0047

Document Information Form

Mine Number: C/007/006

File Name: Incoming

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Date Sent: JUNE 13, 1983

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RECEIVED
JUN 13 1993
DIVISION OF
OIL, GAS & MINING

CORNER CANYON MINE FAN
UC-478-102
Getty Oil Company

Hydrology, Basis for Design

I. RUNOFF

A. Method - USDA Soil Conservation Service methods found in Technical Publication TP-149 were used to calculate runoff for the fan site. This method is applicable for areas less than 2000 acres. A Type II storm distribution was used.

B. Data - Runoff Curve Number, RCN, of 65.5 was used. This is based on woods in good condition with 70% of the drainage area in hydrologic group C and 30% in hydrologic group B, with an average anticedent moisture condition (AMC II).

Rainfall Frequency, 2.3 inches for a 10 year 24 hour storm from the NOAA ATLAS VOLUME VI - UTAH was used.

II. SEDIMENT VOLUME

The sediment trap was sized for 1½ years sediment storage based on 0.1 acre/foot of storage per acre - foot of disturbed area for three years of storage. This method is considered more conservative than the three-year sediment yield derived from the Universal Soils Loss Equation. Due to the small site area, no sediment is considered as being deposited prior to reaching the sediment trap. The sediment trap is not intended to store water above the sediment level. Runoff from storms exceeding 10 year, 24 hour events is expected to pass directly through the trap. The outlet will be a rock wier.

III. DITCHES

Ditches were sized using the manning equation. Ditches will be V-ditches with a minimum depth of one foot. This size ditch will safely pass the peak flow from a 10 year - 24 hour rainfall event in the largest drainage basin. Mannings numbers of 0.03 for soil and grass lined ditches and 0.04 for riprap lined ditches were used. All ditches where the velocity is expected to exceed that permissible of earth ditches will be lined with riprap.

CULVERTS

Culverts were sized assuming inlet control with a headwater depth ratio of 1.0 or as indicated. Figure 4-18 from the American Iron and Steel Institute (AISI) Handbook of Highway Drainage Products was used.

Ford, Bacon & Davis Utah Inc. ENGINEERS-CONSTRUCTORS SALT LAKE CITY, UTAH	SITE PREPARATION & DRAINAGE STANDARD FORM RUNOFF & SEDIMENT CALCULATIONS	4-SF-06
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		9/80
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DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY OIL COMPANY JOB NO. UC-478

LORNER CANYON FAN POND NO. —

BY Glenn DATE MARCH 83 CHECKED BY DMW DATE 3/25/83

REVISED 6-6-83

1. SEDIMENT VOLUME

CONTRIBUTING DRAINAGE AREA, ACRES _____

DISTURBED AREA IN CONTRIBUTING AREA, ACRES 0.30 (INCLUDES BUILDINGS WHICH HAVE NO SEDIMENT YIELD)

A. Sediment Volume = .1 acre ft. of sediment per acre of disturbed area.
= .1 acre-ft./acre X 0.30 acre
= 0.03 acre-ft. = 1300 CF ±

B. Sediment Volume = 3 years sediment from entire watershed as determined by the Universal Soil Loss Equation (USLE) USLE : A=RKLSCP

Where: A = Average annual soil loss in tons/acre.
R = Rainfall factor
K = Soil erodibility factor
LS = Slope length and slope gradient factor
C = Cover factor
P = Erosion control practice factor

Watershed must be divided into sub areas if different factors occur for different areas within the watershed.

SUB-AREA I.D. NO.	SUB AREA DISCRIPTION	AREA Ar	R	K	LS	C	P	A	TONS A X Ar
TOTAL AREA			TOTAL TONS PER YEAR						

NOT USED IN SECTION (AMOUNT PROVIDED 1-A IS LARGER THAN THAT DERIVED BY THIS PART)

SEDIMENT VOLUME (ACRE FEET) = $\left(\dfrac{\text{TONS/YEAR} \times 2000 \text{ lb/TON} \times 3 \text{ YEARS}}{\_\_\_\_ \text{ lbs/ft.}^3 \times 43560 \text{ ft}^2/\text{ACRE}}\right)$ = _____

(Settled Density = _____ lb/ft^3)

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DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY JOB NO. UC-478

