0025

ACT/015/025-87E
#2

CO-OP MINING COMPANY

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FILE COPY

September 20, 1987

Mr. John Whitehead
Utah Division of Oil, Gas & Mining
355 West North Temple
#3 Triad Center Suite 350
Salt Lake City, Utah 84180-1203

RE: Co-Op Mining Bear Canyon Mine
ACT 015/025 Modification on
Hydrology Design, Monitoring
Locations & NOV Abatement

Dear Mr. Whitehead:

Please find enclosed 16 copies of minor modifications associated with problem areas in hydrology designs at the Bear Canyon Mine.

The majority of these changes were recommended by Mr. Tom Munson of your staff, and were implemented to abate an NOV. The balance are in association with the Hiawatha Seam development and will be implemented upon the Division's approval.

Sincerely,

Mel Coonrod

Melvin A. Coonrod
Permitting & Compliance

MC/njc

enclosures

BLACKHAWK ENGINEERING, CO.

Rt. 1, Box 146-H5 - Helper, Utah 84526 - Telephone (801) 637-2422

September 14, 1987

Mr. Tom Munson
Utah Division of Oil, Gas & Mining
355 West North Temple
#3 Triad Center Suite 350
Salt Lake City, Utah 84180-1203

RE: Proposed Drainage Plan
Lower Seam Portal Area
Bear Canyon No. 1 Mine
ACT/015/025
Emery County, Utah

Dear Mr. Munson:

Pursuant to our on-site discussion at the Bear Canyon Mine Site on 9/4/87, I am herein submitting a proposed drainage control plan for the Lower Seam Portal area. Attached with this letter is a description of the drainage plan and calculations, detailed drawings of the collection systems, and a revised Surface Facilities Map [Plate 2-2] showing the entire proposed drainage system.

I appreciate your cooperation and input on reaching a workable solution to this drainage problem. If you have any questions, please contact me or Mel Coonrod.

Co-Op Mining is prepared to install the drainage collection system upon your approval.

Respectfully,

Dan W. Guy

Dan W. Guy

cc: Mr. Wedell Owen
Mr. Mel Coonrod
File

approximations to determine the required characteristics and sizes of the required channels or conduit as the case may be to convey the projected discharges.

Appendix 7-F contains the computer programs and printouts used in sizing the ditches and culverts. Refer to Plate 7-1 for locations of the various structures and Plate 7-5 for areas used in calculations.

The following pages contain summaries of the ditch and culvert sizes.

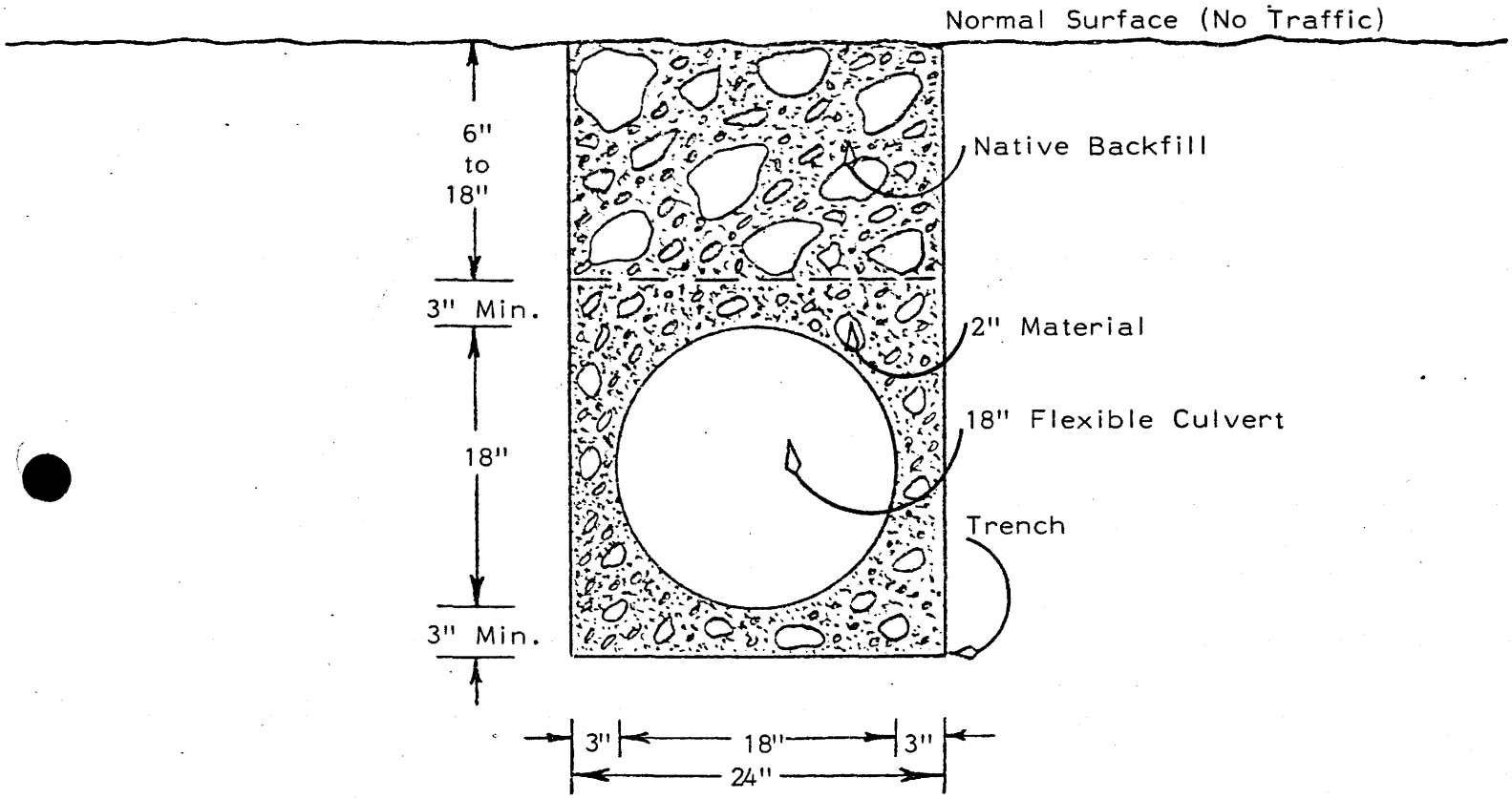
7.2.5.2.0 ADDITIONAL CONTROL FOR HIAWATHA SEAM MINING

