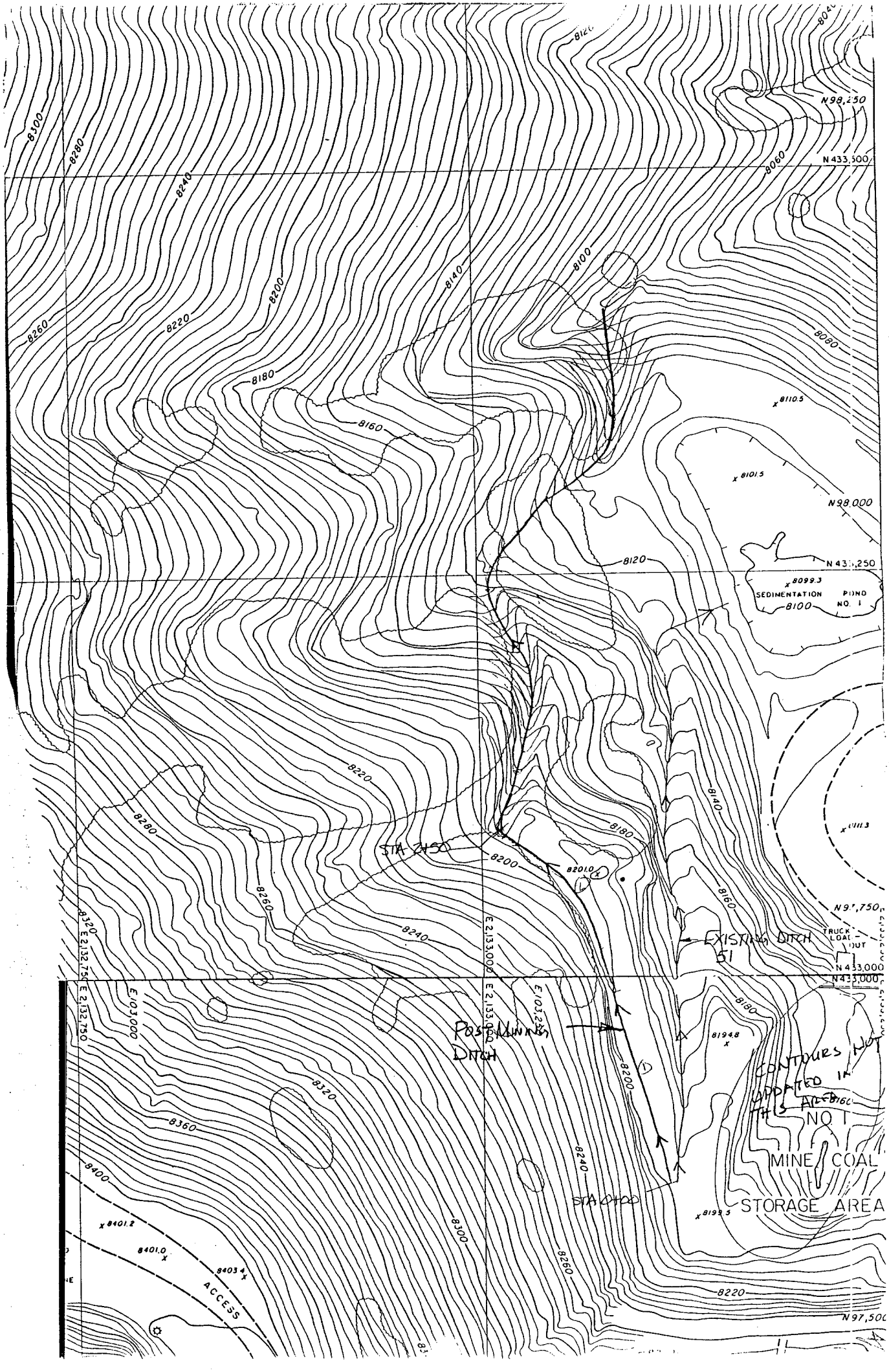
SHEET 3 OF 3
COMPUTED DEA
CHECKED
DATE 25 May 88



TYPICAL SECTION $\frac{3S}{3}$



START STA 0+00
END STA 2+50


N98,250
N433,500
N98,000
N433,250
SEDIMENTATION POND NO. 1
8099.3
8110.5
8101.5
STA 2150
8201.0
EXISTING DITCH 51
TRUCK LOAD-OUT
N433,000
N97,750
E 2,133,000
E 2,132,750
E 103,000
E 103,250
POSSIBLE DITCH
STA 0+00
8194.8
CONTOURS NOT UPDATED IN THIS AREA
NO 1
MINE COAL
STORAGE AREA
8193.5
8401.2
8401.0
8403.4
ACCESS
N97,500

Design Calculations for Channels 25D, 25E, 25F, 81 & 82

HYDRO INPUTS

Channel 25E

	Planimeter Reading	Area (ac)	Contour Interval	Contour Length
Lower Area	242	3.4	50'	1260'
Upper Area	280	3.9	50'	2150'
TOTAL		7.3	50'	3410'

$$\text{AVG SLOPE} = \frac{100 * 50' * 3410'}{\frac{43560\ ft^2}{ac} * 7.3\ ac} = 53.6\%$$

Hydraulic Length = 1450 ft

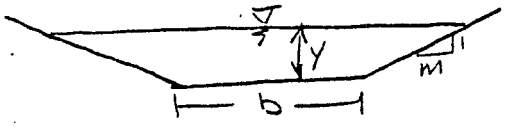
CN for Undisturbed Areas = 75

Rainfall = 2.95 in (100yr, 24 Hr Storm)

Q = 7.2 cfs

Design Channel with Trapezoidal Cross Section

$A = by + my^2 \quad P = b + 2y\sqrt{m^2+1}$ USE $m = 3$



Mannings

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

$$\frac{Qn}{1.49 S^{1/2}} = AR^{2/3}$$

Assume $n = 0.03$, $b = 5ft$, $m = 3$, $S = 34\%$

$$\frac{Qn}{1.49 S^{1/2}} = 0.25$$

Y	$AR^{2/3}$
0.5	1.76
0.1	0.11
0.2	0.35
0.15	0.21
0.16	0.24

$A = 0.85$
$P = 5.72$
$R = 0.15$
$\Rightarrow V = 8.46 > 5.0$ fps

Since Slope is so severe, try widening to get vel < 5 fps then install riprap apron entrance to collect water from Channel 25E drainage.

PROJECT : Plateau Mining Company - Channel 25E 100-Yr Runoff Calculation

AREA= 7.3 ACRES
AVERAGE BASIN SLOPE= 53.6 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1450. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0754 HOURS QPCFS= 73.23 CFS QPIN= 9.9484 INCHES
CN= 49.0358 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.84	.6661	.0000	.0000	.0	.00
10.86	.6689	.0000	.0000	3.7	.00
10.87	.6718	.0000	.0000	22.7	.00
10.89	.6746	.0000	.0000	48.6	.00
10.90	.6775	.0000	.0000	67.2	.00
10.92	.6803	.0000	.0000	73.2	.00
10.93	.6832	.0000	.0000	68.6	.00
10.95	.6860	.0001	.0000	57.9	.00
10.96	.6889	.0001	.0000	45.3	.00
10.98	.6917	.0002	.0000	33.4	.00
10.99	.6946	.0002	.0000	23.6	.00
11.01	.6980	.0003	.0000	16.0	.01
11.02	.7022	.0004	.0000	10.5	.01
11.04	.7063	.0005	.0000	6.8	.02
11.05	.7105	.0006	.0001	4.2	.02
11.07	.7147	.0007	.0001	2.6	.03
11.08	.7189	.0008	.0001	1.6	.03
11.10	.7231	.0009	.0001	.9	.04
11.11	.7272	.0011	.0001	.6	.04
11.13	.7314	.0012	.0002	.3	.05
11.14	.7356	.0014	.0002	.2	.05
11.16	.7398	.0016	.0002	.1	.06
11.17	.7440	.0018	.0002	.0	.06
11.93	1.7902	.2833	.0148	.0	6.38
11.94	1.8241	.2983	.0150	.0	6.54
11.96	1.8579	.3136	.0153	.0	6.69
11.97	1.8917	.3292	.0156	.0	6.84
11.99	1.9255	.3451	.0159	.0	6.99
12.00	1.9565	.3599	.0148	.0	7.13
12.02	1.9629	.3629	.0031	.0	7.20
12.03	1.9693	.3660	.0031	.0	7.00
12.05	1.9757	.3691	.0031	.0	6.46
12.06	1.9821	.3722	.0031	.0	5.67
12.08	1.9885	.3753	.0031	.0	4.80

PROJECT : Plateau Mining Company - Channel 25E 100-Yr Runoff Calculation (Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.09	1.9949	.3785	.0031	.0	3.98
12.11	2.0013	.3816	.0031	.0	3.28

HYDROGRAPH PEAK= 7.20 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= .56 Acre-Feet

Try $b = 10'$ $\quad \frac{Qn}{1.49 S^{1/2}} = 0.25$

y	$AR^{2/3}$
0.2	0.69
0.1	0.22
0.11	0.25 →

$A = 1.14$
$P = 10.7$
$R = 0.11$
$V = 6.3$ fps > 5 fps

Slope is beyond Limits of Riprap Gradation Charts. Extrapolating would give $D_{50} \sim 0.5$ ft, With increased mannings n, perhaps more in the line of 0.75'

Try $n = 0.0395(0.75)^{1/6} = 0.04$, $\underline{b = 10'}$

$\frac{Qn}{1.49 S^{1/2}} = 0.33$

y	$AR^{2/3}$
0.15	0.43
0.14	0.38
0.13	0.34 ⇒

$A = 1.35$
$P = 10.8$
$R = 0.13$
$V = 5.3$ fps

Using Methodology in "Applied Hydrology & Sedimentology for Disturbed Areas" Starting on Pg 185

$$SF = \frac{\cos\theta \tan\phi}{\sin\theta + \eta_b \tan\phi} \qquad \eta_b = 21 R_p^{1/3} / (SG-1) D_{50}$$

ϕ = angle of repose = 42°
θ = Channel Slope = 0.34 ft/ft (θ is in degrees)
SG = Specific Gravity = 2.65

for a $SF \geq 1.2$; $D_{50} \geq 1.3$

USE $\underline{D_{50} = 1.5 \text{ ft}}$, $\underline{SF = 1.29}$ ✓

Use 0.75' freeboard

Total depth = 0.13 + 0.75 = 0.88 ft USE 1.0' Channel depth

Check Side Slope: for $m = 3$, $C = 0.86$

$y = 0.13$; $S = .34$; $D_{50} = 1.5'$, $SG = 2.65$, $m = 3$, $\phi = 42°$

$\tau_{max} = 2.37$, $\eta = 0.32$, $\beta = 20.77$, $\eta' = 0.26$, $SF = 1.6 > 1.2$ ✓

from Drainage Criteria Manual - Table 5-1, Rock type = H

HANSEN ALLEN & LUCE INC

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE
PROJECT NO. 2-7-5

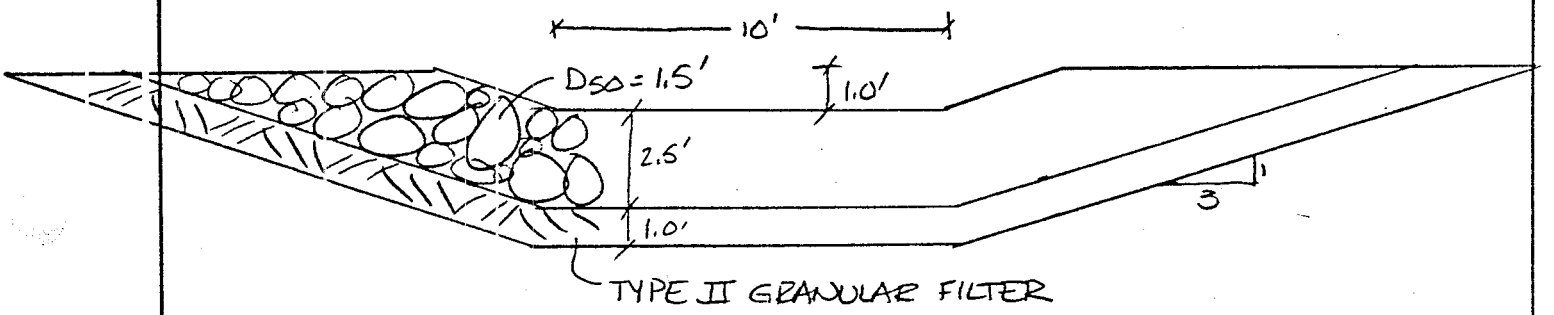
SHEET 5 OF 48
COMPUTED DEH
CHECKED
DATE 21 MAR 88

TYPE H RIPRAP

% SMALLER BY WT	ROCK SIZE (in)	D50 (in)
100	30	
50-70	24	
35-50	18	18
2-10	6	

Dmax = 30" = 2.5'

USE 12" TYPE II BEDDING



TYPICAL SECTION	1A
STA 0+20 TO STA 0+50	2

Table 5-1

CLASSIFICATION AND GRADATION OF ORDINARY RIPRAP

Riprap Designation	% Smaller Than Given Size By Weight	Intermediate Rock Dimension (Inches)	d_{50}* (Inches)
Type VL	70-100	12 2 D50	
	50-70	9 1.5 D50	
	35-50	6	6**
	2-10	2 D50/3	
Type L	70-100	15 1.67 D50	
	50-70	12 1.33	
	35-50	9	9**
	2-10	3 D50/3	
Type M	70-100	21 1.75 D50	
	50-70	18 1.5 D50	
	35-50	12	12
	2-10	4 D50/3	
Type H	100	30 1.67	
	50-70	24 1.33	
	35-50	18	18
	2-10	6 D50/3	
Type VH	100	42 1.75	
	50-70	33 1.38	
	35-50	24	24
	2-10	9 D50/2.67	

*d_{50} = Mean particle size

** Bury types VL and L with native top soil and revegetate to protect from vandalism.

5.2 Wire Enclosed Rock

Wire enclosed rock refers to rocks that are bound together in a wire basket so that they act as a single unit. One of the major advantages of wire enclosed rock is that it provides an alternative in situations where available rock sizes are too small for ordinary riprap. Another advantage is the versatility that results from the regular geometric shapes of wire enclosed rock. The rectangular blocks and mats can be fashioned into almost any shape that can be

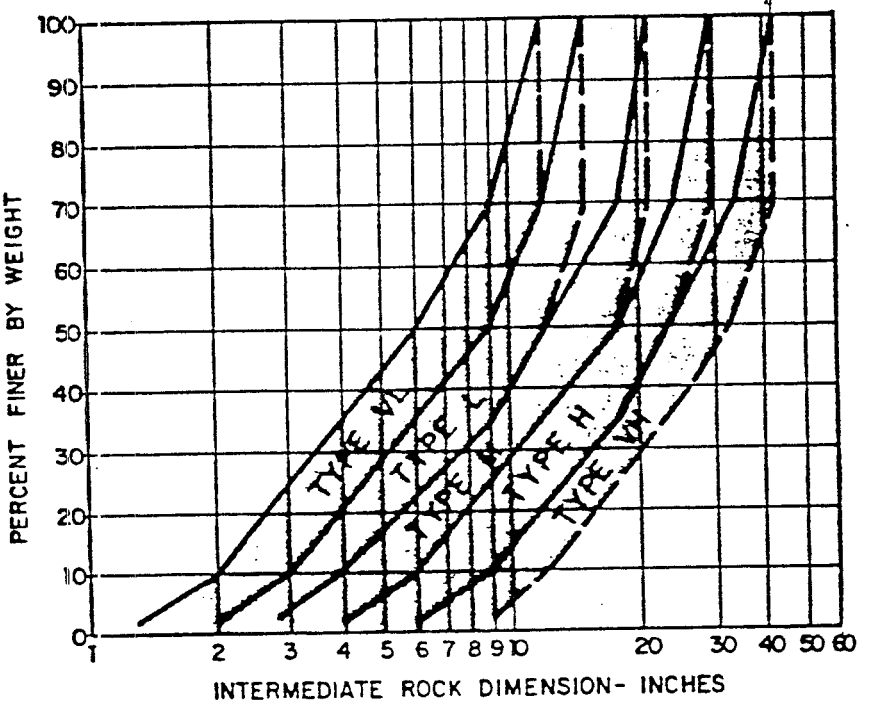


FIGURE 5-1. GRADATION OF ORDINARY RIPRAP

grouted riprap or wire encased riprap applications. The second utilizes a design procedure developed by Terzaghi, which is referred to as the T-V (Terzaghi-Vicksburg) design (7)(19). The T-V filter criteria establishes an optimum bedding gradation for a specific channel soil. The latter requires channel soil information, including a gradation curve, while the Type I and Type II bedding specifications given in Table 5-3 (and Figure 5-2) are applicable whether or not soil information is available.

Table 5-3
GRADATION FOR GRANULAR BEDDING

U. S. Standard Sieve Size	Percent Weight By Passing Type I	Square Mesh Sieves Type II
3"	-	90 - 100
1-1/2"	-	-
3/4"	-	20 - 90
3/8"	100	-
#4	95 - 100	0 - 20
#16	45 - 80	-
#50	10 - 30	-
#100	2 - 10	-
#200	0 - 2	0 - 3

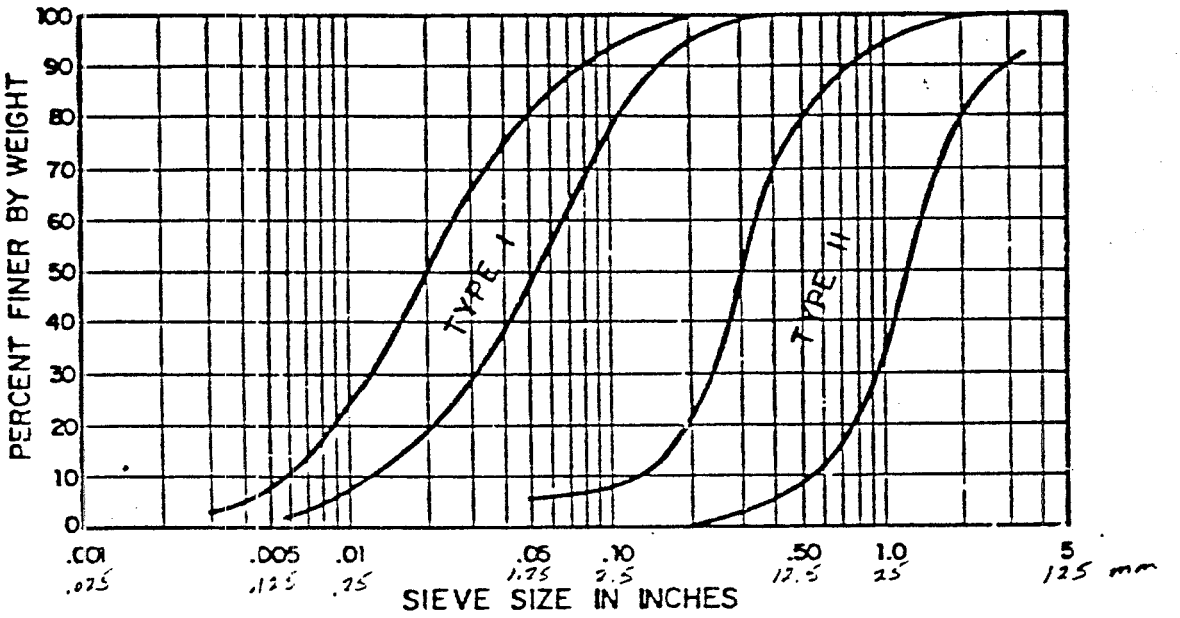


FIGURE 5-2. GRADATION CURVES FOR GRANULAR BEDDING

Table 5-4

THICKNESS REQUIREMENTS FOR GRANULAR BEDDING

Riprap Designation	Minimum Bedding Thickness (Inches)		
	Fine Grained Soils*		Course Grained Soils**
	Type I	Type II	Type II
L, G, SM	4	4	6
M	4	4	6
H	4	6	8
VH	4	6	8

*May substitute one 12 inch layer of Type II bedding. Substitution of one layer of Type II bedding shall not be permitted at drop structures. Use of a combination of filter fabric and Type II bedding at drop structures is acceptable, see Section 5.3.2 for use of filter fabric at drop structures.

**Fifty percent or more by weight retained on the #40 sieve.

,017"

5.3.2 Filter Fabric

Filter fabric is not a complete substitute for granular bedding. Filter fabric provides filtering action only perpendicular to the fabric and has only a single equivalent pore opening between the channel bed and the riprap. Filter fabric has a relatively smooth surface which provides less resistance to stone movement. As a result, it is recommended the use of filter fabric be restricted to slopes no steeper than 2.5h to 1v. Tears in the fabric greatly reduce its effectiveness so that direct dumping of riprap on the filter fabric is not allowed and due care must be exercised during construction. Nonetheless, filter fabric has proven to be an adequate replacement for granular bedding in many instances. Filter fabric provides an adequate bedding for channel linings along uniform mild sloping channels where leaching forces are primarily perpendicular to the fabric.

