0001

Document Information Form

Mine Number: C/015/017

File Name: Incoming

To: DOGM

From:

Person N/A

Company Des-Bee-Dove

Date Sent: December 21, 1984

Explanation:

PERMIT APPLICATION

cc:

File in:

C/ 015 , 017 , **Incoming**

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ACT/015/017
FILE #3

DES-BEE-DOVE COAL MINE

PERMIT APPLICATION

DES-BEE-DOVE TO WILBERG

JUNCTION ROAD

VOLUME 6

RECEIVED
DEC 21 1984
DIVISION OF
OIL, GAS & MINING

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- ☐ Confidential
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Addition 12/19/84

DES-BEE-DOVE COAL MINE
MINE/JUNCTION ROAD

The following submittal is a plan required as abatement for a violation written against the Des-Bee-Dove/Wilberg junction road.

Mainly, these plans detail storm runoff waters over and off-road ditches and conveyance structures. Methodology, hydrological calculations and culvert designs are included.

Soil sampling and slope stability testing will be conducted during the next field season and the laboratory analysis forwarded as soon as they become complete. Testing methodoligies and parameters can be found in the permit application in item number 7 on page 4-16.

Trash Racks and Debris Basins

In the original violation and the inspection memo dated November 20 and again in the extension letter dated December 10, abatement included plans for debris basins or trash racks at the inlet of each culvert. Authority for this requirement was cited as 817.153(c)(1)(iii):

> "Trash racks and debris basins shall be installed in the drainage area wherever debris from the drainage area could impair the functions of drainage and sediment-control structures."

We wish to point out:

1. There are twenty-two individual culverts providing drainage across the haul road. There exists no

criteria on which to base whether or not the individual drainage basins could impair functions of drainage and sedimentation control structures.

As there are no sediment control structures on the up-drainage side of the road there remains only "debris" to evaluate. A check was made with the Price District Office of the Utah Department of Transportation to find if they had guidelines for determination. It was found that by experience trash racks serve only to block culverts and, when used, must be cleaned after every storm event resulting in high maintenance costs and, in some cases, actually causes blockage to the otherwise working drainage culvert.

2. Inspection of the drainage areas shows the vegetation as dominantly Pinion Juniper, a slow producing, sturdy, evergreen tree having a very clean undergrowth that reflects a clean environment and little deadwood debris.

3. Costs of installing trash racks and constant maintenance, we feel is an unwarranted burden. Instead, we believe the culverts, with periodic inspections and maintenance will provide adequate drainage as designed.

The regulations require the operator to maintain the culverts in an unobstructed condition. If future drainage conditions dictate addition of a control structure to facilitate drainage a plan will be submitted.

We request this part of the abatement be deleted as being too vague and without documented reason.

DES-BEE-DOVE JUNCTION ROAD
HYDROLOGIC CALCULATIONS FOR ROAD DRAINAGE
RE: NOV 84-2-22-1

Solving for 10-year one-hour rainfall intensity using charts 2-02 and 2-03 for inches/hour. (Reference U.D.O.T. Manual of Instruction, Part 4, Roadway Drainage).

Chart 2-02 Find $i_2 = .60$

Chart 2-02 Find $i_{100}/i_2 = 2.6$

Calculated $x/.6 = 2.6$

$x = 2.6\ (.6)$

$x = 1.56$

So then $i_{100} = 1.56$ in/hr.

Chart 2-03 locate i_2 and i_{100}, draw straight line from point to point and find: $i_{10} = .98$ in/hr., $i_{25} = 1.2$ in/hr.

10-Year design formula for small area runoff

$Q_{10} = Q_c \times LF \times FF.$

Q_{10} = Design discharge in C.F.S.

Q_c = Discharge (determined from Chart 2-07)

$$\left(Q_c = \frac{(1)(k)(a)^{.795}}{.15}\right)$$

LF = Land factor (taken from Chart 2-08) = (1.5)

FF = Frequency factor i_{design}/i_{25} = (.82)

Hydrologic Calculations:

Site #1A

Area Affected = 3.56 Acres (from Dwg. #CM-10607-DS)

Small Area Runoff Solution: $Q_{10} = Q_c \times LF \times FF$

$Q_c = \frac{(1)(.15)(3.56)^{.795}}{.15}$ $Q_{10} = (2.74)(1.5)(.82)$

$Q_{10} = 3.37$ CFS

$Q_c = 2.74$

Site #1B

Area Affected = 4.54 Acres (from Dwg. #CM-10607-DS)

Small Area Runoff Solution: $Q_{10} = Q_c \times LF \times FF$

$Q_c = \frac{(1)(.15)(4.54)^{.795}}{.15}$ $Q_{10} = (3.33)(1.5)(.82)$

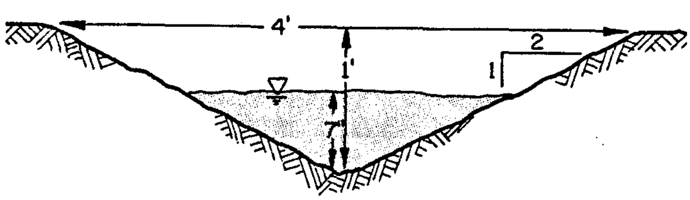
$Q_{10} = 4.10$ CFS

$Q_c = 3.329$

Ditch Size: Mannings Equation $Q = \frac{1.49}{n} A R^{.67} S^{.5}$

$n = .023$ (Bare Soil), $A = 2.0$,

$R = .447^{.67}$, $S = .08^{.5}$



TYPICAL EXISTING DITCH

$Q = \frac{1.49}{.023} \times 2.0 \times .447^{.67} \times .08^{.5}$

$Q = 64.78 \times 2.0 \times .583 \times .283$

$Q_{Max} = 21.37$ CFS (Full Ditch)

$Q_{Design} = 5.06$ CFS

$V = 7.5$ Ft/Sec.

