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PLATEAU MINING COMPANY

A SUBSIDIARY OF UNITED NUCLEAR CORPORATION
Producers & Sellers of Utah Low Sulphur Coal
P.O. Drawer PMC Price, Utah 84501
Phone 637-2875

January 30, 1979

Mr. Harold E. Dolan
Supervisory Mining Engineer
M.S.H.A.
P.O. Box 25367 DFC
Denver, COLORADO 80225

Dear Sir:

In reply to your letter of 01/11/79, the following information is supplied.

The rainfall information was taken from "M.E.S.A. Engineering and Design Manual". The culvert criteria was taken from the "Utah State Department of Highway Manual of Instruction Part 4 Highway Drainage Section 4-605.10 Hydrologic Design of Culverts".

1. PMTS

A. Rainfall Intensity

The U.S. Weather Bureau charts reproduced in the M.E.S.A. Manual Figure 6.18 page 6.69 show a 1 hour probable maximum thunderstorm of 6 inches for the area.

B. Small Area Runoff

Using the State Highway Manual exact drainage patterns were determined to calculate a drainage area of 126 acres.

The roadway to the Starpoint portals provides drainage structures for 42 acres of the area above the culvert.

The coefficient of runoff was determined to be 0.33 by the charts for the area. (Chart 2-05).

Using chart 2-07, the area discharge at K=0.33 and 126 acres is equal to 103 CFS.

C. Design Discharge

Design discharge is equal to:

QF = (QC) (LF) (FF)
QF = Design Discharge
QC = Area Discharge
LF = Land Factor
FF = Frequency

The land factor was determined by chart 2-08 to be 1.00 from alluvium fans (dirty) from shale areas.

The frequency factor was determined by the following:

$\frac{\text{Intensity Max}}{\text{Intensity 25}} = \frac{6}{1.34} = 4.48$

(1.34 from chart 2-03)

QF = (QC) (LF) (FF)
QF = (103) (1.00) (4.48)
QF = 461 CFS

D. Headwater Depth

Since the culvert is an inlet control the chart for Headwater Depth (chart 2-55) gives a Headwater Depth of 3.45 dismeters for 461 CFS and 60" diameter culvert.

Headwater elevation is equal to:

E = (Culvert Dia) (Headwater)
E = (5 feet) (3.45)
E = 17.25 feet

The elevation of water for PMTS 1 hour is 17.25 feet.

2. Probable Maximum 6 Hour

A. Rainfall Intensity

From Figure 6.22 (Design Manual) the maximum runoff occurs between hour 2 and 3 for the six hour storm and is equal to 4.7 in/hr.

B. Small Area Runoff

Using 126 acres and a runoff coefficient of 0.33, the area dis-

charge equals 103 CFS.

C. Design Discharge

QF = (QC) (LF) (FF)
QF = (103) (1.00) (.3.5)
QF = 360 CFS

Frequency factor is equal to:

$$\frac{I\ Max}{I\ 25} = \frac{4.7}{1.34} = 3.5$$

D. Headwater Depth

Using chart (2-55) gives a Headwater Depth of 2.55 diameters for 360 CFS and 60" Diameter culvert.

E = (Culvert Dia) (Headwater)
E = (5) (2.55)
E = 12.75 feet elevation maximum

Between hour 2 and 3 of the probable maximum 6 hour storm.