As shown on Plate 2-2, the outslope of the proposed Hiawatha Seam portal pad will encroach upon the ephemeral channel between D-1D and D-2D on Plate 7-8. It is proposed to install a 15" flexible culvert as shown in Figure 7-F1, 7-F2, 7-F3, 7-F4 and 7-F5, and Plate 2-2 to convey the drainage from the upper areas of the channel beneath the pad. The outlet protection for the flexible culvert shown on Plate 2-2 will adhere to the specifications as indicated on pages 83-B3, B4 and page 64-A Bear Canyon MRP. The rip rap and filter blanket specification will be adhered to as specified.

The pad and channel will be constructed prior to placing the flexible culvert in the excavated channel. The culvert will be backfilled and all heavy equipment will be precluded from the area to avoid an accidental crushing of the buried culvert. The flexible culvert is designed to withstand being buried but will not hold up under

Figure 7-F1

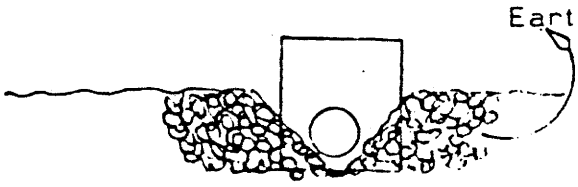
CROSS-SECTION OF
BURIED FLEXIBLE CULVERT

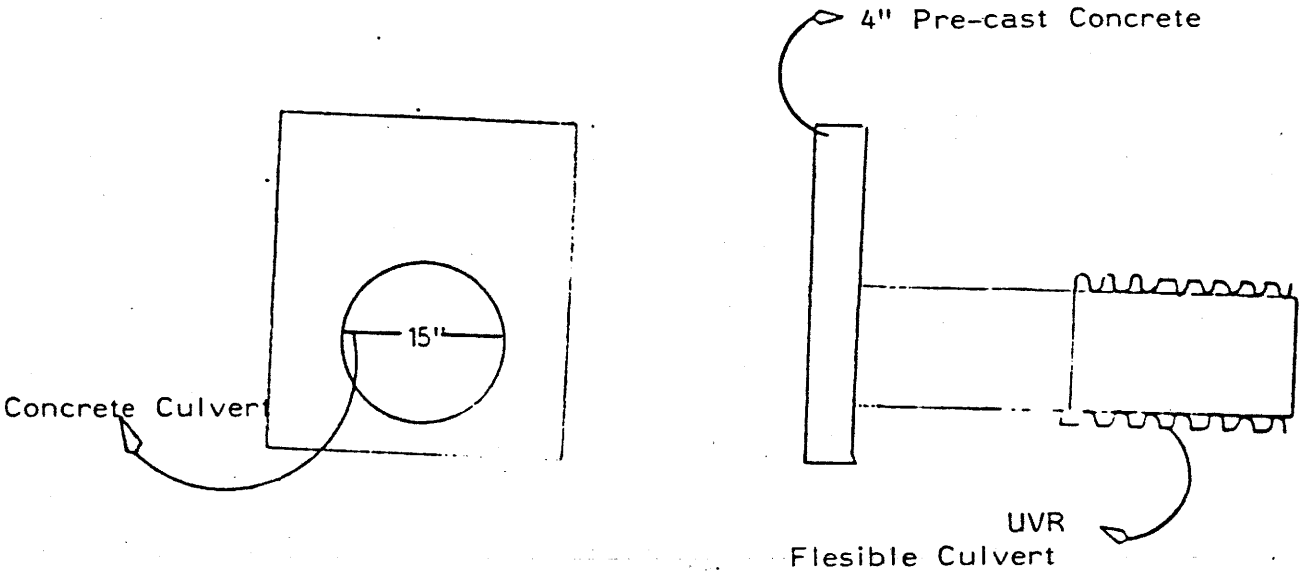


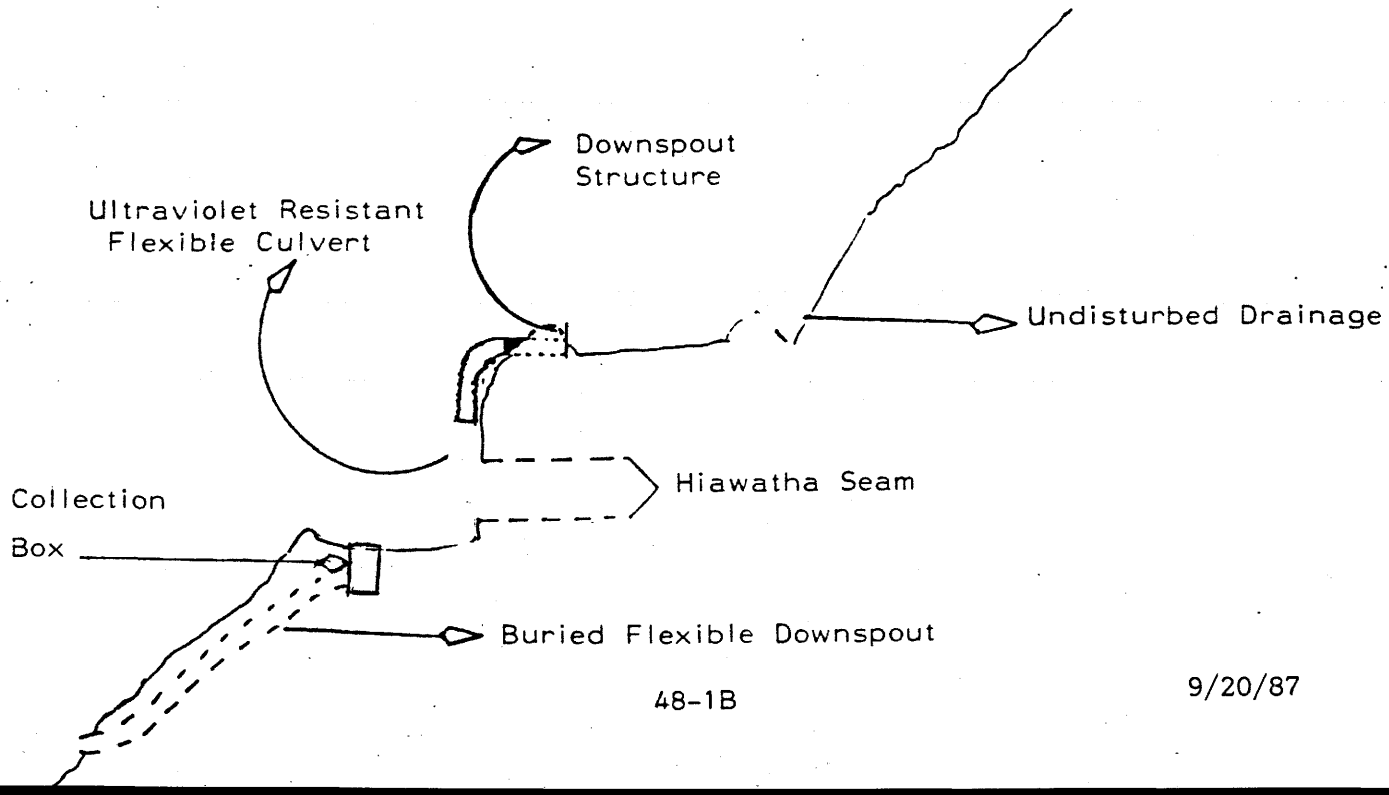
Scale 1" = 1'