CORNER CANYON POND NO. _____

BY Glenn DATE _____ CHECKED BY _____ DATE _____

REVISED 6-6-83

2. **SETTLING VOLUME** (For 24-hour detention time)

Settling volume = volume of runoff from 10-year, 24-hour rainfall

10 year, 24-hour rainfall, inches 2.3

DETERMINATION OF WEIGHTED RUNOFF CURVE NUMBER FOR CONTRIBUTING WATERSHED

SOIL TYPE	HYDROLOGIC (ASSUMED) GROUP	RCN (AMC II)	ACRES	RCN X ACRES
UNDISTURBED	70% C 30% B	65.5	.10	6.55
DISTURBED PAD	do	85.5	.265	22.66
BUILDINGS	~	98	.035	3.43
		TOTALS	.40	32.6
WEIGHTED RCN, AMC II = (TOTAL RCN X ACRES)/TOTAL ACRES				81.5

030

RUNOFF, INCHES 0.75" (SCS-TP-149 p.5)

RUNOFF, ACRE-FEET 0.025 Ac Ft (Contributing drainage area, acres X runoff, inches/12) OR 1090 CF ±

ADDITIONAL RUNOFF VOLUME CALCULATIONS

FREQ. 24HR STM	RAINFALL INCHES	RUNOFF INCHES	RUNOFF AC. FT.

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DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY OIL COMPANY JOB NO. UC-478

CORNER CANYON POND NO. _____

BY Glenn DATE MARCH 1983 CHECKED BY _____ DATE _____

REVISED 6-6-83

3. TOTAL REQUIRED STORAGE VOLUME

Total required storage volume = ~~Sediment volume~~ + ~~Settling volume~~ = 1650 ~~AC-FT.~~ CF

USE 1½ YEARS STOR. 1000CF±

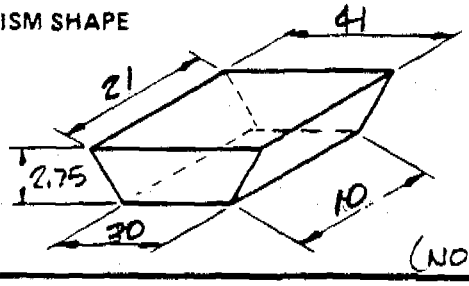
4. POND DESIGN VOLUME

STATE WILL ACCEPT MIN. STORAGE VOLUME OF 1450 CF

NOTE VOLUME REQ'D IF IRREGULAR SHAPE DEDUCT BLDGS = 570 + 1000± = 1570 ≅ 1530 Provided

ELEV. FT.	AREA SQ. FT.	AREA AC.	AVG. AREA AC.	INTERVAL FT.	STORAGE AC. FT.	ACC. STORAGE AC. FT.

PRISM SHAPE



$V = \frac{1}{3} D \left(A_T + A_B + \sqrt{A_T \times A_B} \right)$

WHERE:

A_T = TOP AREA = 861

A_B = BOTTOM AREA 300

D = DEPTH = 2.75'

(NOTE: 2.75' DEPTH IS BELOW THE OUTLET LEVEL)