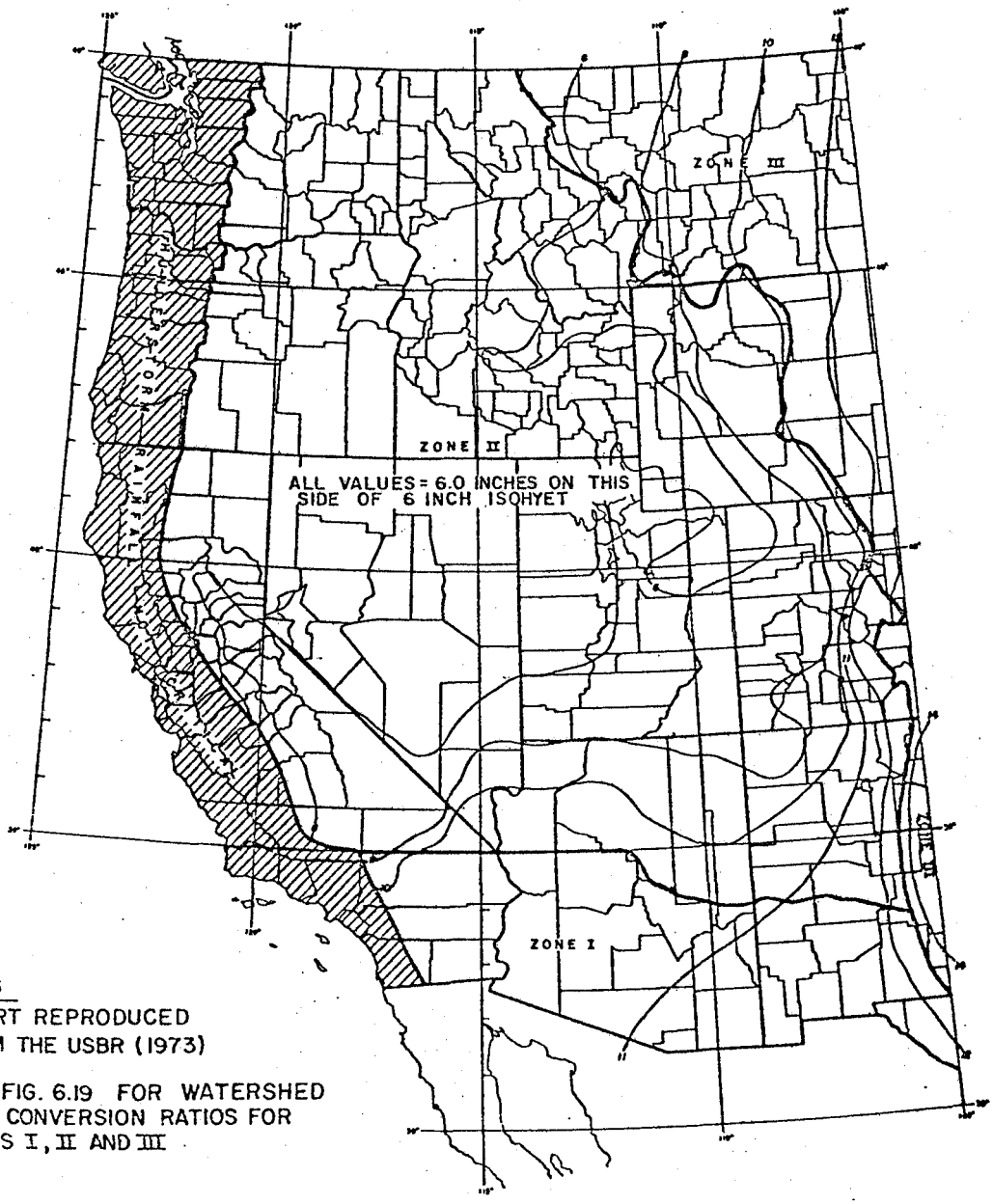
Sincerely,

PLATEAU MINING COMPANY

E. A. Shaw

E.A. Shaw
Safety Manager

EAS/jh



NOTES

1. CHART REPRODUCED FROM THE USBR (1973)
2. SEE FIG. 6.19 FOR WATERSHED SIZE CONVERSION RATIOS FOR ZONES I, II AND III

FIG. 6.18 PROBABLE MAXIMUM THUNDERSTORM (PMTS)(INCHES) FOR A POINT STORM OF ONE-HOUR DURATION WEST OF THE 105TH MERIDIAN

Table 2-05: K-FACTORS

25-year 60-minute rainfall intensity	TOPOGRAPHY			
	Mountainous slope over 30%	Rough-hilly 15% - 30%	Rolling 5% - 15%	Flat to rolling 0% - 5%
0.65	0.16	0.11	0.08	0.05
0.70	0.17	0.12	0.08	0.06
0.90	0.22	0.15	0.11	0.07
1.00	0.25	0.17	0.12	0.08
1.10	0.27	0.19	0.13	0.09
1.25	0.31	0.21	0.15	0.10
1.30	0.32	0.22	0.16	0.10
1.40	0.35	0.24	0.17	0.11
1.55	0.39	0.26	0.19	0.12
1.80	0.45	0.31	0.22	0.14
2.00	0.50	0.34	0.24	0.16
2.25	0.56	0.38	0.27	0.18
2.50	0.62	0.42	0.30	0.20