At drop structures and sloped channel drops, where seepage forces may run parallel with the fabric and cause piping along the bottom surface of the fabric, special care is required in the use of filter

CHANNEL 25 D Contour Interval = 50'

	Planimeter Reading	Area (ac)	Contour Length	CN
Roadway	107	1.5	—	90
Upper Area	1145	16.0	6880	75
Lower Area	1082	15.2	7560	75
Channel 25E	522	7.3	2150	75
TOTAL (or Avg)		40.0	16,590	75.6

$$\text{AVG. SLOPE} = \frac{100 * 50' * 16{,}590'}{43{,}560 * 40.0} = 47.6\%$$

Hydraulic Length ~ 4060 ft

$Q_{100} = 35$ cfs Use Channel Slope = 9.1%

Trapezoidal Channel

Try $D_{50} = 0.5'$, $b = 10'$ $n = .0395(.5)^{1/6} = 0.035$, $m = 3$

$\frac{Qn}{1.49 S^{1/2}} = 2.73$

Y	$AR^{2/3}$	
1.0	11.17	A = 5.1
0.5	3.31	P = 12.8
0.45	2.76 →	R = 0.4
		V = 6.9

Riprap Sizing: ∠ Repose = 42°
SG = 2.65
for S.F. = 1.2 $D_{50} = 0.71$ ft
USE $D_{50} = 0.75'$ (SF = 1.25 - OK)

Check flow depth w/new $n = 0.0395(.75)^{1/6} = 0.038$ (use 0.04)

$\frac{Qn}{1.49 S^{1/2}} = 3.12$

Y	$AR^{2/3}$	
0.46	2.87	A = 5.5
0.47	2.98	P = 13.0
0.48	3.09 →	R = 0.42
		V = 6.4

Check Riprap Size: $D_{50} = 0.75'$ gives S.F. = 1.21 OK

Anticipate bend forces - Try $D_{50} = 1.0'$ ($n \sim 0.4$ OK)

PROJECT : Plateau Mining Company - Channel 25D 100-Yr Runoff Calculation

AREA= 40.0 ACRES
AVERAGE BASIN SLOPE= 47.6 PERCENT
CURVE NUMBER= 75.6
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 4060. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TF= .1792 HOURS QPCFS= 168.83 CFS QPIN= 4.1857 INCHES
C3= 20.6312 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.71	.6423	.0000	.0000	.0	.00
10.75	.6491	.0000	.0000	8.5	.00
10.79	.6559	.0000	.0000	52.4	.00
10.82	.6626	.0000	.0000	112.1	.00
10.86	.6694	.0002	.0000	155.0	.00
10.89	.6762	.0003	.0001	168.8	.02
10.93	.6829	.0004	.0001	158.1	.03
10.97	.6897	.0006	.0002	133.5	.05
11.00	.6966	.0008	.0002	104.4	.07
11.04	.7065	.0011	.0003	77.0	.10
11.07	.7165	.0015	.0004	54.3	.13
11.11	.7264	.0020	.0005	36.9	.17
11.14	.7363	.0025	.0005	24.3	.23
11.18	.7463	.0031	.0006	15.6	.28
11.22	.7562	.0037	.0006	9.8	.35
11.25	.7662	.0043	.0007	6.0	.41
11.29	.7761	.0051	.0007	3.7	.48
11.32	.7860	.0059	.0008	2.2	.54
11.36	.7960	.0067	.0008	1.3	.61
11.40	.8059	.0076	.0009	.8	.67
11.43	.8158	.0085	.0009	.4	.74
11.47	.8258	.0095	.0010	.2	.80
11.50	.8418	.0113	.0017	.1	.86
11.54	.9222	.0218	.0106	.0	1.04
11.86	1.6453	.2365	.0326	.0	22.88
11.90	1.7256	.2708	.0344	.0	25.68
11.93	1.8060	.3069	.0361	.0	28.32
11.97	1.8863	.3446	.0377	.0	30.82
12.00	1.9579	.3794	.0348	.0	33.13
12.04	1.9731	.3869	.0076	.0	34.88
12.08	1.9883	.3945	.0076	.0	34.96
12.11	2.0036	.4022	.0077	.0	32.97
12.15	2.0188	.4099	.0077	.0	29.43
12.18	2.0340	.4177	.0078	.0	25.25

PROJECT : Plateau Mining Company - Channel 25D 100-Yr Runoff Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.22	2.0492	.4255	.0078	.0	21.19
12.26	2.0645	.4333	.0079	.0	17.70
12.29	2.0797	.4412	.0079	.0	14.95

HYDROGRAPH PEAK= 34.96 cfs
TIME TO PEAK= 12.08 Hours
RUNOFF VOLUME= 3.20 Acre-Feet

Check Superelevation on Bend (Flexible Linings Book)

$R_o = 550'$ $\Delta_c = \cos^{-1}(R_o/R_d)$ $R_d = R_o + (T+B)/4$

$T = b + 2my = 10 + 2(3).48 = 12.88$

$R_d = 550 + (12.9 + 10)/4 = 555.7\ ft$ $\Delta_c = \cos^{-1}(550/555.7) = 8.21$

$\Delta = 140°$ (Total approx # of degrees in bend) >> Δ_c

USE LONG BEND PROCEDURE

$y/b = .48/10 = 0.048$ $V^2/R_d = (6.5)^2/555.7 = 0.076$

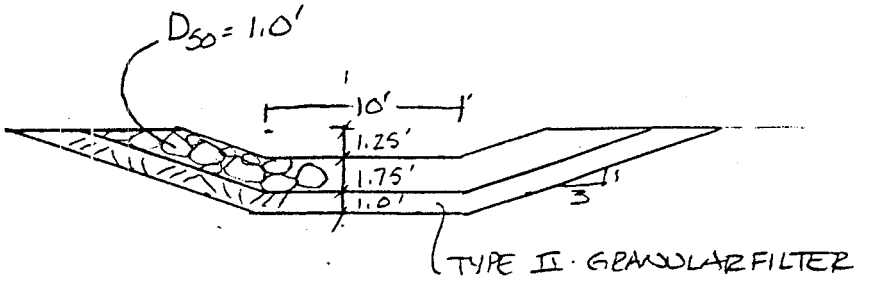
from Chart 33, $K_3 \sim 1.25$, $y' = K_3 y = 1.25(.48) = 0.6\ ft.$

Use Channel depth = 1.25 ft bend freeboard = 1.25 - .6 = 0.65'
normal freeboard = 1.25 - .48 = 0.77'

USE TYPE III RIPRAP

% SMALLER BY WT	SIZE (in)	D_{50} (in)
70-100	21	
50-70	18	
35-50	12	12
2-10	4	

$D_{max} = 21" = 1.75'$



TYPICAL SECTION 13
STA 0+00 TO STA 5+48 2

$$R_d = R_o + \left(\frac{T + B}{4}\right)$$

where: R_o = mean radius of the center line of the channel, ft.

T = top width of the channel, ft.

B = bottom width of the channel, ft.

For channels with no defined bottom width, such as triangular or parabolic channels, set B equal to zero.

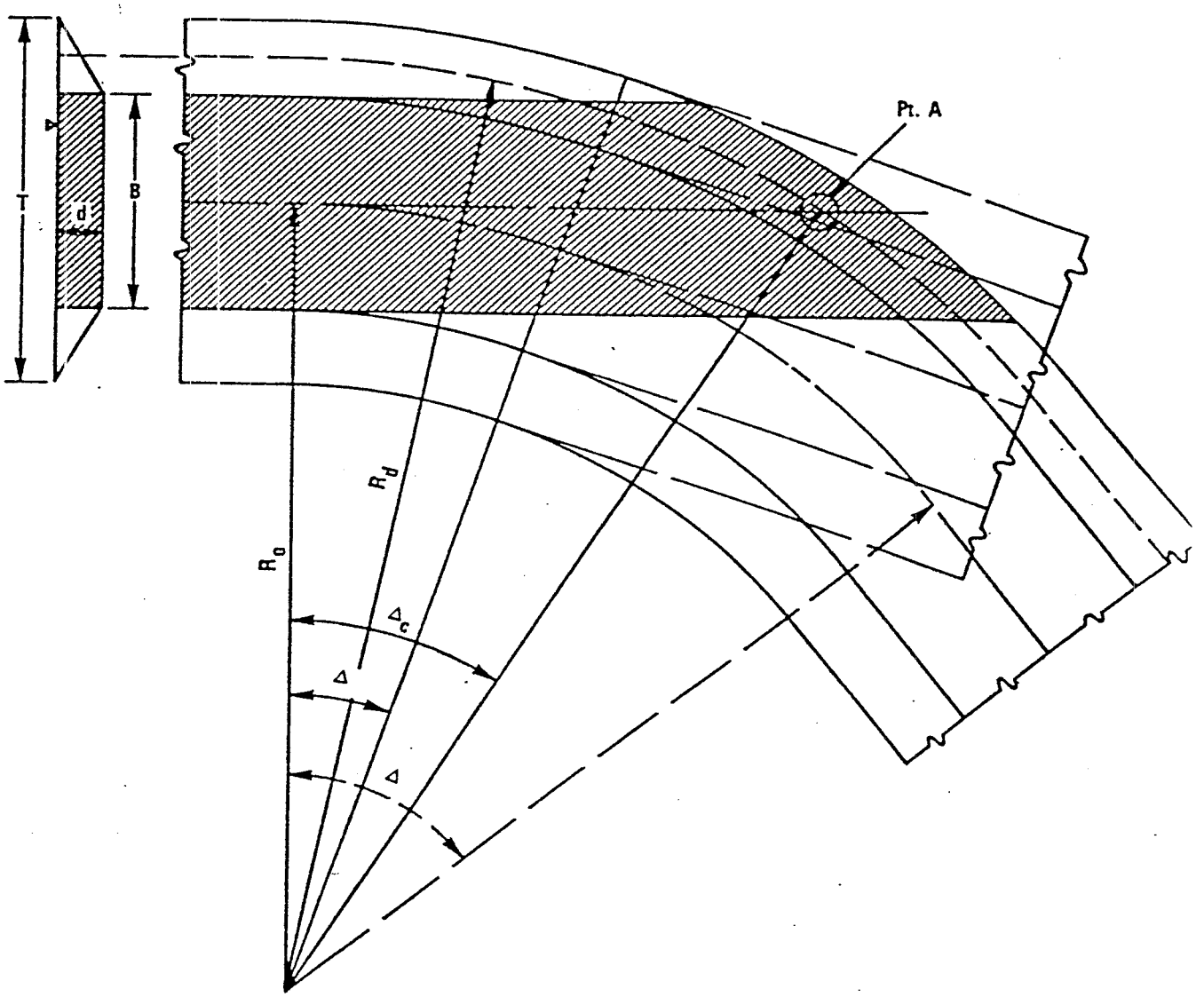
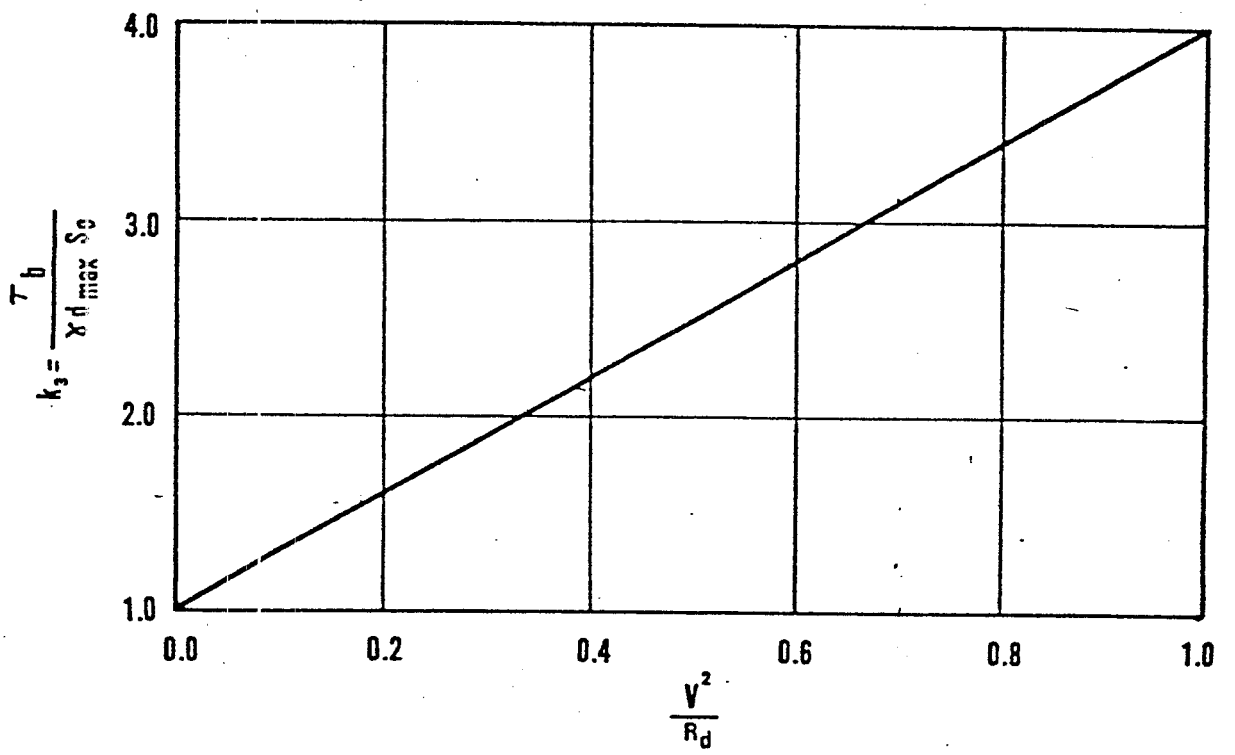


Figure 2. DEFINITION SKETCH FOR FLOW IN BENDS

Chart 33



RATIO OF MAXIMUM BOUNDARY SHEAR IN BENDS
TO MAXIMUM BOTTOM SHEAR IN STRAIGHT REACH

CHANNEL 25F

Contour Int = 50'

	Planimeter Reading	Area (ac)	Contour Length
Area Sheet 2 of 5	2200 − 1058	30.8	9,900
1 of 5	679	9.5	3,950
3 of 5	140	2.0	860
Area off Maps (Approx 1/3 of Sheet 3 of 3)	47	0.7	287
TOTAL		43.0	14,997

$$\text{Avg. Slope} = \frac{100 * 50 * 14{,}997}{43560 * 43.0} = 40.3\ \%$$

Hydraulic Length (To beginning of narrow area) = 3,640 ft

USE CN = 75 $\quad Q_{100} = 362$ cfs

FOR RIPRAP DESIGN, USE S = 14.2%, 7.1 (Design accounts for Change in Grade)
11.2%, 7.1

DEPTH

DESIGN STEEP SECTION FIRST

DESIGN RIPRAP - ASSUME $D_{50} = 1.0'$, then $n = .0395(1)^{1/6} \Rightarrow .04$, $m = 3$

TRY $b = 5'$, $S = 14.2$ $\quad \frac{Qn}{1.49 S^{1/2}} = 2.59$

Y	$AR^{2/3}$	
1.0	6.35	
0.5	1.76	
0.6	2.45	A = 4.3
0.63	2.67	P = 8.9
0.62	2.60 →	R = 0.48
		V = 8.5

for SF = 1.2, D_{50} Req'd = 1.75' - Widen Channel

TRY b = 10' $\quad \frac{Qn}{1.49 S^{1/2}} = 2.59$

Y	$AR^{2/3}$	
0.5	3.31	
0.4	2.26	A = 4.9
0.45	2.76	P = 12.7
0.43	2.55 →	R = 0.38
		V = 7.5

Try $D_{50} = 1.25'$, SF = 1.25 ok

Check depth req's

@ S = 11.2%, $\frac{Qn}{1.49 S^{1/2}} = 2.91$

(Slope later increased to 12.1%
min - Leave calcs as they are)

Y	$AR^{2/3}$	
0.47	2.98	A = 5.2
0.46	2.87 ⇒	P = 12.9
		R = 0.41
		V = 6.9

Channel depth = 0.46 + 0.75 = 1.21'

USE 1.25' depth

18/-2

PROJECT : Plateau Mining Company - Channel 25F 100-Yr Runoff Calculation

AREA= 43.0 ACRES
AVERAGE BASIN SLOPE= 40.0 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 3640. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .1822 HOURS QPCFS= 178.44 CFS QPIN= 4.1154 INCHES
CN= 20.2849 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.82	.6631	.0000	.0000	.0	.00
10.86	.6700	.0000	.0000	9.0	.00
10.90	.6769	.0000	.0000	55.4	.00
10.93	.6837	.0000	.0000	118.5	.00
10.97	.6906	.0002	.0000	163.8	.00
11.01	.6981	.0003	.0001	178.4	.02
11.04	.7082	.0005	.0002	167.2	.03
11.08	.7183	.0008	.0003	141.1	.06
11.12	.7284	.0011	.0003	110.4	.09
11.15	.7386	.0015	.0004	81.4	.14
11.19	.7487	.0020	.0005	57.4	.19
11.23	.7588	.0025	.0005	39.0	.25
11.26	.7689	.0030	.0006	25.7	.31
11.30	.7790	.0037	.0006	16.5	.38
11.33	.7891	.0043	.0007	10.3	.44
11.37	.7992	.0051	.0007	6.4	.51
11.41	.8093	.0059	.0008	3.9	.58
11.44	.8194	.0067	.0008	2.3	.65
11.48	.8295	.0076	.0009	1.4	.71
11.52	.8734	.0121	.0045	.8	.81
11.55	.9551	.0230	.0109	.5	1.13
11.59	1.0368	.0370	.0140	.3	1.99
11.63	1.1186	.0539	.0169	.1	3.59
11.66	1.2003	.0736	.0197	.0	5.87
11.70	1.2820	.0959	.0223	.0	8.68
11.74	1.3637	.1205	.0247	.0	11.80
11.77	1.4454	.1475	.0269	.0	15.07
11.81	1.5271	.1765	.0291	.0	18.34
11.85	1.6088	.2076	.0311	.0	21.55
11.88	1.6905	.2406	.0330	.0	24.64
11.92	1.7723	.2754	.0348	.0	27.58
11.95	1.8540	.3118	.0365	.0	30.37
11.99	1.9357	.3499	.0381	.0	33.01
12.03	1.9675	.3652	.0152	.0	35.28
12.06	1.9830	.3727	.0075	.0	36.20

PROJECT : Plateau Mining Company - Channel 25F 100-Yr Runoff Calculation (Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.10	1.9985	.3802	.0076	.0	35.02
12.14	2.0140	.3878	.0076	.0	31.95
12.17	2.0294	.3955	.0077	.0	27.85
12.21	2.0449	.4032	.0077	.0	23.58
12.25	2.0604	.4109	.0078	.0	19.74
12.28	2.0759	.4187	.0078	.0	16.60

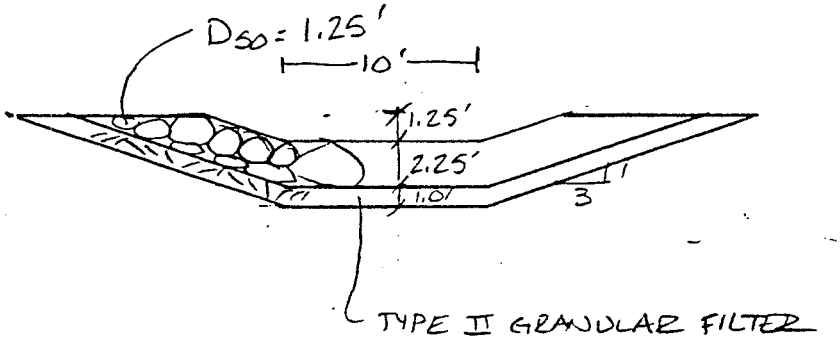
HYDROGRAPH PEAK= 36.20 cfs
TIME TO PEAK= 12.06 Hours
RUNOFF VOLUME= 3.32 Acre-Feet

ROCK TYPE IS BETWEEN M & H

% PASSING BY WT	SIZE (in)	D50 (in)
70-100	27	
50-70	21	
35-50	15	15
2-10	6	

(Dmax = 27" = 2.25')

USE 12" TYPE II GRANULAR BEDDING



TYPICAL SECTION	15
STA 0+00 TO STA 6+20	2
STA 9+00 TO STA ~~22+35~~ 21+84	

DESIGN WILDER SECTION, Slope = 7.1%

Q = 36.2, b = 10, m = 3, n = .04, S = .071,

$\frac{Qn}{1.49S^{1/2}} = 3.66$

y	$AR^{2/3}$	
0.5	3.31	A = 6.1
0.55	3.90	P = 13.4
0.53	3.66 ⇒	R = 0.46
		V = 5.9

Channel depth = 0.53 + 0.75 = 1.28 ft (USE 1.25 ft)

Check Riprap Size. $\phi = 42°$, y = .53, SG = 2.65,

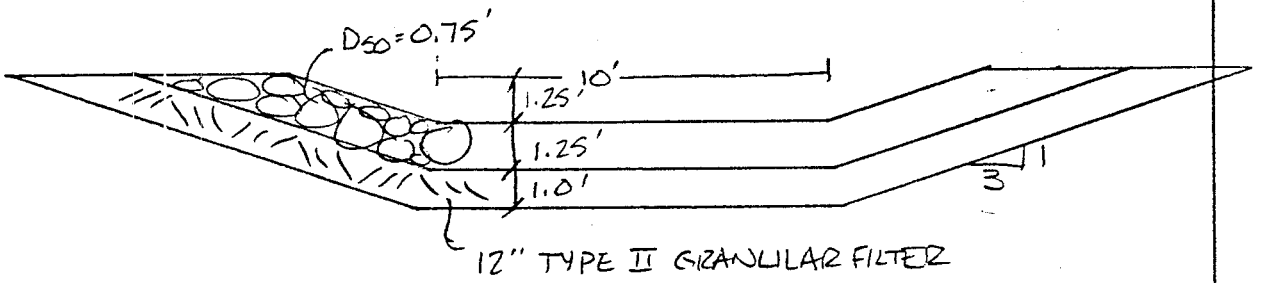
(for D50 = 0.75") S.F. = 1.39 ok.

RIPRAP IS TYPE L

% SMALLER BY WT	SIZE (in)	D50 (in)
70-100	15	
50-70	12	
35-50	9	9
2-10	3	

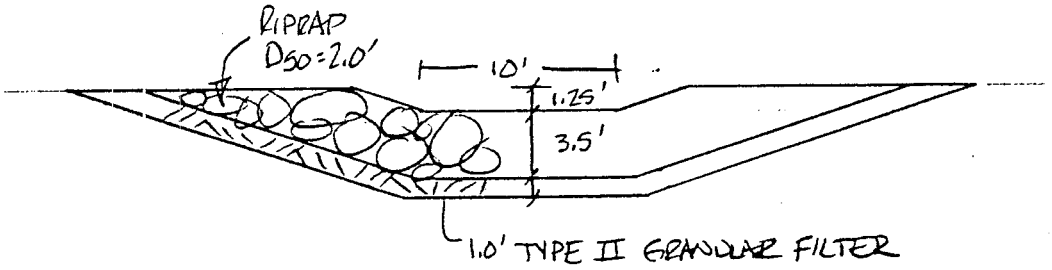
$D_{max} = 15'' = 1.25'$

USE 12" TYPE II GRANULAR FILTER



TYPICAL SECTION	16
STA 6+20 TO STA 9+00	2

DRAW SECTION FOR STA 21+84 TO STA 22+10 AT JUNCTION WITH D50 = 2.0'

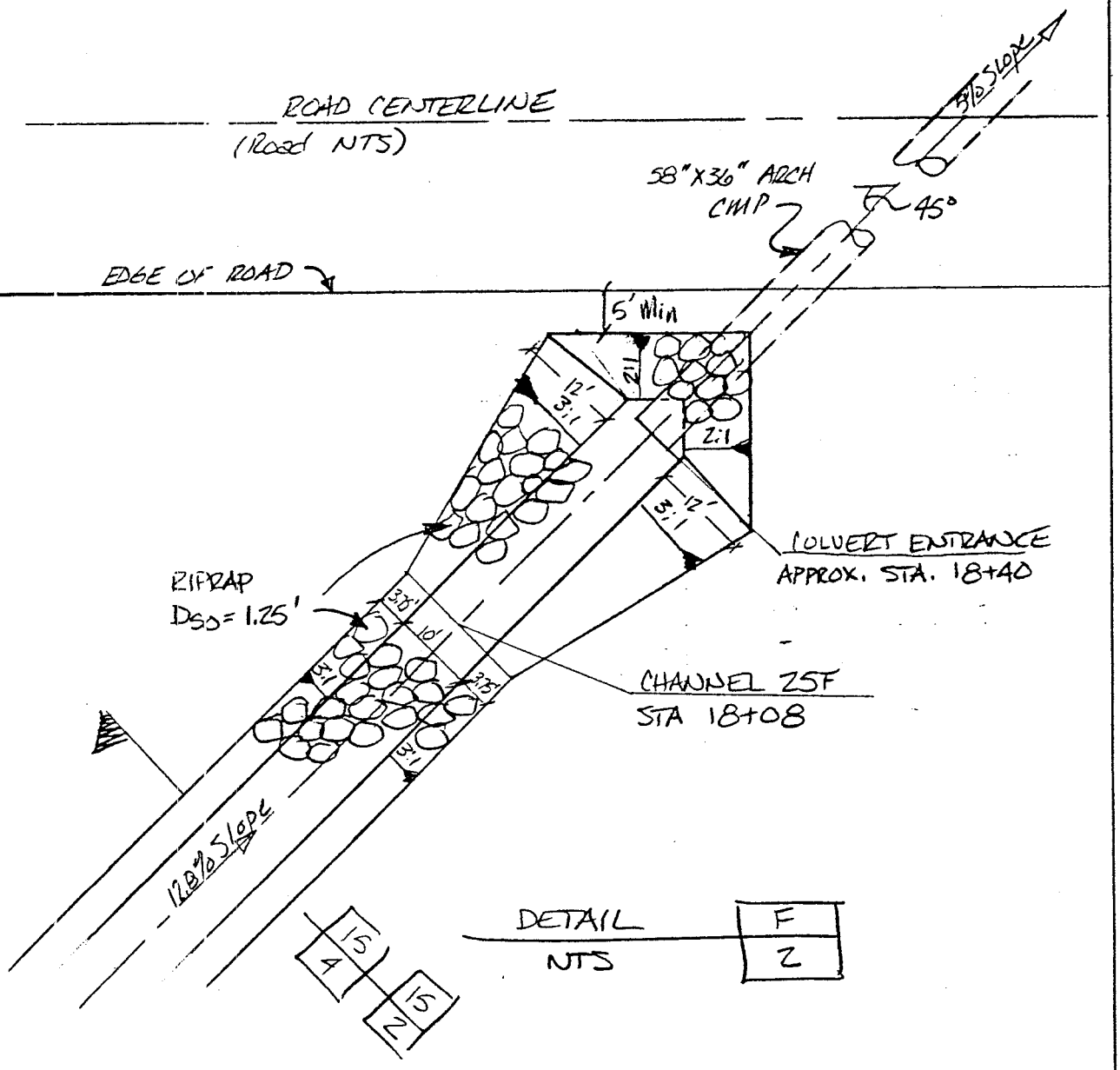


TYPICAL SECTION	
STA 21+84 TO STA 22+10	

HANSEN ALLEN & LUCE inc

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE
PROJECT NO. 2-7-5

SHEET 22 OF 48
COMPUTED DEH
CHECKED
DATE 24 MAR 88



CULVERT - CHANNEL 25F - INLET

EXTEND RIPRAP UPSTREAM
(channel Slope = 12.8%)

