APPENDIX 11-G

NORTH PINTO MODIFICATION
DESIGN & AS BUILT

(9/93;12/26/95)

APPENDIX 11-G

NORTH PINTO POND MODIFICATION

Due to reformatting of the Navajo Mine PAP, the following references in this appendix (formerly Appendix 29-M under NM-0003C) have been changed, deleted or renumbered:

NM-0003C Reference	NM-0003D Reference
Exhibit 29-2 or Exhibit 29-3A	Exhibit 11-36

NAVAJO MINE

NORTH PINTO POND HYDROLOGY

BHP Minerals International Inc. is proposing to alter the existing hydrology design for the Navajo Mine's North Pinto Pond area. The new hydrology design will entail the modification of the existing North Pinto sedimentation pond and its inlet channel. The construction and modification proposed are to enable the Navajo Mine to better control the surface runoff from the upstream watersheds of Pinto Pond from entering the North Shop and coal handling facilities.

Pinto pond's watersheds are approximately 87 acres of mostly undisturbed land. The exceptions are the haul road and a residence that utilize a small portion of the watershed. For the purposes of this design, however, the watersheds were assumed undisturbed. A soil curve number of 80 was designated for this area. For hydrological analysis, this area has been divided into two (2) subwatersheds labelled as A and B. These configurations and their associated hydrological structures are shown on the attached map, exhibit 29-2.

Federal regulation 30 CFR 816.46 (c)(2)(iii) requires that a sedimentation pond contain the runoff generated for a 100 year-6 hour (2.10 inches) storm event when excluding a combination spillway from the hydrological design. The proposed enlargement of Pinto Pond is designed to meet these regulations. In addition, the pond has been expanded to contain twenty-five (25) years of sediment yield from its respective watershed.

The culvert shown on exhibit 29-2 was constructed to divert watershed A runoff from the haul road to Pinto Pond. This culvert was modelled using the peak discharge from Watershed "A" for a 10 year-6 hour storm event. This diversion meets the requirements of federal regulation 30 CFR 816.43 (b)(3).

Navajo Mine is proposing to modify the inlet and outlet channels at the culvert. The runoff entering the culvert comes from Channel 1 located on the southwest side of Pinto haul road. The runoff exiting the culvert flows through Channel 2 into Pinto Pond. These proposed hydrological structures are designed for a 10 year-6 hour storm event, therefore satisfying federal regulation 30 CFR 816.43 (b)(3).

Channel 3 shown on exhibit 29-2 is designed to divert runoff from entering the south east corner of Pinto Pond to the existing inlet channel. This channel will help in the prevention of rilling on the south and east side slopes of Pinto Pond. Channel 3 was

modelled using the peak discharge from Watershed "B" for a 2 year-6 hour storm event, hence satisfying federal regulation 30 CFR 816.43 (c)(3).

Precipitation values used in these designs were taken from the Navajo Mine's Reclamation Surface Stabilization Design Handbook, Table "C", BHP-Utah International Inc.

The SEDCAD Hydrology Software Package (Version 3.0) was used for the designs of hydrological structures within this packet. Utilizing a user-defined storm and routing network structures, this package is capable of predicting the hydrological, hydraulic, and sediment runoff response of disturbed and undisturbed lands. The model outputs have been used to evaluate hydrologic structure performance. The specific design information and SEDCAD models are contained in the following pages.

STATEMENT OF CERTIFICATION

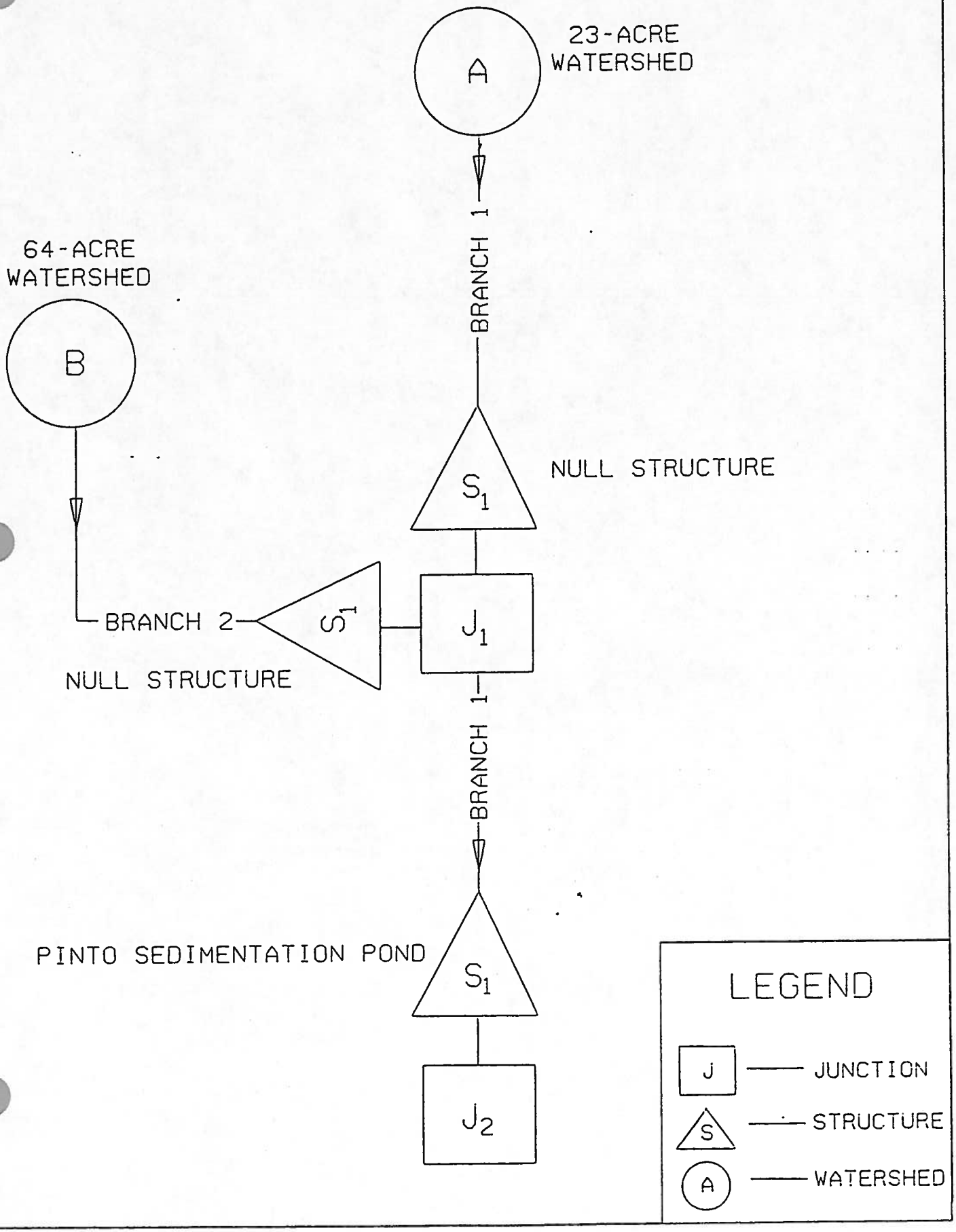
The hydrologic stuctures found in the following pages have been designed using current, prudent engineering practices and have been certified by a qualified, registered professional engineer in accordance with 30 CFR 816.49 (a) (2).