Site 1A: By Nomagraph 3.37 CFS < the 24" Culvert Design < 1.0 HW/D.

Site 1B: By Nomagraph 4.10 CFS < the 24" Culvert Design < 1.0 HW/D.

SOLUTION: At Sta. 131+00, install concrete collection box on outlet of existing 24" CMP. This box will then serve also as an inlet control structure for the proposed 24" CMP that will be placed in the slope for stability. The proposed 24" CMP and concrete collection box will then accommodate the combined flows (CFS) of both ditches (Sites 1A and 1B) totaling 7.47 CFS. A rock dissipator will be added to the outlet. See Dwg. CM-10608-DS for concrete collection box details and Dwg. CM-10584-DS, Sheet #8, for plan view (Map Packet 5-1).

Hydraulic Calculations

Site #2

(From Dwg. #CM-10607-DS)

Area Affected = 1200' Long x 100' Wide = 2.75 Acres

Small Area Runoff Solution:

$$Q_c = \frac{(1)(.15)(2.75)^{.795}}{.15}$$

$$Q_c = 2.24$$

$$Q_{10} = Q_c \times LF \times FF$$

$$Q_{10} = (2.24)(1.5)(.82)$$

$$Q_{10} = 2.76 \text{ CFS}$$

Ditch Size: Mannings Equation (Same as Sites 1A & 1B)

$Q = 21.37$ CFS (Full Ditch)

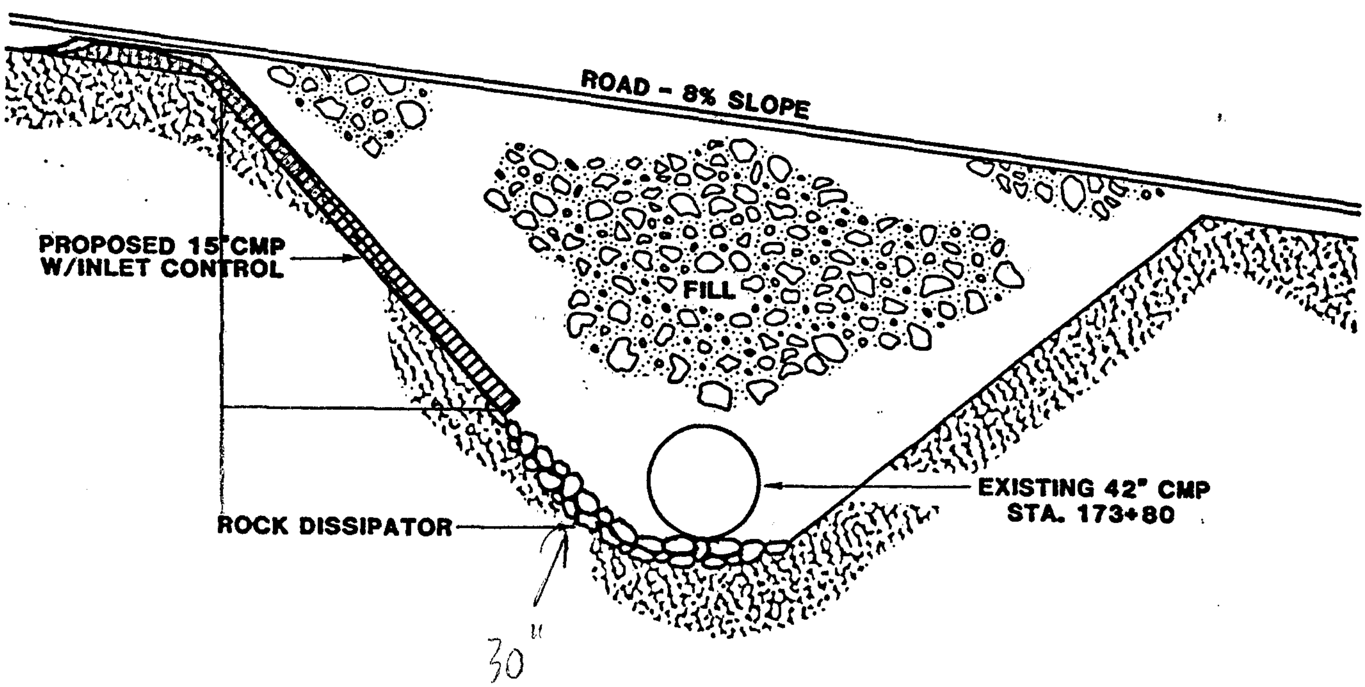
$Q_{Design} = 5.06$ CFS

$V = 7.5$ Ft/Sec

By Nomagraph 2.76 CFS < 15" Culvert Design with 1.0 HW/D.

SOLUTION: At the top of the fill slope approximate station 172+70, install proposed 15" cmp with inlet control structure, placed in the fill side slope for stability. This 15" cmp will outlet into a rock dissipator. See Figure 1, and Dwg. CM-10584-DS, Sheets 9 and 19 (Map Packet 5-1).

exit velocity 14.9 ft/s 30"



DES BEE DOVE COAL MINE
EMERY COUNTY, UTAH

TYPICAL PROFILE VIEW
15" CMP AT SITE#2

UTAH POWER & LIGHT COMPANY
Department of Mining & Exploration

DATE: 19 DEC 1984	BY: A.W.BROW
SCALE: NONE	FIGURE 1

Hydraulic Calulations

Site #3A (From Dwg. #CM-10607-DS)