4'/.128 = 31.25'
(use 32')

CULVERT OUTLET CHANNEL - 25F DESIGN

Q=36.2 cfs, Channel Slope = 12.1% Culvert = 58"x36" Arch CMP

Check Riprap Size for a 5' Channel @ 12.1%

$\eta = 0.043$, $m = 3$

$\frac{Qn}{1.49 S^{1/2}} = 3.01$

Y	$AD^{2/3}$	
0.7	3.24	A = 4.7
0.68	3.07	P = 9.2
0.67	2.99 ⟹	R = 0.51
		V = 7.7

Riprap: $\phi = 42$, $SG = 2.65$

if SF = 1.2, $D_{50} = 1.49'$ Since flows are concentrated at outlet use $D_{50} = 1.75'$ for 3D

$D_{50} = 1.75'$ S.F. = 1.37

Riprap type between H and VH

% PASSING BY WT	Size (in)	D_{50} (in)
70-100	36	
50-70	27	
35-50	21	21
2-10	9	

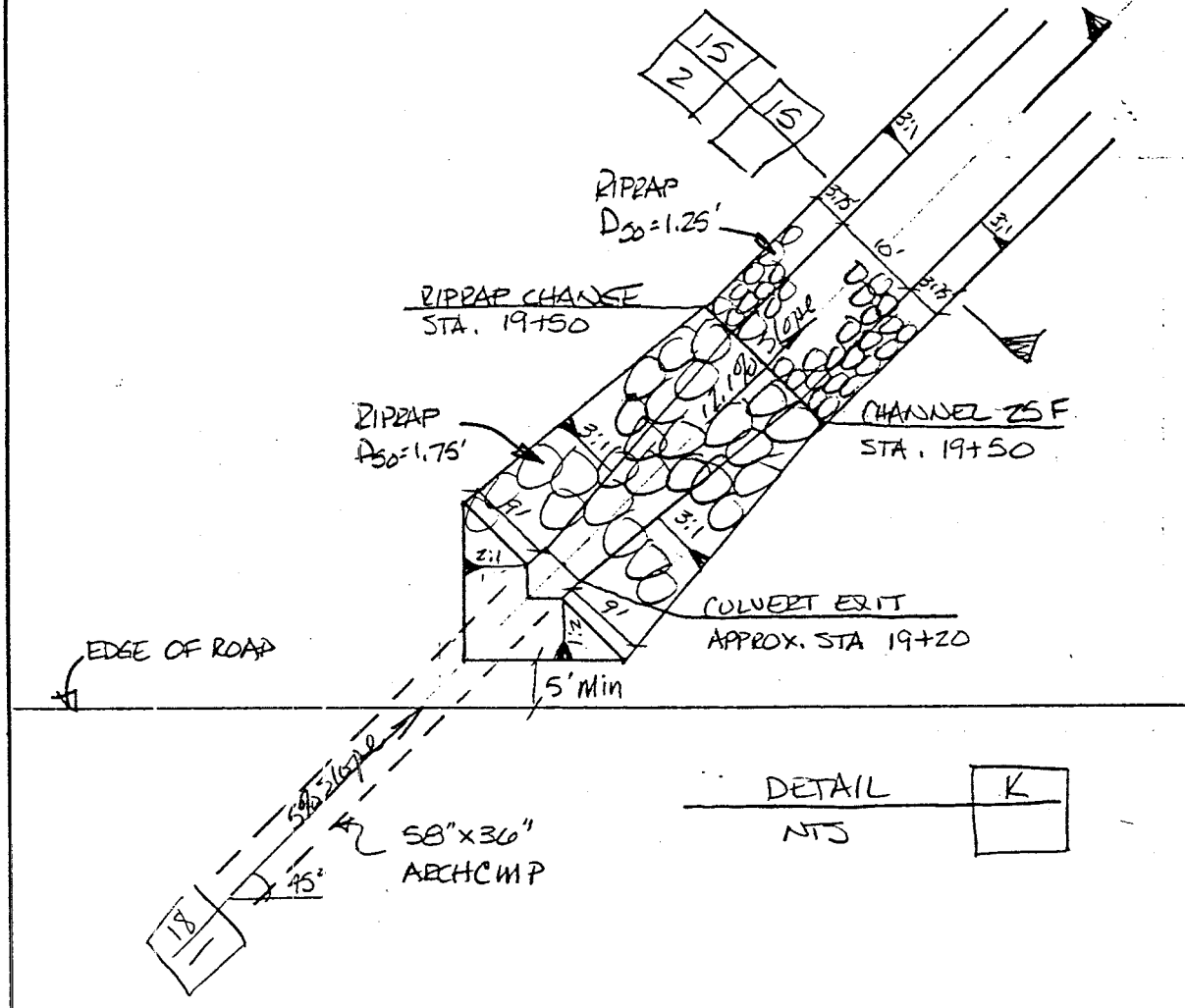
$D_{max} = 36" = 3'$

Channel depth @ Culvert must be 3.0' - downstream reduce to 1.5 (0.83' freeboard)

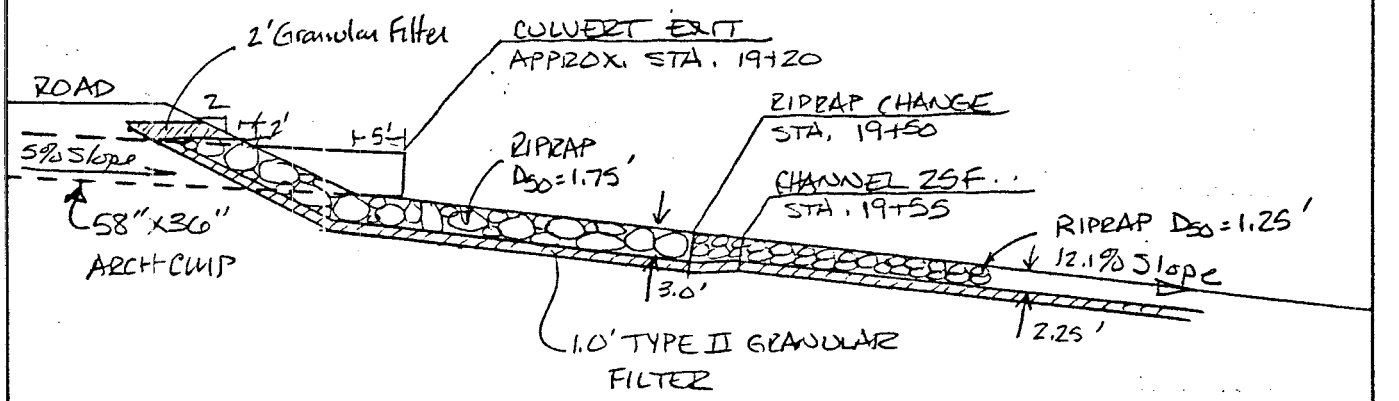
HANSEN ALLEN & LUCE INC

CLIENT: PLATEAU
PROJECT: CHANNEL RECLAMATION
FEATURE:
PROJECT NO.: 2-7-5

SHEET 24 OF 48
COMPUTED: DEH
CHECKED:
DATE: 21 MAR 88



DETAIL K
NTS



TYPICAL SECTION 18
CULVERT 25F OUTLET —

CHANNEL 81

Planimeter Reading	Area (ac)	Contour Interval	Contour Length
1894	53.1	50'	17,100

$$SLOPE = \frac{100 * 50 * 17{,}100}{43{,}560 * 53.1} = 37.0\%$$

HYD. LENGTH = 4,000 ft ; CN = 75 ; P = 2.95"

Q_{100} = 42.7 cfs

Channel Slopes. Upper Section, Max = Min = 1.8%
Lower Section, Max = 9.4%, Min = 9.1%

Lower Section Design
Riprap Q = 42.7 cfs, b = 5', m = 3, n = .04, S = 9.5% (Max Slope designed later reduced to 8.9% - Lower Calcs)

$$\frac{Qn}{1.49 S^{1/2}} = 3.73$$

y	$AR^{2/3}$
0.5	1.76
0.6	2.45
0.75	3.69 ⇒
0.76	3.78

A = 5.4
P = 9.7
R = 0.56
V = 7.9

ϕ = 42°, SG = 2.65
TRY D_{50} = 1.25' S.F. = 1.20 ok.

DEPTH S = 8.9%

$$\frac{Qn}{1.49 S^{1/2}} = 3.85$$

y	$AR^{2/3}$
0.77	3.87 ⇒

A = 5.6
P = 9.9
R = 0.57
V = 7.6

Channel depth = 0.77 + 1.0 = 1.77 (Use 1.75 ft)

RIPRAP IS BETWEEN TYPE M & H

% PASSING BY WT	Size (in)	D_{50} (in)
70-100	27	
50-70	21	
35-50	15	15
2-10	6	

D_{max} = 27" = 2.25'

USE 12" TYPE II GRANULAR FILTER

PROJECT : Plateau Mining Company - Channel S1 100-Yr Flow Calculation

AREA= 53.1 ACRES
AVERAGE BASIN SLOPE= 37.0 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 4000. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

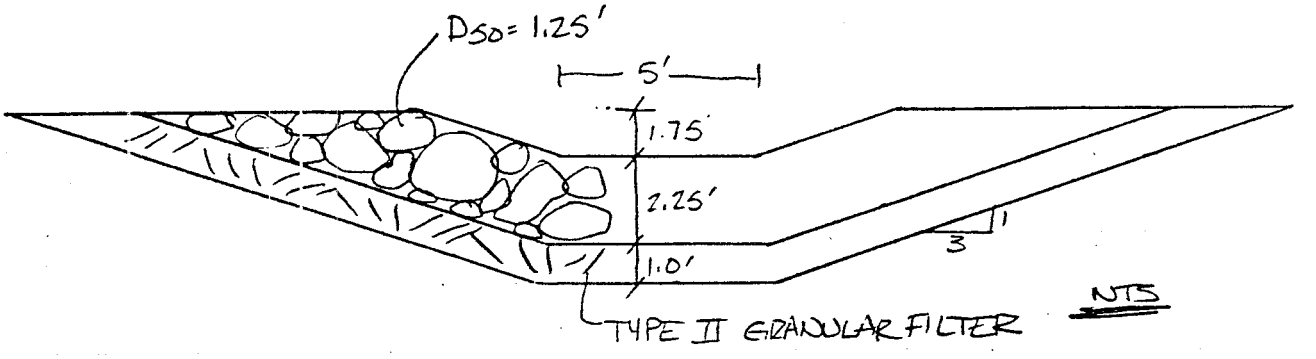
TP= .2043 HOURS QPCFS= 196.53 CFS QPIN= 3.6704 INCHES
C3= 18.0916 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.83	.6640	.0000	.0000	.0	.00
10.87	.6717	.0000	.0000	9.9	.00
10.91	.6794	.0000	.0000	61.0	.00
10.95	.6871	.0001	.0000	130.5	.00
10.99	.6948	.0002	.0001	180.4	.01
11.03	.7055	.0004	.0002	196.5	.03
11.07	.7169	.0007	.0003	184.1	.05
11.12	.7282	.0011	.0004	155.4	.09
11.16	.7395	.0016	.0004	121.5	.15
11.20	.7509	.0021	.0005	89.7	.21
11.24	.7622	.0027	.0006	63.2	.29
11.28	.7735	.0033	.0007	42.9	.37
11.32	.7849	.0040	.0007	28.3	.46
11.36	.7962	.0048	.0008	18.1	.55
11.40	.8075	.0057	.0009	11.4	.64
11.44	.8189	.0066	.0009	7.0	.74
11.48	.8302	.0076	.0010	4.3	.83
11.52	.8889	.0139	.0062	2.5	.97
11.56	.9805	.0270	.0131	1.5	1.44
11.61	1.0721	.0440	.0170	.9	2.66
11.65	1.1637	.0645	.0205	.5	4.84
11.69	1.2553	.0884	.0239	.3	7.91
11.73	1.3470	.1153	.0270	.2	11.66
11.77	1.4386	.1451	.0298	.0	15.82
11.81	1.5302	.1777	.0325	.0	20.16
11.85	1.6218	.2127	.0351	.0	24.51
11.89	1.7135	.2502	.0374	.0	28.76
11.93	1.8051	.2898	.0396	.0	32.83
11.97	1.8967	.3315	.0417	.0	36.71
12.01	1.9620	.3625	.0310	.0	40.25
12.06	1.9794	.3709	.0084	.0	42.67
12.10	1.9967	.3793	.0085	.0	42.74
12.14	2.0141	.3879	.0085	.0	40.18
12.18	2.0314	.3965	.0086	.0	35.80
12.22	2.0488	.4051	.0087	.0	30.73

PROJECT : Plateau Mining Company - Channel 81 100-Yr Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.26	2.0662	.4138	.0087	.0	25.88
12.30	2.0835	.4226	.0088	.0	21.76
12.34	2.1009	.4315	.0088	.0	18.53

HYDROGRAPH PEAK= 42.74 cfs
TIME TO PEAK= 12.10 Hours
RUNOFF VOLUME= 4.11 Acre-Feet



NTS

TYPICAL SECTION	17
STA 5+65 TO STA 20+~~95~~ 40	2

UPPER SECTION - Slope = 1.8%

$Q = 42.7$, $b = 5'$, $m = 3$, $n = .035$, $S = .018$

$\frac{Qn}{1.49 S^{1/2}} = 7.50$

Y	$AR^{2/3}$
1.0	6.34
1.1	7.63 ⇒

A = 9.1
P = 11.96
R = 0.76
V = 4.7

$\phi = 42°$, SG = 2.65

for $D_{50} = 0.25$ S.F. = 0.97
$D_{50} = 0.50$ S.F. = 1.91

USE $D_{50} = 0.50'$

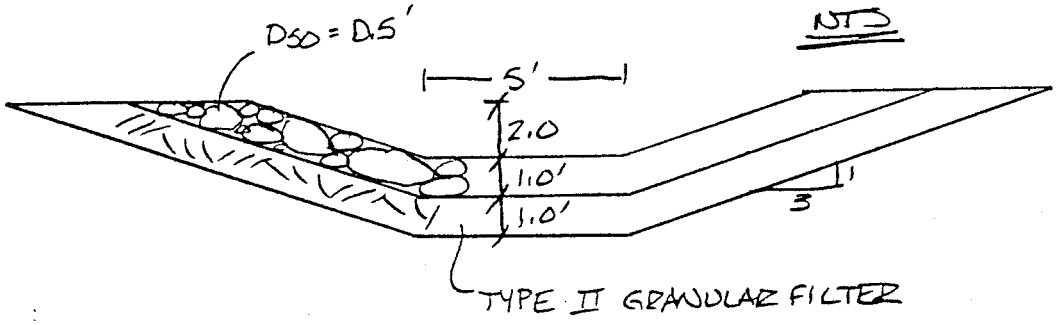
RIPRAP TYPE IS VL

% SMALLER BY WT	SIZE (IN)	D_{50} (IN)
70-100	12	
50-70	9	
35-50	6	6
2-10	2	

$D_{max} = 12" = 1'$

USE 12" TYPE II GRANULAR FILTER

Channel depth = 2.0 (1.1 + 0.75 = 1.85 freeboard) USE 2.0'



TYPICAL SECTION	17
STA 0+00 TO STA 5+65	2

EXTREME LOWER SECTION BELOW ROAD CULVERT

Channel Slope ~ $\frac{20}{110} * 100 = 18.2\%$

$Q = 42.7$, $b = 5$, $m = 3$, $n = 0.04$

$\frac{Qn}{1.49 S^{1/2}} = 2.69$

y	$AR^{2/3}$	
0.5	1.76	
0.6	2.45	A = 4.3
0.62	2.60	P = 9.0
0.63	2.67 ⇒	R = 0.48
		V = 9.8

$\phi = 42°$, $y = .63$, $S.G = 2.65$

for S.F. = 1.2, D_{50} req'd = 2.35 TOO LARGE
WIDEN CHANNEL

b = 10', $n = .043$

$\frac{Qn}{1.49 S^{1/2}} = 2.90$

y	$AR^{2/3}$	
0.5	3.31	A = 5.2
0.4	2.26	P = 12.9
0.46	2.87 ⇒	R = 0.41
		V = 8.2

$\phi = 42°$, $y = 0.46$, $SG = 2.65$

for S.F. = 1.2, D_{50} Req'd = 1.7 ft

USE $D_{50} = 1.75'$, S.F. = 1.22

Channel depth = 0.46 + 1.0' = 1.46' (USE 1.50')

RIPRAP TYPE H to VH

% PASSING BY WT	SIZE (in)	D_{50} (in)
70-100	36	
50-70	27	
35-50	21	21
2-10	8	

D_{max} = 36" = 3.0'

USE 12" TYPE II GRANULAR FILTER

CULVERT 81A INLET MUST TURN FLOW PRIOR TO CULVERT ENTRY

Channel Characteristics

$b = 5'$
$m = 3$
$D_{50} = 1.25'$
$y = 0.75$
$d = 1.75'$
$V = 7.9$

Check Superelevation

Assume $R_o = 80'$ $T = b + 2my = 5 + 2(3)(.75) = 9.5'$

$R_d = R_o + (T+B)/4 = 80 + (9.5+5)/4 = 83.63$

$\Delta_c = \cos^{-1}(R_o/R_d) = \cos^{-1}(80/83.6) = 16.88$

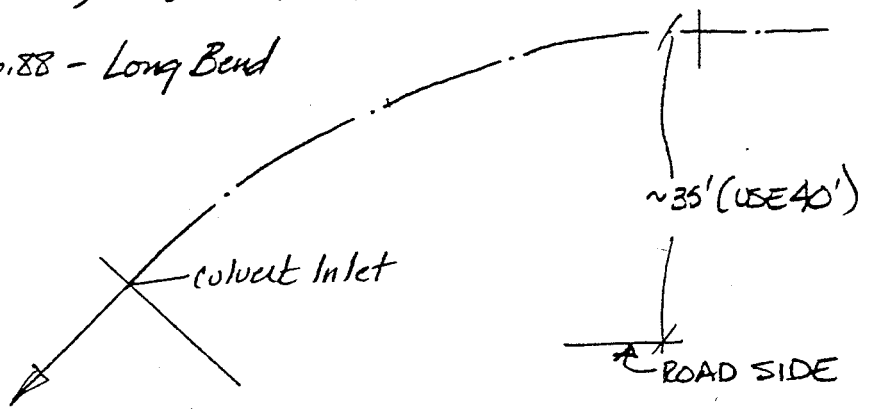
$\Delta = 45° > 16.88$ - Long Bend

$y/b = 0.75/5 = 0.15$

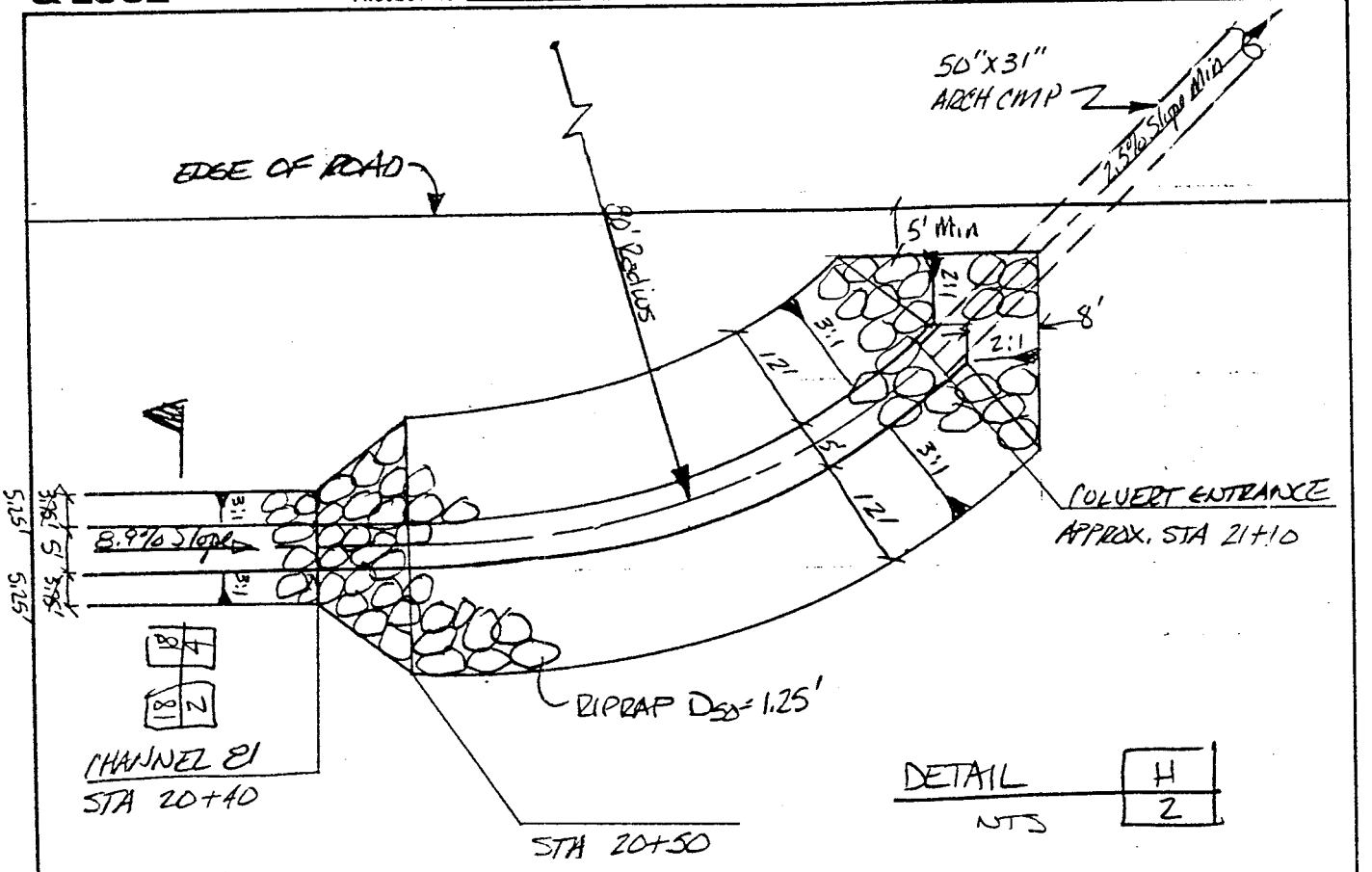
$\frac{V^2}{R_d} = \frac{(7.9)^2}{83.6} = 0.75$

from Chart 33
$K_3 \sim 3.3$

$y' = K_3 y = 3.3(.75) = 2.5'$



Increase depth over a 10' dist from 1.25' to 4.0' to handle Superelevation and backwater curve from Culvert Inlet