Signed Ron Van Valkenburg

Date 5-15-92

RON C. VAN VALKENBURG
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER

PINTO POND AREA
SEDCAD ROUTING SCHEMATIC



BHP–UTAH INTERNATIONAL
SEDCAD COMPUTER MODEL
WATERSHED INPUTS

NAVAJO MINE
PINTO POND

WATERSHED	A	B
Total Acres	23.00	64.00
Undisturbed	23.00	64.00
Disturbed	0.00	0.00
Spoil	0.00	0.00
Curve Number (CN)		
Undisturbed	80.00	80.00
Disturbed	80.00	80.00
Spoil	93.00	93.00
Watershed CN	80.00	80.00
Control Practice Factor (CP)		
Undisturbed	0.373	0.373
Disturbed	0.393	0.393
Spoil	1.000	1.000
Watershed CP	0.373	0.373
Soil Erodibility Factor (K)		
Undisturbed	0.30	0.30
Disturbed	0.15	0.15
Spoil	0.30	0.30
Watershed K	0.30	0.30
Tc Utilizing Velocity (hr)	0.308	0.563
Length of Slope (ft)	200	200
Ave. Slope (%)	3.30%	3.40%
Length–Slope Factors (LS)		
MUSLE LS Factor	0.389	0.401
"m"	0.3	0.3
"theta"	0.03	0.03
RUSLE LS Factor	0.542	0.542
"m"	0.3	0.3
"slope factor"	0.40	0.40

BHP–UTAH INTERNATIONAL
AVERAGE ANNUAL SOIL LOSS
UTILIZING THE "MUSLE" OR "RUSLE" EQUATION

NAVAJO MINE
PINTO POND

WATERSHED	A	B
Total Acres	23	64
Undisturbed	23	64
Disturbed	0	0
Spoil	0	0
Rainfall Erosivity (R)	20	20
Soil Erodibility Factor (K)		
Undisturbed	0.30	0.30
Disturbed	0.15	0.15
Spoil	0.30	0.30
Watershed K	0.30	0.30
Length–Slope Factors (LS)		
MUSLE LS Factor	0.389	0.401
"m"	0.3	0.3
"theta"	0.03	0.03
RUSLE LS Factor	NA	NA
"m"	0.3	0.3
"slope factor"	0.400	0.400
Control Practice Factor (CP)		
Undisturbed	0.373	0.373
Disturbed	0.393	0.393
Spoil	1.000	1.000
Watershed CP	0.373	0.373
Sediment Yields		
Tons/Acre/Year	0.87	0.90
Tons/Year	20.00	57.39
Acre–Feet/Year	0.01	0.03
5 Yr Sediment Vol. (ac–ft)	0.06	0.17
10 Yr Sediment Vol. (ac–ft)	0.12	0.34
15 Yr Sediment Vol. (ac–ft)	0.18	0.51
20 Yr Sediment Vol. (ac–ft)	0.24	0.68
25 Yr Sediment Vol. (ac–ft)	0.29	0.84
Total Sediment Vol. (ac–ft) for A & B		1.13

NAVAJO MINE

NORTH PINTO SEDIMENTATION POND

The North Pinto sedimentation pond is designed to contain the 4.53 ac.-ft. runoff from a 100 year-6 hour storm event and a 25 year sediment deposition. The pond will not overflow unless a storm event of greater precipitation than a 100 year event occurs, or if successive storms immediately follow a 100 year-6 hour event.

A gauge post will be installed in the pond to monitor the pond volume. Water and sediment levels will be maintained below the 5374.5 elevation to insure that the design capacity is available. Periodic cleaning will be performed as needed. Water will be pumped below the design capacity level within 10 days following a runoff event. Water will be pumped to water trucks for distribution on roads, or will be pumped to and contained in a mining pit.