V 1530 CF ✓ OK ~~ACRE FT.~~

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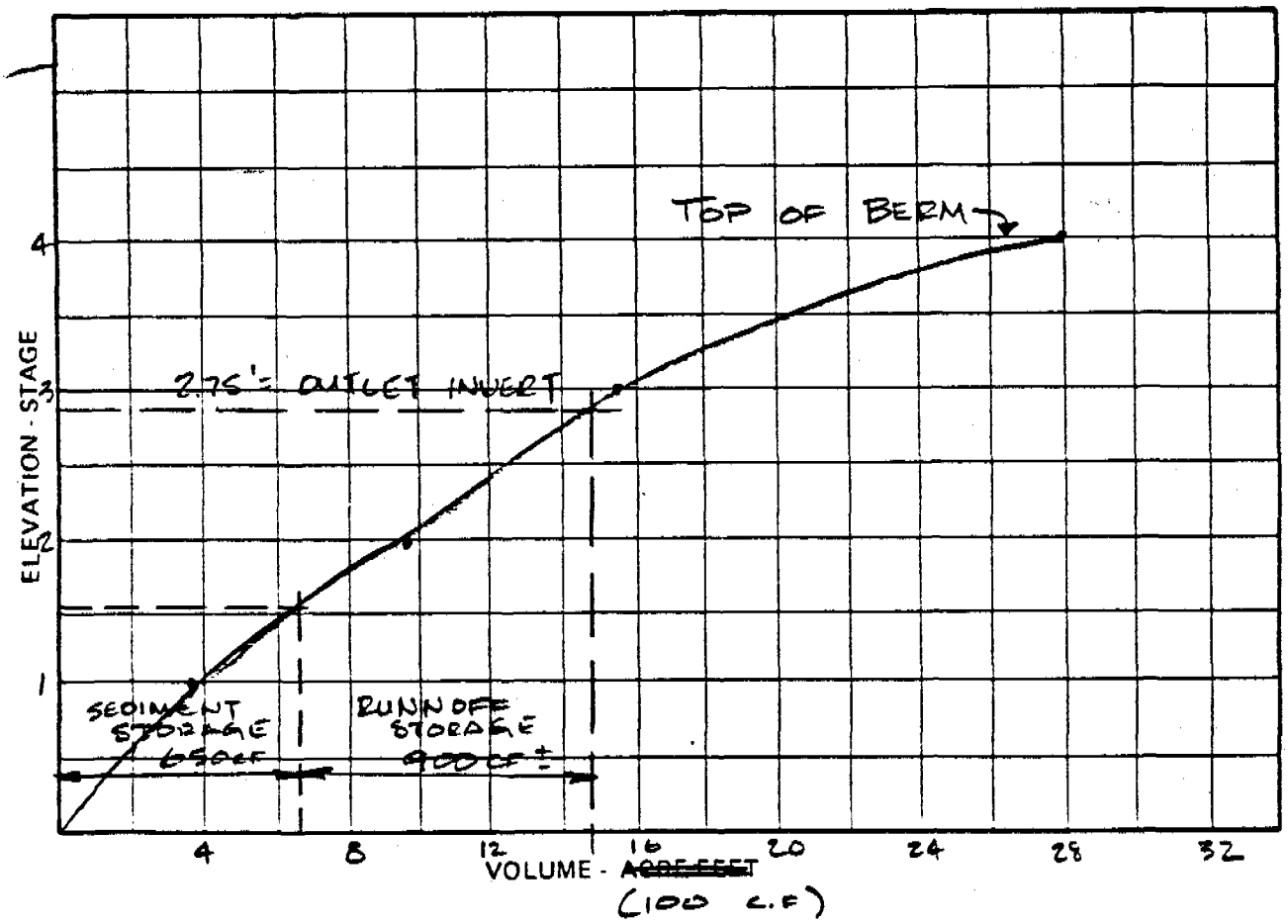
DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY OIL JOB NO. UC-478

CORNER CANYON POND NO. SED. TRAP

BY Glenn DATE 6-6-83 CHECKED BY _____ DATE _____

5. POND STAGE - VOLUME CURVE



CLEAN-OUT ONCE/YEAR @ 60% SEDIMENT CAPACITY OR STAGE = 1'-0"

DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY OIL CO. JOB NO. UC-478
CORNER CANYON POND NO. 1

BY Glenn DATE MARCH 83 CHECKED BY _____ DATE _____

MAIN INTERCEPTOR DITCH

6. Peak Rate of Discharge - Used to Design Emergency Spillway, Road Culverts and Interceptor Ditches

Drainage Area = 15.5 Acres *

Hydraulic Length = 1600 Feet

Equivalent Drainage Area = 30 Acres (Fig. 7 ; TP-149)

Average Watershed Slope = 56.5 %

Weighted Watershed Runoff Curve Number = 65.5 { ASSUME WOODS IN GOOD CONDITION, 70% HYD. GROUP C 30% HYD GROUP B.

A. Peak Rate of Discharge From Charts ES-1026, ES-1027, TP-149

Rainfall Frequency = 10 Years Rainfall Depth = 2.3 Inches

Q_1(For 65 RCN_1) = Q(ES 102 for STEEP slopes) x Slope Correction Factor (Ex. 2-0)

= 2.7 x 1.24 = 3.35 cfs

Q_2(For 70 RCN_2) = 8.2 x 1.24 = 10.17 cfs

Equivalent Discharge = 4.03 cfs (Interpolate Between Q_1 and Q_2)

$$\text{Actual Peak Discharge} = \text{Equivalent Discharge} \times \frac{\text{Actual Drainage Area}}{\text{Equivalent Drainage Area}}$$

$$\text{Actual Peak Discharge } 4.03 \times \left(\frac{15.5}{30}\right) = 2.08 \text{ cfs}$$

Note: Q_1 and Q_2 above refer to runoff resulting from RCN's to nearest 5 (60, 65, 70, etc.) If computed RCN ends in 0 or 5 (60, 65, 70, etc.), Q_2 and the next line will not be needed. In this case, Q_1 runoff will be the equivalent Discharge. Refer to SCS-TP-149 and Engineering Field Manual, Chapter 2.