Area Affected = 1900' Long x 100' Wide = 4.36 Acres

Small Area Runoff Solution:

$$Q_c \; \frac{(1)(.15)(4.36)^{.795}}{.15}$$

$$Q_c = 3.22$$

$$Q_{10} = Q_c \times LF \times FF$$

$$Q_{10} = (3.22)(1.5)(.82)$$

$$Q_{10} = 3.96 \text{ CFS}$$

Site #3B

Area Affected = 1600' Long x 100' Wide = 3.67 Acres

Small Area Runoff Solution:

$$Q_c = \frac{(1)(.15)(3.67)^{.795}}{.15}$$

$$Q_c = 2.81$$

$$Q_{10} = Q_c \times LF \times FF$$

$$Q_{10} = (2.81)(1.5)(.82)$$

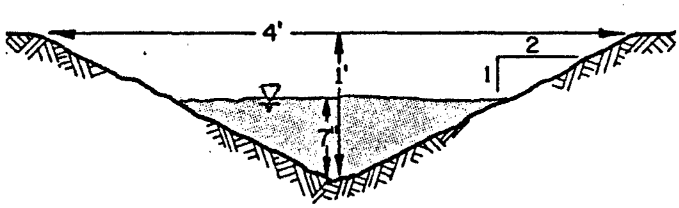
$$Q_{10} = 3.46 \text{ CFS}$$

Ditch Size: Mannings Equation:

$$Q = \frac{1.49}{n} A R^{.67} S^{.5}$$

$n = .023$ (Bare Soil), $A = 2.0$,

$R = .447^{.67}$, $S = .07^{.5}$



TYPICAL EXISTING DITCH

$$Q = \frac{1.49}{.023} \times 2.0 \times .447^{.67} \times .07^{.5}$$

$$Q = 64.78 \times 2.0 \times .583 \times .265$$

$Q = 20.02$ CFS (Full Ditch)

$Q_{Design} = 4.74$ CFS

$V = 7.04$ Ft/Sec

Site #3A: By Nomagraph 3.96 CFS < the 15" Culvert Design with 1.0 Hw/D.
Site #3B: By Nomagraph 3.46 CFS < the 15" Culvert design with 1.0 Hw/D.

SOLUTION: At the top of the fill slopes on both sides of the road approximate station 199+20, install proposed 15" CMP's with inlet control structures. CMP's will be placed in the fill side slopes for stability. Both pipes will outlet into rock dissipators. See Figure 2, and Dwg. CM-10584-DS, Sheets #10 and 19 (Map Packet 5-1).

Hydrologic Calculations:

Site #4

Area Affected = .76 Acres

Small Area Runoff Solution: $Q_{10} = Q_c \times LF \times FF$

$Q_c = \frac{(1)(.15)(.76)^{.795}}{.15}$

$Q_{10} = (.804)(1.5)(.82)$

$Q_{10} = .989$ CFS

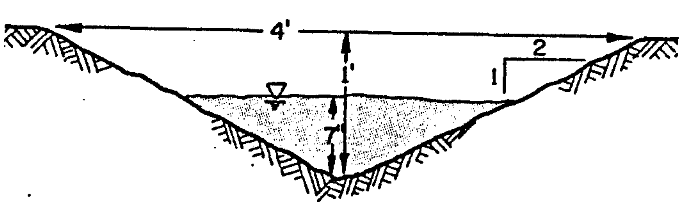
$Q_c = .804$

Ditch Size: Mannings Equation:

$Q = \frac{1.49}{n} A R^{.67} S^{.5}$

n = .023 (Bare Soil), A = 2.0,

$R = .447^{.67}$, $S = .0246^{.5}$



TYPICAL EXISTING DITCH

$Q = \frac{1.49}{.023} \times 2.0 \times .447^{.67} \times .0246^{.5}$

$Q = 64.78 \times 2.0 \times .583 \times .157$

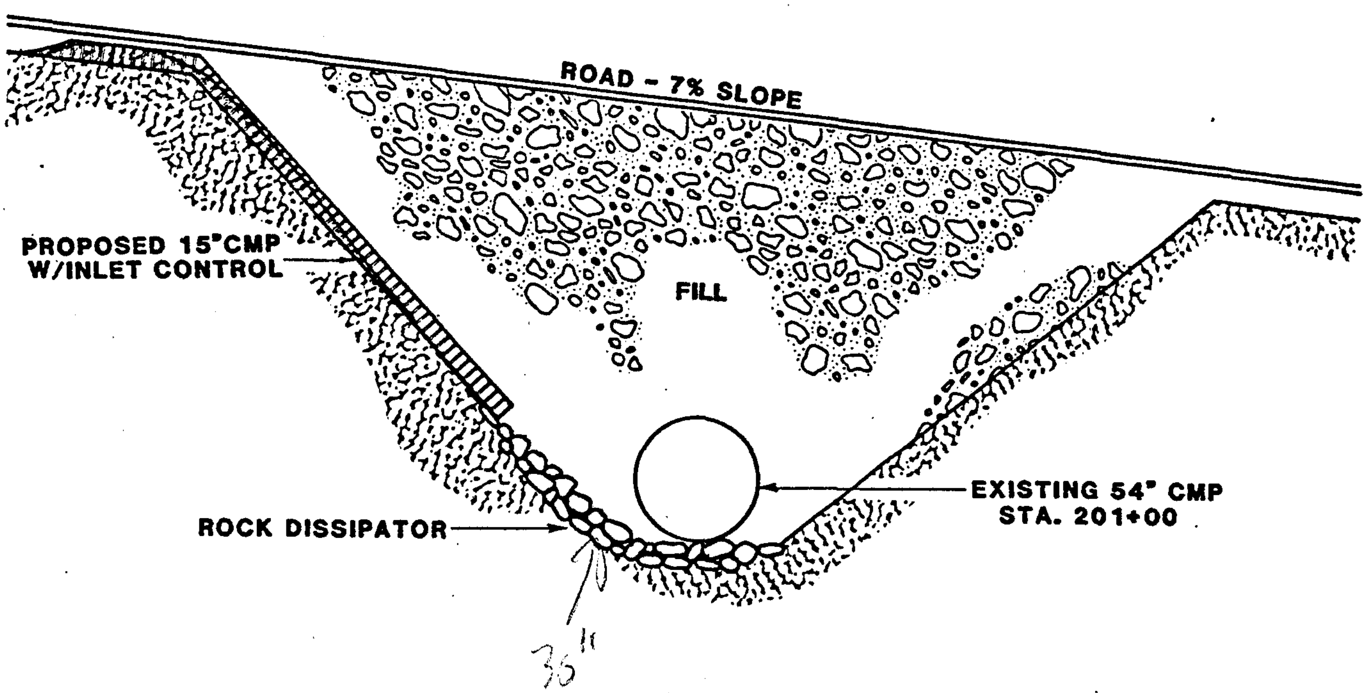
Q = 11.86 CFS (Full Ditch)