Watersheds "A" and "B" shown on Exhibit 29-3a are routed to this pond. The total watershed encompasses 87 acres of type Az soil, with a soil curve number of 80. For the purposes of SEDCAD, the channel material contains characteristics that model "Fine Sand Colloidal" and "Sandy Loam Noncolloidal" both at velocities of 2.5 fps.

A SEDCAD computer run performed on the Pinto sedimentation pond for the 100 year-6 hour storm event has been included in this packet and the results are summarized below.

Design Summary: 100 Year-6 Hour Storm Event (2.10 Inches)
Acres = 87

	Pond #1
Drainage Area (Acres)	87
Runoff Volume (Ac.-Ft.)	4.53
25 Year Sediment Volume (Ac.-Ft.)	1.13
Total Storage Capacity (Ac.-Ft.)	5.66
Elevation Top of Pond	5381.5
Elevation of Pond Bottom	5373.0
Maximum Water/Sediment Level	5374.5

****
POND VOLUMES USING BOTTOM DIMENSIONS
****

**** INPUT DATA USING BOTTOM DIMENSIONS ****

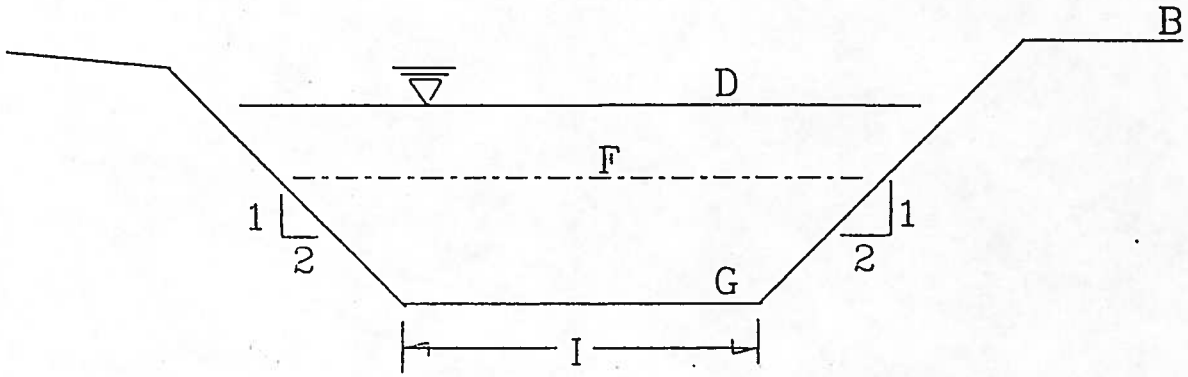
POND NUMBER.....	PINTO POND
LENGTH OF POND	315 FT
WIDTH OF POND	93 FT
DEPTH OF POND	8.5 FT
ONE SIDE SLOPE OF LENGTH	2
ONE SIDE SLOPE OF LENGTH	2
ONE SIDE SLOPE OF WIDTH.....	2
ONE SIDE SLOPE OF WIDTH.....	2

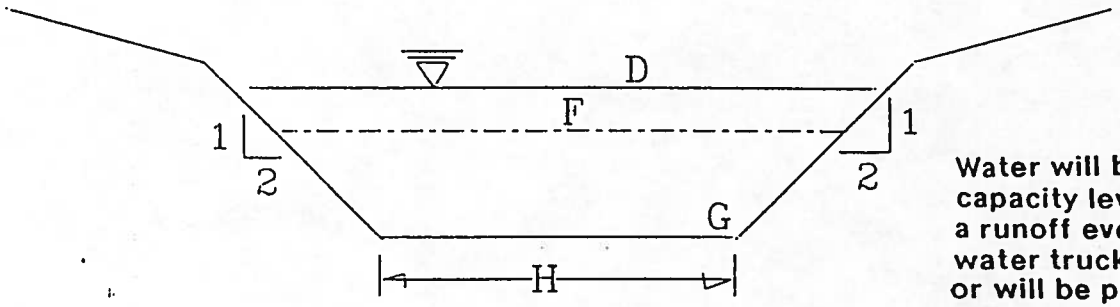
****** POND RESULTS INCREMENTALY ******

ELEVATION	VOLUME AC.FT.	SURFACE AC.	DEPTH FT.
5373.0	0.00	0.67	0.00
5373.5	0.34	0.69	0.50
5374.0	0.69	0.71	1.00
5374.5	1.05	0.73	1.50
5375.0	1.42	0.75	2.00
5375.5	1.80	0.77	2.50
5376.0	2.19	0.79	3.00
5376.5	2.59	0.81	3.50
5377.0	3.00	0.83	4.00
5377.5	3.42	0.85	4.50
5378.0	3.85	0.87	5.00
5378.5	4.29	0.89	5.50
5379.0	4.74	0.91	6.00
5379.5	5.20	0.93	6.50
5380.0	5.67	0.95	7.00
5380.5	6.15	0.97	7.50
5381.0	6.64	1.00	8.00
5381.5	7.15	1.02	8.50

***** POND RESULTS *****

THE POND VOLUME IS	7.145061 AC.FT
THE TOP DIMENSIONS ARE...	349 FT. X 127 FT.
THE SURFACE AREA IS...	1.017516 AC.





Water will be pumped below the design capacity level within 10 days following a runoff event. Water will be pumped to water trucks for distribution on roads, or will be pumped to and contained in a mining pit.