Type I Storm distribution ES-1026: Hawaii, Alaska coastal side of Sierra Nevada and Cascade Mountains in California, Oregon and Washington.
Type II Storm distribution ES-1027: rest of United States, Puerto Rico, and the Virgin Islands.

* ASSUMES TOTAL AREA DRAINS INTO ONE DITCH. THIS IS CONSERVATIVE SINCE SOME OF THE DRAINAGE IS DIVERTED TO OTHER DITCHES.

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DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY OIL CO JOB NO. UC-478

CORNER CANYON POND NO.

BY Glenn DATE MARCH 83 CHECKED BY DATE

B. Table for Additional Peak Rate of Discharge Calculations

FREQ. YRS	DEPTH INS.	RCN	DRAIN AREA	HYDR L	EQUIV. AREA	AVE. SLOPE	SLOPE CORR.	RCN_1	q_1 CHTS.	Q_1	RCN_2	q_2 CHTS.	Q_2	Q EQUIV.	Q ACT.
10	2.3	80.6	.43	310	1.94	10.7%	.94	80	1.7	1.6	85	2.5	2.35	1.69	0.37 cfs
	NOTE DOGM REQUIRES 2 YR-24 HR STORM AS MIN. EVENT														

MAIN SITE DITCH

Ford, Bacon & Davis Utah Inc. ENGINEERS-CONSTRUCTORS SALT LAKE CITY, UTAH	SITE PREPARATION & DRAINAGE STANDARD FORM RUNOFF & SEDIMENT CALCULATIONS	4-SF-06
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DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY OIL COMPANY JOB NO. UC-478

CORNER CANYON POND NO.