$Q_{Design} = 2.80$ CFS

V = 4.2 Ft/Sec

By Nomagraph .989 CFS < 12" Culvert Design with .6 HW/D

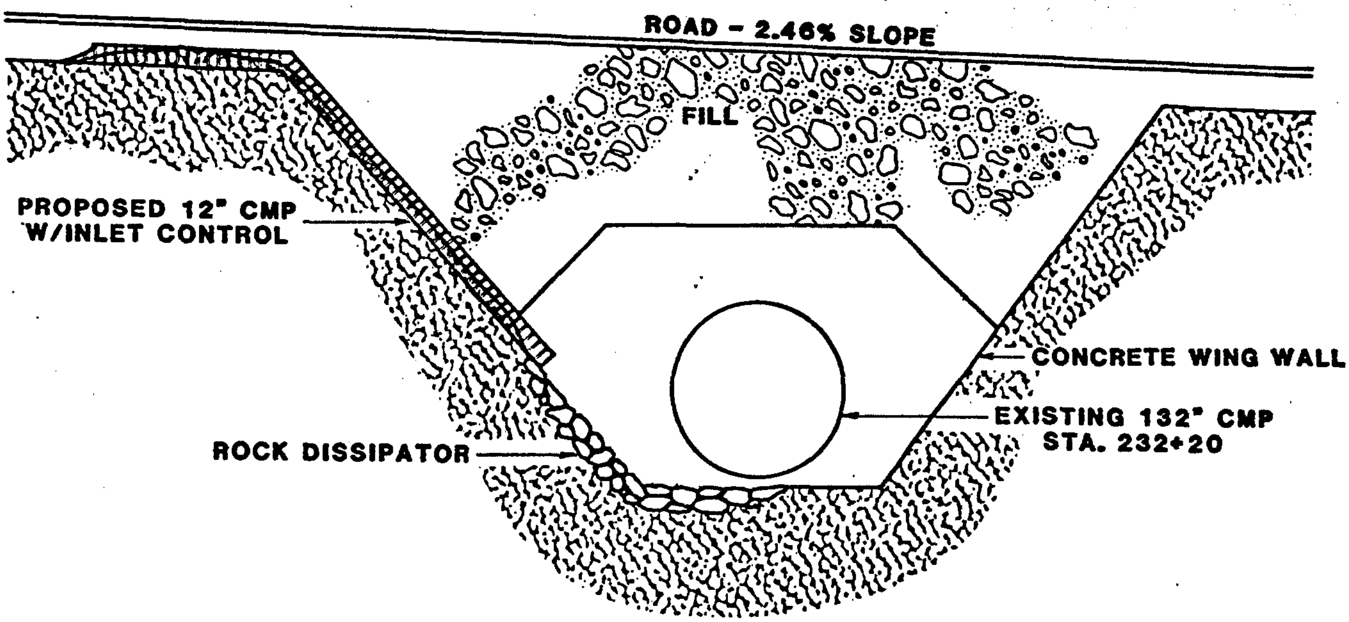
MONSEN ENGINEERING CO. 83541



DES BEE DOVE COAL MINE EMERY COUNTY, UTAH TYPICAL PROFILE VIEW 15" CMP AT SITES #3A & #3B	
UTAH POWER & LIGHT COMPANY Department of Mining & Exploration	
DATE: 19 DEC 1984	BY: A.W.BROW
SCALE: NONE	FIGURE 2

SOLUTION: At the top of the fill slope approximate station 230+70, install proposed 12" CMP with inlet structure placed in the fill slope for stability. This 12" CMP will outlet into a rock dissipator. See Figure 3 and Dwg. CM-10584-DS, Sheets 11 and 19 (Map Packet 5-1).

MONSEN ENGINEERING CO. 83541



DES BEE DOVE COAL MINE EMERY COUNTY, UTAH TYPICAL PROFILE VIEW 12" CMP AT SITE #4	
UTAH POWER & LIGHT COMPANY Department of Mining & Exploration	
DATE: 19 DEC 1984	BY: A.W.BROW
SCALE: NONE	FIGURE 3