ENTRANCE - CULVERT 81

CULVERT OUTLET

FROM EARLIER CALC'S - for $b=5'$, $n=.04$; D_{50} req'd $\simeq 2.1'$

increase n accordingly and recalculate

$Q=42.7$, $b=5$, $n=.0395(2.25)^{1/6}=0.045$, $m=3$, $S=.182$

$\frac{Qn}{1.49S^{1/2}} = 3.03$

y	$AR^{2/3}$	
1.0	6.35	$A=4.7$
0.7	3.24	$P=9.2$
0.68	3.07	$R=0.51$
0.67	2.99 →	$V=9.1$

$\phi=42$, $SG=2.65$ for $SF=1.2$, D_{50} req'd $=2.50'$

USE $D_{50}=2.50'$

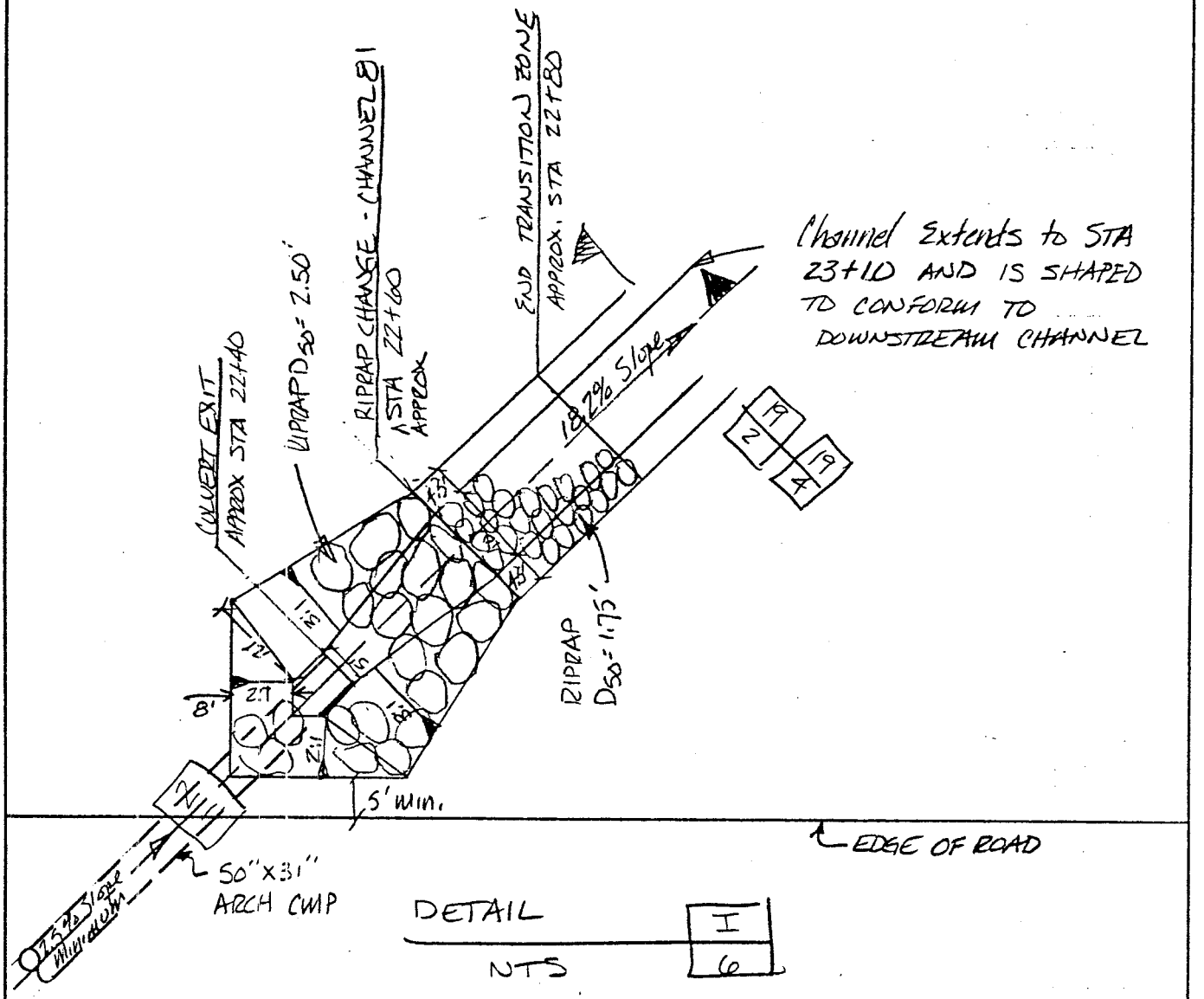
EXTEND 20' DOWNSTREAM in transition to 10' bottom width.

ROCK TYPE VH	% Passing by Wt	Size (in)	D_{50} (in)
	70-100	54	
	50-70	42	
	35-50	30	30
	7-10	12	

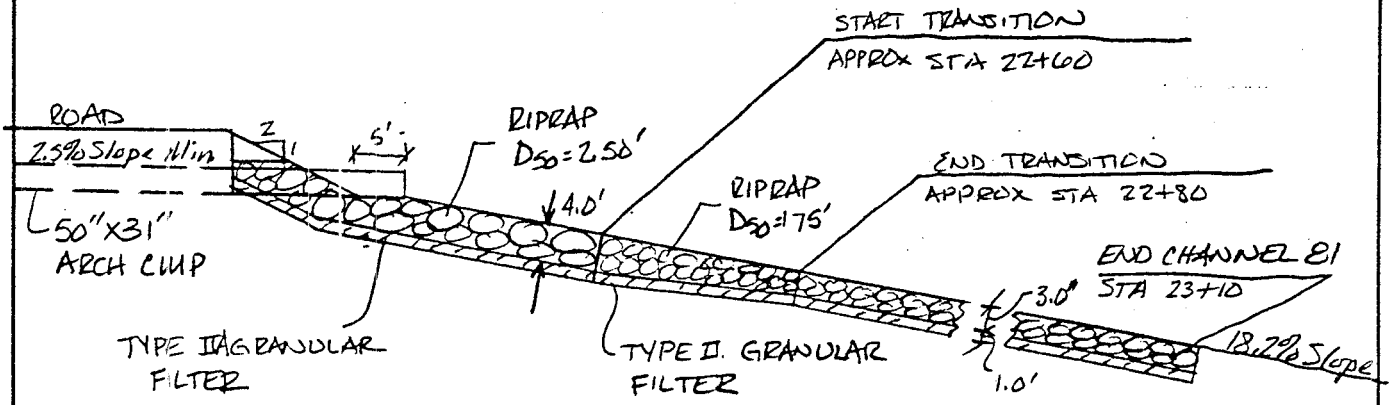
HANSEN ALLEN & LUCE INC

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE
PROJECT NO. 2-7-5

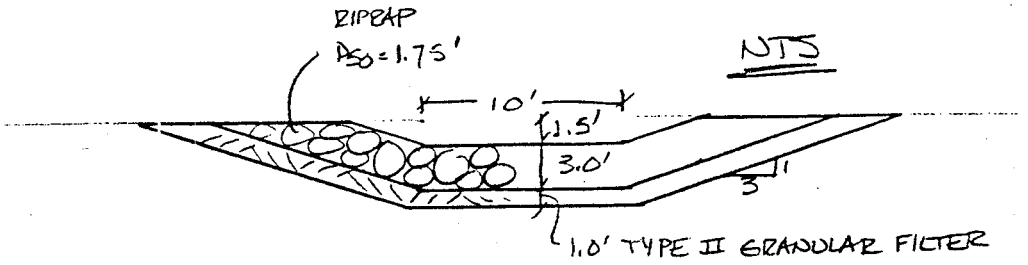
SHEET 32 OF 48
COMPUTED DEH
CHECKED
DATE 24 MAR 88



DETAIL I
NTS 6



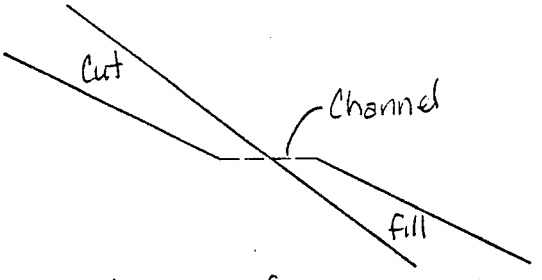
TYPICAL SECTION 2
CULVERT 81 OUTLET —



TYPICAL SECTION	19
STA 22+~~05~~ 60 TO STA. ~~22+75~~ 23+10	2

DITCH 82 - SLOPE TOE DITCH (Old ditch 6B)

Ditch is at base of natural side hill with a max sideslope of 1.3:1, Construction of a channel on such a steep slope is not possible. Can't catch Slope.

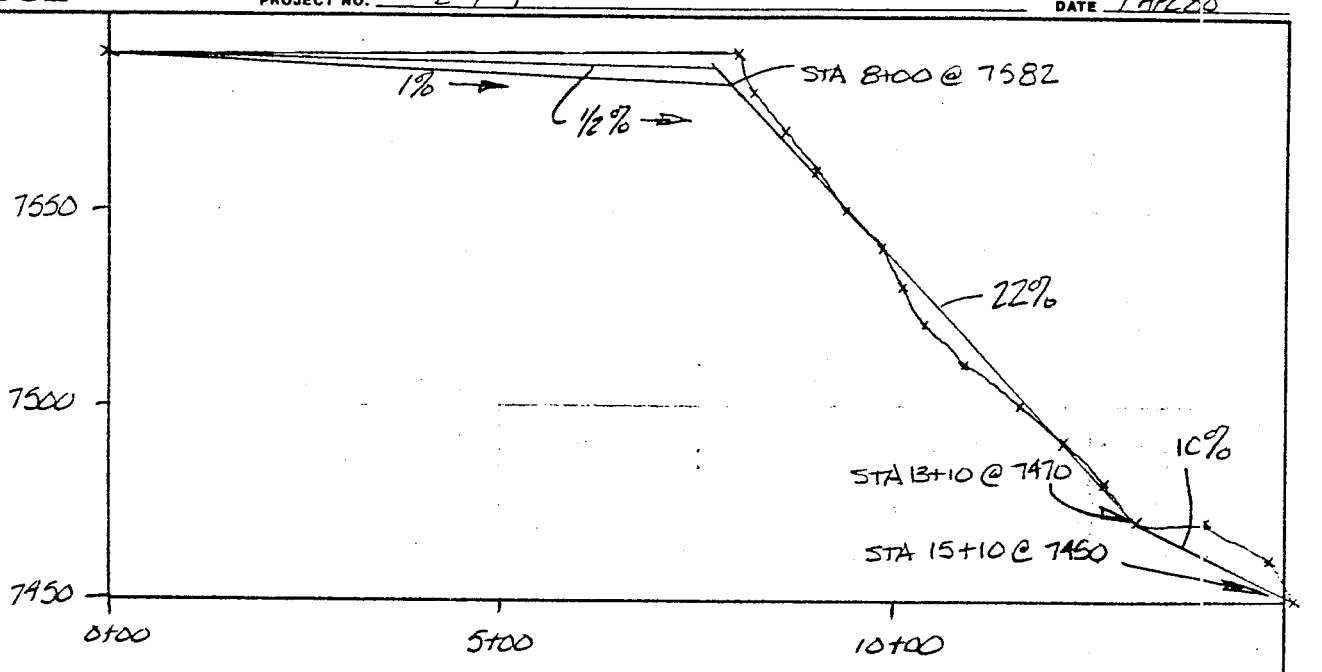


Place channel on refuse pile with clay liner, then run down intersection of pile and nat slope. Join with Channel 81-

Recalculate flows in Ditch (Channel) 81. for design purposes, calc. flows for upper section separately to minimize channel design.

Develop X-Section down Channel

DIST.	ELEV	DIST	ELEV	DIST	ELEV
0+00	7590	9+80	7540	12+70	7480
8+00	7590	10+10	7530	13+10	7470
8+20	7580	10+40	7520	14+00	7470
8+60	7570	10+90	7510	14+80	7460
9+00	7560	11+60	7500	15+10	7450
9+40	7550	12+20	7490		



Planimeter Rdg = 1361 ; Contour Interval = 50'
Area = 19.1 ac
Contour Length = 8,110 ft
Hydraulic Length = 1880 ft
Precip = 2.95 in

$$\text{Slope} = \frac{100 * 50 * 8110}{43560 * 19.1} = 48.7\%$$

$Q_{100} = 18.2$ cfs.

Design Flat Channel on top of Refuse Pile.

Slope = 1%, m = 3, b = 3', n = .03

$$\frac{Qn}{1.49 S^{1/2}} = 3.67$$

y	$AR^{2/3}$	
1.0	4.47	A = 5.2
0.9	3.61	P = 8.8
0.91	3.69 ⇒	R = 0.60
		V = 3.5

Velocity should be lowered Slightly to reduce erosion potential. Decrease Slope, widen channel.

S = 0.005, b = 5, m = 3, n = .03

$$\frac{Qn}{1.49 S^{1/2}} = 5.20$$

y	$AR^{2/3}$	
0.7	3.24	A = 6.9
0.9	5.19 ⇒	V = 2.6 fps ok

(2.0' depth req'd) (1.0' freeboard)

find matching Δx: $\frac{7590 - h}{x} = .005$ $\frac{h - 7470}{1310 - x} = 0.22$

Check $F_r^2 = \frac{(18.1)^2 (5 + 2(3).9)}{g (6.9)^3} = 0.32 \ll 1.0$ Subcritical

PROJECT : Plateau Mining Company - Ditch 82 100-Yr Flow Calculation

AREA= 19.1 ACRES
AVERAGE BASIN SLOPE= 48.7 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 1880. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

TP= .0974 HOURS QPCFS= 148.37 CFS QPIN= 7.7038 INCHES
CS= 37.9720 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.83	.6632	.0000	.0000	.0	.00
10.84	.6669	.0000	.0000	7.4	.00
10.86	.6706	.0000	.0000	46.1	.00
10.88	.6743	.0000	.0000	98.5	.00
10.90	.6779	.0000	.0000	136.2	.00
10.92	.6816	.0000	.0000	148.4	.00
10.94	.6853	.0001	.0000	139.0	.00
10.96	.6890	.0001	.0000	117.3	.01
10.98	.6927	.0002	.0000	91.8	.02
11.00	.6964	.0003	.0000	67.7	.02
11.02	.7018	.0004	.0001	47.7	.03
11.04	.7072	.0005	.0001	32.4	.04
11.06	.7126	.0006	.0001	21.3	.05
11.08	.7180	.0008	.0002	13.7	.06
11.10	.7234	.0009	.0002	8.6	.08
11.12	.7288	.0011	.0002	5.3	.09
11.14	.7342	.0013	.0002	3.2	.11
11.16	.7396	.0016	.0002	1.9	.13
11.18	.7450	.0018	.0002	1.1	.14
11.20	.7504	.0021	.0003	.7	.16
11.21	.7558	.0023	.0003	.4	.18
11.23	.7612	.0026	.0003	.2	.20
11.25	.7666	.0029	.0003	.1	.21
11.27	.7720	.0032	.0003	.0	.23
11.90	1.7234	.2543	.0182	.0	15.03
11.92	1.7670	.2731	.0187	.0	15.62
11.94	1.8107	.2923	.0192	.0	16.19
11.95	1.8543	.3120	.0197	.0	16.74
11.97	1.8980	.3321	.0201	.0	17.27
11.99	1.9416	.3527	.0206	.0	17.79
12.01	1.9614	.3622	.0095	.0	18.21
12.03	1.9697	.3662	.0040	.0	18.12
12.05	1.9780	.3702	.0040	.0	17.18
12.07	1.9862	.3742	.0040	.0	15.47

PROJECT : Plateau Mining Company - Ditch 82 100-Yr Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.09	1.9945	.3783	.0040	.0	13.33
12 11	2.0028	.3823	.0040	.0	11.18
12 13	2.0111	.3864	.0041	.0	9.25

HYDROGRAPH PEAK= 18.21 cfs
TIME TO PEAK= 12.01 Hours
RUNOFF VOLUME= 1.48 Acre-Feet

$$x = \frac{7590 - h}{.005}$$

$$h = .22(1310 - x) + 7470$$

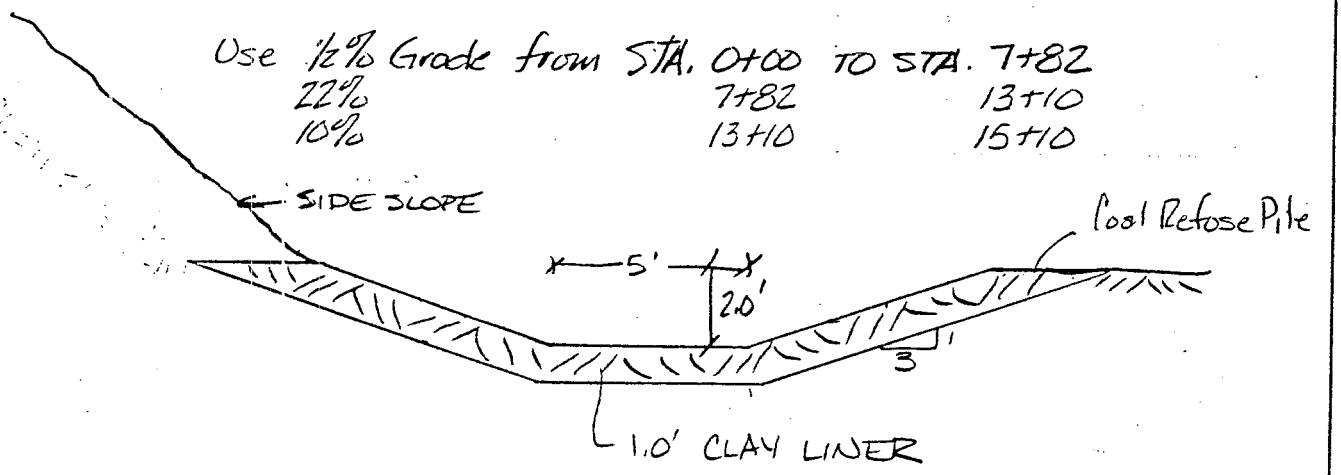
$$= .22\left(1310 - \left(\frac{7590 - h}{.005}\right)\right) + 7470$$

$$h = 288.2 - 333960 + 44h + 7470$$

$$326{,}201.8 = 43h \qquad h = 7586.09$$

$$\therefore \quad x = \frac{7590 - 7586.1}{.005} = \underline{\underline{782\ ft}}$$

Use ½% Grade from STA. 0+00 TO STA. 7+82
22% 7+82 13+10
10% 13+10 15+10



TYPICAL SECTION	28
STA 0+00 TO STA. 7+72	

FOR 22% SECTION, TRY MAINTAINING 5' BOTTOM WIDTH
Assume $D_{50} = 1.0'$, $n = .04$

$$\frac{Qn}{1.49 S^{1/2}} = 1.04$$

Y	$AR^{2/3}$	
1.0	6.35	
0.5	1.76	A = 2.3
0.4	1.18	V = 8.1 fps
0.37	1.03 ⇒	

RIPRAP: $S = .22$, $\phi = 42°$, $SG = 2.65$ for S.F. = 1.2, $D_{50} = 1.8'$ would have to go to 2.0'

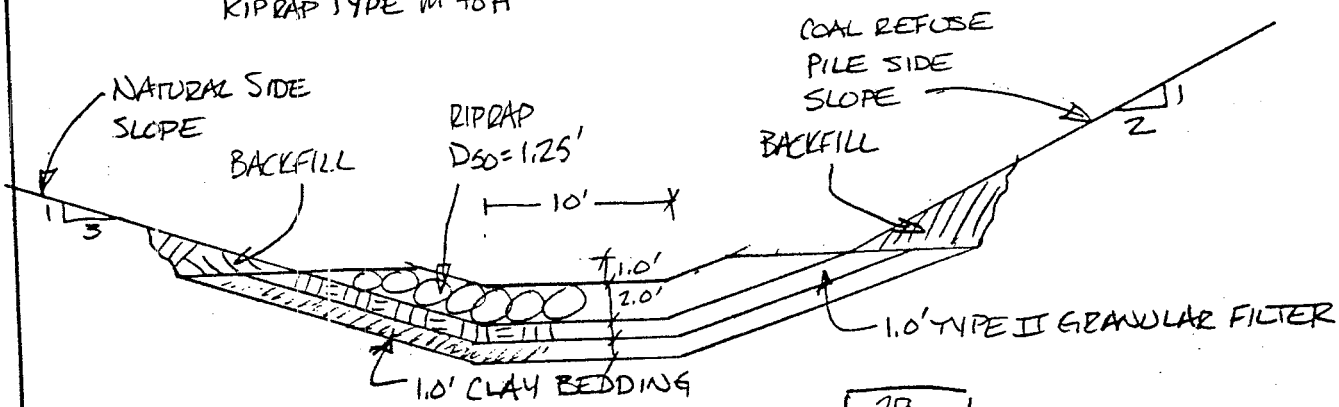
TRY WIDENING TO 10'

Y	$AR^{2/3}$	
0.3	1.38	
0.2	0.70	A = 2.7
0.25	1.01 ⇒	V = 6.8

RIPRAP: for SF = 1.2, $D_{50} = 1.22'$ USE $\underline{1.25'\ D_{50}}$ SF = 1.22

DEPTH = 1.0' (0.75' freeboard)

RIPRAP TYPE M to H



TYPICAL SECTION
STA 7+82 TO STA 13+10

29

% PASSING	SIZE (in)
70-100	24
50-70	21
35-50	15
2-10	5

$D_{max} = 24'' = 2.0'$

FOR 10% SLOPE KEEP 10' BOTTOM WIDTH, $m=3$, $n=.04$, $S=0.1$, $Q=18.2$

$\frac{Qn}{1.49 S^{1/2}} = 1.55$

Y	$AR^{2/3}$	
0.5	3.31	
0.3	1.38	A = 3.5
0.32	1.54 ⇒	V = 5.2 fps

RIPRAP: $S=.1$, $\phi=42°$, $SG=2.65$, $w/SF=1.2$ $D_{50}=0.57'$

REDUCE BOTTOM WIDTH TO 5', $m=3$, $n=.04$, $S=0.1$

Y	$AR^{2/3}$	
0.5	1.76	
0.45	1.46	A = 3.0
0.47	1.57 ⇒	V = 6.0

RIPRAP: $S=.1$, $\phi=42°$, $SG=2.65$, $w/SF=1.2$, $D_{50}=0.83'$ ✗

USE $D_{50}=1.0'$, SF = 1.40 ✗

TRANSITION FROM 10' TO 5' BOTTOM WIDTH OVER 20' LENGTH

CHANNEL DEPTH = 0.47 + 1.0' = 1.5' (Matches downstream Channel Approx.)