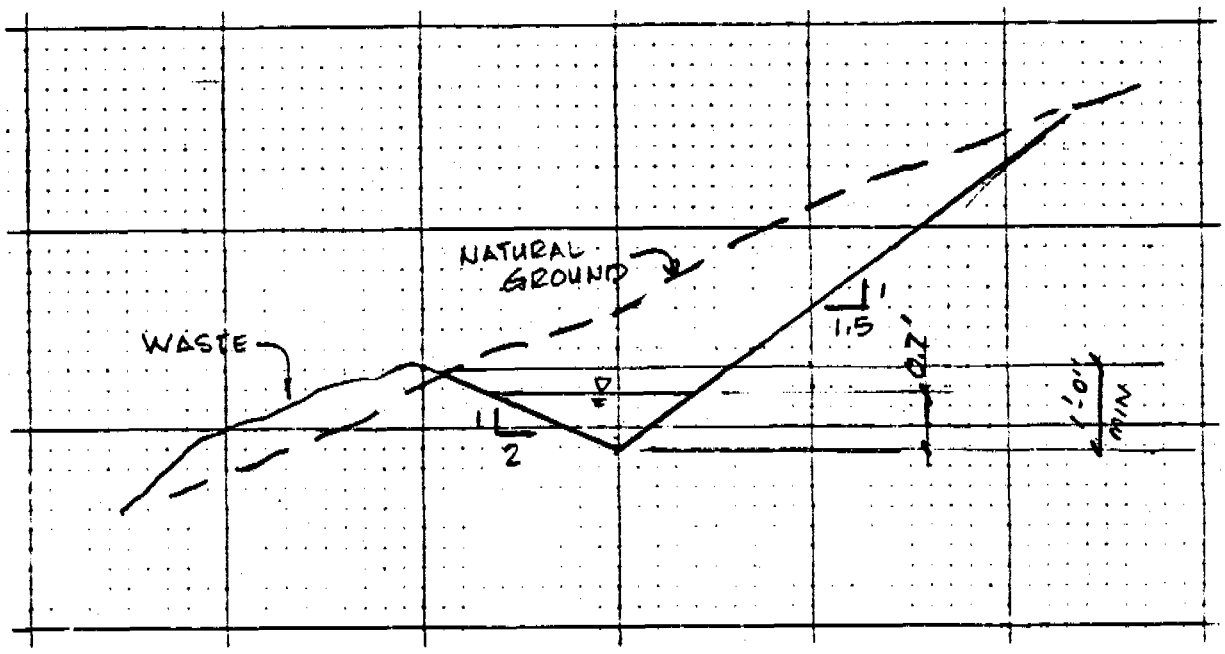
BY Glenn DATE MARCH 83 CHECKED BY DATE

7. Ditch Velocity/Design (MAIN DIVERSION)

A. Ditch Location (See Sht.__ and Dwg. _____)

B. Ditch Characteristics :

1. Manning's No. = .03 (SOIL & GRASS)
2. Slope = .025
3. Ditch cross-section (sketch + dimensions)



C. Design Discharge: 2.87 cfs (See Section 6)

D. Computed Flow Velocity:
(based on Q(cfs) = $\frac{1.49}{n} A R^{2/3} S^{1/2}$)
Depth D .7 ft.
Area A .86 ft.^{2}
Wetted Perimeter W_p 2.83 ft.
Hydraulic Radius R .30 ft.
Slope S .025 ft. per ft.
Flow Q 3.03 cfs > 2.1 ∴ OK
Uniform Flow Velocity = Q/A 3.5 ft./sec. (@ 3.03 CFS ACTUAL V IS LESS)

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DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY OIL JOB NO. UC-478

CORNER CANYON POND NO.

BY GLENN DATE 3-83 CHECKED BY DATE

E. Table for Additional Ditch Calculations

Description	Lining Mat'l.	n	Max. Vel.	Q Req'd	D	A	Wp	R	S	V	Q	
SINCE 1'-0" DITCH IS OK FOR MAX DISCHARE												
USE THIS MINIMUM DITCH THROUGHOUT												
DETERMINE SLOPE @ WHICH RIPRAP IS REQUIRED												
IN MAIN DIVERSION DITCH (i.e. V ≥ 4.0 FPS)												
	Grass	0.03	4 FPS	2.87 cfs	.64	0.72	2.58	.28	3.52%	4 FPS	2.87	OK
		∴ IF S EXCEEDS 3.5% USE										
						6 INCHES RIP RAP						
CHECK 1'-0" DITCH S ≥ .035												
	RIPRAP	.04	12	2.87	.7	.86	2.93	.3	.036	3.13	2.73	< 2.87 NG
	RIPRAP	.04			.71	.88	2.87	.31	.036	3.24	2.85 ≅ 2.87	∴ OK
	Freeboard ≅ 3.5" ≅ 3.6" REQ'D ∴ OK											
USE 1'-0" DITCH THROUGHOUT WITH ALL SLOPES												
EXCEEDING 3.5% BEING RIPRAPED.												