METHODOLOGY

From U.D.O.T. Instruction Manual

Part 4

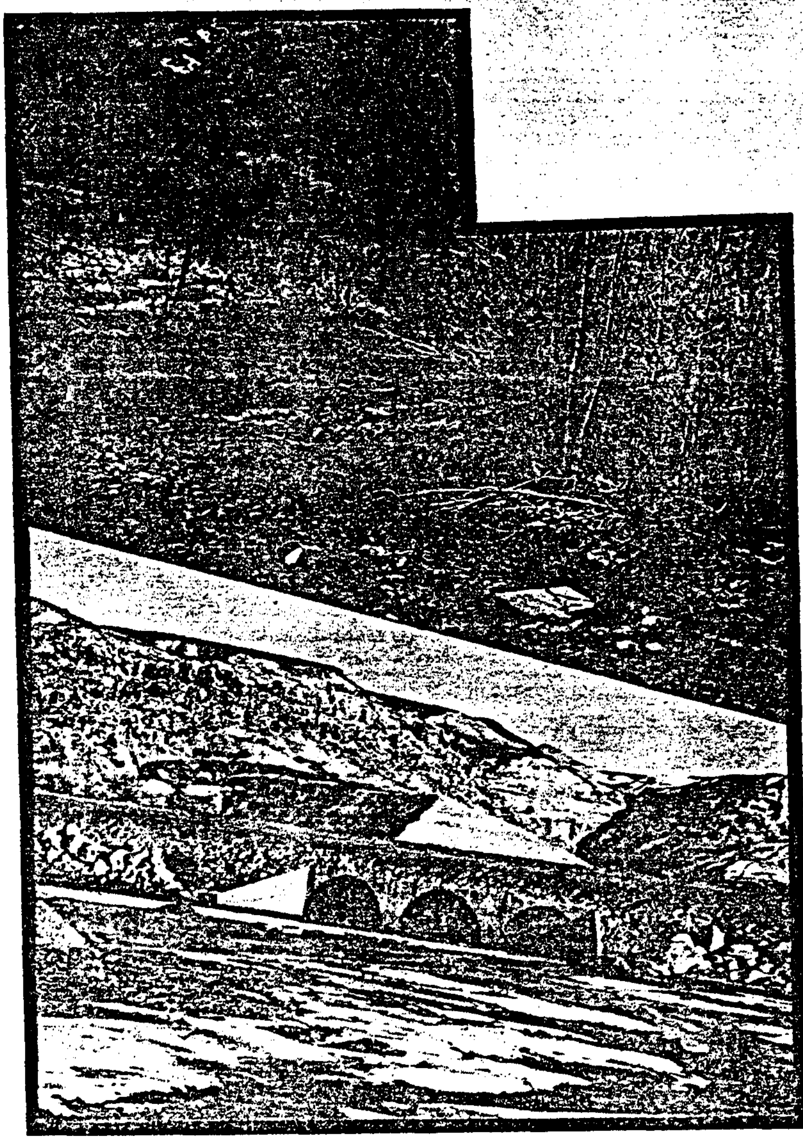
Roadway Drainage

UTAH
DEPARTMENT OF TRANSPORTATION

MANUAL
OF
INSTRUCTION

PART 4
ROADWAY DRAINAGE

chapter 2



culverts

DRAINAGE, IRRIGATION, AND SEWER FACILITIES (4-600)

4-605 CULVERTS

Culverts must be properly designed in order to efficiently and economically convey a design discharge under a roadway. The design of culverts can be divided into two phases:

1. Hydrologic design
2. Hydraulic design

4.605.10 HYDROLOGIC DESIGN OF CULVERTS

Under hydrologic design the site characteristics (slope, shape, vegetation, etc. of the drainage area) are analyzed and hydrologic analysis is performed. This includes the estimation of flood that will occur at the culvert crossings. There are several methods available for computing the peak discharge.

The small area method for drainage areas of less than about two square miles, and the large area method (index method) developed by the United States Geological Survey for areas larger than two square miles are explained in detail with examples. Other methods are explained briefly with reference to the sources for details. The following sections explain the means of making the estimation of floods for both small and large drainage areas.

1. RAINFALL INTENSITY

In order to design successfully a project to take care of drainage problems, the hydraulics engineer must have some information concerning the hydrological characteristics of the area of the project. In many instances he must know the rainfall intensity for the region under study.

The Weather Bureau has prepared a report for estimating rainfall intensities for local drainage design in Utah (REF 5). This report, consisting of a group of rainfall maps and various charts, furnishes a means of finding rainfall intensities for durations of twenty minutes to twenty-four hours. The frequencies of storms range from one year to one hundred years. Furthermore, the information in this report can be used to plot a rainfall intensity-duration frequency curves for storm sewer design. The method of plotting this curve is explained in Chapter 5 (see Index No. 4-625).

Regarding the rainfall intensity, the most useful information to this department is the one-hour duration storm, since it is used in the small area method of flood determination. Since this data is the most frequently employed of rainfall information, the two charts necessary to find it are included in this manual on Pages 2-02 and 2-03. (These charts are those developed by the Weather Bureau.) The following example demonstrates the procedure of determining rainfall intensity.

(Example)

GIVEN: A region near Price.

FIND: The 10-year one-hour rainfall intensity.

SOLUTION:

1. Enter Chart 2-02 and find $i_2 = 0.47$ in./hr.
2. Enter Chart 2-02 and find $i_{100}/i_2 = 2.5$.
3. Calculated $i_{100} = 1.2$ in./hr.
4. Enter Chart 2-03 using a straight-edge from i_2 to i_{100} and find $i_{10} = 0.75$ in./hr.