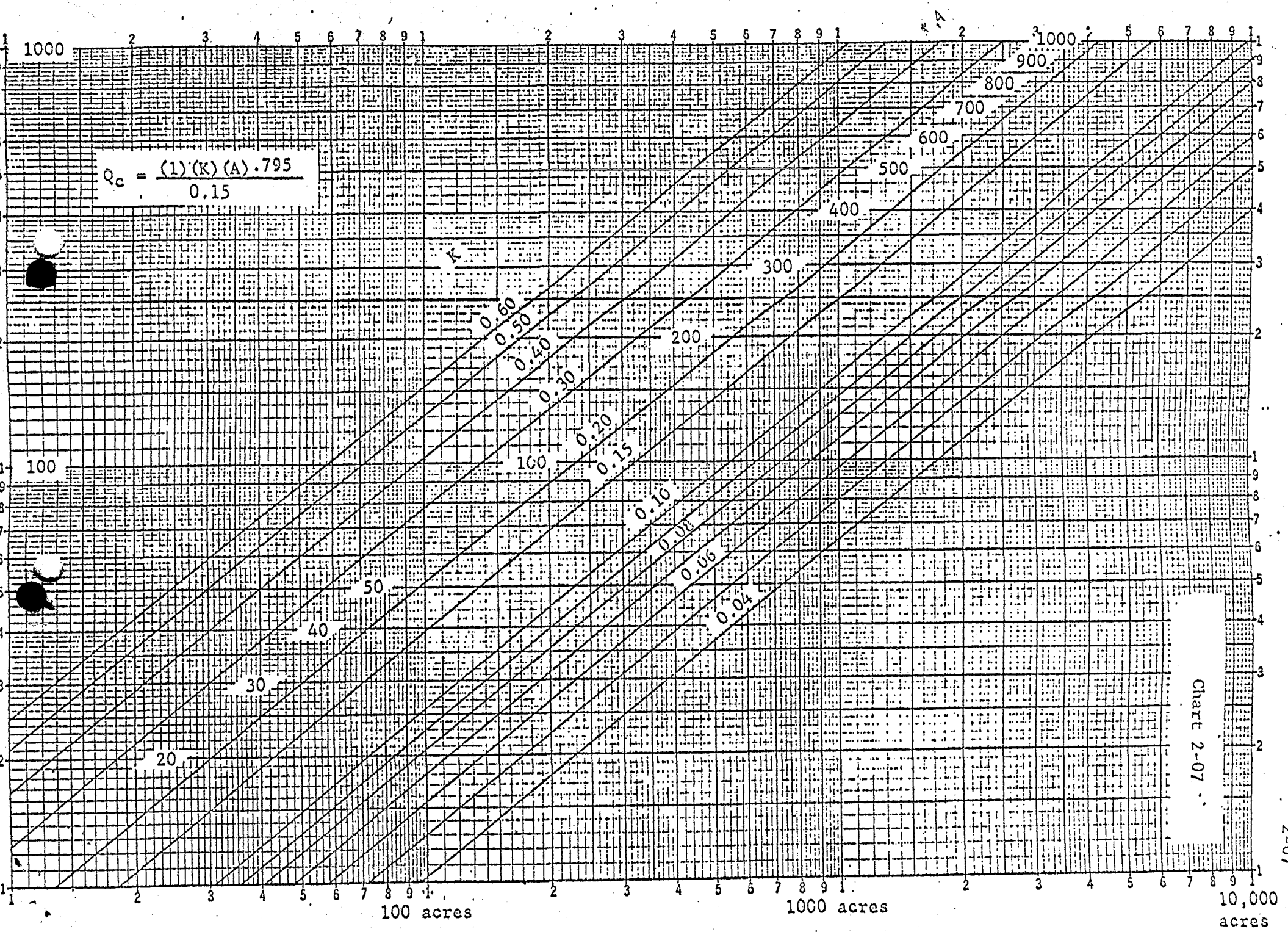

$Q_c = \frac{(1)(K)(A)^{.795}}{0.15}$
K
0.60
0.50
0.40
0.30
0.20
0.15
0.10
0.08
0.06
0.04
1000
900
800
700
600
500
400
300
200
100
50
40
30
20
100 acres
1000 acres
10,000 acres
Drainage Area
Chart 2-07

Table 2-08: LAND FACTORS FOR SMALL WATERSHEDS.