F-0163, R-0,A

DETERMINATION OF SEDIMENT VOLUME, SETTLING VOLUME AND TOTAL STORAGE VOLUME OF SEDIMENTATION PONDS

PROJECT GETTY OIL Co. JOB NO. UC-478
CORNER CANYON POND NO. _____

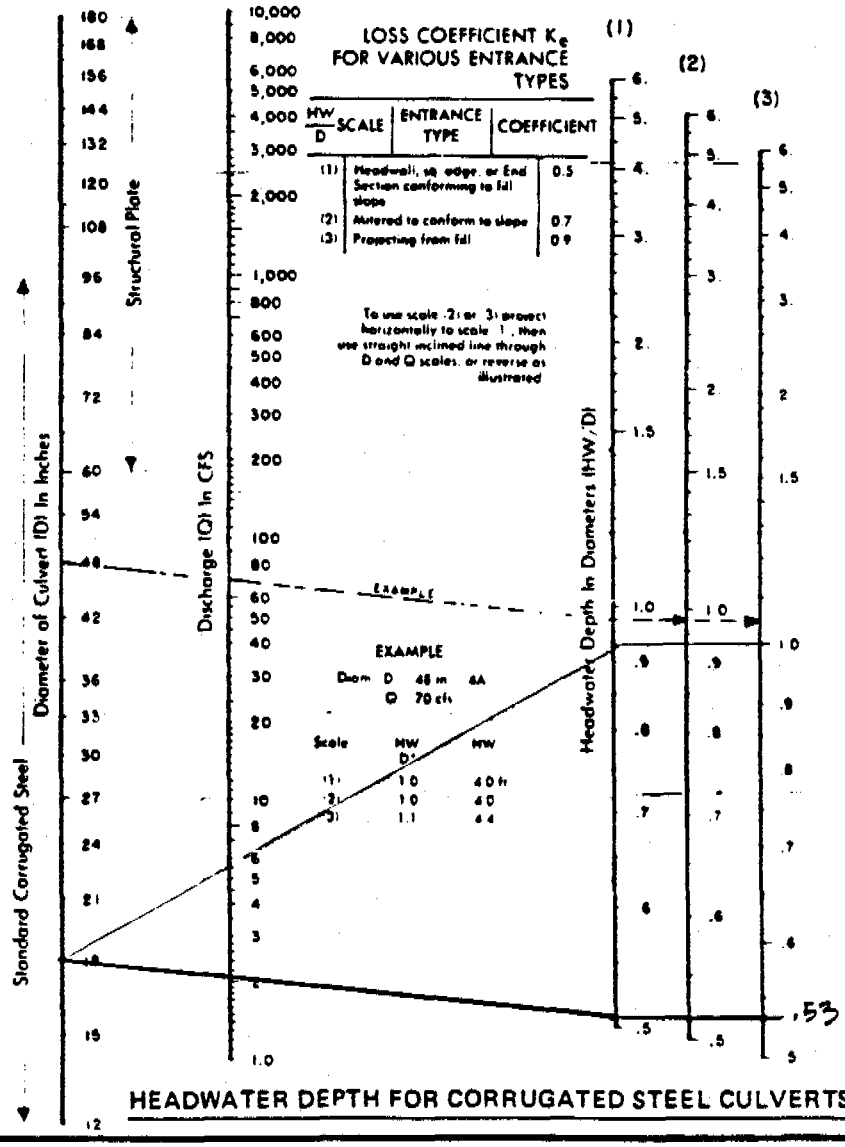
BY glenn DATE MARCH 83 CHECKED BY _____ DATE _____
REVISED - 6-7-83

F. Maximum Allowable Velocity
Ditch Lining SOIL & GRASSES
Max. Allowable Velocity 4 FPS
Max. Velocity: 3.5 ft./sec. (From pages 7 & 8)

G. Is Ditch Design O.K.? YES

H. Culvert Design (Taken From AISI Handbook of Steel Drainage & Highway Construction Products)

Fig. 4-18. *Inlet control* nomograph for corrugated steel *pipe* culverts. The manufacturers recommend keeping *HW/D* to a maximum of 1.5 and preferably to no more than 1.0.