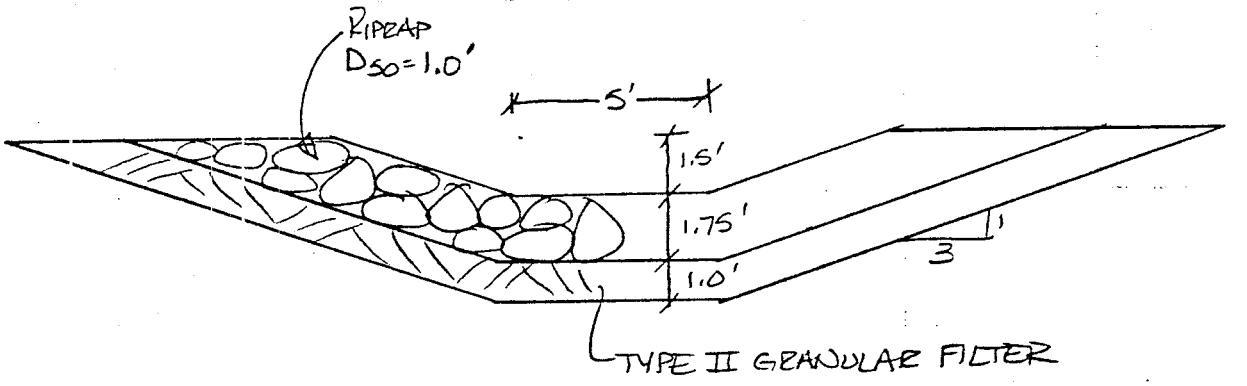
CHECK IF STILL SUPERCRITICAL

$F_r^2 = \frac{Q^2 T}{g A^3} = \frac{(18.2)^2 (5 + 2(3).47)}{g(5(.47) + 3(.47)^2)^3} = 2.98$ $F_r = 1.73$ Critical

RIPRAP TYPE: III

% PASSING	SIZE (in)
70-100	21
50-70	18
35-50	12
2-10	4

$D_{max} = 21'' = 1.75'$

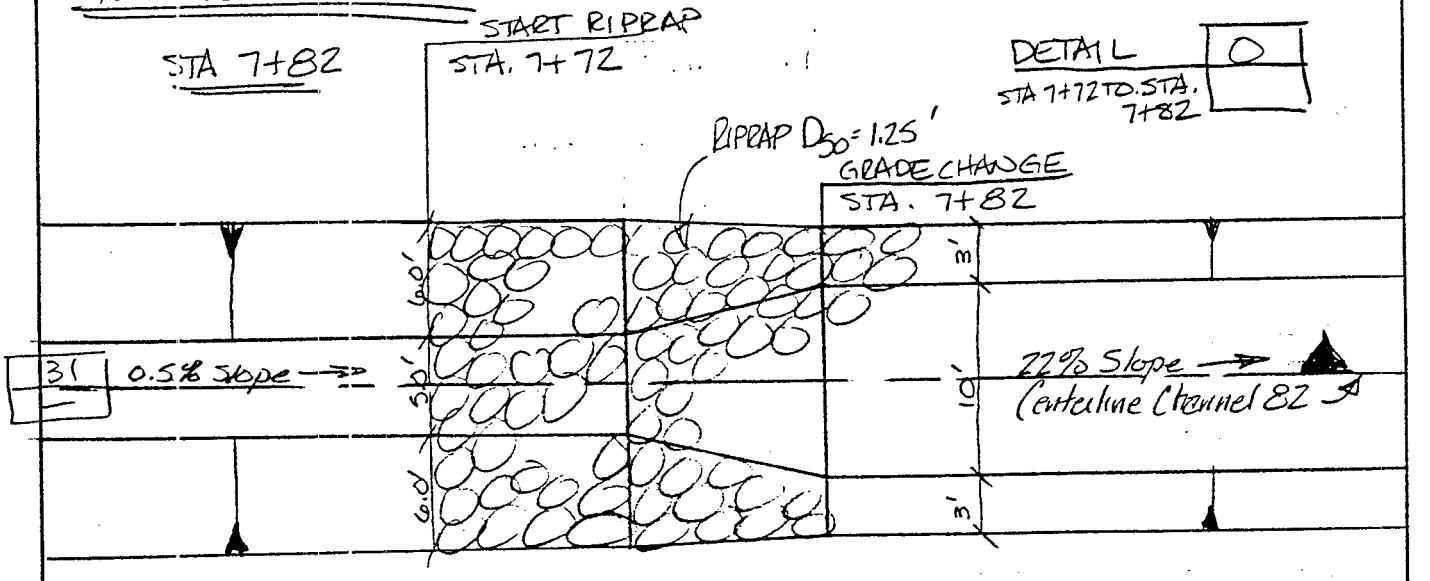


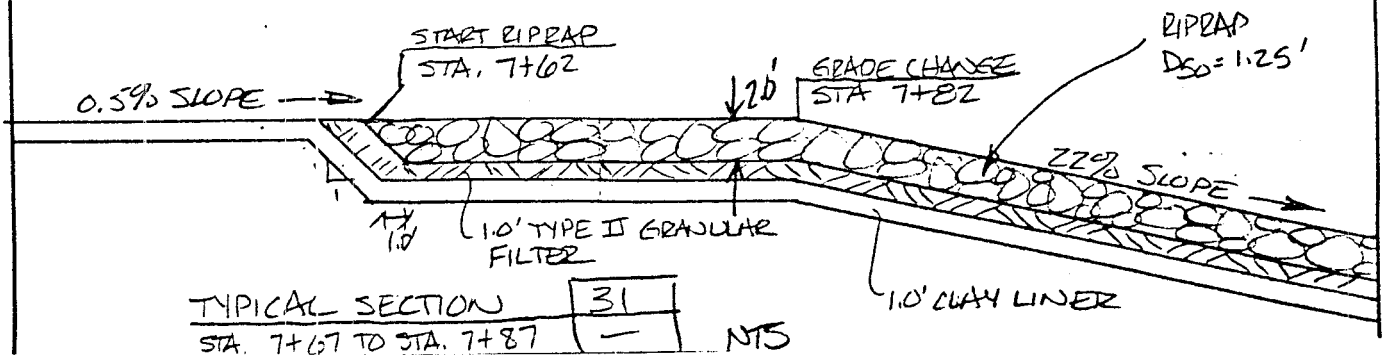
TYPICAL SECTION 30
STA 13+25 TO STA. 15+10

TRANSITION DESIGNS

STA 7+82

DETAIL 0
STA 7+72 TO STA. 7+82





TYPICAL SECTION 31
STA. 7+67 TO STA. 7+87 —

NTS

Check velocity at Sta 7+77 if flow goes critical

$$Fr^2 = 1 = \frac{Q^2 B}{g A^3} = \frac{(18.1)^2(5+6y)}{g(5y+3y^2)^3} \qquad 0.0983 = \frac{5+6y}{(5y+3y^2)^3} \qquad y_c \sim 0.65'$$

$A = 4.5\,ft^2$ $\quad V = Q/A = 18.1/4.5 = 4\,fps$ too great for Clay liner extend riprap upstream 5' TO STA 7+72

STA 13+10

Check for Choking Conditions

Contraction Ratio $b_3 = 5'$, $b_1 = 10'$ $\quad \frac{b_3}{b_1} = \frac{5}{10} = 0.5$

$$Fr_1 = \frac{Q^2 T}{g A^3} = \frac{(18.1)^2(10+2(3).25)}{g(2.7)^3} = 5.9$$

from Henderson "Open Channel Flow" Fig 7-11
Choking is impossible except by Oblique wave Action.

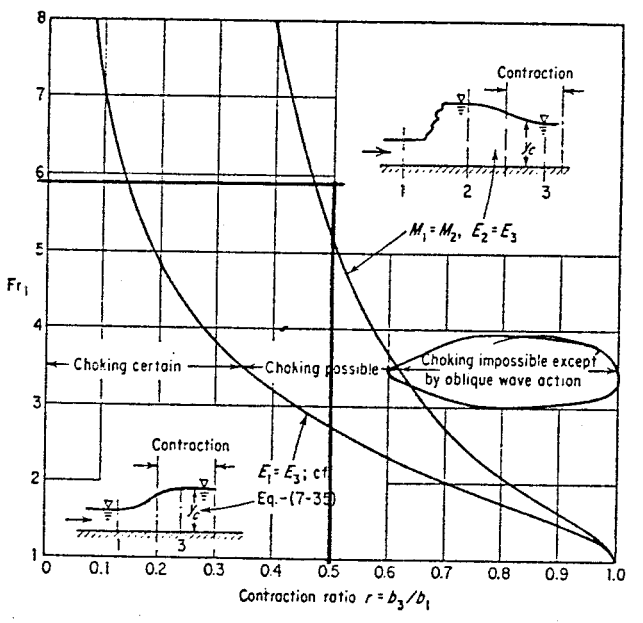


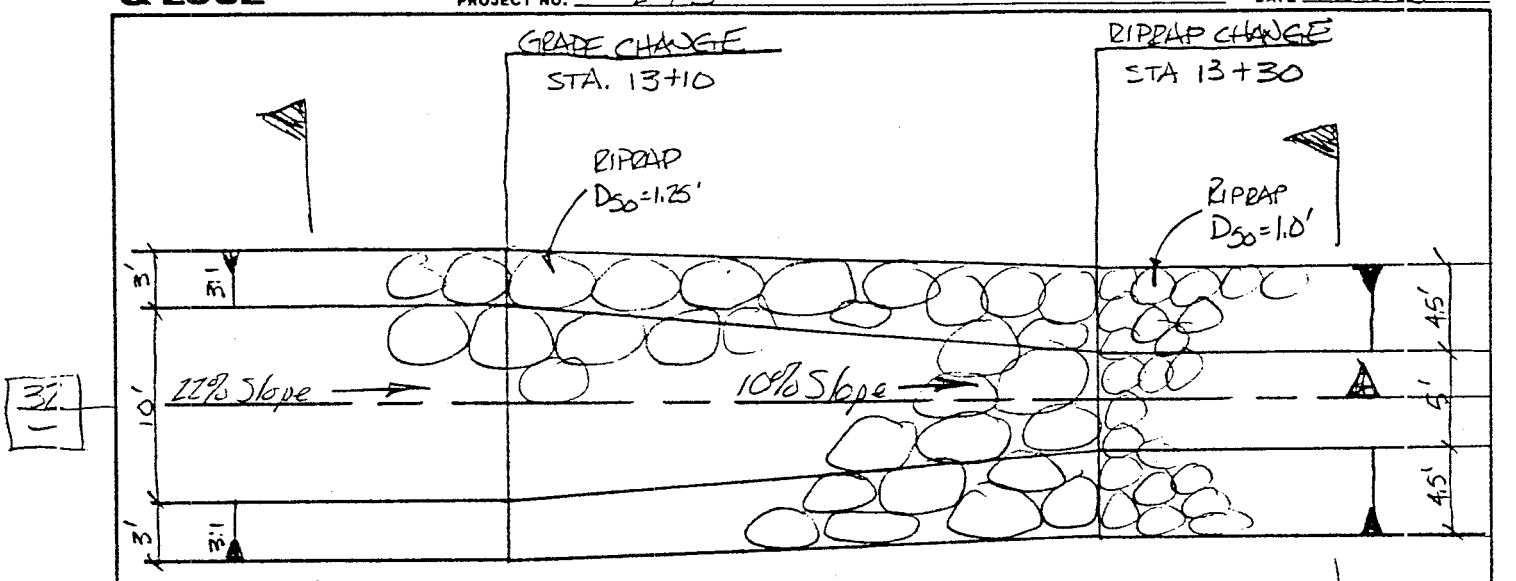
Figure 7-11. The Choking of a Width Contraction in Supercritical Flow

EXTEND TRANSITION OVER 15' LENGTH

HANSEN ALLEN & LUCE INC

CLIENT: PLATEAU
PROJECT: CHANNEL RECLAMATION
FEATURE:
PROJECT NO. 2-7-5

SHEET 41 OF 4
COMPUTED DEI
CHECKED
DATE 4 APR 88

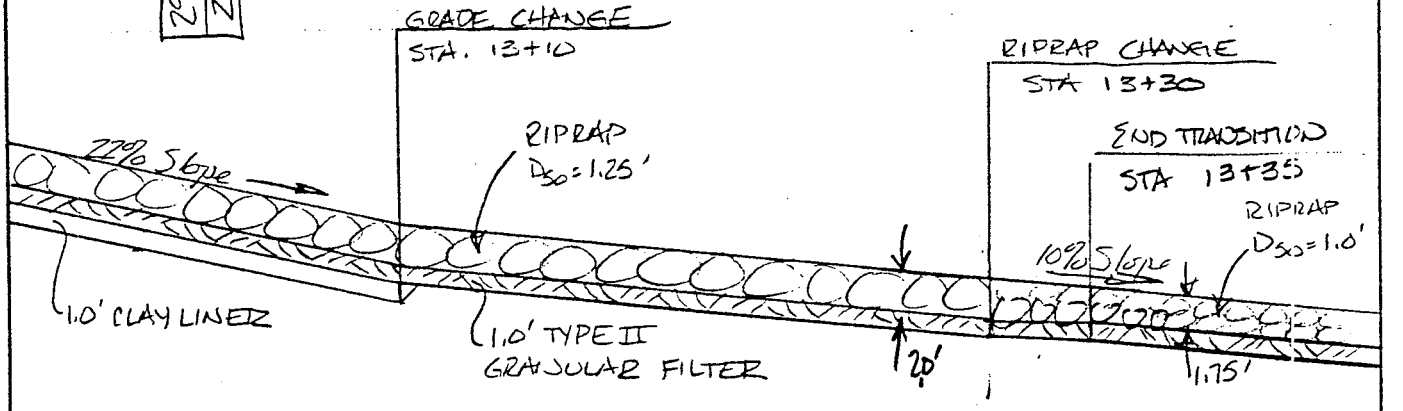


29 | 29 Z

DETAIL P
STA 15+10 TO STA 15+25

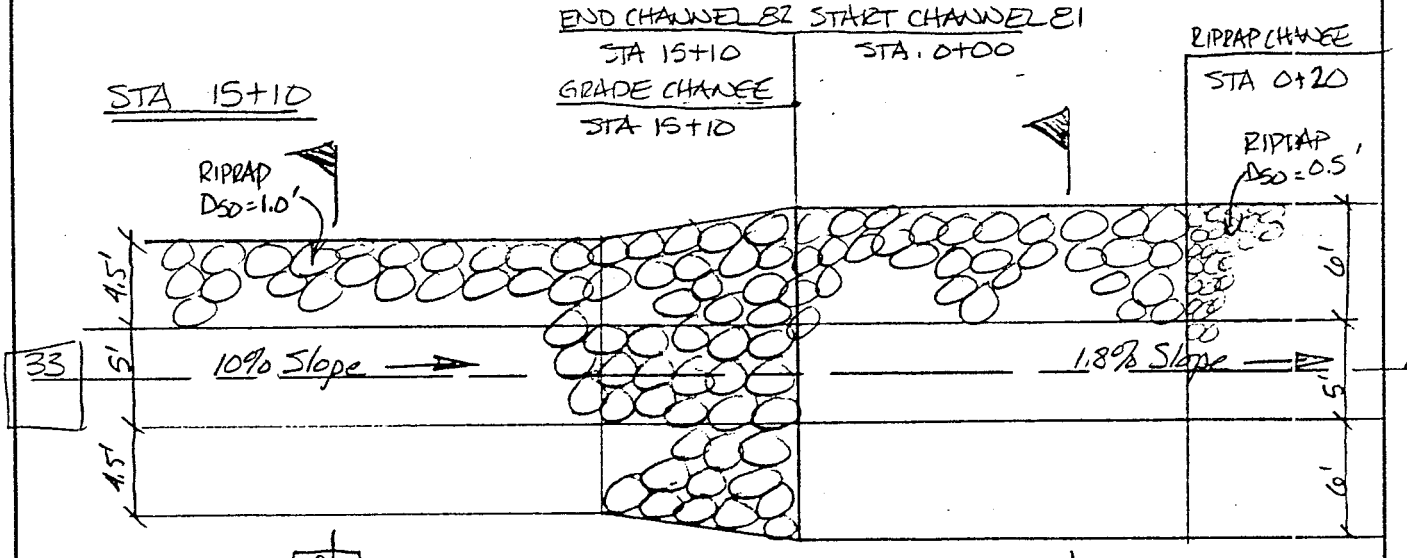
NTS

30 | 30 Z



TYPICAL SECTION 32 —
STA. 13+10 TO STA. 13+25

NTS



30 | 30 Z

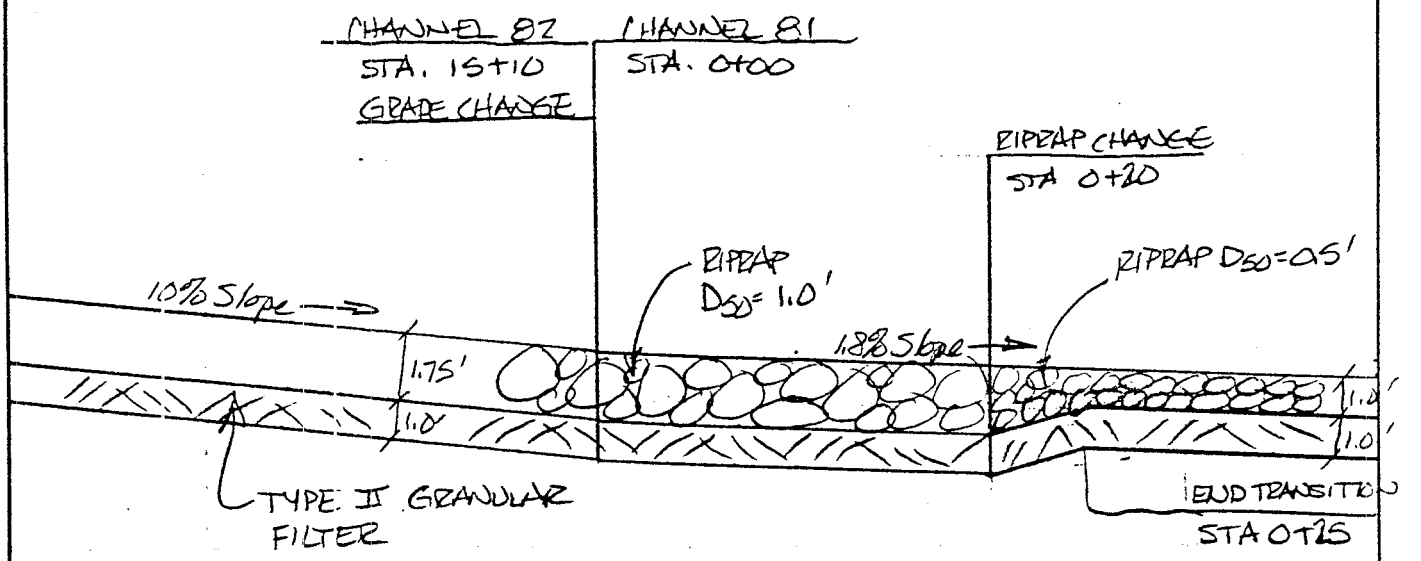
DETAIL Q

21 | 21 Z

HANSEN ALLEN & LUCE inc

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE
PROJECT NO. 2-7-5

SHEET 12 OF 18
COMPUTED DEH
CHECKED
DATE 5 APR 88



TYPICAL SECTION
STA 0+00 TO STA 0+25

33

DESIGN END CHANNEL 82, START CHANNEL 81

Design Q at STA 0+00 (Channel 81) = 18.2 cfs (flow from Channel 82)

	Channel 81	Channel 82
b (ft)	5	5
m	3	3
D_{50}	0.5	1.0'
depth (ft)	2.0'	1.5'
y (ft)	0.7	0.47
A (ft^2)	5.0	3.0
V (fps)	3.7	6.0
T	9.2	7.8
F_r^2	0.76	3.0

hyd. Jump will Occur

$F_r = \frac{Q^2 T}{g A^3}$ $T = b + 2my$

for Channel 81 $Q = 18.2$, $n = .0395(.5)^{1/6} = 0.035$, $m = 3$, $S = 0.018$, $b = 5$

$\frac{Qn}{1.49 S^{1/2}} = 3.20$

y	$AR^{2/3}$	
0.5	1.76	
0.7	3.24	⇒ A = 5.0, V = 3.7
0.69	3.16	

$T = 5 + 6(.7) = 9.2'$

Calculation of Hydraulic Jump Characteristics

Momentum is Conserved. $M = \frac{Q^2}{gA} + \frac{y^2}{6}(2my + 3b)$ $M_1 = M_2$

$A = by + my^2$

Channel 82

$\frac{(18.2)^2}{g(3.0)} + \frac{(.47)^2}{6}(2(3).47 + 3(5)) = 4.09 = M_1$

$\frac{(18.2)^2}{g(5y + 3y^2)} + \frac{y^2}{6}(6y + 15) = 4.09$ $y_2 = 0.87 ft$ = Alt depth

from Backdrawn Curve Analysis - y_c occurs within 3-4 ft

Transition w/ larger rock riprap for 10' downstream

Provide flow depth = 0.87+1 = 1.87 Use 2.0' for 10' length

Backdown Curve Starting At Channel 81 Sta. 0+00

Supercritical Flow

Trap	TO	TRANSITION	TO	Trap	
	N	S	M	B	L
Trap	0.040	0.100	3.0	5.0	10.0
TRANS	0.040	0.018			20.0
Trap	0.035	0.018	3.0	5.0	10.0