TYPICAL GEOGRAPHIC LOCATIONS	TYPICAL TERRAIN CHARACTERISTICS	LAND FACTORS
	ALLUVIAM	
	(CLEAN)	
Farmington Salt Lake Bench Lands	Fans from granitic uplifts Spits, bars, glacial till, etc.	0.3 → 0.8
	(DIRTY)	
Sevier Valley Echo Canyon Salt Lake Valley	Fans and pediment plains from shale areas, etc. Conglomerate Lake deposits - flood plain areas	1.0 → 1.5
	IGNEOUS	
	(RIOLITIC - POROUS)	
N.W. of St. George Fish Lake area Marysville Canyon	Cinder areas (Small areas) Basalt and lava flows Riolitic flows	0.5 → 1.5
	(SHISTOS OR GRANITIC)	
Bald Mountain - Uintahs Farmington Canyon Little Cottonwood Canyon Salt Lake City	Rubbled uplifts Metamorphic shales Batholitic uplifts - granitic	0.3 → 1.2
	LIMESTONE	
Logan Canyon	Hard, pure limestone or dolomite (breaks up in blocks; talus slopes may be present)	0.5 → 1.0
	SANDSTONE	
Brigham City Bryce Canyon	Massive (well-cemented) quartzite, etc. abundant talus slopes - rubble piles Friable (poorly-cemented) dirty sand dunes may be present	0.5 → 2.0
	SHALE	
San Rafael Swell Green River	Sandy shale - alternating clayey sand and shale members Clayey shale	1.5 → 2.5