Figure 7F-2

DOWNSPOUT STRUCTURE





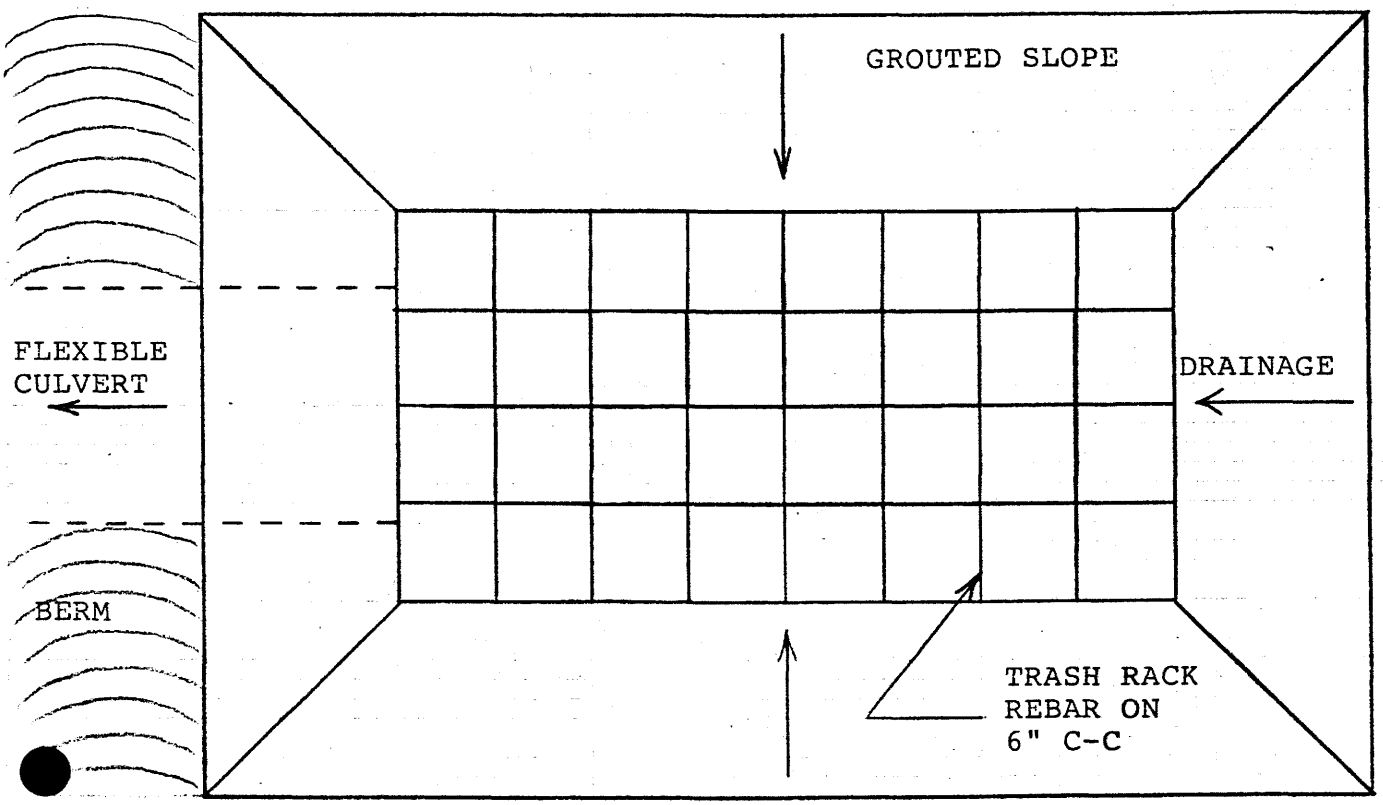


BY D. GUI DATE 9/14/87 SUBJECT COLLECTION BOX SHEET NO. ... OF ...