Q= 18.20

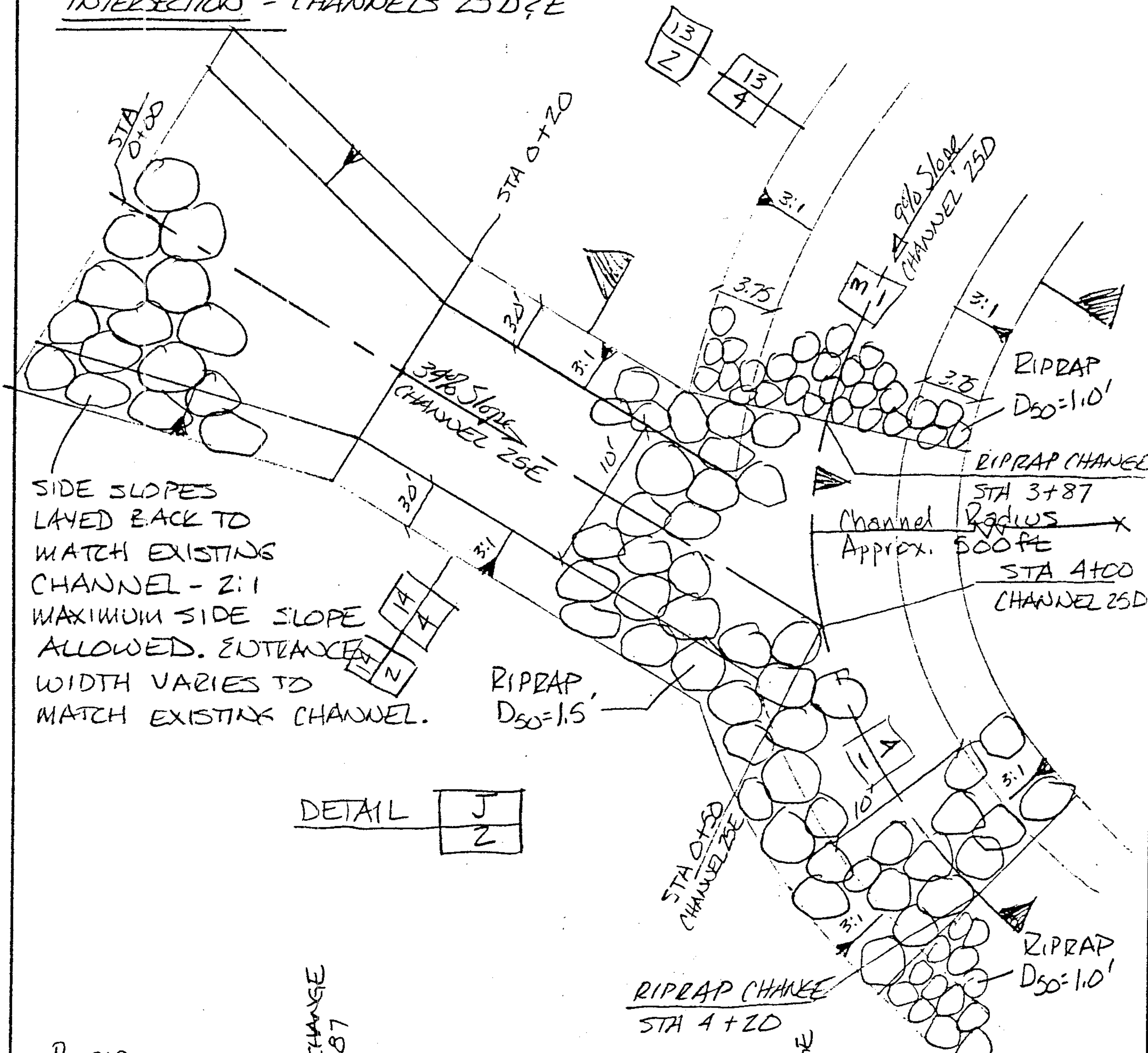
INDEP. VAR., X	DEP. VAR., Y	DERIVATIVE DY/DX	INCREMENT DLX	FR2
+10.000	0.47	+4.030714E-02	+1.000	2.942
+11.000	0.51	+4.340979E-02	+1.000	2.225
+12.000	0.56	+5.116758E-02	+1.000	1.666
+13.000	0.63	+1.159284E-01	+1.000	1.144
+10.000	0.47	+4.030714E-02	+0.500	2.942
+10.500	0.49	+4.157033E-02	+0.500	2.557
+11.000	0.51	+4.343058E-02	+0.500	2.222
+11.500	0.53	+4.631150E-02	+0.500	1.927
+12.500	0.59	+6.236949E-02	+0.500	1.407
+12.500	0.59	+6.236949E-02	+0.250	1.407
+12.750	0.60	+7.569299E-02	+0.250	1.280
+13.000	0.63	+1.280541E-01	+0.250	1.126
+13.250	0.65	+6.150161E-02	+0.250	1.420
+12.500	0.59	+6.236949E-02	+0.125	1.407
+12.625	0.59	+6.770711E-02	+0.125	1.344
+12.750	0.60	+7.588678E-02	+0.125	1.279
+12.875	0.61	+9.052516E-02	+0.125	1.208
+13.000	0.63	+1.309739E-01	+0.063	1.122
+13.063	0.64	+2.220797E-01	+0.063	1.063
+13.125	0.64	+8.322323E-02	+0.063	1.238
+13.188	0.65	+8.985954E-02	+0.063	1.210
+13.000	0.63	+1.309739E-01	+0.031	1.122
+13.031	0.63	+1.578943E-01	+0.031	1.096
+13.063	0.64	+2.241538E-01	+0.031	1.063
+13.094	0.64	-1.057145E+00	+0.031	0.989
+13.000	0.63	+1.309739E-01	+0.016	1.122
+13.016	0.63	+1.423830E-01	+0.016	1.109
+13.031	0.63	+1.582916E-01	+0.016	1.096
+13.047	0.63	+1.824194E-01	+0.016	1.080
+13.078	0.64	+3.499498E-01	+0.008	1.038
+13.086	0.65	+6.714271E-01	+0.008	1.019
+13.094	0.65	+2.160890E-01	+0.008	1.066

HANSEN ALLEN & LUCE inc

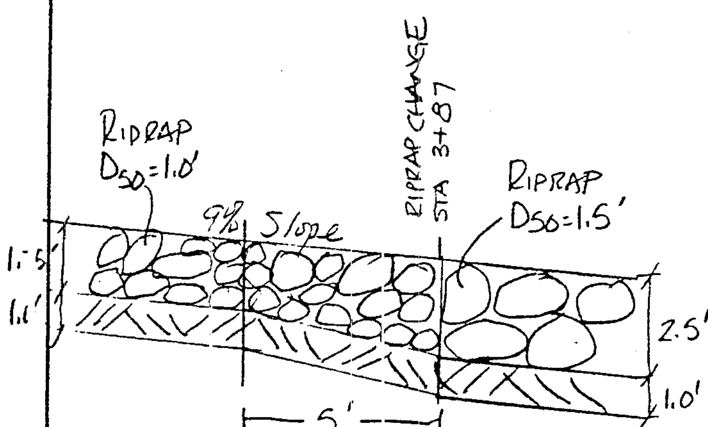
CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE
PROJECT NO. 2-7-5

SHEET 45 OF 48
COMPUTED DEH
CHECKED
DATE 22 MAR 88

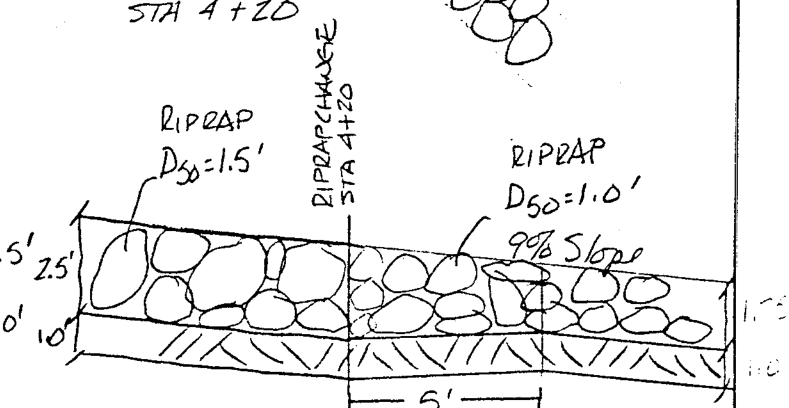
INTERSECTION - CHANNELS 25D&E



DETAIL J / 2



TYPICAL SECTION 3 / —
STA 3+87

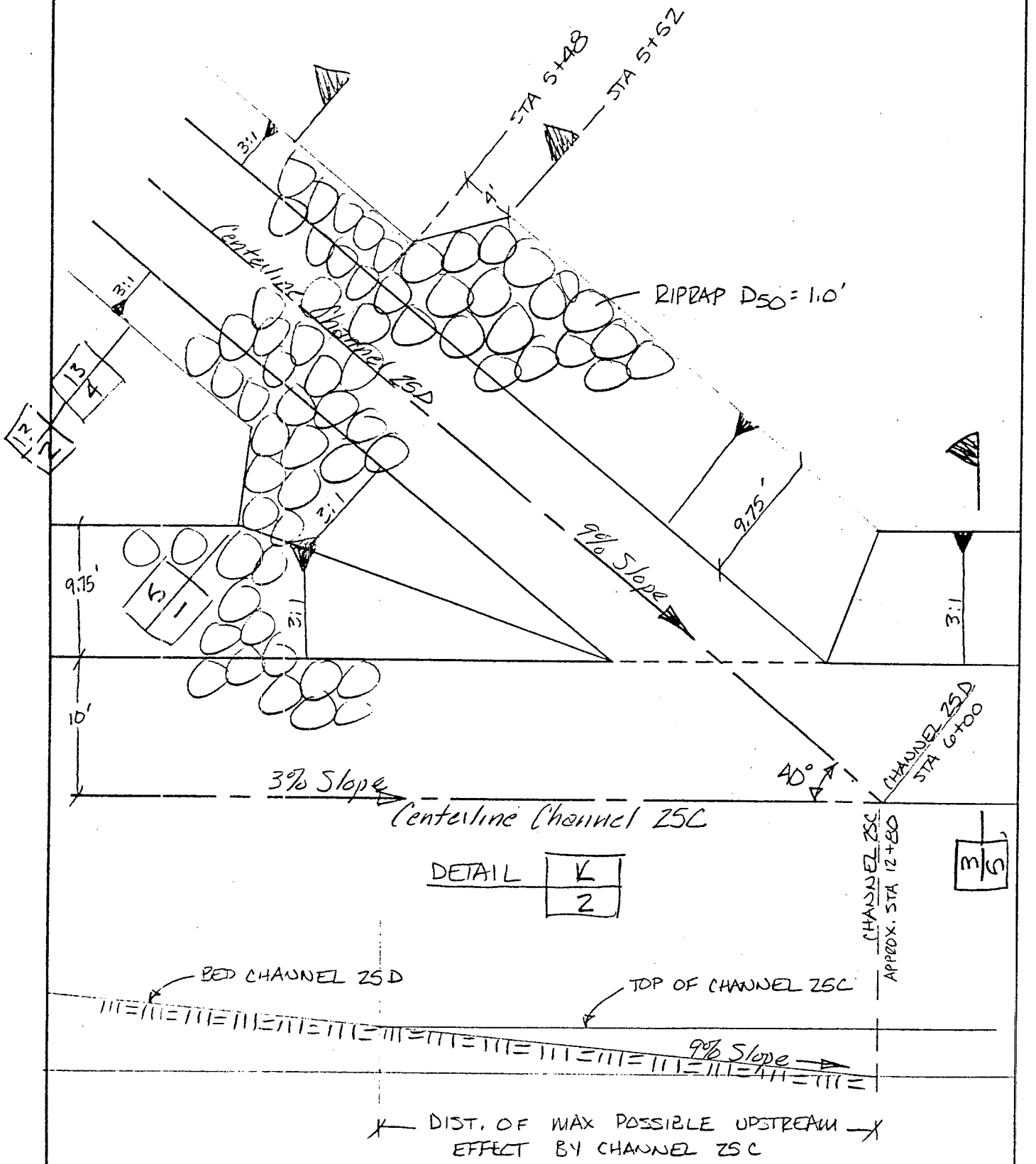


TYPICAL SECTION 4 / —
STA 4+20

HANSEN ALLEN & LUCE INC

CLIENT: PLATEAU
PROJECT: CHANNEL RECLAMATION
FEATURE:
PROJECT NO.: 2-7-5

SHEET 46 OF 48
COMPUTED:
CHECKED:
DATE: 11 MAR 88

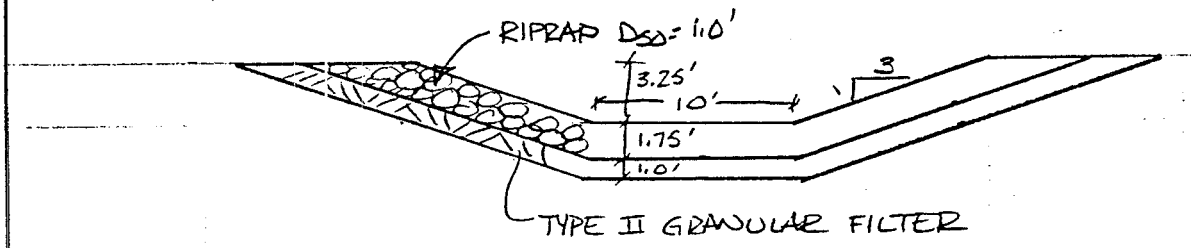


HANSEN ALLEN & LUCE inc

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE
PROJECT NO. 2-7-5

SHEET 47 OF 48
COMPUTED DEH
CHECKED
DATE 22 MAR 88

CHANNEL 25D - STA 5+48 TO 6+00



TYPICAL SECTION
STA 5+52

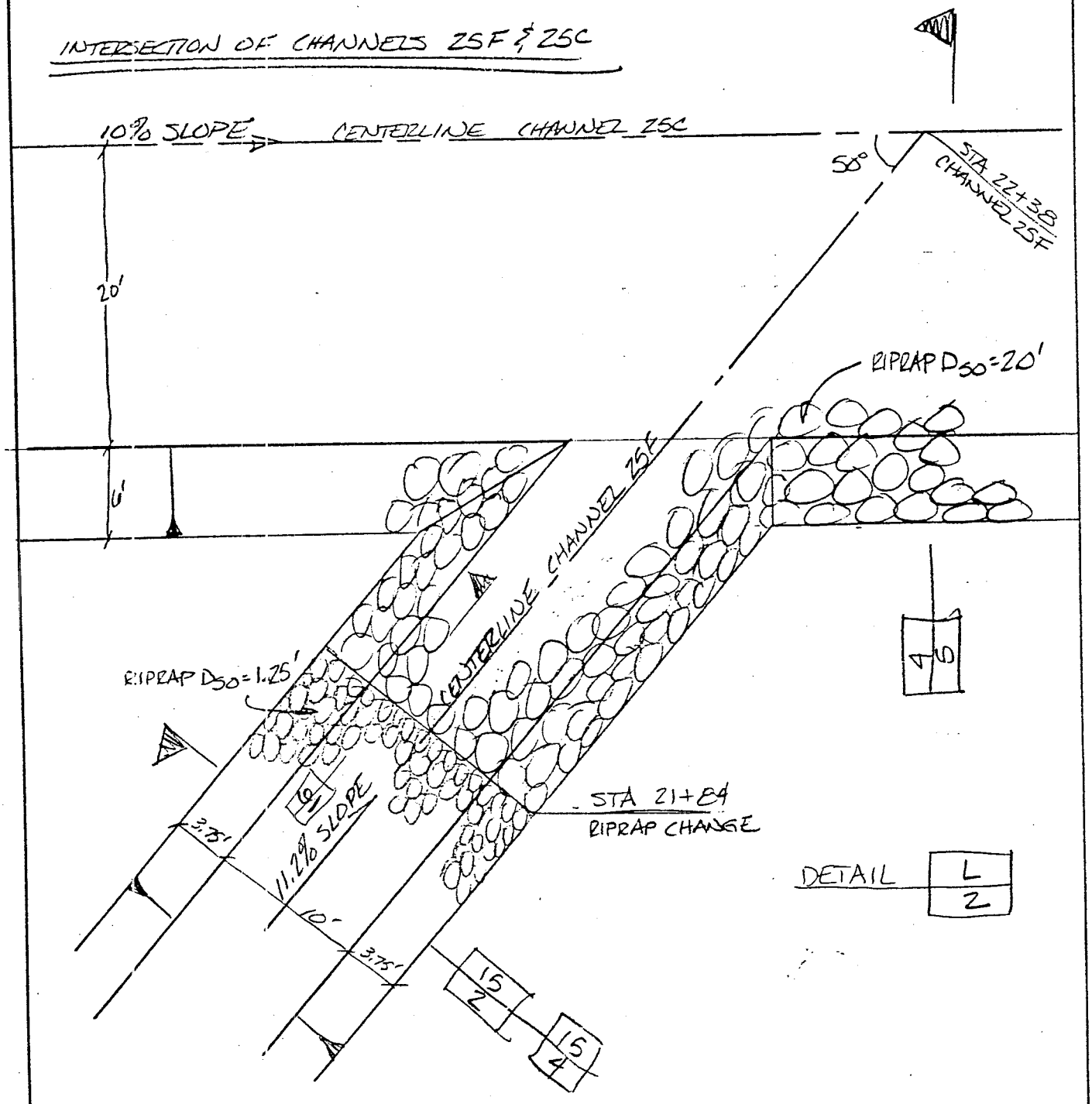
5
—

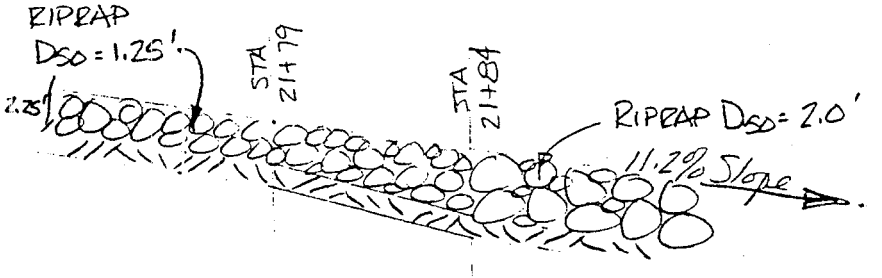
HANSEN ALLEN & LUCE INC

CLIENT: PLATEAU
PROJECT: CHANNEL RECLAMATION
FEATURE:
PROJECT NO.: 2-7-5

SHEET 48 OF 48
COMPUTED DEH
CHECKED
DATE 21 MAR 88

INTERSECTION OF CHANNELS 25F & 25C





TYPICAL SECTION
STA 21+84

6
—

Design Calculations for Channel 83

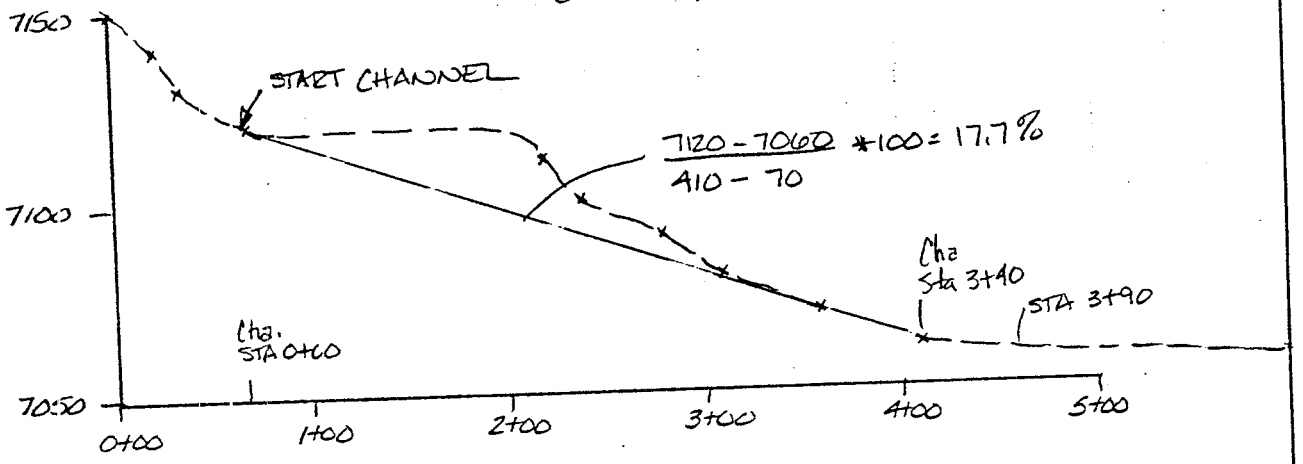
HANSEN ALLEN & LUCE INC

CLIENT: PLATEAU
PROJECT: CHANNEL RECLAMATION
FEATURE: Channel 83
PROJECT NO.: 2-7-5

SHEET 1 OF 5
COMPUTED DEF
CHECKED
DATE 6 APR 88

DESIGN OF CHANNEL 83 - THROUGH POND 8

STA	ELEV	STA	ELEV
0+00	7150	2+40	7100
0+25	7140	2+80	7090
0+35	7130	3+10	7080
0+70	7120	3+60	7070
2+20	7110	4+10	7060
		6+50	7050



FLOW CALC.

Area = 16.5 + 6.1 = 22.6 ac
Contour Length = 13,600 ft
Contour Int = 50'
Slope = $\frac{100 * 50 * 13600}{43560 * 22.6}$ = 69.1%
Hyd. Length = 2400 ft
Precip = 2.95 in

Q_{100} = 21.6 cfs

Channel Design: Try b=5', n=.035' (D_{50}=0.5'), m=3, S=.177

$\frac{Qn}{1.49 S^{1/2}}$ = 1.21

y	$AR^{2/3}$
0.5	1.76
0.4	1.18 ⇒
0.41	1.24

A = 2.48
V = 8.7

Riprap: S=.177, ϕ=42°, y=.4, SG=2.65

w/ S.F. = 1.2, D_{50} = 1.44 ft try increasing width to 10'

b=10', n=.04 (D_{50}=1.0'), m=3, S=.177

$\frac{Qn}{1.49 S^{1/2}}$ = 1.38

y	$AR^{2/3}$
0.25	1.01
0.3	1.38 ⇒

A = 3.27
V = 6.6

PROJECT : Plateau Mining Company - Channel 83 100-Yr Flow Calculation

AREA= 22.6 ACRES
AVERAGE BASIN SLOPE= 69.1 PERCENT
CURVE NUMBER= 75.0
DESIGN STORM= 2.95 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 2400. FEET
MINIMUM INFILTRATION RATE= .00 IN/HR

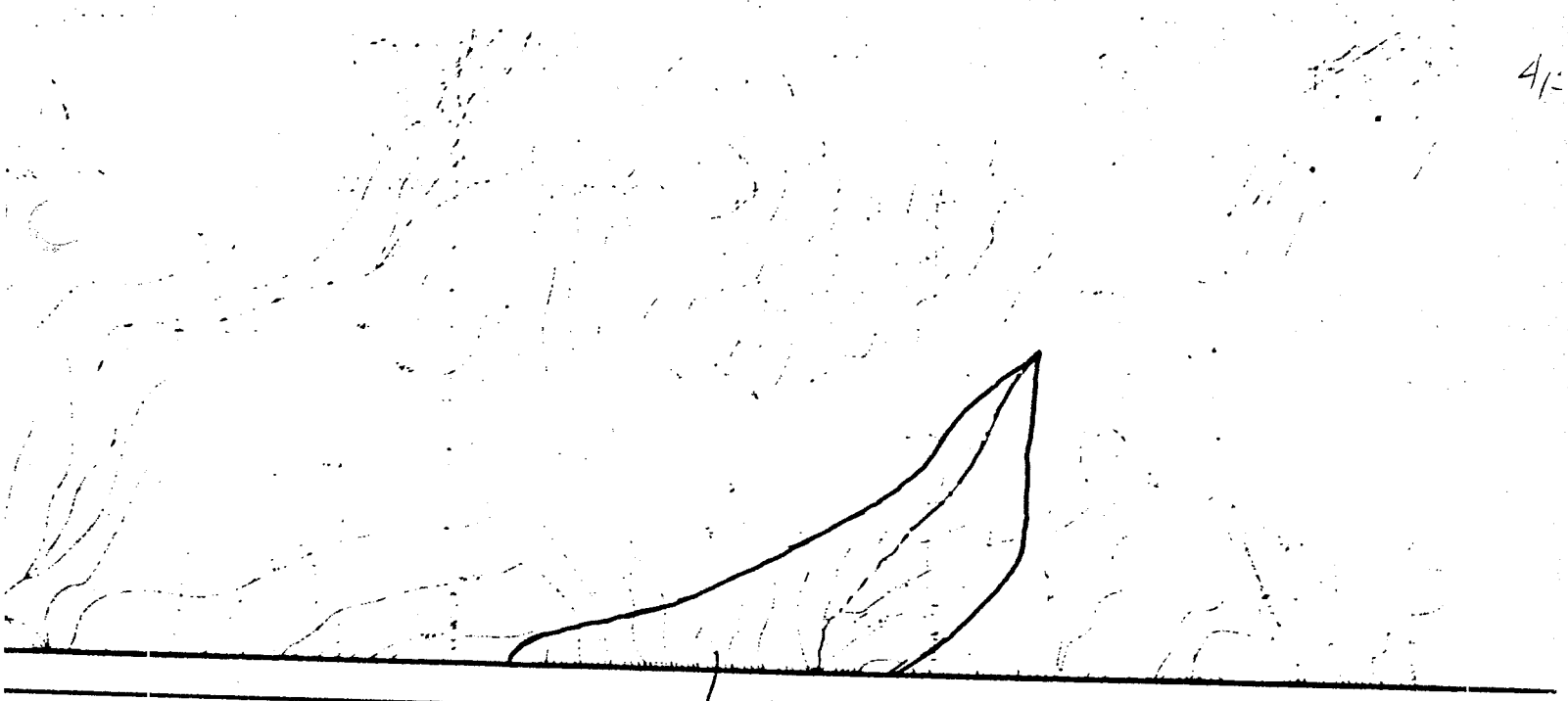
TP= .0994 HOURS QPCFS= 172.01 CFS QPIN= 7.5481 INCHES
C3= 37.2045 ITERATIONS= 8 SCS 24-hour

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
10.83	.6641	.0000	.0000	.0	.00
10.85	.6679	.0000	.0000	8.6	.00
10.87	.6716	.0000	.0000	53.4	.00
10.89	.6754	.0000	.0000	114.2	.00
10.91	.6791	.0000	.0000	157.9	.00
10.93	.6829	.0000	.0000	172.0	.00
10.95	.6866	.0001	.0000	161.1	.00
10.97	.6904	.0002	.0000	136.0	.01
10.99	.6941	.0002	.0000	106.4	.02
11.01	.6987	.0003	.0000	78.5	.03
11.03	.7042	.0004	.0001	55.3	.04
11.05	.7097	.0005	.0001	37.6	.05
11.07	.7152	.0007	.0001	24.7	.06
11.09	.7207	.0009	.0002	15.9	.08
11.11	.7262	.0010	.0002	10.0	.10
11.13	.7318	.0012	.0002	6.1	.12
11.15	.7373	.0015	.0002	3.7	.14
11.17	.7428	.0017	.0002	2.2	.16
11.19	.7483	.0020	.0003	1.3	.18
11.21	.7538	.0022	.0003	.8	.20
11.23	.7593	.0025	.0003	.4	.22
11.25	.7648	.0028	.0003	.3	.24
11.27	.7703	.0031	.0003	.1	.26
11.29	.7758	.0035	.0003	.0	.28
11.90	1.7388	.2609	.0188	.0	17.94
11.92	1.7834	.2802	.0193	.0	18.65
11.94	1.8279	.3000	.0198	.0	19.33
11.96	1.8725	.3203	.0203	.0	19.99
11.98	1.9170	.3411	.0208	.0	20.63
12.00	1.9569	.3601	.0190	.0	21.23
12.02	1.9654	.3641	.0041	.0	21.58
12.04	1.9738	.3682	.0041	.0	21.08
12.06	1.9823	.3723	.0041	.0	19.52
12.08	1.9907	.3764	.0041	.0	17.18

PROJECT : Plateau Mining Company - Channel 83 100-Yr Flow Calculation
(Continued)

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
12.10	1.9991	.3805	.0041	.0	14.57
12.12	2.0076	.3847	.0041	.0	12.11
12.14	2.0160	.3888	.0042	.0	10.02

HYDROGRAPH PEAK= 21.58 cfs
TIME TO PEAK= 12.02 Hours
RUNOFF VOLUME= 1.75 Acre-Feet



6.1 ac.