Chart 2-03: RAINFALL INTENSITY VS. RETURN PERIOD

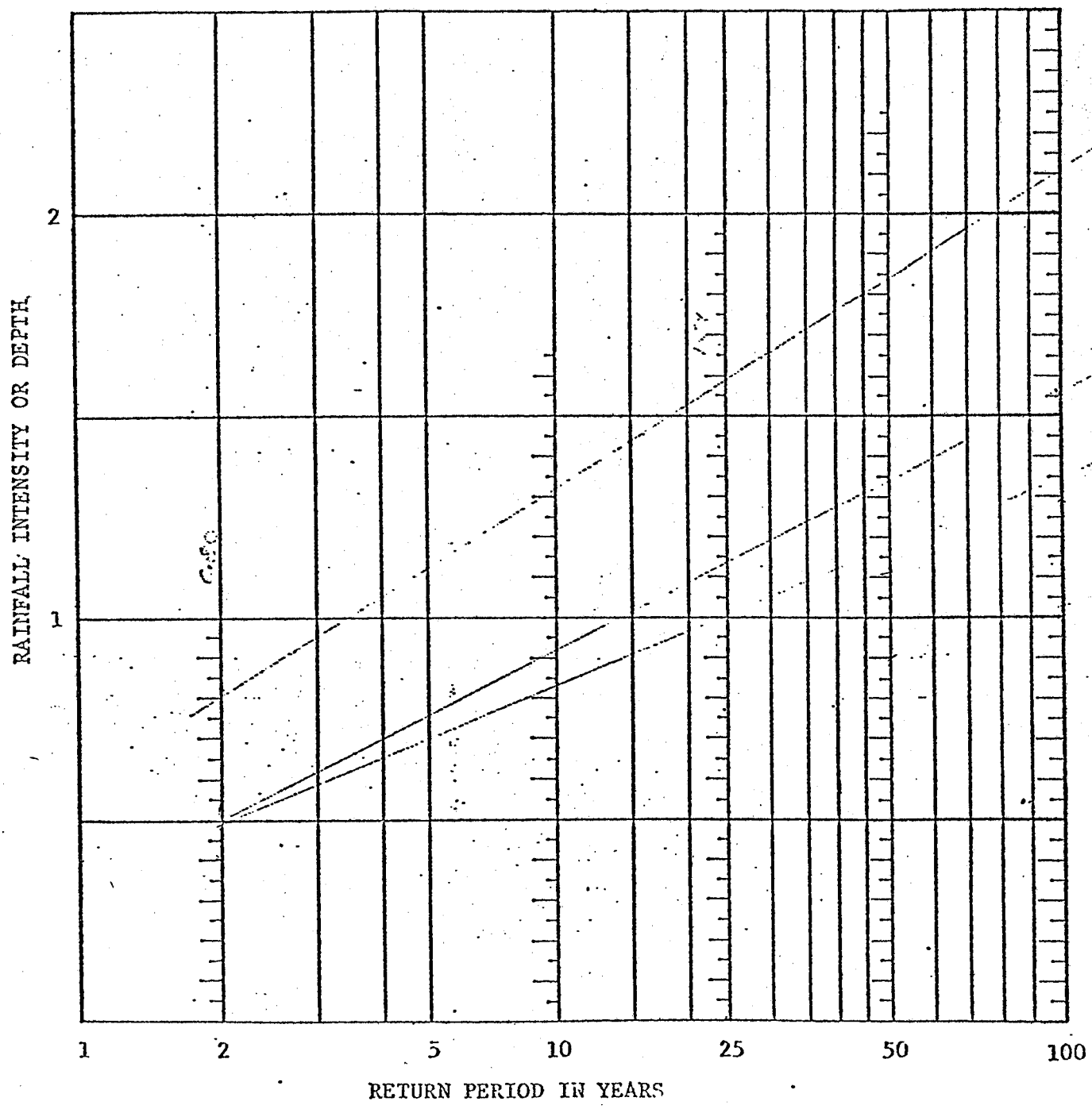
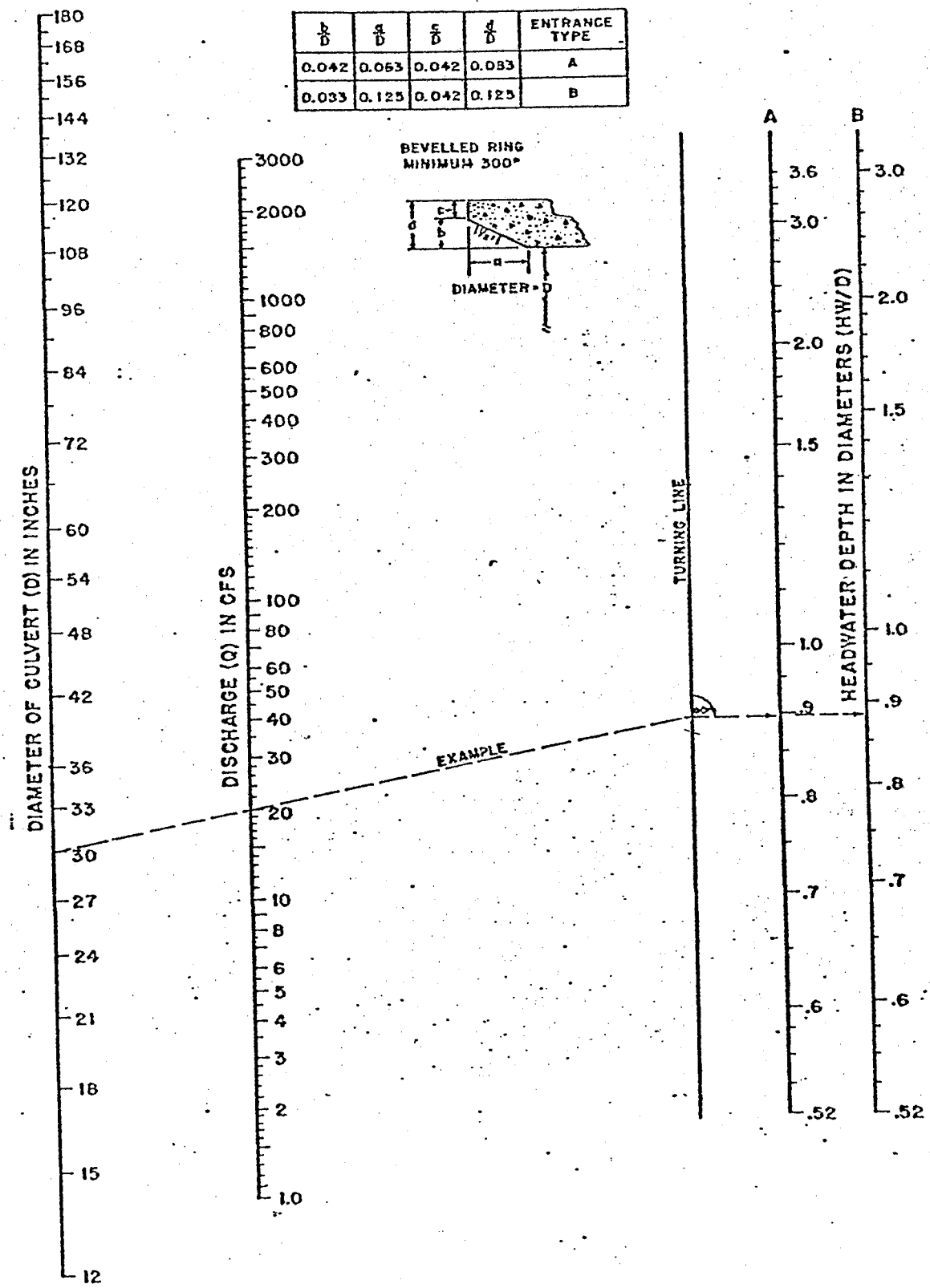