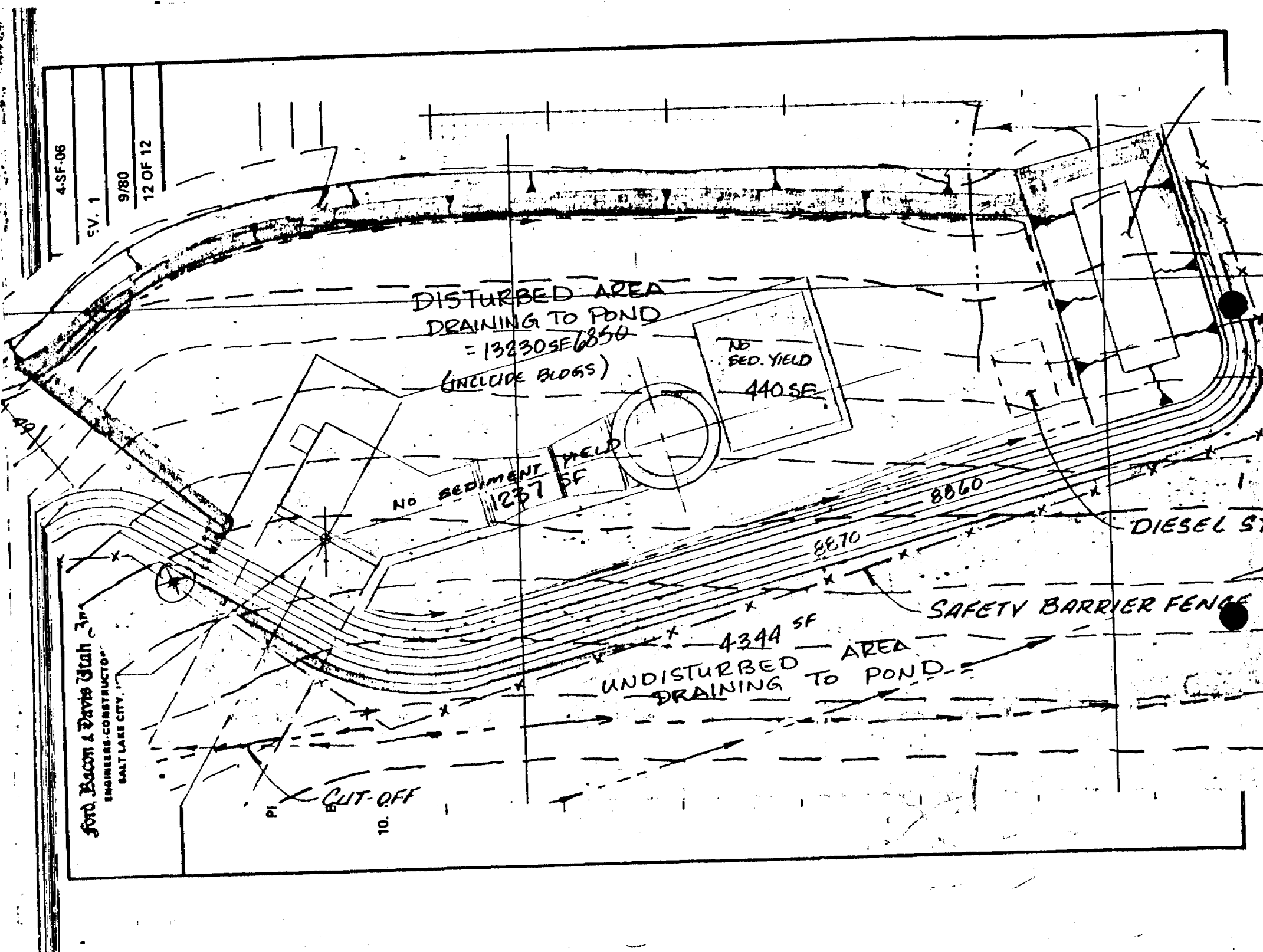


~~Design Discharge: 3 cfs~~
~~Entrance Type: TYPE 3~~
~~HW/D Ratio Used~~
~~Diameter Required 18" in. (min)~~