Chart 2-02: ISOPLUVIALS AND ISOPLETHS FOR UTAH REGIONS

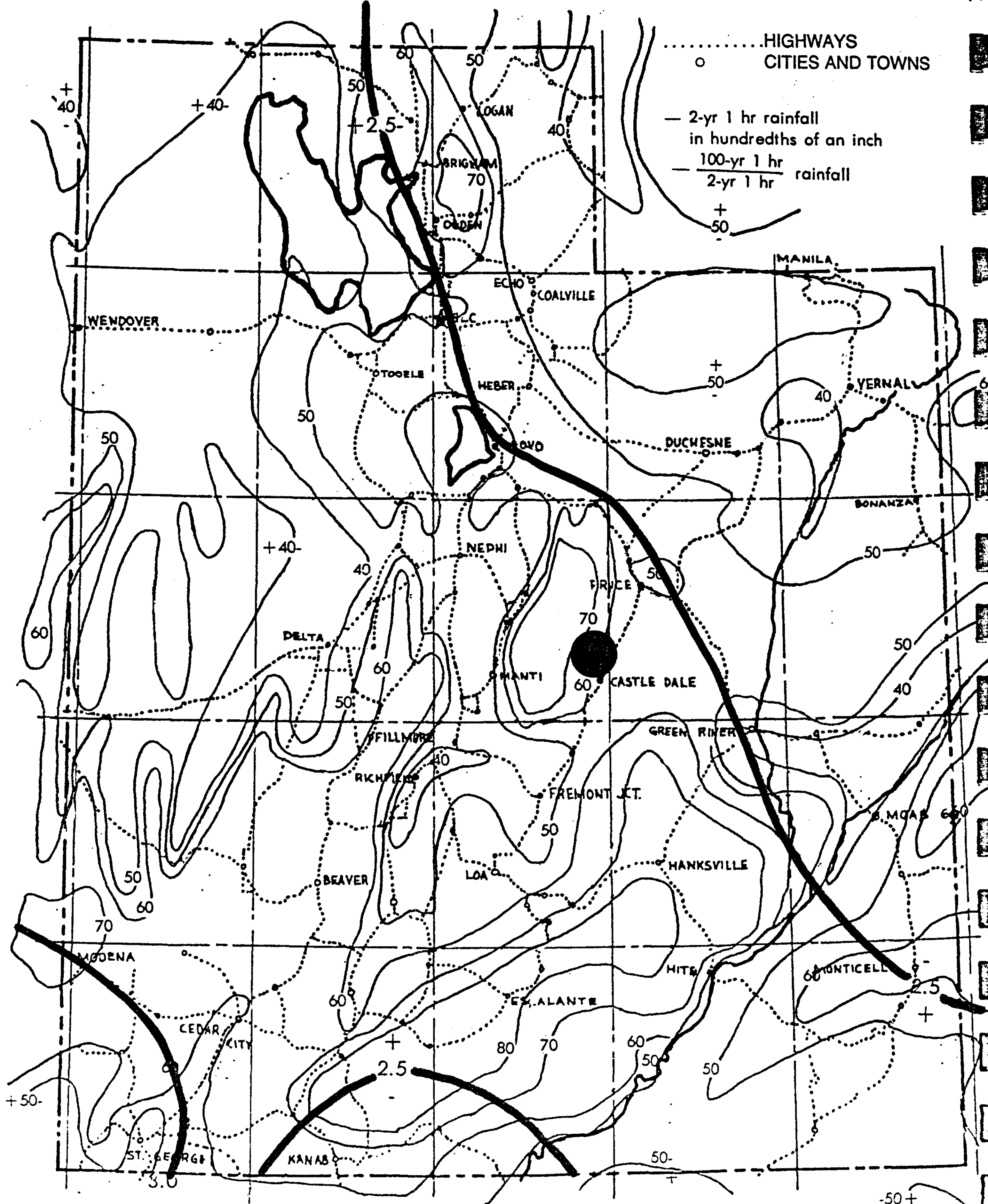
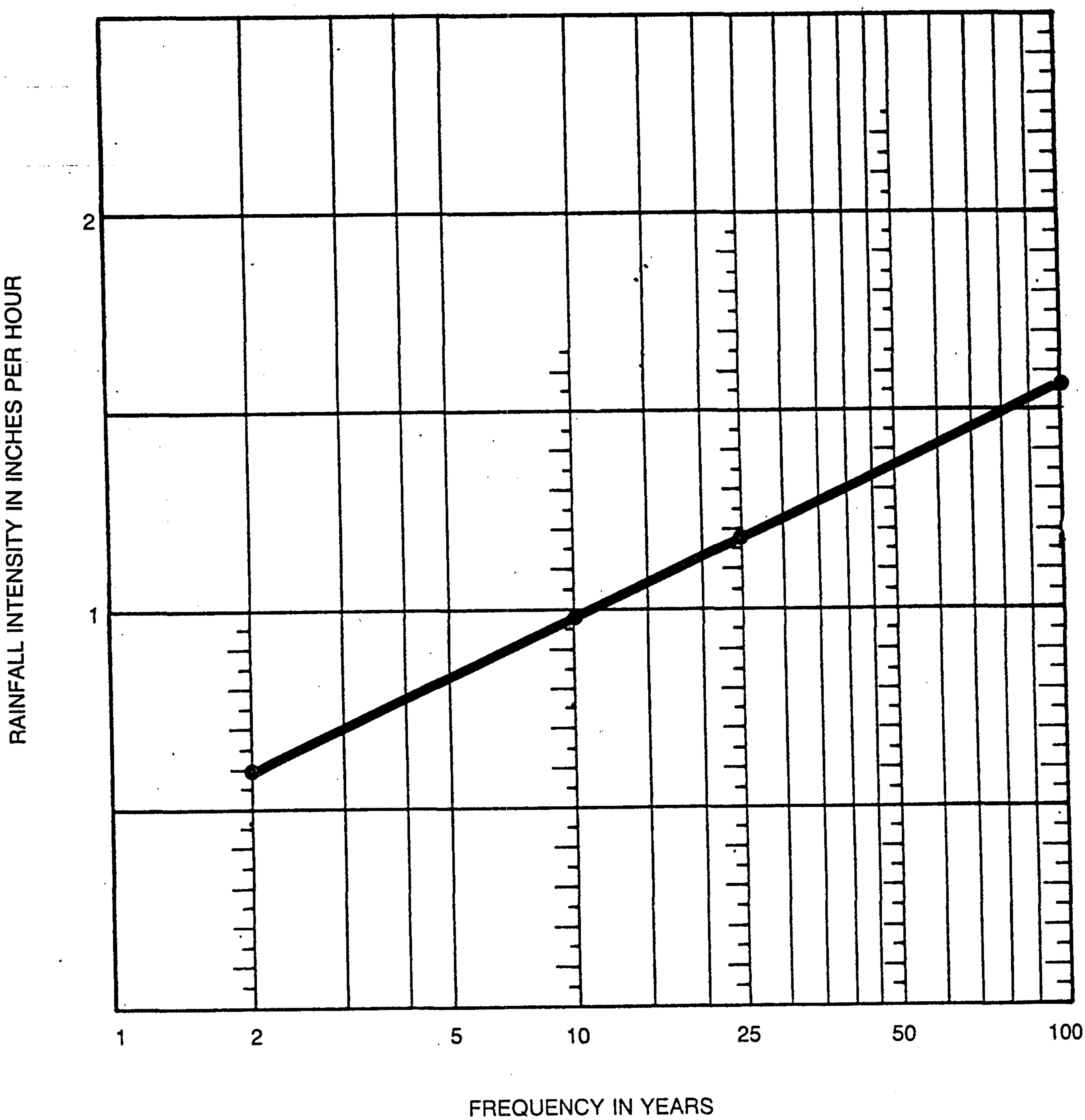