Chart 2-55: HEADWATER DEPTH FOR CIRCULAR PIPE CULVERTS WITH BEVELLED RING INLET CONTROL



BUREAU OF PUBLIC ROADS
MARCH 1964

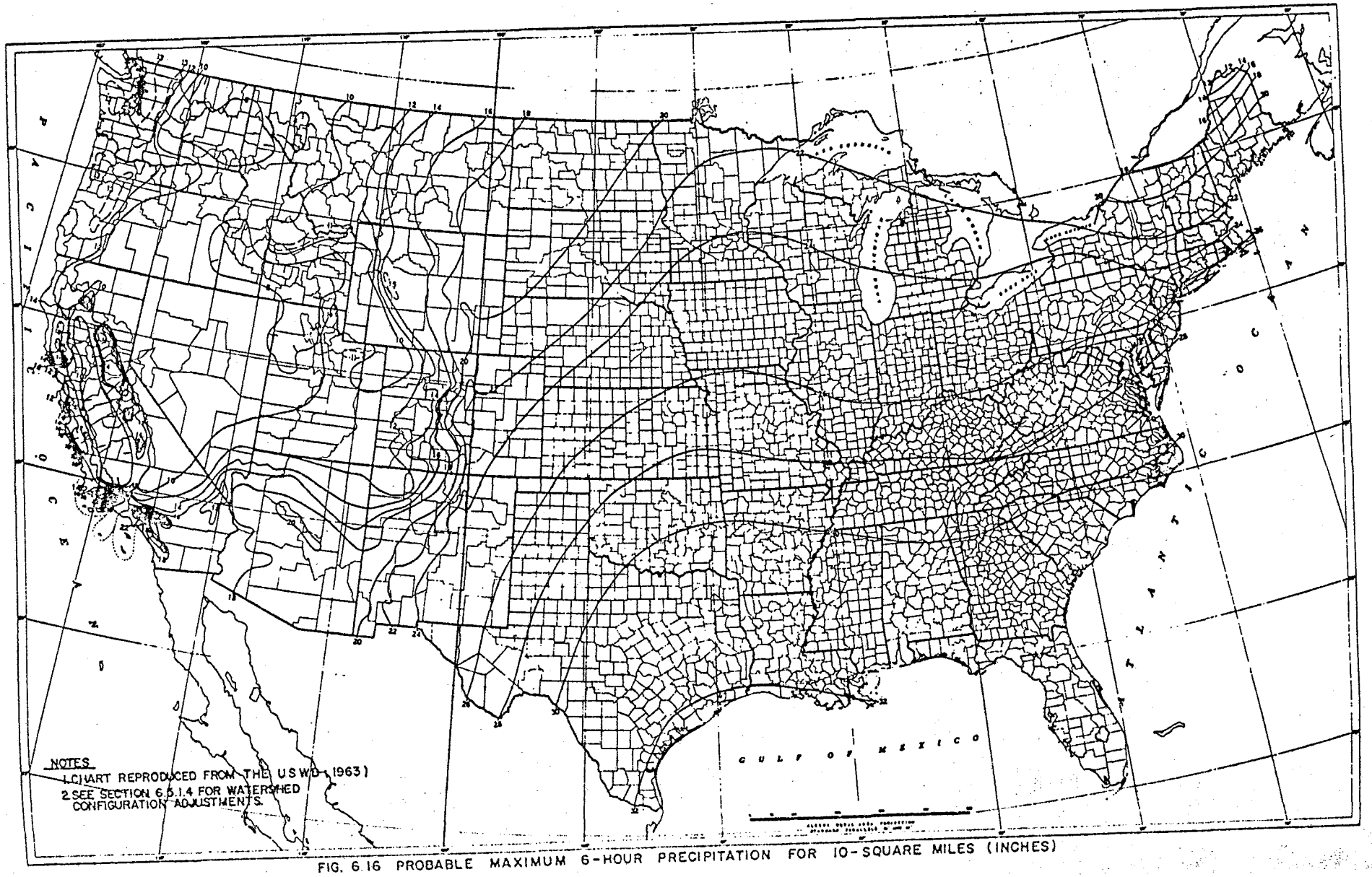
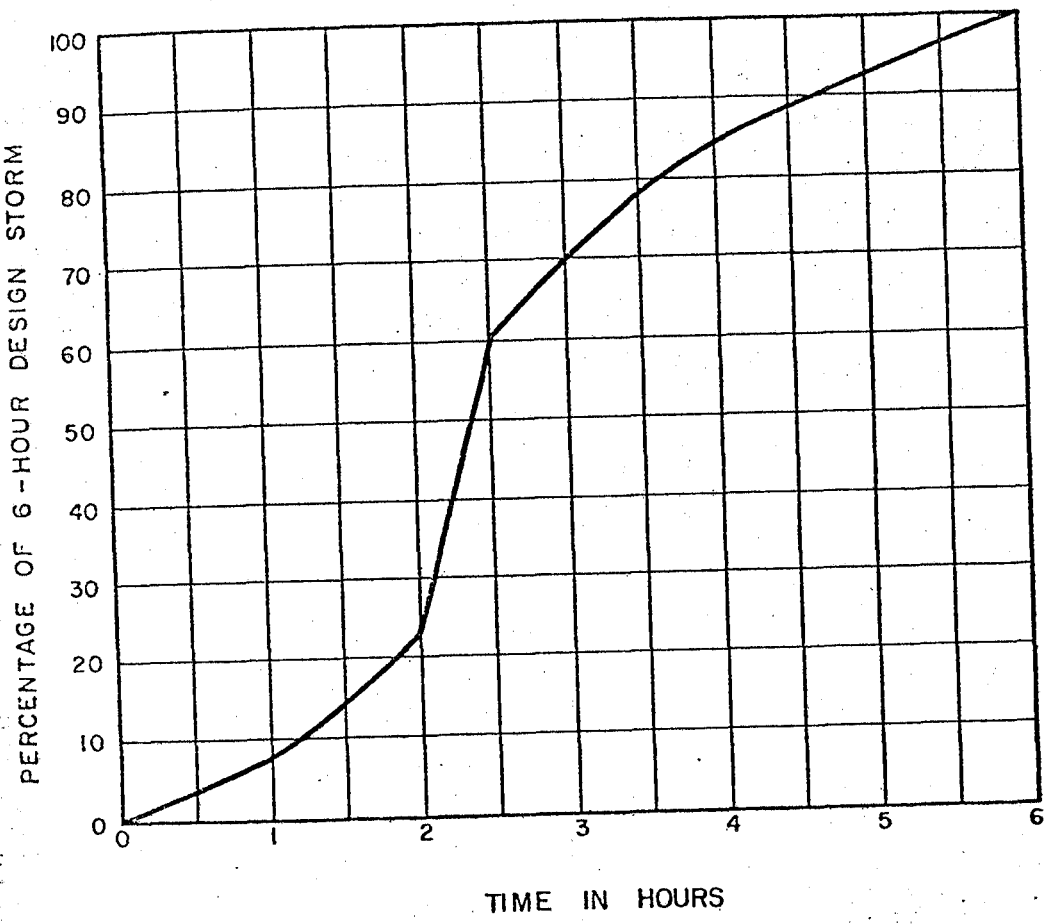


FIG. 6.16 PROBABLE MAXIMUM 6-HOUR PRECIPITATION FOR 10-SQUARE MILES (INCHES)



NOTE
1. BASED ON RECOMMENDATIONS BY THE SCS (1972)

FIG. 6.22 DISTRIBUTION OF PRECIPITATION DURING 6-HOUR DESIGN STORM