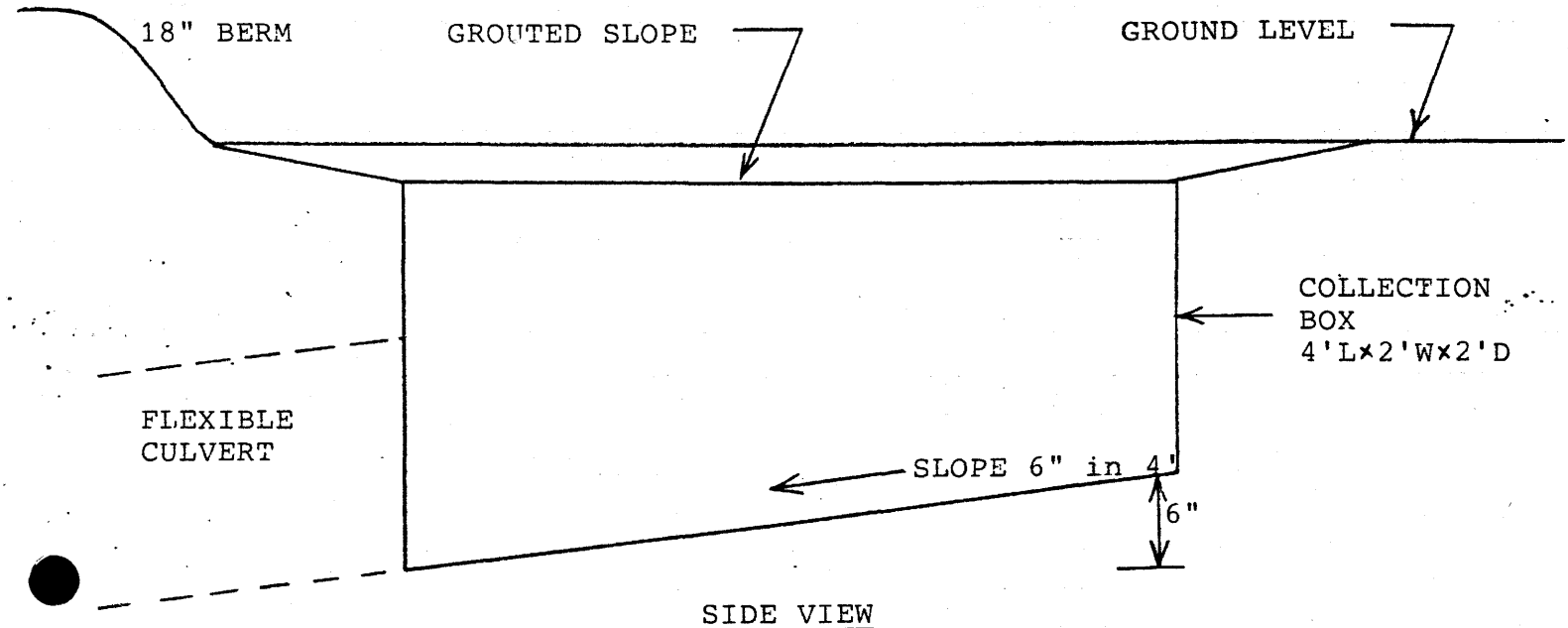
CHKD. BY ... DATE ... JOB NO. ...

SCALE: 1"=1'

Figure 7-F3



TOP VIEW



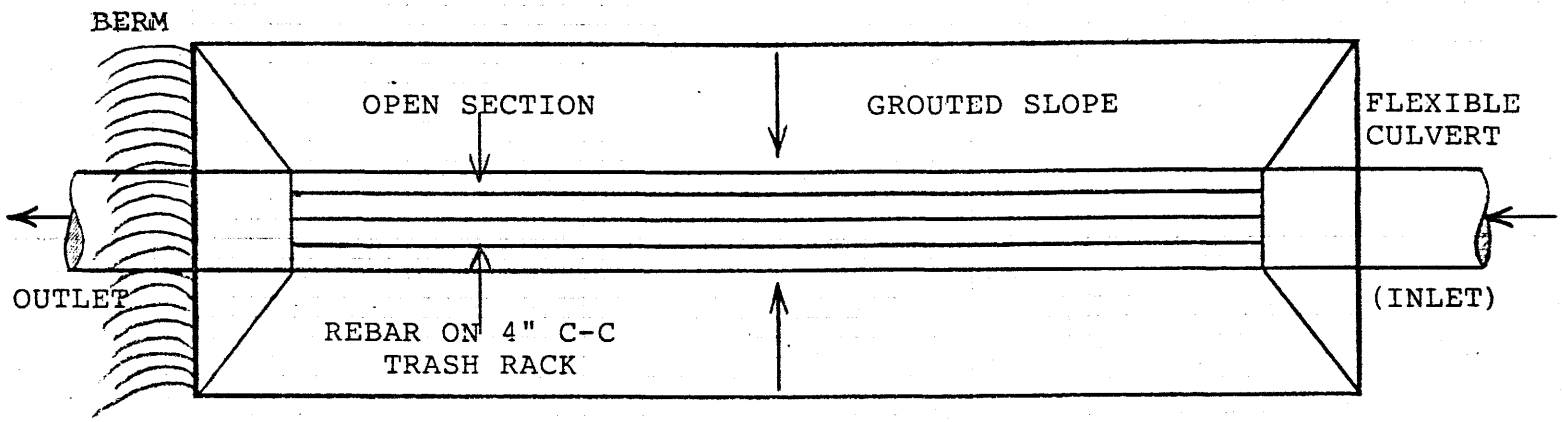
SIDE VIEW

BY D. GUY DATE 9/14/87 SUBJECT OPEN CULVERT TYPICAL SEC. SHEET NO. ..... OF.....