Chart 2-03: RAINFALL INTENSITY VS. RETURN PERIOD

60 min



2. SMALL AREA RUNOFF

The small area method is effectively used for drainage areas of less than about two square miles and loses reliability for those larger than this. Discharges for areas larger than five square miles are not justifiable by this method. The following equation gives the relation used:

$$Q_f = Q_c \times LF \times FF$$

where Q_f = design discharge in c.f.s.,
Q_c = discharge taken from the chart,
LF = the land factor determined as explained below,
FF = the frequency factor determined as explained below.

First the 25-year rainfall intensity is determined as outlined in the preceding article. After investigating the topography of the area, Table 2-05 is used to find the K-factor corresponding to the intensity. Chart 2-06 or 2-07, at the intersection of the drainage area and the line of the chosen K-factor, gives Q_c. Next, Table 2-08 can be used to estimate a land factor. Finally, the rainfall intensity is found for design frequency, and divided by the 25-year intensity as determined above. FF = i_d/i_{25} is the required frequency factor. The example below illustrates the procedure.

(Example)

GIVEN: Drainage area = 1000 acres of sandy shale near Escalante.

FIND: The design discharge for a 10-year secondary project through a very mountainous region.

SOLUTION:
1. From Chart 2-02, i_2 = 0.8 in./hr; i_{100}/i_2 = 2.7,
2. Calculate i_{100} = 2.16 in./hr,
3. Enter Chart 2-03: i_{25} = 1.63 in./hr; i_{10} = 1.35,
4. Enter Table 2-05 and find K = 0.42,
5. Enter Chart 2-07 and find Q_c = 680 c.f.s.,
6. Enter Table 2-08 and estimate LF = 2.0,
7. Calculate FF = 1.35/1.63 = 0.83,
8. Calculate Q_{10} = (680)(2.0)(0.83) = 1129 c.f.s.