ITEM	DIM.	ELEV. DIM.
ELEV. OF TOP OF DAM	B	5381.5
ELEV. OF POND BOTTOM	G	5373.0
TOP WIDTH OF DAM (ft.)	A	NA (INCISED)
DESIGNED MAX. WAT. LEVEL	D	5380.0
TOE OF EMBANKMENT	E	NA (INCISED)
MAX SEDIMENT LEVEL	F	5374.5
BOTTOM LENGTH (ft.)	H	315.0
BOTTOM WIDTH (ft.)	I	93.0

NOT TO SCALE

RON C. VAN VALKENBURG
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER
9261
5-11-92

BHP MINERALS INTERNATIONAL INC.
NAVAJO MINE
FRUITLAND, NEW MEXICO USA

POND CROSS SECTIONS
Pinto Pond

DRAWN BY SYP	SCALE N/A	
APPROVED BY	DATE 03/20/92	
DRAWING NO.	LOCATION NO.	

NAVAJO MINE

PINTO SEDIMENTATION POND

CHANNEL 1

The existing Channel 1 diverts the runoff from watershed "A" to the Pinto Culvert. The proposed modification of Channel 1 will reduce the sediment accumulation at the Pinto Culvert inlet, and it is shown on Exhibit 29-2.

Watershed "A" is 23 acres of undisturbed land with an average curve number of 80. The proposed channel is designed to pass the runoff from a 10 year-6 hour storm event. The SEDCAD model indicates a peak flow of 4.47 cfs from this watershed, which will produce a flow depth of 0.52 feet. Flow velocities are more than 2.5 fps for an erodible channel, therefore, erosion control measures (rip rap with a D50 of 9") will be required.

To design the channel, the SEDCAD Utility computer program was used. The design details and typical cross-section for this structure follow.

Design Summary:

Channel Depth (Ft.)	2.0
Channel Bottom Width (Ft.)	3.0
Channel Inner Side Slopes	2:1
Channel Outer Side Slopes	3:1
Channel Slope (%)	1.0
Peak Stage: 10 Year-6 Hour (Ft.)	0.52
Freeboard (Ft.)	1.48
Required Flow (cfs)	4.47
Velocity (fps)	2.13
Lining	D50 9" Rip Rap

SEDCAD+ RIPRAP CHANNEL DESIGN

channel 1 10yr-6hr

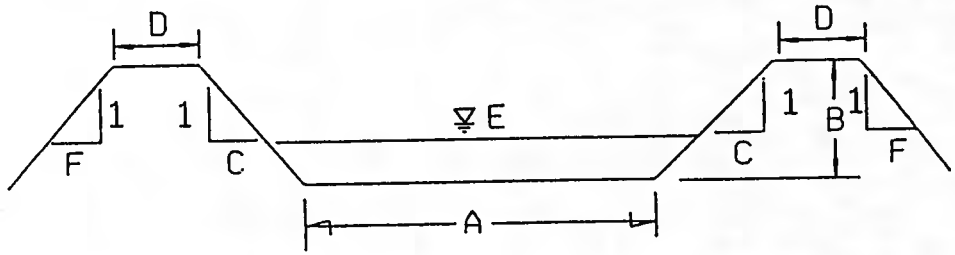
INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	4.47 cfs	
Slope	1.00 %	
Sideslopes (L and R)	2.00:1	2.00:1
Bottom Width	3.00 feet	
Freeboard	1.48 ft	

RESULTS:

Mild Slope Design

Depth	0.52 ft
with Freeboard	2.00 ft
Top Width	5.08 ft
with Freeboard	11.00 ft
Velocity	2.13 fps
Cross Sectional Area	2.10 sq ft
Hydraulic Radius	0.39 ft
Manning's n	0.038
Froude Number	0.58
Dmax	1.500 ft (18.00 in)
D50	0.750 ft (9.00 in)
D10	0.250 ft (3.00 in)



CHANNEL 1
CROSS-SECTION

ITEM	DIM.	ELEV./DIM.
BOTTOM WIDTH (FT)	A	3.0
CHANNEL DEPTH (FT)	B	2.0
SIDE SLOPES (C:1)	C	2:1
BERM WIDTH (FT)	D	1.0
PEAK STAGE (FT)	E	0.52
CHANNEL SLOPE (%)		1.0
MAX VELOCITY (FPS)		2.13
*DESIGN CFS		4.47
LINING		Rip Rap
D_{50} (where needed)		9"
SIDE SLOPES (F:1)	F	3:1

NOT TO SCALE

BHP MINERALS INTERNATIONAL INC.
NAVAJO MINE
FRUITLAND, NEW MEXICO USA

CHANNEL 1 CROSS-SECTION

DRAWN BY SYP	SCALE N/A	
APPROVED BY	DATE 06/02/92	
DRAWING NO.	LOCATION NO.	

NAVAJO MINE

PINTO SEDIMENTATION POND

CHANNEL 2

The existing Channel 2 passes the runoff from Pinto Culvert to the Pinto Pond inlet spillway. The proposed modification of Channel 2 will reduce the rate of sediment deposition in Pinto Pond. The location is shown on Exhibit 29-2.

The proposed channel is designed to pass the runoff from a 10 year-6 hour storm event. The runoff entering Channel 2 is via the watershed "A", Channel 1, and Pinto Culvert and from natural drainages from watershed "B". The SEDCAD model indicates a combined peak flow of 12.12 cfs from watershed "A" and "B", which will produce a flow depth of 0.79 feet. Flow velocities are more than 2.5 fps for an erodible channel, therefore, erosion control measures (rip rap with a D50 of 9") will be required.

To design the channel, the SEDCAD Utility computer program was used. The design details and typical cross-section for this structure follow.