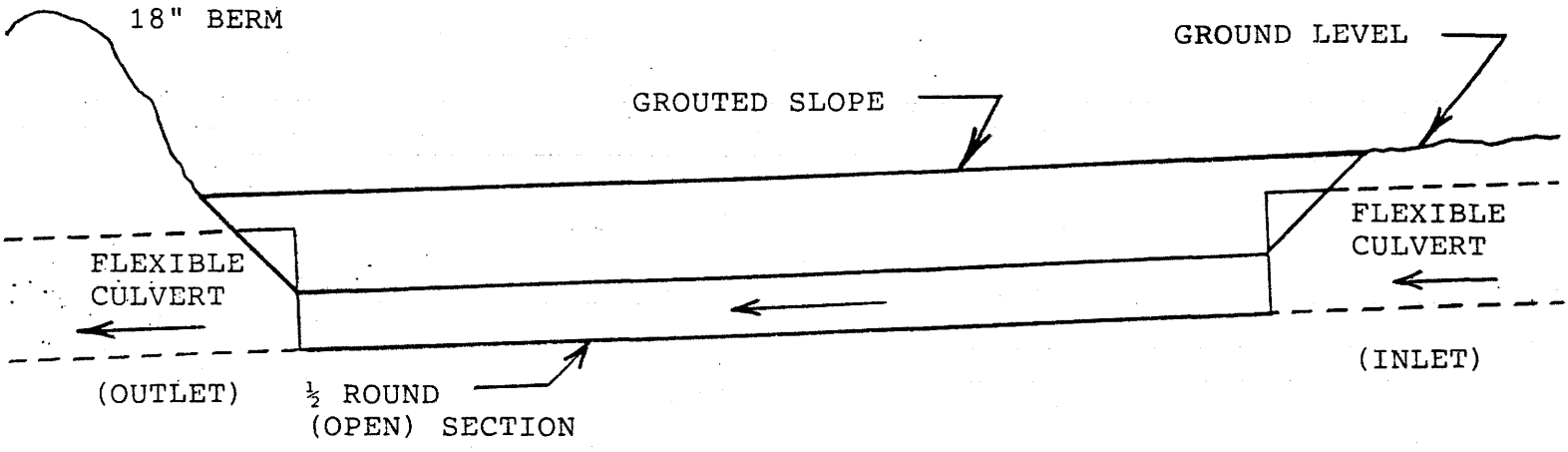
CHKD. BY ..... DATE ..... JOB NO. .....

SCALE: 1"=2'

Figure 7-F4



TOP VIEW



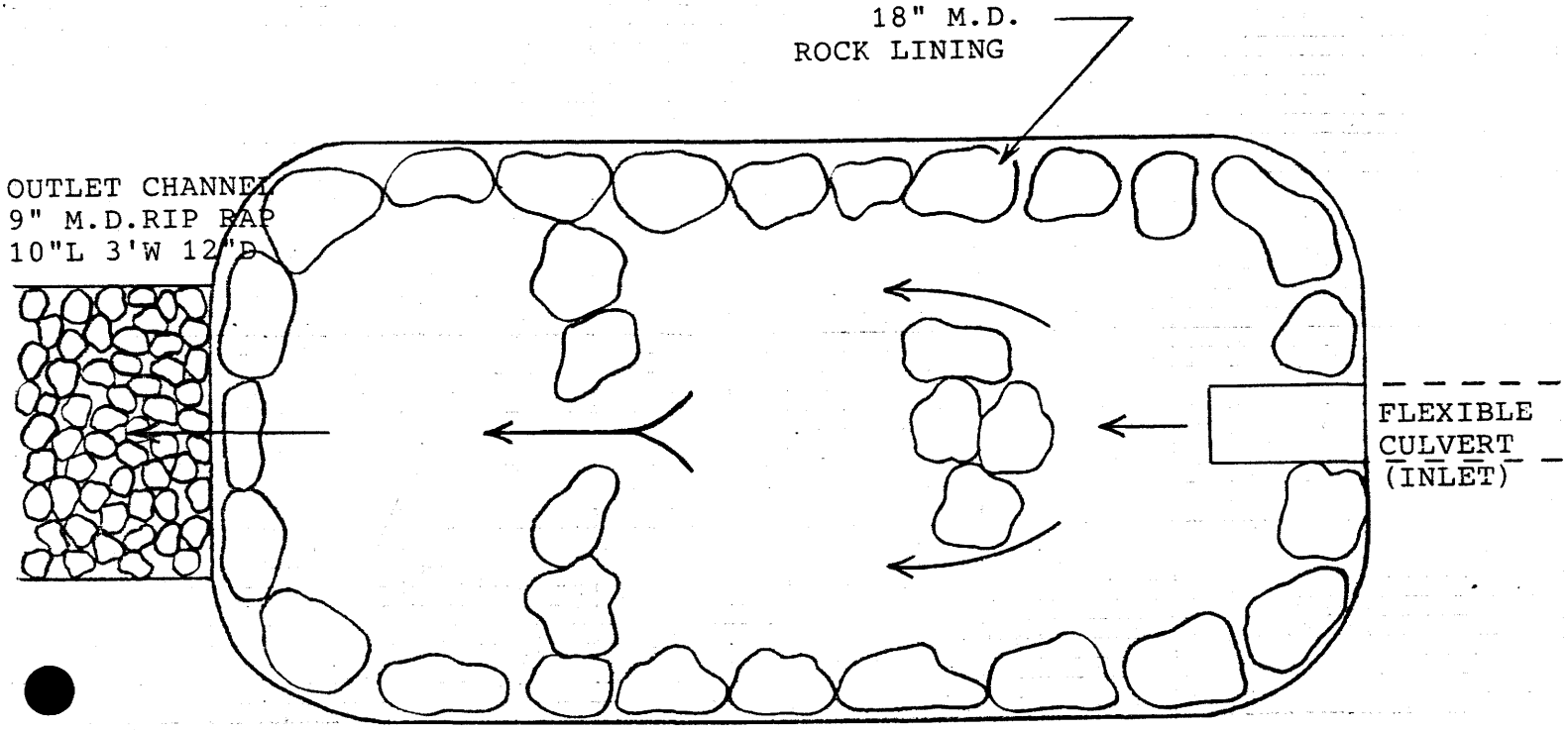
SIDE VIEW

BY D. GUY DATE 9/14/87 SUBJECT CATCH BASIN ENERGY DISSAPATOR SHEET NO. ..... OF.....