TION
ONTROL
ROL
ON
ER

MINE PORTAL
DOWNSPOUT
CATCH BASIN
LIGHT POLE
POWER POLE

(801) 484-4351

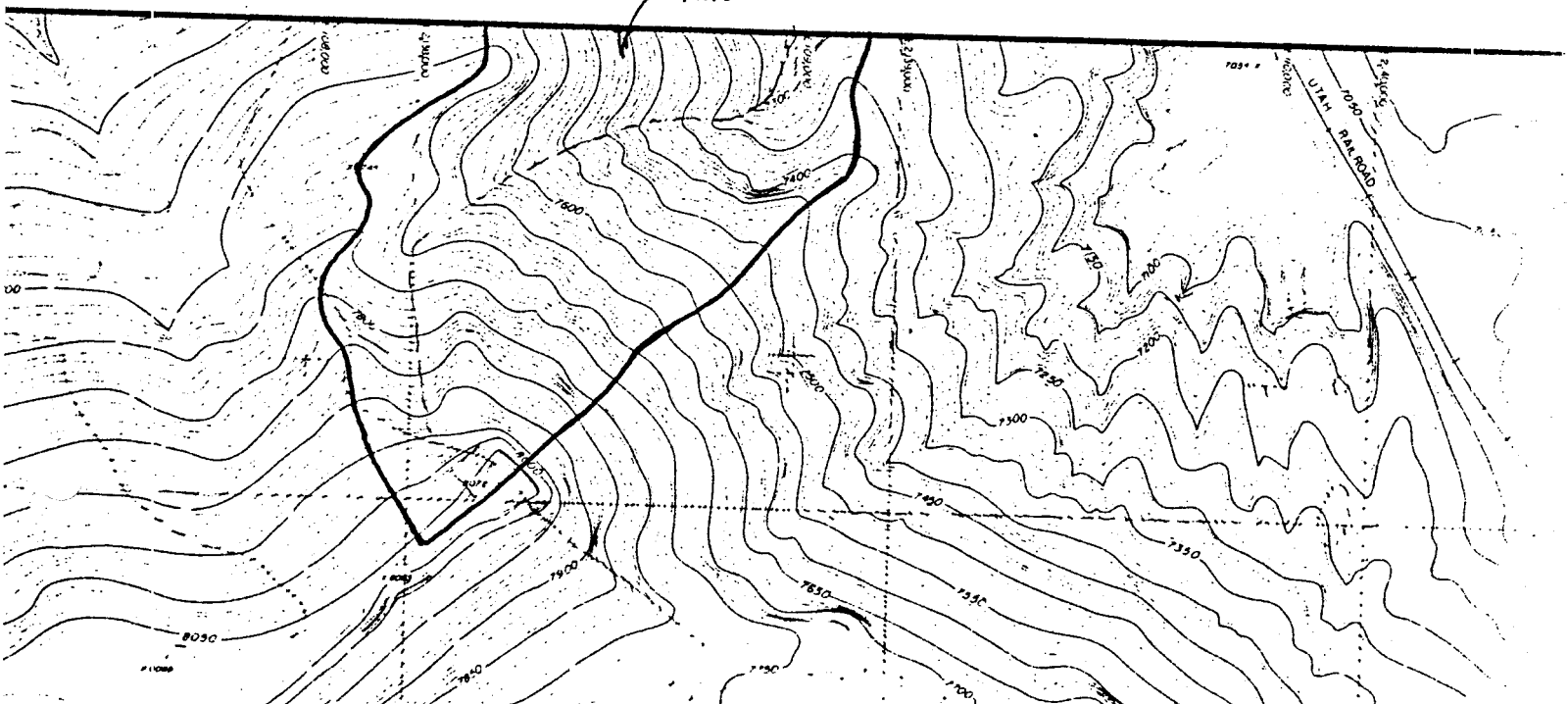
Olympus

AERIAL SURVEYS INC.

50 WEST 2950 SOUTH Salt Lake City, Utah 84115

N 450,000
N 442,000
N 434,000
N 426,000

16.5 ac



RIPRAP: w/SF=1.2; D_{50} = 1.08'

Its much more economical to go to b=5' with the small increase in Riprap Size.

Recalculate flow depth + Check riprap size based on adjusted n.

$n = .0395(1.5)^{1/6} = 0.04$ Increase b to account for larger n

$Q = 21.6$, $S = .177$, $b = 6'$, $m = 3$

$\frac{Qn}{1.49 S^{1/2}} = 1.38$

y	$AR^{2/3}$
0.5	2.07
0.4	1.40 ⇒ A = 2.9
0.39	1.34 V = 7.5

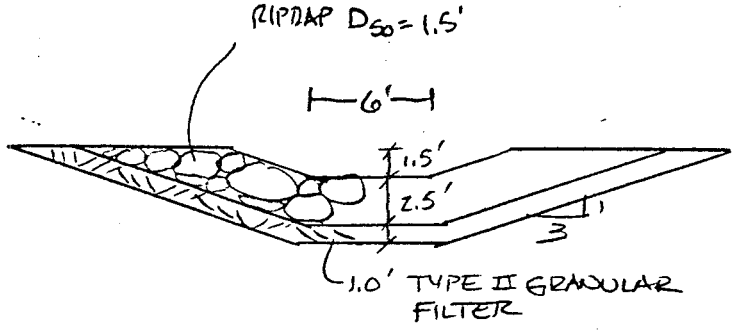
RIPRAP: USE D_{50} = 1.5'; SF = 1.24 OK

RIPRAP TYPE H

% Passing	Size (in)
70-100	30
50-70	24
35-50	18
2-10	6

(D_{max} = 30" = 2.5')

USE TYPE II FILTER - 1.0' DEPTH
CHANNEL DEPTH: 0.4 + 1.0 = 1.4' USE 1.5'



TYPICAL SECTION 34

Design Calculations for Culverts 25F & 81A

CULVERT DESIGN

Channel 25F Road Culvert — INLET CONTROL —

Q = 36.2 cfs, Assume HW/D = 1.0
Projecting Inlet

from Chart 6: USE 58" x 36" CMP ARCH CULVERT

WITH 1.0' FREEBOARD - FLOW LINE DEPTH = 4.0'

— PIPE FLOW CONTROL —

Assume Length = 150', 1.0' HEAD DROP, Ke = 0.9

From Chart 12 — USE 58" x 36" — OK

Channel 84 Road Culvert — INLET CONTROL —

Q = 32.7 cfs, Assume HW/D = 1.0
Projecting Inlet

from Chart 6: USE 50" x 31" CMP ARCH CULVERT

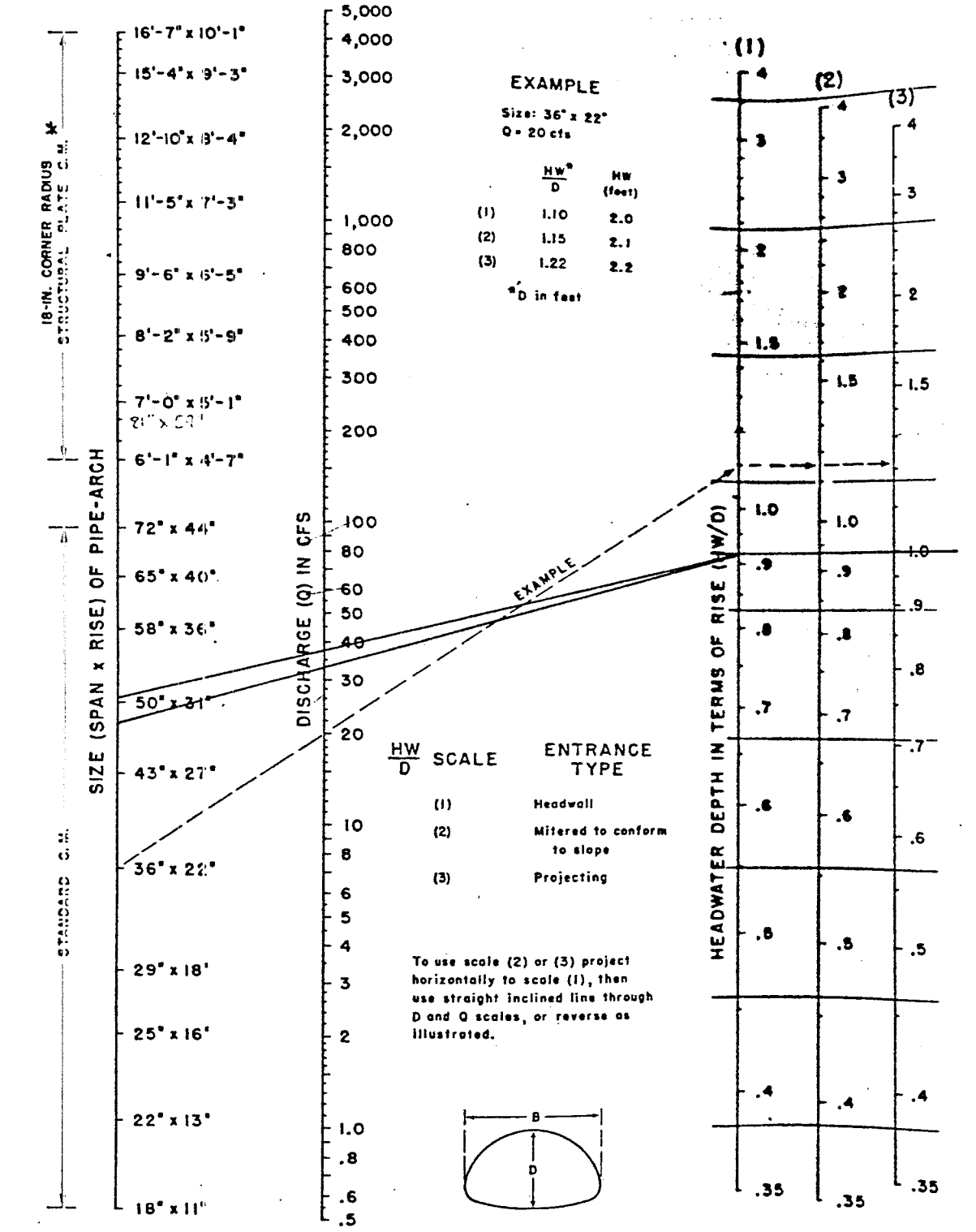
WITH 1.0' Freeboard - Flow Line DEPTH = 43"

— PIPE FLOW CONTROL —

Length ~ 130', 2.0' Head Drop, Ke ~ 0.9

From Chart 12 - USE 50" x 31" — OK WITH Δh = 2.0'

CHART 6

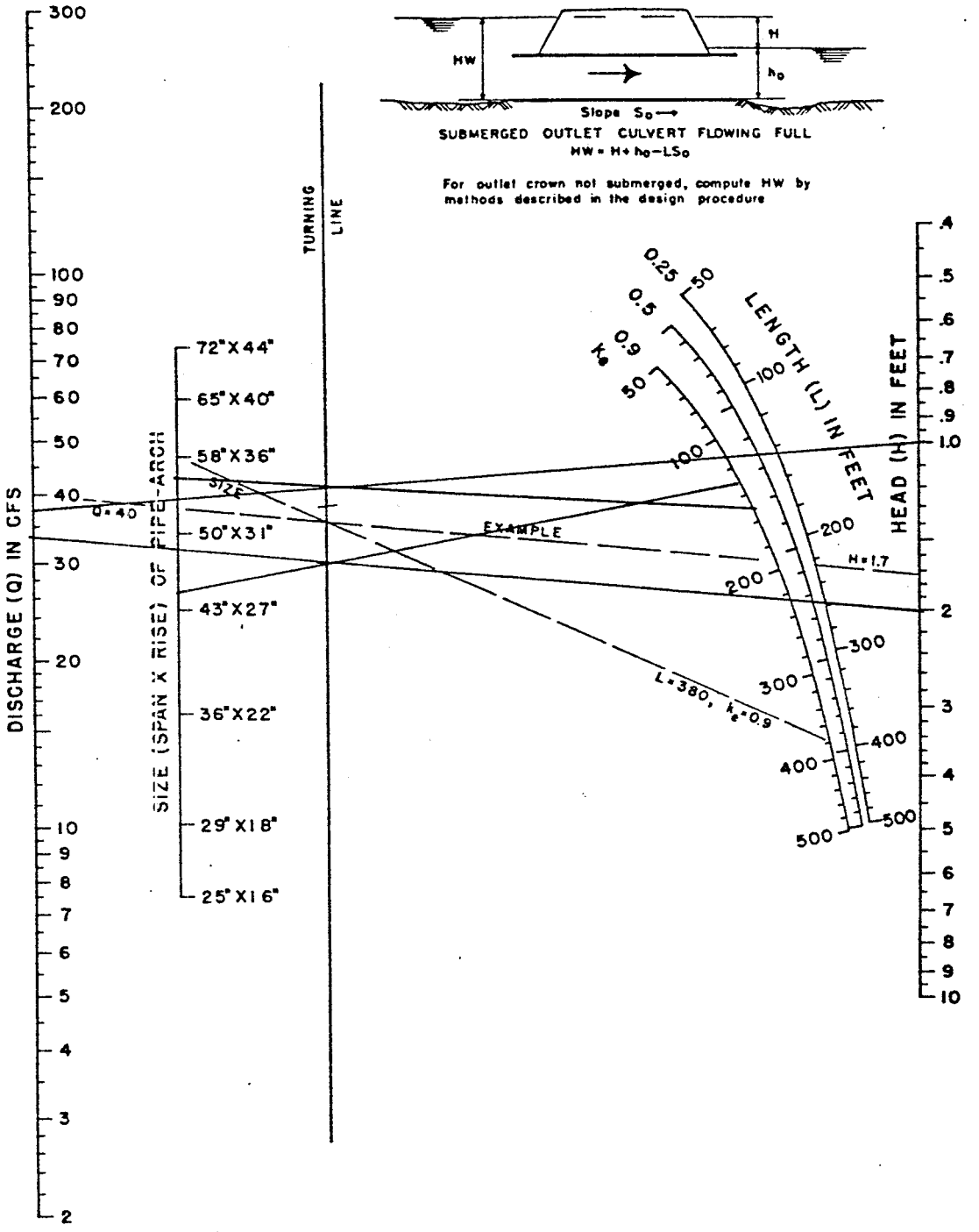


*ADDITIONAL SIZES NOT DIMENSIONED ARE LISTED IN FABRICATOR'S CATALOG

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR C. M. PIPE-ARCH CULVERTS WITH INLET CONTROL

CHART 12



HEAD FOR STANDARD C. M. PIPE-ARCH CULVERTS FLOWING FULL n=0.024

BUREAU OF PUBLIC ROADS JAN. 1963

Reclamation Volumes and Cost Estimate

HANSEN ALLEN & LUCE INC

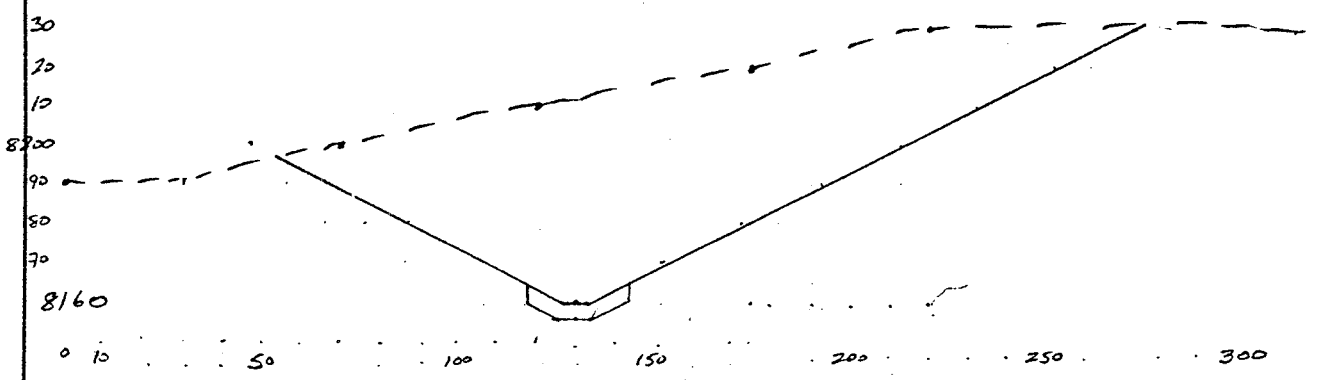
CLIENT Plateau Mining Co
PROJECT Channel Reclamation
FEATURE Cut
PROJECT NO.

SHEET 1 OF 1
COMPUTED GP
CHECKED
DATE June 22, 1988

Channel 4A: see calculations by DB Nov 18, 87
92,000 cy

check: @ STA 1+35 channel invert elev = 8160

x	Exist elev
0	8190
30	90
70	8200
120	10
130	℄
175	20
220	30
315	30



$A = by + my^2 = 6(52) + 2(52)^2 = 5720\ ft^2$

∴ Dave's estimate of 6,290 ft² ok

℄

H 1"=50'
V 1"=10'

HANSEN ALLEN & LUCE INC

CLIENT Plateau
PROJECT
FEATURE Q.T.O. CUT
PROJECT NO.

SHEET 2 OF 4
COMPUTED GSP
CHECKED
DATE 22 JUNE 88

Channel 25 B STA 0+00 to STA 2+80 confluence

section 4: $b = 13'$ $D_{channel} = 2'$ $t_{rip} = 4'$ $t_{gravel} = 1'$
$z = 3:1$

Cut:

$Area = by + my^2$ $y = 2 + 4 + 1 = 7'$
$b = 13 + 2(\tan(\frac{1}{2}\tan^{-1}\frac{1}{3})\,7') = 15.3'$

$A_{cut} = 15.3(7) + 3(7)^2 = 254\ ft^2$

Vol cut $= 254 \times 280/27 = \boxed{2,600\ cy}$ but this will be included in riprap and gravel cost.

Channel 25C (see DEH calculations 28 Oct 87, sheet 9)

	STA	AREA ft^2	Δ VOL cy CUT
	0+00	0	
			3981
	2+00	1075	
			3081
	3+40	113.5	
			84
	3+80	0	
			0
Fill	4+00	0	
			185
	6+00	50	
			74
	6+80	0	

7405 cy Fill STA 0+00 to 6+80

STA 20+60	0	
		52,720 cy
26+50	4825	
		27,470
29+40	290	
		161
29+70	0	
31+20	0	
35+00	0	

80,351 cy

TOTAL CUT CHANNEL 25C = $\boxed{87,800\ cy}$ CUT

HANSEN ALLEN & LUCE INC

CLIENT Plateau
PROJECT
FEATURE Q.T.O. CUT
PROJECT NO.

SHEET 3 OF 4
COMPUTED GJP
CHECKED
DATE 23 June 88

Channel 25F – all cut costs assumed included in cost of riprap and gravel filter

Channel 25D – same

channel 81 & 82 – same, ie all cut costs included in riprap and gravel filter costs

POND COSTS (see DEH 19NOV87 sheet 15 & 16 calculations)

POND	cut cy	unit cost	COST
6	3067	2.61	8,000
7	4898	2.61	12,800
8	4237	2.82	12,000
			$32,800

Total cut costs for channels (not including any cut to place riprap & filter)

channel	Cut Vol. cy	unit cost	Est. cost
4A	92,000	3.50	322,000
25C	87,800	2.70	237,000
			$559,000

UNIT COSTS:

CHANNEL 4A

assume: 20,000 yd³ haul to upper mine pad 9,700 feet

50,0000 cy haul to pond 2 3,300 feet

22,000 cy haul to refuse pile 7,300 feet

vol wtd haul distance = 5,650 feet

1987 Dodge Guide ⇒ $3.20/cy + .30/cy handling = $3.50

CHANNEL 25C

Net cut = 39,076 cy (see DEH calc) haul to refuse 2100 ft

rest 48,700 cy assume 1000 ft

vol wtd haul distance 1500 feet

1987 Dodge Guide ⇒ $2.70/cy

HANSEN ALLEN & LUCE INC

CLIENT Plateau
PROJECT Channel Reclamation
FEATURE Riprap & Filter QTO
PROJECT NO.

SHEET 4 OF 4
COMPUTED CR
CHECKED
DATE June 23, 1988

SUMMARY Q.T.O.