Design Summary:

Channel Depth (Ft.)	2.0
Channel Bottom Width (Ft.)	3.0
Channel Inner Side Slopes	2:1
Channel Outer Side Slopes	3:1
Channel Slope (%)	1.6
Peak Stage: 10 Year-6 Hour (Ft.)	0.79
Freeboard (Ft.)	1.21
Required Flow (cfs)	12.12
Velocity (fps)	3.37
Lining	D50 9" Rip Rap

SEDCAD+ RIPRAP CHANNEL DESIGN

channel 2 10yr-6hr

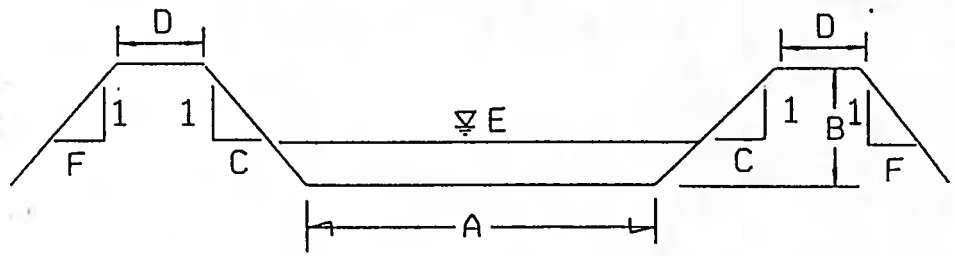
INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	12.12 cfs	
Slope	1.60 %	
Sideslopes (L and R)	2.00:1	2.00:1
Bottom Width	3.00 feet	
Freeboard	1.21 ft	

RESULTS:

Mild Slope Design

Depth	0.79 ft
with Freeboard	2.00 ft
Top Width	6.15 ft
with Freeboard	10.99 ft
Velocity	3.37 fps
Cross Sectional Area	3.60 sq ft
Hydraulic Radius	0.55 ft
Manning's n	0.038
Froude Number	0.78
Dmax	1.500 ft (18.00 in)
D50	0.750 ft (9.00 in)
D10	0.250 ft (3.00 in)



CHANNEL 2
CROSS-SECTION

ITEM	DIM.	ELEV./DIM.
BOTTOM WIDTH (FT)	A	3.0
CHANNEL DEPTH (FT)	B	2.0
SIDE SLOPES (C:1)	C	2:1
BERM WIDTH (FT)	D	1.0
PEAK STAGE (FT)	E	0.79
CHANNEL SLOPE (%)		1.6
MAX VELOCITY (FPS)		3.37
'DESIGN CFS		12.12
LINING		Rip Rap
D_{50} (where needed)		9"
SIDE SLOPES (F:1)	F	3:1

NOT TO SCALE

BHP MINERALS INTERNATIONAL INC.
NAVAJO MINE
FRUITLAND, NEW MEXICO USA

CHANNEL 2 CROSS-SECTION

DRAWN BY SYP	SCALE N/A	
APPROVED BY	DATE 08/02/92	
DRAWING NO.	LOCATION NO.	

NAVAJO MINE

PINTO SEDIMENTATION POND

CHANNEL 3

The proposed Channel 3 will redirect watershed "B" from entering the south east corner of Pinto Pond to the existing inlet spillway. This channel will help in the prevention of rilling on the south and east side slopes of Pinto Pond. The location is shown on exhibit 29-2.

Watershed "B" is 64 acres of undisturbed land with an average curve number of 80. The proposed channel is designed to pass the runoff from a 2 year-6 hour storm event. The SEDCAD model indicates a peak flow of 1.76 cfs from this watershed which will produce a flow depth of 0.21 feet. Flow velocities are less than 2.5 fps, therefore, erosion control measures will not be required.

To design the channel, the SEDCAD utility computer program was used. The design details and typical cross-section for this structure follow.

Design Summary:

Channel Depth (Ft.)	2.0
Channel Bottom Width (Ft.)	3.0
Channel Inner Side Slopes	2:1
Channel Outer Side Slopes	3:1
Channel Slope (%)	1.0
Peak Stage: 2 Year-6 Hour (Ft.)	0.21
Freeboard (Ft.)	1.79
Required Flow (cfs)	1.76
Velocity (fps)	2.42
Lining	Grass/Dirt

SEDCAD+ ERODIBLE CHANNEL DESIGN

channel 3 2year-6hour

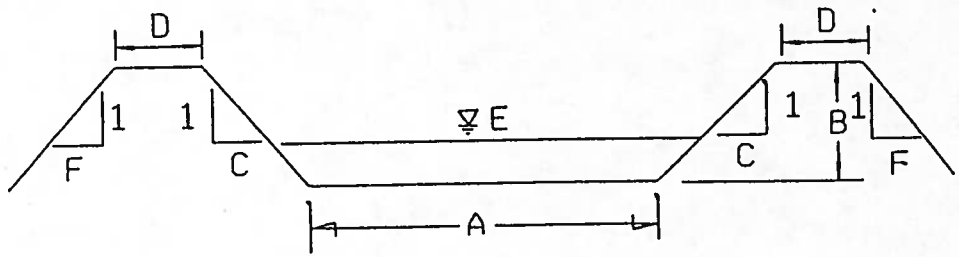
Limiting Velocity Technique
Sediment-laden Water

INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	1.76 cfs	
Slope	1.00 %	
Sideslopes	2.00:1 (L)	2.00:1 (R)
Bottom Width	3.00 ft	
Manning's n	0.020	
Max. Velocity	2.50 fps	
Material	SANDY LOAM NONCOLLOIDAL	
Freeboard	1.79 ft	

RESULTS:

Actual Discharge	1.76 cfs
Depth	0.21 ft
with Freeboard	2.00 ft
Top Width	3.85 ft
with Freeboard	11.01 ft
Velocity	2.42 fps
Cross Sectional Area	0.73 sq ft
Hydraulic Radius	0.18 ft
Froude Number	0.98