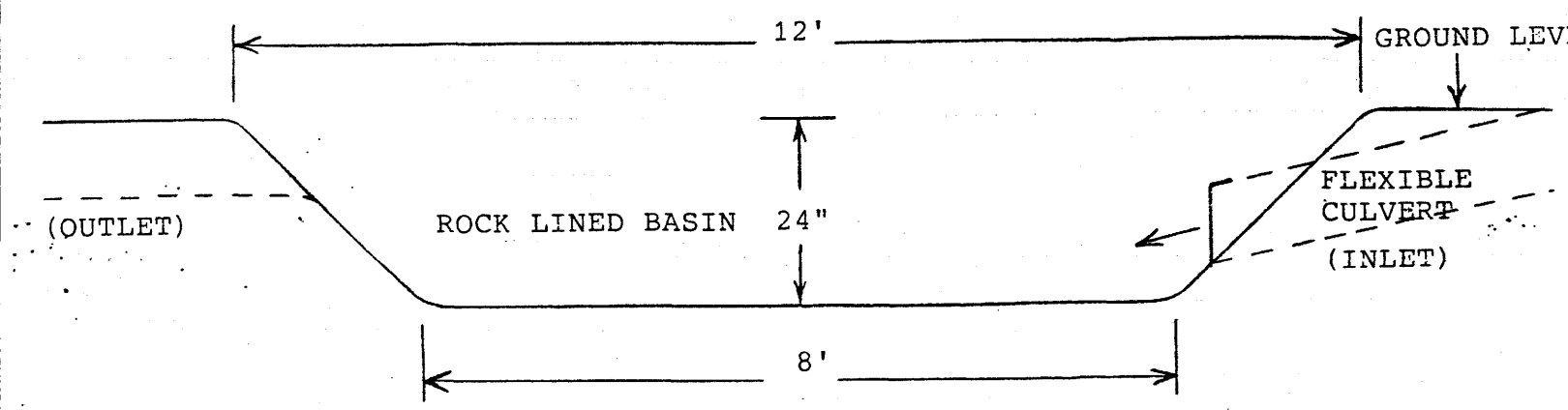
CHKD. BY ..... DATE ..... JOB NO. .....

SCALE: 1"=2'

Figure 7-F5



TOP VIEW



SIDE VIEW

heavy equipment traffic. This channel is included in drainage area AD-1 (Plate 7-5). The maximum water this channel is calculated to flow is shown on Table 7.2-8 as 1.5 cfs (Ditch D-2D). Calculations for this ditch are shown in Appendix 7-F under Runoff Ditch Sizing. Based on this flow, the culvert is sized as shown on Table 7.2-7 (Revised Summary of Culvert Sizes). The new culvert is designated C-4D, and matches the criteria for culvert C-1D. The headwater depth above the top of the culvert inlet is proposed to be 1' more than adequate to carry the expected flow. Energy dissipators will be placed as indicated in the following sections (7.2.5.2.1 and 7.2.5.2.2)

The outslope of the pad will be protected by the installation of 6" M.D. rock along the area where drainage will occur. The only drainage that will reach the toe of the pad is that from the upper pad to the lower; the majority of the drainage above will be conveyed through the culvert. The 6" rock will be more than adequate, since the approved plan calls for natural 6" rip-rap in the post-mining channel that will carry not only the disturbed drainage AD-1, but the undisturbed drainage from AU-3 as well.

The ditch in this area has been measured, and typical section is shown on Plate 7-8 as cross-section D-D. The ditch profile is also shown on this plate as Profile "F". Plate 7-8A is a typical section of the proposed channel restoration in the area of the portal pad and culvert, after their removal and upon final reclamation.

Drainage Control System
Bear Canyon No.1 Mine
Lower Seam Portal Area

The proposed method of handling the drainage in and around the lower seam portal area is described in the following steps, starting from the top [upper pad] area and ending at the bottom [lump coal] area:

[1] Upper Pad - Drainage from the disturbed area on the upper pad from the sub-station to culvert C-OD, will continue to flow into culvert C-OD, as approved; the only change will be the outlet location of the flexible culvert will be moved approximately 20' to the west to direct runoff onto the rock ledge above the Lower Seam [Hiawatha] portals; water will then flow over the rock ledge to the portal pad below;

[2] Portal Pad - The north east corner of the bin will be bermed a minimum of 30" high over to the highwall. Runoff water from the upper pad will flow southward around the bin and into a collection box at the edge of the portal pad area; the pad will be sloped to flow to the box;

[3] Flexible Culvert - The collection box at the portal pad will discharge into a flexible culvert with a minimum diameter of 15" [a larger pipe may be used, depending on availibility]; the culvert will drop onto the next lower pad area [Conveyor Support Pad];

[4] Conveyor Support Pad - This pad will be sloped to drain to the flexible culvert area; the flexible culvert will be opened [or replaced with $\frac{1}{2}$ round culvert] for a distance of at least 10' to allow surface water to enter the culvert; the entrance to the culvert will be protected by a trash rack and grouted as shown on the attached typical drawing; water will then flow down the flexible culvert to the Coal Processig pad area;

[5] Coal Processing Pad - This pad will also be sloped to drain to the culvert; another 10' opening will be left in the culvert for the surface runoff; water will then be conveyed down to the lower [Lump Coal] pad area;

[6] Lump Coal Pad - The flexible culvert will parallel the conveyor down to the lump coal bin, pass beneath the bin supports, and empty into a catch basin/energy dissipator just south of the bin; runoff will then flow south into ditch D-4D and pass through culvert C-2D and onto Sediment Pond "A".

The revised drainage is shown on Plate 2-2. Detailed drawings of the various drainage controls are shown in the attached typicals. Sizing calculations are summarized on the following sheet: "Lower Seam Portal Area - Drainage Sizing Calculations".

Lower Seam Portal Area

Drainage Sizing Calculations

Drainage sizing for the flexible culvert is discussed under section 7.2.5.2.0 [p, 48-1] of Chapter 7 of the Bear Canyon MRP. The main change to that discussion will be that the 15" flexible culvert and inlet structures will replace existing culvert C-1D, with the new culvert being designated C-1D. The following is a summary of the sizing criteria for this culvert:

[1] Flow: 1.5 cfs

a. Based on calculated total flow for ditch D-2D [Plate 7-5], shown in Table 7.2-8 and Appendix 7-F.

[2] Velocity: 10.9 fps

a. Based on 1.5 cfs flow and 20% slope as previously determined.