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

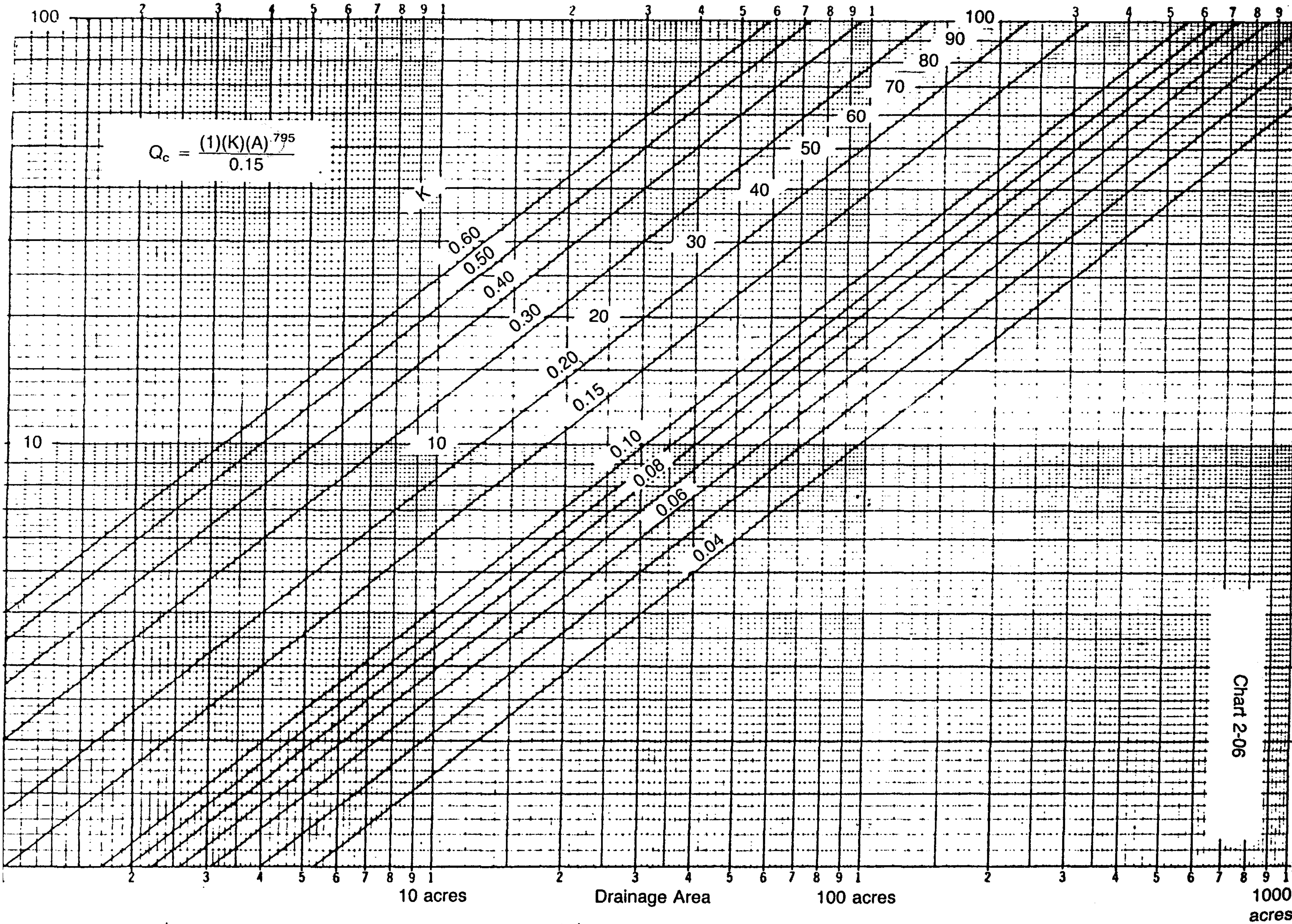
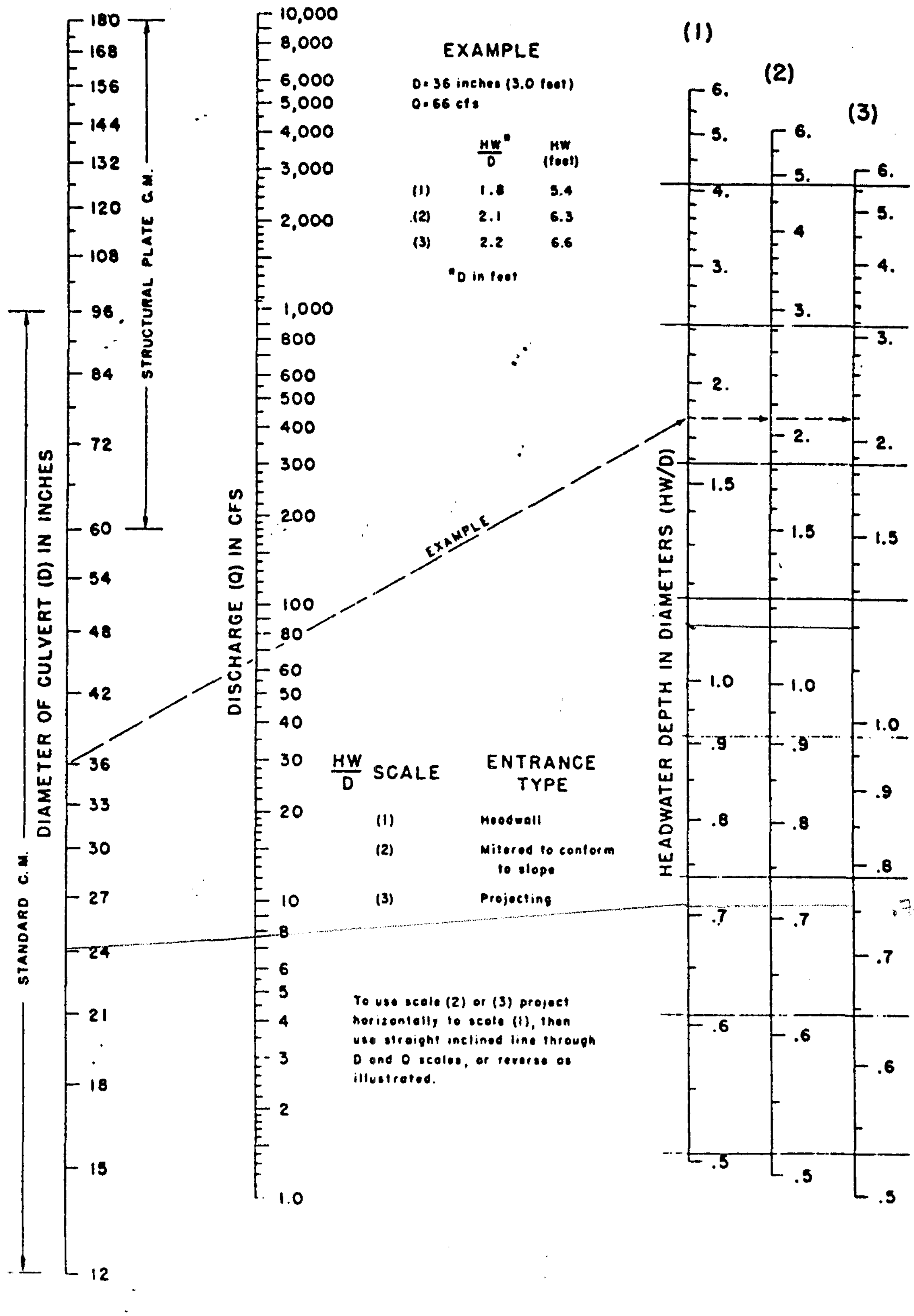

$Q_c = \frac{(1)(K)(A)^{.795}}{0.15}$
K
0.60
0.50
0.40
0.30
0.20
0.15
0.10
0.08
0.06
0.04
100
90
80
70
60
50
40
30
20
10
10 acres
Drainage Area
100 acres
1000 acres

Chart 2-06

Table 2-08: LAND FACTORS FOR SMALL WATERSHEDS

TYPICAL GEOGRAPHIC LOCATIONS	TYPICAL TERRAIN CHARACTERISTICS	LAND FACTORS
	ALLUVIAM	
Farmington Salt Lake Bench Lands	(CLEAN) Fans from granitic uplifts Spits, bars, glacial till, etc.	0.3 → 0.8
Sevier Valley Echo Canyon Salt Lake Valley	(DIRTY) Fans and sediment plains from shale areas, etc. Conglomerate Lake deposits — flood plain areas	1.0 → 1.5
	IGNEOUS	
N.W. of St. George Fish Lake area Marysville Canyon	(RIOLITIC — POROUS) Cinder areas (Small areas) Basalt and lava flows Riolitic flows	0.5 → 1.5
Bald Mountain — Uintahs Farmington Canyon Little Cottonwood Canyon Salt Lake City	(SHISTOS OR GRANITIC) 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 2-48: HEADWATER DEPTH FOR C.M.P. CULVERTS WITH INLET CONTROL



BUREAU OF PUBLIC ROADS JAN 1963