CHANNEL 3
CROSS-SECTION

ITEM	DIM.	ELEV/DIM.
BOTTOM WIDTH (FT)	A	3.0
CHANNEL DEPTH (FT)	B	2.0
SIDE SLOPES (C:1)	C	2:1
BERM WIDTH (FT)	D	1.0
PEAK STAGE (FT)	E	0.21
CHANNEL SLOPE (%)		1.0
MAX VELOCITY (FPS)		2.42
'DESIGN CFS		1.76
LINING		Grass/Dirt
D_{50} (where needed)		N/A
SIDE SLOPES (F:1)	F	3:1

NOT TO SCALE

BHP MINERALS INTERNATIONAL INC.
NAVAJO MINE
FRUITLAND, NEW MEXICO USA

CHANNEL 3 CROSS-SECTION

DRAWN BY SYP	SCALE N/A	
APPROVED BY	DATE 06/02/92	
DRAWING NO.	LOCATION NO.	

NAVAJO MINE

PINTO HAUL ROAD CULVERT

The culvert shown on exhibit 29-2 was constructed to divert Watershed "A" runoff from the haul road to Pinto Pond. Runoff from Watershed "A" drains to the northernmost corner of the watershed passing through Channel 1. This runoff is then routed by Pinto Culvert to the inlet channel (Channel 2). This culvert was modelled using the peak discharge from Watershed "A" for a 10 year-6 hour storm event.

The design details and typical cross-sections are included in the following pages.

Design Summary:

Culvert Inlet Elev. (Ft.)	5386.8
Culvert Outlet Elev. (Ft.)	5382.9
Culvert Diameter (Ft.)	2.0
Pipe Length (Ft.)	158.9
Design Discharge (cfs)	4.47

SEDCAD+ CULVERT SIZING UTILITY

PINTO CULVERT

Design Discharge	=	4.470	cfs
Entrance Loss Coefficient	=	0.5	
Pipe Length	=	158.900	feet
Pipe Slope	=	2.400	%
Manning's n	=	0.016	
Maximum Headwater	=	3.200	feet
Tailwater Depth	=	0.000	feet

Smallest Diameter Required to Pass Flow is 12 inches

PERFORMANCE CURVES:

Diameter: 8 inches

Headwater (ft)	Discharge (cfs)	Control	Flow Type
0.32	0.00		0
0.64	0.00		0
0.96	0.00		0
1.28	0.00		0
1.60	0.00		0
1.92	0.00		0
2.24	0.00		0
2.56	0.00		0
2.88	0.00		0
3.20	0.00		0
3.52	0.00		0
3.84	1.92	Outlet	6
4.16	2.01	Outlet	6
4.48	2.04	Outlet	6
4.80	2.07	Outlet	6

Diameter: 9 inches

Headwater (ft)	Discharge (cfs)	Control	Flow Type
0.32	0.00		0
0.64	0.00		0
0.96	0.00		0
1.28	0.00		0
1.60	0.00		0
1.92	0.00		0
2.24	0.00		0
2.56	0.00		0
2.88	0.00		0
3.20	0.00		0
3.52	0.00		0
3.84	2.56	Outlet	6
4.16	2.63	Outlet	6
4.48	2.70	Outlet	6
4.80	2.77	Outlet	6

Diameter: 12 inches

Headwater (ft)	Discharge (cfs)	Control	Flow Type
0.32	0.00		0
0.64	0.00		0
0.96	0.00		0
1.28	0.00		0
1.60	0.00		0
1.92	0.00		0
2.24	0.00		0
2.56	0.00		0
2.88	0.00		0
3.20	0.00		0
3.52	0.00		0
3.84	5.45	Outlet	6
4.16	5.57	Outlet	6
4.48	5.70	Outlet	6
4.80	5.83	Outlet	6

Diameter: 15 inches

Headwater (ft)	Discharge (cfs)	Control	Flow Type
0.32	0.00		0
0.64	0.00		0
0.96	0.00		0
1.28	0.00		0
1.60	0.00		0
1.92	0.00		0
2.24	0.00		0
2.56	0.00		0
2.88	0.00		0
3.20	0.00		0
3.52	0.00		0
3.84	9.48	Outlet	6
4.16	9.71	Outlet	6
4.48	9.94	Outlet	6
4.80	10.15	Outlet	6