[3] Rip-Rap: 18" Med. Diam.

a. Based on Figure 7.2.7 [p.63] for 10.9 fps. velocity.

[4] Slope: 20.0%

a. Based on measurement of steeper portion of slope at previous location of C-1D.

[5] Diameter: 15"

a. Based on diameter of previous culvert C-1D and on

common size availability of flexible culvert.

Note: 15" is a minimum diameter; larger culvert may be used depending on availability.

[6] Required Headwater: 9"

a. Based on nomograph and equation described in Section 7.2.5.2.4, p. 53.

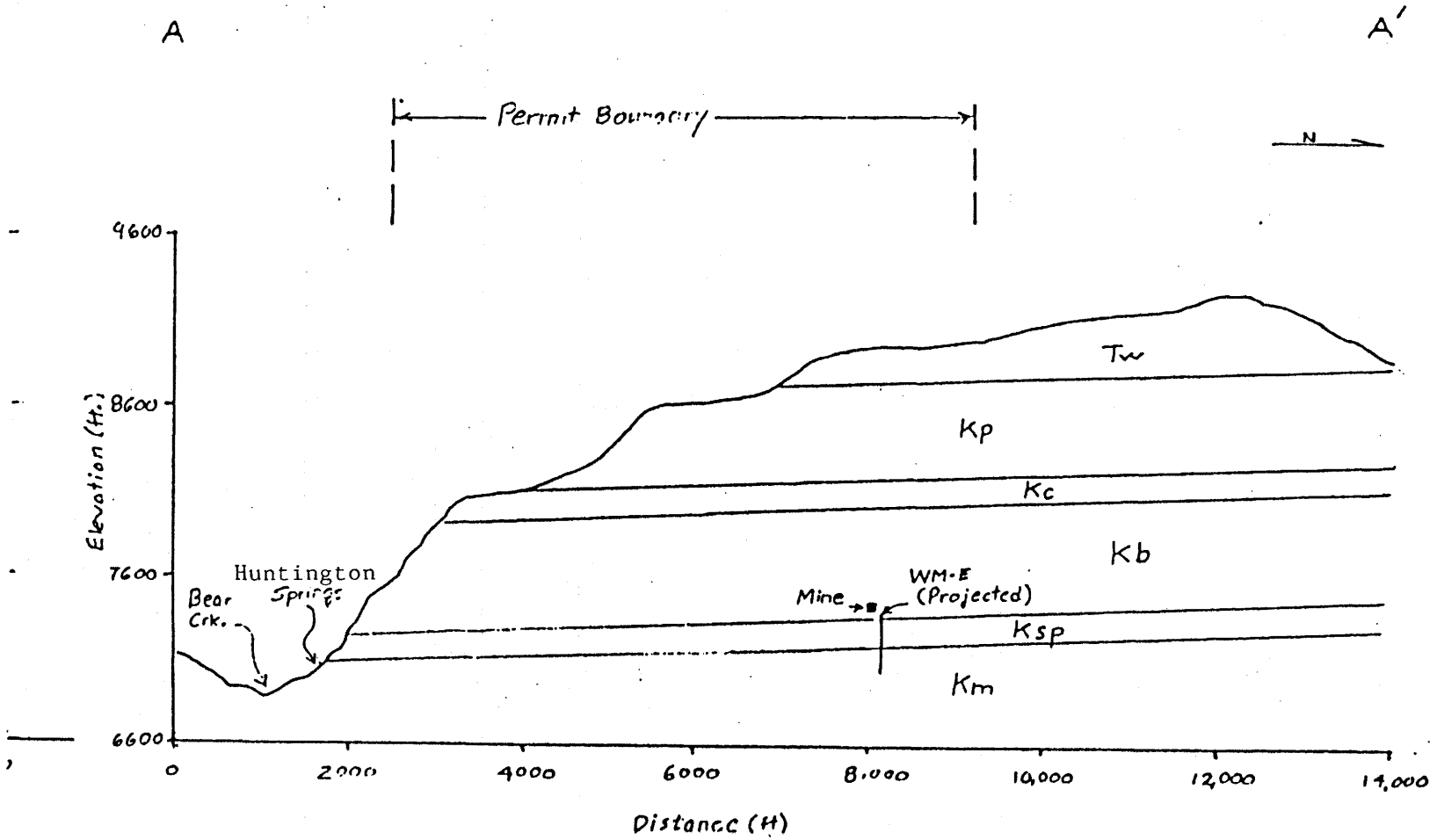
upstream from where the mine road crosses Bear Creek in the mine plan area. The monitoring location downstream is a Weir W-4. In addition to these a third monitoring location is being added. In the future the right-hand tributary of Bear Creek will be monitored just above its confluence with Bear Creek. [See Plates 7-1, 2-2].

Monitoring of the following parameters will be performed monthly: flow (gpm), ph, temperature (°C), total dissolved solids (mg/l), iron , magnesium potassium, chloride, nitrate sulphate, carbonates, bicarbonates, calcium, magnesium, sodium and total suspended solids (all in mg/l). On a quarterly basis the parameters list in Table 7.2-6 will be measured.

Flows will be determined by direct measurement (depth times width times 2/3 velocity) or, whenever feasible, by timed filling of a unit volume container. Chemical analyses will be performed by a certified laboratory. Reporting format will be as shown in Figure 7.2-3.

7.2.5 SURFACE WATER CONTROL AND DIVERSIONS

The vast majority of the disturbed area of the Bear Canyon Mine is on the west side of Bear Canyon (same side as the mine portal and to the south). The all run-off from this west side disturbed area is collected and channelled to Sedimentation Pond "A". The small amount of run-off from the disturbed area east of Bear Creek is channelled to Sedimentation Pond "B". In order to minimize the amount of water crossing the disturbed area, run-off from the undisturbed area above is diverted around or channelled through the disturbed area and into Bear Creek.