	CHANNEL	TOTAL L (ft)	Riprap (CY)	Filter (CY)
✓	4A	350	907	412
	63A	75	368	204
✓	25B	280	1724	614
✓	25C	3922	16,687	10,176
	25F	2210	4,442	3,019
	82	1510	1203	890
14	81	2322	4075	2763
	25D	585	961	736
	25E	50	115	69
	83	390	942	540
	6	340	2129	720
	7	370	568	449
	51	250	221	247
Totals			34,343	20,839

Channel costs

Earthwork	55,200 cy x	2.87	158,000
Riprap	34,343 cy x	52.00	1,786,000
Gravel	20,839 cy x	16.00	333,000
	TOTAL CHANNEL		$2,277,000
RELATED EARTHWORK	192,000 cy	x $3.08	$591,000
	TOTAL PROJECT		$2,868,000

SHEET NO. 1

CHANNEL NO.	STATION	AREA RIPRAP (FT²)	AVG. AREA RIPRAP (FT²)	LENGTH (FT)	VOLUME (YD³) / Σ VOLUME (YD³)	AREA FILTER (FT²)	AVG. AREA FILTER (FT²)	VOLUME (YD³) / Σ VOLUME (YD³)
4A								
TOP BACK OF FILTER D=0 W=6	0-22.2					0	0	0 / 0
TOP BACK OF RIPRAP D=0 W=6	0-20	0	0	2.2	0 / 0	8.47	4.24	.35 / .35
END INLET TRANSISION D=0.78 W=6	0-12.2	63.49	31.75	7.83	9.21 / 9.21	29.27	18.87	5.47 / 5.82
END OF 5 D50 (2.0') TRANSISION D=1 W=6	0-10	66.94	65.21	2.17	5.24 / 14.45	30.25	29.76	2.39 / 8.21
END OF INLET SECTION D=1 W=6	0+00	66.94	66.94	10	24.79 / 39.24	30.25	30.25	11.20 / 19.41
CHANNEL END D=1 W=6	3+50	66.94	66.94	350	867.74 / 906.98	30.25	30.25	392.13 / 411.54

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE VOLUMES
PROJECT NO. 2-7-5
SHEET 1 OF 26
COMPUTED DE
CHECKED
DATE MAY 26, 83

HANSEN ALLEN & LUCE INC

SHEET NO. 2

CHANNEL NO.	STATION	AREA RIPRAP (FT^2)	AVG. AREA RIPRAP (FT^2)	LENGTH (FT)	VOLUME (YD^3) / Σ VOLUME (YD^3)	AREA FILTER (FT^2)	AVG. AREA FILTER (FT^2)	VOLUME (YD^3) / Σ VOLUME (YD^3)
63A								
TOP BACK OF FILTER D=0 W=20	0-2.2					0	0	0 / 0
TOP BACK OF RIPRAP D=0 W=20	0+00	0	0	2.2	0 / 0	23.32	11.66	95 / 95
END OF INLET TRANSISION D=1.25' W=18.04	0+3.91	55.59	27.79	3.91	4.02 / 4.02	40.91	32.11	4.65 / 5.60
END OF 5 D50 (1.75') TRANSISION D=2.0' W=16.87	0+8.75	61.84	58.71	4.84	10.52 / 14.55	44.48	42.69	7.65 / 13.25
END OF INLET SECTION D=2.0' W=10.0'	0+20	49.82	55.83	11.25	23.26 / 37.81	37.61	41.04	17.10 / 30.35
START RIPRAP CHANGE TRANSISION D=2.0 W=10.0	0+25	49.82	49.82	10	18.45 / 56.26	37.61	37.61	13.93 / 44.28
RIPRAP CHANGE END D50=2.0 TRANSISION D=2.0 W=10.0	0+30	120.00	84.91	5	15.72 / 71.99	49.25	43.43	8.04 / 52.32
START RIPRAP CHANGE TRANSISION D=2.0 W=10.0	0+70	120.00	120.00	40	177.78 / 249.76	49.25	49.25	72.96 / 125.29
RIPRAP CHANGE END D50=1.25 TRANSISION D=2.0 W=10.0	0+75	49.82	84.91	5	15.72 / 265.49	37.61	43.43	8.04 / 133.33

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE VOLUMES
PROJECT NO. 2-7-5

SHEET 2 OF 26
COMPUTED DE
CHECKED
DATE MAY 26 [illegible]

HANSEN ALLEN & LUCE INC

SHEET 3 OF 16
COMPUTED DE
CHECKED
DATE MAY 26, 85

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE VOLUMES
PROJECT NO. 2-7-5

HANSEN ALLEN & LUCE INC

SHEET NO. 3

CHANNEL NO. 63A CONT	STATION	AREA RIPRAP (FT.2)	AVG. AREA RIPRAP (FT2)	LENGTH (FT)	VOLUME (YD3) / Σ VOLUME (YD3)	AREA FILTER (FT.2)	AVG. AREA FILTER (FT.2)	VOLUME (YD3) / Σ VOLUME (YD3)
START CHANNEL DEPTH TRANSISION D=2.0 W=10.0	0+90	49.82	49.82	15	27.68 / 293.17	37.61	37.61	20.89 / 154.22
END CHANNEL DEPTH TRANSISION CULVERT INLET D=3.5 W=10.0	1+15	66.42	58.12	25	53.89 / 346.98	47.10	42.35	39.21 / 193.44
END CHANNEL START OUTLET TRANSISION D=3.5 W=10.0	1+20	66.42	66.42	5	12.30 / 359.28	47.10	47.10	8.72 / 202.16
TOP BACK OF RIPRAP OUTLET D=0 W=10.0	1+27	0	33.21	7	8.61 / 367.89	13.32	6.66	1.73 / 203.89
TOP BACK OF FILTER OUTLET D=0 W=10.0	1+29.2			2.2		0		

ELIPSOID

$V = 4.1888\,ab^2$

SHEET 4 OF 26
COMPUTED DB
CHECKED
DATE MAY 26, 88

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE VOLUMES
PROJECT NO. 2-7-5

HANSEN ALLEN & LUCE INC

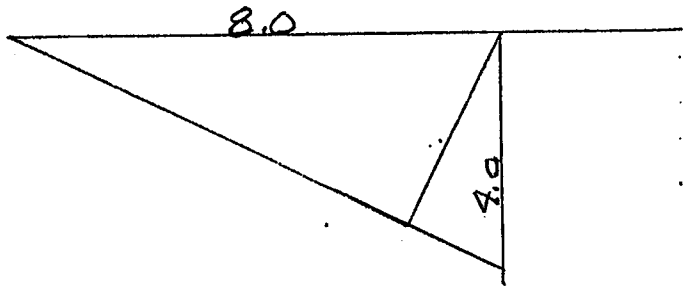
SHEET NO. 4

CHANNEL NO.	STATION	AREA RIPRAP (FT²)	AVG. AREA RIPRAP (FT²)	LENGTH (FT)	VOLUME (YD³) / Σ VOLUME (YD³)	AREA FILTER (FT²)	AVG. AREA FILTER (FT²)	VOLUME (YD³) / Σ VOLUME (YD³)
25B								
TOP BACK OF FILTER INLET CULVERT D=0 W=5	0-20.2						0	0 / 0
TOP BACK OF RIPRAP D=0 W=5	0-18	0	0	2.2	0 / 0	0 / 8.32	4.16	.34 / .34
START SLOPE INLET TRANSISION D=0 W=15	0-10	73.19	36.60	8.94	12.12 / 12.12	34.92	21.62	7.16 / 7.50
END INLET TRANSISION START CHANNEL DEPTH TRANSISION D=5 W=5	0+00	199.68	136.44	10	50.53 / 62.65	66.54	50.73	18.79 / 26.2
END DEPTH TRANSISION D=2.0 W=13.0	0+35	155.79	177.73	35	230.39 / 293.04	55.57	61.06	79.15 / 105.4
RIPRAP CHANGE START CHANNEL DEPTH TRANSISION D=2.0 W=13.0	2+40	155.79	155.79	205	1182.85 / 1475.89	55.57	55.57	421.92 / 527.3
END CHANNEL DEPTH TRANSISION D=2.5 W=13.0	2+45	168.44	162.11	5	30.02 / 1505.91	58.73	57.15	10.58 / 537.94
END CHANNEL D=2.5 W=13.0	2+80	168.44	168.44	35	218.35 / 1724.26	58.73	58.73	76.13 / 614.07

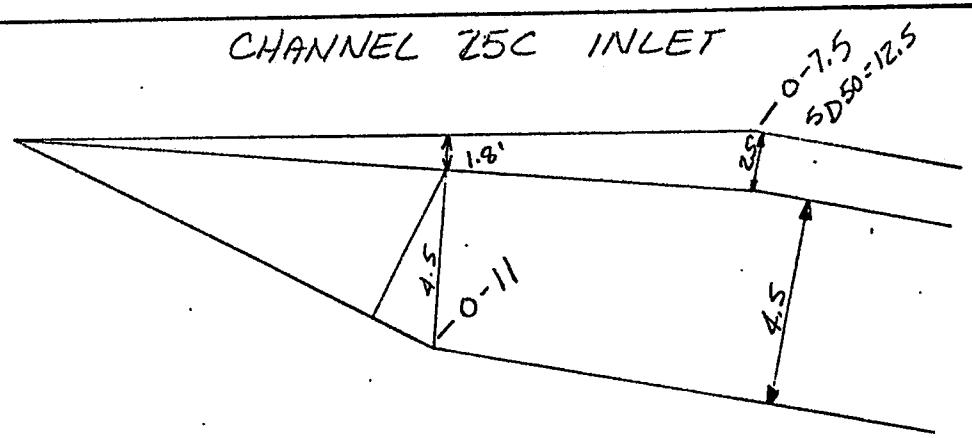
CLIENT PLATTEAU
PROJECT
FEATURE
PROJECT NO.
SHEET 5 OF 26
COMPUTED
CHECKED
DATE

HANSEN ALLEN & LUCE INC

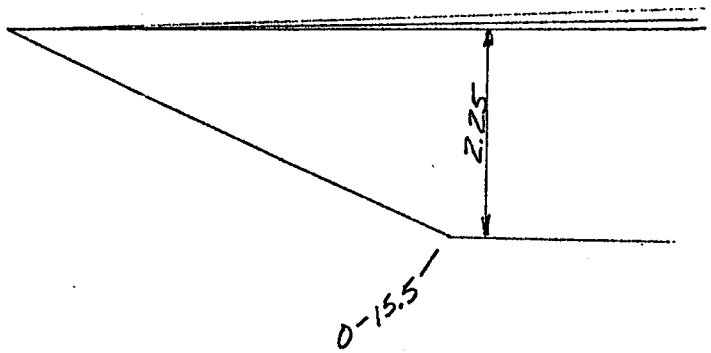
CHANNEL 25B INLET



CHANNEL 25C INLET



CHANNEL 25F INLET



$$\frac{x}{\cos A} = y$$

SHEET 6 OF 26
COMPUTED DB
CHECKED
DATE MAY 26, 95

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE VOLUMES
PROJECT NO. 2-7-5

HANSEN ALLEN & LUCE INC

SHEET NO. 6

CHANNEL NO.	STATION	AREA RIPRAP (FT²)	AVG. AREA RIPRAP (FT²)	LENGTH (FT)	VOLUME (YD³) / Σ VOLUME (YD³)	AREA FILTER (FT²)	AVG. AREA FILTER (FT²)	VOLUME (YD³) / Σ VOLUME (YD³)
25C								
TOP BACK OF FILTER INLET D=0 W=25.0	0-22.2					0	0	0 / 0
TOP BACK OF RIPRAP INLET D=0 W=25.0	0-20	0	0	2.2	0 / 0	28.32	14.16	1.15 / 1.15
END OF INLET TRANSISION D=1.8' W=25.0	0-11	231.05	115.53	9	38.51 / 38.51	69.63	48.97	16.32 / 17.48
END OF 5 DEG (2.5') TRANSISION D=2.5 W=25.0	0-7.5	250.97	241.01	3.5	31.24 / 69.75	74.06	71.84	9.31 / 26.79
END INLET SECTION D=2.5 W=25.0	0+00	250.97	250.97	7.5	69.71 / 139.47	74.06	74.06	20.57 / 47.36
CHANNEL WIDTH & DEPTH TRANISION START D=2.5 W=25.0	6+80	250.97	250.97	680	6320.73 / 6460.19	74.06	74.06	1865.21 / 1912.5
END WIDTH/DEPTH TRANSISION RIPRAP CHANGE D50=1.0 D=3.25 W=20.0	7+20	81.15	166.06	40	246.01 / 6706.21	55.52	64.79	95.99 / 2008.5
START CHANNEL WIDTH TRANSISION & DEPTH D=3.25 W=20.0	20+30	81.15	81.15	1310	3937.28 / 10643.48	55.52	55.52	2693.75 / 4702.3
END WIDTH/DEPTH TRANSISION RIPRAP CHANGE D50=2.0 D=2.0 W=40.0	20+60	225.00	153.07	30	170.08 / 1233.56	79.25	67.38	74.87 / 4777.18

SHEET NO. 1

CHANNEL NO. 25C CONT	STATION	AREA RIPRAP (FT.2)	AVG. AREA RIPRAP (FT2)	LENGTH (FT)	VOLUME (YD3) / Σ VOLUME (YD3)	AREA FILTER (FT.2)	AVG. AREA FILTER (FT.2)	VOLUME (YD3) / Σ VOLUME (YD3)
START CHANNEL DEPTH TRANSISION D=2.0 W=40.0	38+10	225.00	225.00	1750	14583.33 / 15816.89	79.25	79.25	5136.57 / 9913.75
END DEPTH TRANSISION START CHANNEL WIDTH TRANSISION D=4.0 W=40.0	38+30	269.27	247.13	20	183.06 / 15999.95	91.89	85.57	63.39 / 9977.13
END WIDTH TRANSISION D=4.0 W=20.0	38+60	199.27	234.27	30	260.30 / 16260.25	71.89	81.89	90.99 / 10068.12
RIPRAP END SECTION DEPTH TRANSISION START D=3.66 W=20.0	38+69	191.74	195.51	9	65.17 / 16325.42	69.71	70.82	23.61 / 10091.73
END RIPRAP DEPTH TRANSISION D=3.4 W=20.0	38+76	453.43	322.58	7	83.63 / 16409.05	91.37	80.54	20.88 / 10112.61
START END CHANNEL SLOPE D=3.03 W=20.0	38+86	437.05	445.24	10	164.90 / 16573.95	89.03	90.20	33.41 / 10146.02
END CHANNEL TOP BACK OF RIPRAP D=0 W=20.0	39+00	0	218.53	14	113.31 / 16687.26	23.32	56.18	29.13 / 10175.15
TOP BACK OF FILTER D=0 W=20.0	39+2.2			2.2		0	11.66	0.95 / 10176.10

SHEET 2 OF 26
COMPUTED DB
CHECKED
DATE MAY 26, 88

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE VOLUMES
PROJECT NO. 7-7-5

HANSEN ALLEN & LUCE INC

SHEET 8 OF 26
COMPUTED DB
CHECKED
DATE MAY 26 85

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE VOLUMES
PROJECT NO. 2-7-5

HANSEN ALLEN & LUCE INC

SHEET NO. 8

CHANNEL NO.	STATION	AREA RIPRAP (FT²)	AVG. AREA RIPRAP (FT²)	LENGTH (FT)	VOLUME (YD³) / ½ VOLUME (YD³)	AREA FILTER (FT²)	AVG. AREA FILTER (FT²)	VOLUME (YD³) / ½ VOLUME (YD³)
25F								
TOP BACK OF FILTER INLET D=0 W=10.0	0-22.2					0	0	0 / 0
TOP BACK OF RIPRAP INLET D=0 W=10.0	0-20	0	0	2.2	0 / 0	13.32	6.66	0.54 / 0.54
END OF INLET TRANSISION D=0.9 W=10.0	0-15.5	52.14	26.07	4.5	4.35	33.98	23.65	3.94 / 4.48
END OF 5D50 (1.25) TRANSISION D=1.25 W=10.0	0-13.75	57.12	54.63	1.75	3.54 / 7.89	36.19	35.09	2.27 / 6.76
END INLET SECTION D=1.25 W=10.0	0+00	57.12	57.12	13.75	29.10 / 36.99	36.19	36.19	18.43 / 25.19
GRADE CHANGE RIPRAP CHANGE D_{50}=0.75 D=1.25 W=10.0	6+20	57.12	57.12	620	1311.64 / 1348.63	36.19	36.19	831.03 / 856.2
GRADE CHANGE RIPRAP CHANGE D_{50}=1.25 D=1.25 W=10.0	9+00	27.58	27.58	280	286.01 / 1634.65	29.54	29.54	306.34 / 1162.5
START CHANNEL DEPTH TRANSISION D=1.25. W=10.0	18+08	57.12	57.12	908	1920.92 / 3555.57	36.19	36.19	1217.06 / 2379.6
END DEPTH TRANSISION CULVERT INLET D=4.0 W=10.0	18+40	96.25	76.69	32	90.89 / 3646.47	53.58	44.89	53.20 / 2432.8

SHEET 9 OF 26
COMPUTED DB
CHECKED
DATE MAY 26, 86

CLIENT PLATEAU
PROJECT CHANNEL RECLAMATION
FEATURE VOLUMES
PROJECT NO. 2-7-5

HANSEN ALLEN & LUCE INC

SHEET NO. 9

CHANNEL NO. 26F CONT	STATION	AREA RIPRAP (FT.2)	AVG. AREA RIPRAP (FT2)	LENGTH (FT.)	VOLUME (YD3) / Σ VOLUME (YD3)	AREA FILTER (FT2)	AVG. AREA FILTER (FT.2)	VOLUME (YD3) / Σ VOLUME (YD3)
AREA BEHIND CULVERT ENTRANCE DETAIL J		993 A3			36.78 / 3683.25	458 A3		16.96 / 2449.7
AREA BEHIND CULVERT OUTLET DETAIL K		1123 A3			41.59 / 3724.84	3448 A3		127.70 / 2577.
ADDITIONAL FILTER DETAIL J						358.32 A3		13.27 / 2590.
ADDITIONAL FILTER DETAIL K						354.02 A3		13.11 / 2603.8
START DEPTH TRANSISION/ CULVERT OUTLET D50(1.75) D=3.0 W=10.0	19+20	116.84				52.25		
END DEPTH TRANSISION RIPRAP CHANGE D50(1.25) D=1.25 W=10.0	19+50	83.64	100.24	30	111.38 / 3836.21	41.18	46.71	51.90 / 2655.7
END RIPRAP DEPTH TRANSISION D=1.25 W=10.0	19+55	57.12	70.38	5	13.03 / 3849.25	36.19	38.69	7.16 / 2662.
RIPRAP CHANGE D50(2.0) D=1.25 W=10.0	21+85	57.12	57.12	235	497.16 / 4346.40	36.19	36.19	314.99 / 2977.
END CHANNEL D=1.25 W=10.0	22+10	103.40	103.40	25	95.74 / 4442.14	44.50	44.50	41.20 / 3019.1

HANSEN ALLEN & LUCE inc

CLIENT Plateau
PROJECT Reclamation
FEATURE QTD.
PROJECT NO.

SHEET 10 OF 26
COMPUTED GSP
CHECKED
DATE June 22, 1988

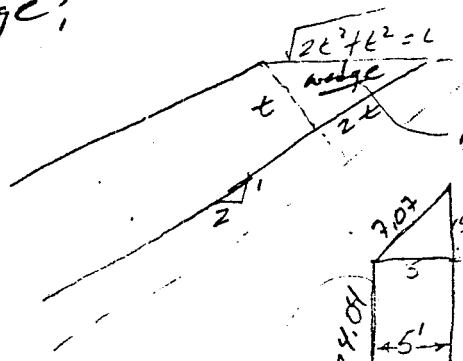
DETAIL J: STA 18+40 to 18+40+5+11.31 = 1856.31

Riprap Vol t = thickness of riprap

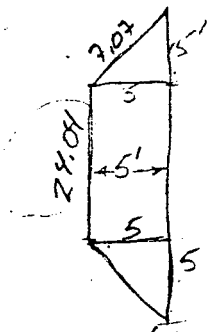
bottom = 5'x5' x t = 25 t

Sides = $2\left[\left(\frac{\sqrt{5^2+5^2}+\sqrt{2(5+12)^2}}{2}\right) \times \underset{\text{slope dist.}}{8.944}\right] t = 278.27\,t$

wedge:



t = 3 ⇒ L = 6.71'
t = 2.25' L = 5.03'
$A = \frac{1}{2}2t^2 = t^2$



Vol one side $24.04 \times t^2 + 2\left[\frac{t^2+0}{2} \times 5\right.$

$= 24.04t^2 + 5t^2$

Both sides = $2(29.04\,t^2)$

edge: $2(7.07) \times \underset{\tan(\frac{1}{2}\tan^{-1}\frac{1}{2})}{0.236}\,t^2 = 3.33$

∴ riprap vol = $25t + 278.27t + 58.08t^2 + 3.33t^2$

$\boxed{\text{riprap vol} = 303.27t + 61.41t^2}$

t = 2.25' ⇒ vol = $\boxed{993\ ft^3}$ $D_{50} = 1.25'$

Gravel Vol - 1' thick STA 18+40 to 18+56.31

bottom = $(5+.236t)^2 \times 1'$ t = 2.25' → 30.6 ft²

sides = $2\left[\frac{\sqrt{5^2+5^2}+\sqrt{2(5+12)^2}}{2}\right) * (8.944+.236t)\,1 = 295\ ft^2$

wedge = 24.04(2t) + 24 = .132

Vol gravel = 30.6 + 295 ft² + 26.3 + 3.7 = $\boxed{458\ ft^3}$

ADDITIONAL FILTER 8.94 * 20.04 * 2 = $\boxed{358.32\ ft^3}$

Detail K: STA 19+06.5 to 19+20

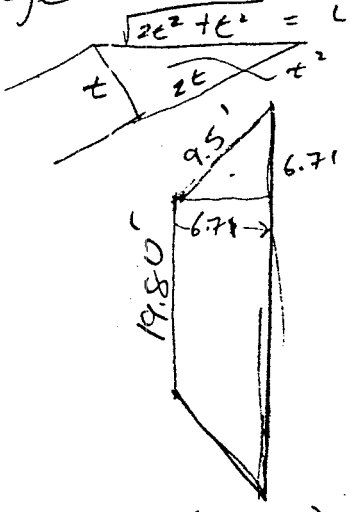
Riprap Vol: t = thickness of riprap = 3'

bottom := $5' \times 5' \times t = 25t$

sides $= 2\left[\left(\frac{\sqrt{5^2+5^2} + \sqrt{2(5+9)^2}}{2}\right) 6.708\right] t$

wedge:

$\sqrt{2t^2+t^2} = L$ $\quad t = 3' \Rightarrow L = 6.71'$



Vol $= 2\left[19.80 \times t^2 + 6.71 t^2\right]$

Vol $= 53.0 t^2$

Edge: $2(7.07) \times .236 t^2 = 3.33 t^2$

∴ Riprap Vol $= 25t + 180.2t + 53.0t^2 + 3.33t^2$

w/ $t = 3'$

Riprap Vol = $\boxed{1123 \text{ ft}^3}$

Gravel Vol - 1' thick STA 19+06.5 to 19+20

bottom := $(5 + .236t)^2 \times 1 = 32.6$

sides $= 2\left[\frac{\sqrt{5^2+5^2} + \sqrt{2(5+9)^2}}{2} * (6.708 + .236t)\right](1) = 199.3$

wedge $= (1)(19.8)(2t) + 20(1) = 138.8$

TOTAL Gravel = $\boxed{344 \text{ ft}^3}$

ADDITIONAL FILTER $8.94 * 19.80 * 2 = \boxed{354.02 \text{ ft}^3}$