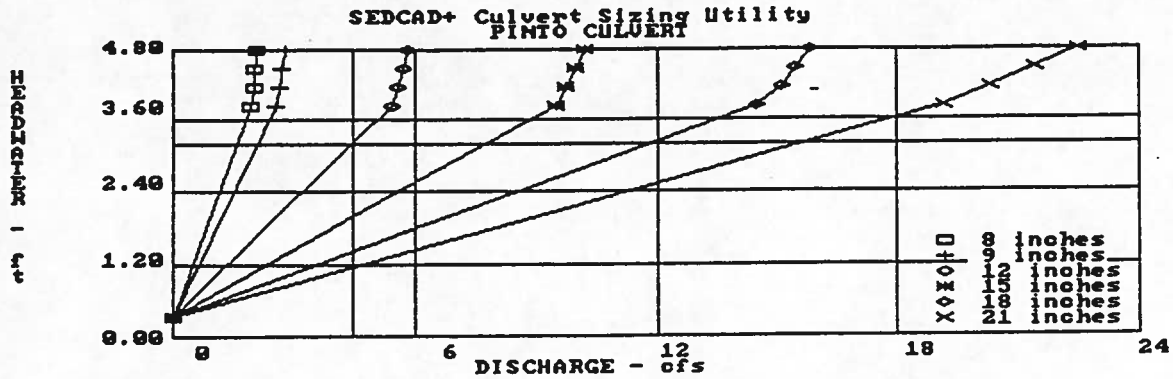
Diameter: 18 inches

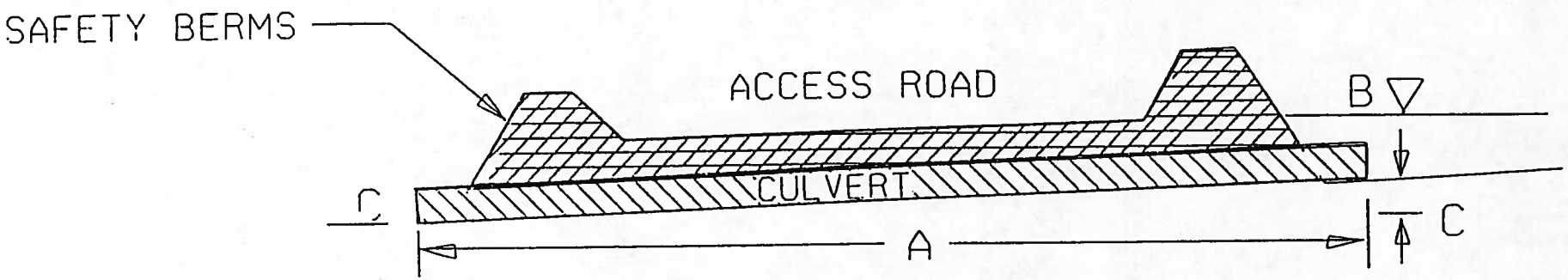
Headwater (ft)	Discharge (cfs)	Control	Flow Type
0.32	0.00		0
0.64	0.00		0
0.96	0.00		0
1.28	0.00		0
1.60	0.00		0
1.92	0.00		0
2.24	0.00		0
2.56	0.00		0
2.88	0.00		0
3.20	0.00		0

3.52	0.00		0
3.84	14.52	Outlet	6
4.16	15.12	Outlet	6
4.48	15.47	Outlet	6
4.80	15.83	Outlet	6

Diameter: 21 inches

Headwater (ft)	Discharge (cfs)	Control	Flow Type
0.32	0.00		0
0.64	0.00		0
0.96	0.00		0
1.28	0.00		0
1.60	0.00		0
1.92	0.00		0
2.24	0.00		0
2.56	0.00		0
2.88	0.00		0
3.20	0.00		0
3.52	0.00		0
3.84	19.22	Inlet	5
4.16	20.37	Inlet	5
4.48	21.47	Inlet	5
4.80	22.51	Inlet	5


SEDCAD+ Culvert Sizing Utility
PINTO CULVERT
HEADWATER - ft
4.80
3.60
2.40
1.20
0.00
0
6
12
18
24
DISCHARGE - cfs
8 inches
9 inches
12 inches
15 inches
18 inches
21 inches



ACCESS ROAD CULVERT

NOT TO SCALE

ITEM	DIM.	ELEV.-DIM.
CULVERT LENGTH	A	158.9 (Ft)
HEADWATER	B	3.2 (Ft)
ELEVATION CHANGE	C	3.0 (Ft)

BHP-UTAH INTERNATIONAL INC.

NAVAJO MINE

FRUITLAND, NEW MEXICO USA

PINTO CULVERT

TYPICAL CROSS-SECTIONS

DRAWN BY SYP	SCALE N/A	
APPROVED BY	DATE 04/01/92	
DRAWING NO.	LOCATION NO.	

North Pinto Pond

LR

BHP Navajo Coal Company
PO Box 1717
Fruitland, NM 87416

Phone: 505-598-5861

General Information

Storm Information:

Storm Type:	Type II - 60
Design Storm:	100 yr - 6 hr
Rainfall Depth:	2.000 inches

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	76.900	76.900	42.40	3.60

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	76.900	0.332	0.000	0.000	80.000	M	42.40	3.605
	Σ	**76.900**						**42.40**	**3.605**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	5. Nearly bare and untilled, and alluvial valley fans	3.41	75.00	2,200.00	1.840	0.332
#1	**1**	**Time of Concentration:**					**0.332**

CIVIL SOFTWARE DESIGN

SEDCAD+ Version 3

AS BUILT DESIGN HYDROLOGY CALCULATION FOR NORTH PINTO POND CHANNEL 2

by

Name: Brian Sambirsky

Company Name: BHP MINERALS
File Name: C:\BRIAN\NPINTOCH

Date: 12-19-1995

Civil Software Design -- SEDCAD+ Version 3.1
Copyright (C) 1987-1992. Pamela J. Schwab. All rights reserved.

Company Name: BHP MINERALS
Filename: C:\BRIAN\NPINTOCH User: Brian Sambirsky
Date: 12-19-1995 Time: 09:44:26
As built design hydrology calculation for North Pinto Pond Channel 2
Storm: 1.30 inches, 10 year- 6 hour, Type II-65
Hydrograph Convolution Interval: 0.1 hr

SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE

-Hydrology-

JBS	SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base-Flow (cfs)	Runoff Volume (ac-ft)	Peak Discharge (cfs)
111	1	21.30	83	M	0.330	0.000	0.000	0.0	0.48	6.65
		Type: Null			Label: CP-37 Influence					
111	Structure	21.30							0.48	
111	Total IN/OUT	21.30							0.48	6.65
211	1	55.60	83	M	0.350	0.000	0.000	0.0	1.25	16.77
		Type: Null			Label: North Pinto Pond					
211	Structure	55.60							1.73	
21	otal IN/OUT	76.90							1.73	23.42
111	to 211 Routing					0.028	0.249			
		Type: Null			Label: North Pinto Pond					
311	Structure	55.60							1.73	
311	Total IN/OUT	76.90							1.73	23.42
211	to 311 Routing					0.000	0.000			