STRATIGRAPHIC SECTION A-A'

Figure 7.1-1

9/20/87

7.1.7 GROUND WATER MONITORING PLAN

Monitoring activities will focus on determining water levels, discharge and water quality fluctuations in relevant aquifers or ground water occurrences in the mine area. Data will be collected from mine roof seeps and sumps, future encounters, if any, by drill holes within the mine, observation wells and springs. Procedures to correlate ground water discharge and contamination of Bear Creek will also be used, following procedures by Waddell, et. al., (1983). The objectives of the monitoring plan are to (1) identify potential impacts during and after mining, and (2) provide on-going base line data on aquifer characteristics and ground water occurrences.

The monitoring activities will be timed to determine the approximate seasonal variations with time for the piezometric heads and water volumes encountered and water quality parameters, for the declining and rising limbs of the annual weather cycle. It is proposed that samples will be collected at about February 1, May 1, August 1, and November 1, at all sites. In addition to these monitoring activities, data shall be routinely collected at all new drill holes and other encounters in the mine, where significant in-flows are encountered.

Springs below the mines will be sampled to determine discharge and water quality parameters and their possible variation with time. These springs include Huntington Spring, COP Development Springs, [mine water] Springs (Plate 3.4-1). Water quality parameters to be measured are listed in Table 7.1-4. However, periodic checks will be made of the mine area to determine any possible impacts not currently expressed at the surface. This information will be used to estimate seasonal fluctuations, aquifer recharge, and consistent long-term changes and to confirm the formations contributing to spring flow.

The water levels in the mine sumps cannot be recorded quarterly. Those areas are sealed, and water samples submitted for quality analysis to a qualified laboratory. This information will be used to assess leakage rates and possible contamination. As mining progresses, three observation wells (WM-F, G, and H) will be drilled through the underlying Hiawatha coal seam, at the base of the Blackhawk formation and a minimum of 25 feet into the underlying Star Point sandstone formation. These well locations are identified in Plate 3.4-1. Locations of these wells are approximate and site conditions and mine personnel will determine their exact locations. The purpose of these wells will be for the collection of piezometric surface and water quality data, as encountered. These three wells are located in areas of projected mining activity and will be drilled upon approval of these monitoring sites. These wells are located such as to determine the extent or occurrence of ground water within the depths of impact of the mining activities on the ground water regime. Any ground waters encountered by these wells will be sampled and will be used to correlate with the water quality data from Huntington Springs, and COP Development Spring to provide a check on estimates of ground water contamination. These springs are focused on since their flow is the sole use of ground water to be possibly affected by the mining activities.

The existing and proposed data collection sites selected are expected to provide a representative cross section for hydrologic data across the mine area based on the flow directions projected.

-Summary of Ditch Sizes-

All ditches are triangular "V ditch" with 1:1 side slopes. (See Plate 7.1 for typical.)

	Flow(cfs)	Vel.(fps)	Rip Rap Size**	Slope(%)	Depth Of Ditch	Depth Of Water
D-1R	10.2	6.8	6"	6.0	2'-0"	1'-6"
D-2R	12.1	6.8	6"	6.0	2'-0"	1'-6"
D-3R	10.4	6.8	6"	6.0	2'-0"	1'-6"
D-1U	1.5	3.5	N/R	4.0	1'-3"	0'-9"
D-2U	1.5	3.9	N/R	5.0	1'-3"	0'9"
D-3U	6.1	5.5	4"	5.0	1'-9"	1'-3"
D-4U	11.8	6.6	6"	5.0	2'-0"	1'-6"
D-5U	.9	3.5	N/R	7.0	1'-0"	0'-6"
D-6U	.9	3.5	N/R	7.0	1'-0"	0'-6"
D-7U	10.3	6.6	6"	5.0	2'-0"	1'-6"
D-8U	2.3	4.4	N/R	6.25	1'-3"	0'-9"
D-9U	1.8	5.0	4"	8.3	1'-3"	0'-9"
D-10U	1.5	5.7	6"	18.0	1'-0"	0'-6"
D-11U	7.6	7.9	9"	14.0	1'-6"	1'-0"
D-1D	.8	4.0	N/R	9.0	1'-0"	0'-6"
D-2D	1.5	5.5	4"	10.0	1'-3"	0'-9"
D-3D	1.0	5.2	4"	15.0	1'-0"	0'-6"
D-4D	4.8	5.3	4"	6.25	1'-6"	1'-0"
D-5D	7.2	6.2	6"	6.4	1'-9"	0'-9"
D-6D	1.2	4.4	N/R	6.25	1'-3"	0'-9"

*6" freeboard added to required flow depth.
** see Plate 7.1 for location of rip rap.
N/R - not required

-Summary of Culvert Sizes-

	Flow(cfs)	Vel.(fps)	Rip Rap	Slope(%)	Diameter	Required Headwater**
C-1R	10.2	9.5	12"	8.0	18"	27"
C-2R	12.1	9.5	12"	8.0	18"	36"
C-3R	16.4	9.5	12"	8.0	18"	27"
C-1U	8.8	12.3	24"+	15.0	30"	18"
C-2U	1.5	8.4	9"	15.0	15"	9"
C-3U	7.9++	5.7	6"	5.0	12"	36"*
C-4U	6.1++	5.1	6"	5.1	10"	36"*
C-5U	6.1++	5.0	N/R	4.8	10"	36"*
C-6U	.9	4.4	N/R	3.7	10"	12"
C-7U	10.3	9.7	12"	8.3	12"	27"
C-8U	8.8	13.0	24"+	15.0	18"	24"
C-9U	1.5	8.0	9"	7.3	15"	9"
C-1D	1.5	10.9	18"	20.0	15"	9"
C-2D	4.8	9.6	12"	12.0	18"	15"
C-3D	1.2	5.2	6"	4.2	12"	9"
60" CMP	231.2	13.8	24"	3.4	60"	102"

*When capacity of culvert is exceeded flow continues down ditch to next culvert.

**From invert elevation.

*** All culverts & ditches meet and or exceed minimum requirements.

+ Replaced with 15" flexible culvert

++ A two foot high check dam of rip-rap is used to develop the headwater necessary for maximum flow through the culvert, excess flow continues down the ditch.

N/R - Not required

9/20/87