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Company Name: BHP MINERALS
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Date: 12-19-1995 Time: 09:44:26
As built design hydrology calculation for North Pinto Pond Channel 2
Storm: 1.30 inches, 10 year- 6 hour, Type II-65
Hydrograph Convolution Interval: 0.1 hr

DETAILED SUBWATERSHED INPUT/OUTPUT TABLE

J	B	S	SWS	Seg. #	Land Flow Condition	Distance (ft)	Slope (%)	Velocity (fps)	Segment Time (hr)	Time Conc. (hr)	Muskingum K (hr)	Muskingum X
1	1	1	1	-a	5	2150.00	3.26	1.81	0.33	0.330		
2	1	1	1	-a	5	2120.00	2.83	1.68	0.35	0.350		

CIVIL SOFTWARE DESIGN

SEDCAD+ Version 3

AS BUILT DESIGN HYDROLOGY CALCULATION FOR NORTH PINTO POND CHANNEL 3

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Name: Brian Sambirsky

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Civil Software Design -- SEDCAD+ Version 3.1
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Company Name: BHP MINERALS
Filename: C:\BRIAN\NPINTOCH User: Brian Sambirsky
Date: 12-19-1995 Time: 09:54:18
As built design hydrology calculation for North Pinto Pond Channel 3
Storm: 0.80 inches, 2 year- 6 hour, Type II-65
Hydrograph Convolution Interval: 0.1 hr

SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE

-Hydrology-

JBS SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base-Flow (cfs)	Runoff Volume (ac-ft)	Peak Discharge (cfs)
111 1	21.30	83	M	0.330	0.000	0.000	0.0	0.11	1.28
	Type: Null			Label: CP-37 Influence					
111 Structure	21.30							0.11	
111 Total IN/OUT	21.30							0.11	1.28
211 1	55.60	83	M	0.350	0.000	0.000	0.0	0.29	3.22
	Type: Null			Label: North Pinto Pond					
211 Structure	55.60							0.40	
2[illegible] Total IN/OUT	76.90							0.40	4.50
111 to 211 Routing					0.028	0.249			
	Type: Null			Label: North Pinto Pond					
311 Structure	55.60							0.40	
311 Total IN/OUT	76.90							0.40	4.50
211 to 311 Routing					0.000	0.000			

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Company Name: BHP MINERALS
Filename: C:\BRIAN\NPINTOCH User: Brian Sambirsky
Date: 12-19-1995 Time: 09:54:18
As built design hydrology calculation for North Pinto Pond Channel 3
Storm: 0.80 inches, 2 year- 6 hour, Type II-65
Hydrograph Convolution Interval: 0.1 hr

DETAILED SUBWATERSHED INPUT/OUTPUT TABLE

J	B	S	SWS	Seg. #	Land Flow Condition	Distance (ft)	Slope (%)	Velocity (fps)	Segment Time (hr)	Time Conc. (hr)	Muskingum K (hr)	X
1	1	1	1	-a	5	2150.00	3.26	1.81	0.33	0.330		
2	1	1	1	-a	5	2120.00	2.83	1.68	0.35	0.350		

SEDCAD+ RIPRAP CHANNEL DESIGN

Channel 1 10yr-6hr

INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	12.29 cfs	
Slope	1.00 %	
Sideslopes (L and R)	2.00:1	2.00:1
Bottom Width	3.00 feet	
Freeboard	1.1 ft	

RESULTS:

Mild Slope Design

Depth	0.90 ft
with Freeboard	2.00 ft
Top Width	6.59 ft
with Freeboard	10.99 ft
Velocity	2.86 fps
Cross Sectional Area	4.30 sq ft
Hydraulic Radius	0.61 ft
Manning's n	0.038
Froude Number	0.62
Dmax	1.500 ft (18.00 in)
D50	0.750 ft (9.00 in)
D10	0.250 ft (3.00 in)

SEDCAD+ RIPRAP CHANNEL DESIGN

Channel 2 10yr-6hr

INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	23.42 cfs	
Slope	1.60 %	
Sideslopes (L and R)	2.00:1	2.00:1
Bottom Width	3.00 feet	
Freeboard	0.98 ft	

RESULTS:

Steep Slope Design - PADER Method

Depth	1.02 ft
with Freeboard	2.00 ft
Top Width	7.08 ft
with Freeboard	11.00 ft
Velocity	4.55 fps
Cross Sectional Area	5.14 sq ft
Hydraulic Radius	0.68 ft
Manning's n	0.032
Froude Number	0.94
Dmax	0.313 ft (3.75 in)
D50	0.250 ft (3.00 in)
D10	0.083 ft (1.00 in)

SEDCAD+ RIPRAP CHANNEL DESIGN

Channel 3 2yr-6hr

INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	3.22 cfs	
Slope	1.00 %	
Sideslopes (L and R)	2.00:1	2.00:1
Bottom Width	3.00 feet	
Freeboard	1.57 ft	

RESULTS:

Mild Slope Design

Depth	0.43 ft
with Freeboard	2.00 ft
Top Width	4.73 ft
with Freeboard	11.01 ft
Velocity	1.92 fps
Cross Sectional Area	1.67 sq ft
Hydraulic Radius	0.34 ft
Manning's n	0.038
Froude Number	0.57
Dmax	1.500 ft (18.00 in)
D50	0.750 ft (9.00 in)
D10	0.250 ft (3.00 in)