note: HW/D = 1.0
q_{max} = 5.5 CFS
for 18" ϕ CMP
TYPE 3 ENTRANCE

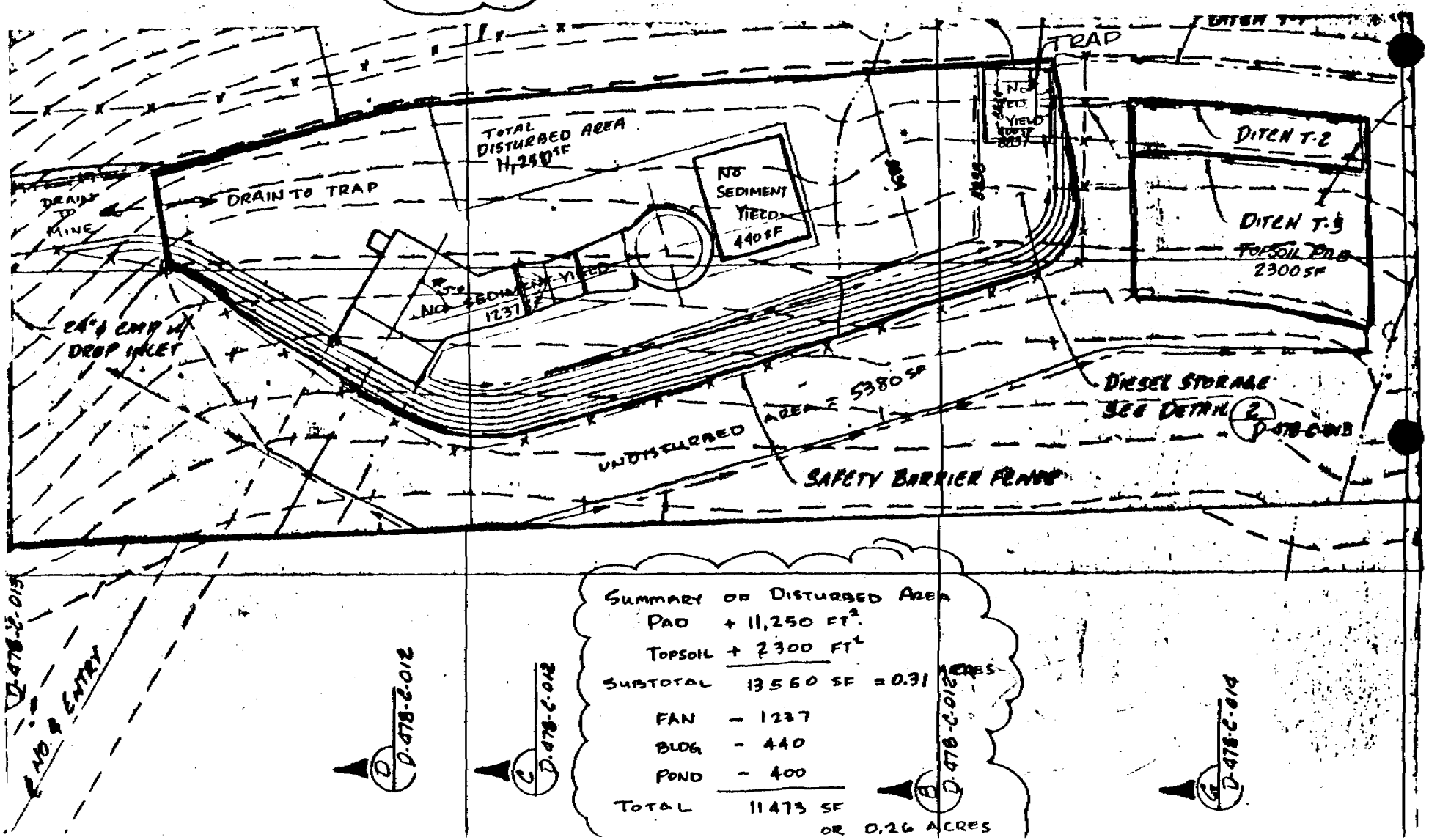
FOR q = 2.08 CFS
HW/D = .53
OR D = 9½"

HEADWATER DEPTH FOR CORRUGATED STEEL CULVERTS WITH INLET CONTROLLING FLOW


4-SF-06
REV. 1
9/80
12 OF 12
DISTURBED AREA
DRAINING TO POND
= 13230SF 6850
(INCLUDE BLDGS)
NO SED. YIELD
440 SF
NO SEDIMENT YIELD
1237 SF
8860
8870
DIESEL ST
SAFETY BARRIER FENCE
4344 SF
UNDISTURBED AREA
DRAINING TO POND
CUT-OFF
PI
BC
10.
Ford, Bacon & Davis Utah Inc
ENGINEERS-CONSTRUCTORS
SALT LAKE CITY, UTAH

CORNER CANYON, MINE FAN
SITE DRAINAGE & SEDIMENT MAP
BY GLENN BARTON 3-83

VOID



SUMMARY OF DISTURBED AREA

PAD	+ 11,250 FT²	
TOPSOIL	+ 2300 FT²	
SUBTOTAL	13560 SF	= 0.31 ACRES
FAN	- 1237	
BLDG	- 440	
POND	- 400	
TOTAL	11473 SF	OR 0.26 ACRES

From: Hydraulic Eng. Circular No 15. US DOT

Figure 3

DRAINAGE CHANNEL LINING DESIGN

DATE: 6-83

PROJECT: CORNER CANYON DESIGNER: Glenn

~~STATION~~ ~~TO STATION~~

DRAINAGE AREA = N/A ACRES

HYDROLOGIC COMPUTATIONS:

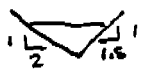
N/A

DESIGN FLOW: Q 10 = 2.08 cfs

DESIGN FLOW FOR TEMPORARY LINING: Q N/A = N/A cfs

SOIL ERODIBILITY: GOOD - NOT EASILY ERODED

CHANNEL DESCRIPTION: MAX. TOP WIDTH = 3.5 ft. (T)



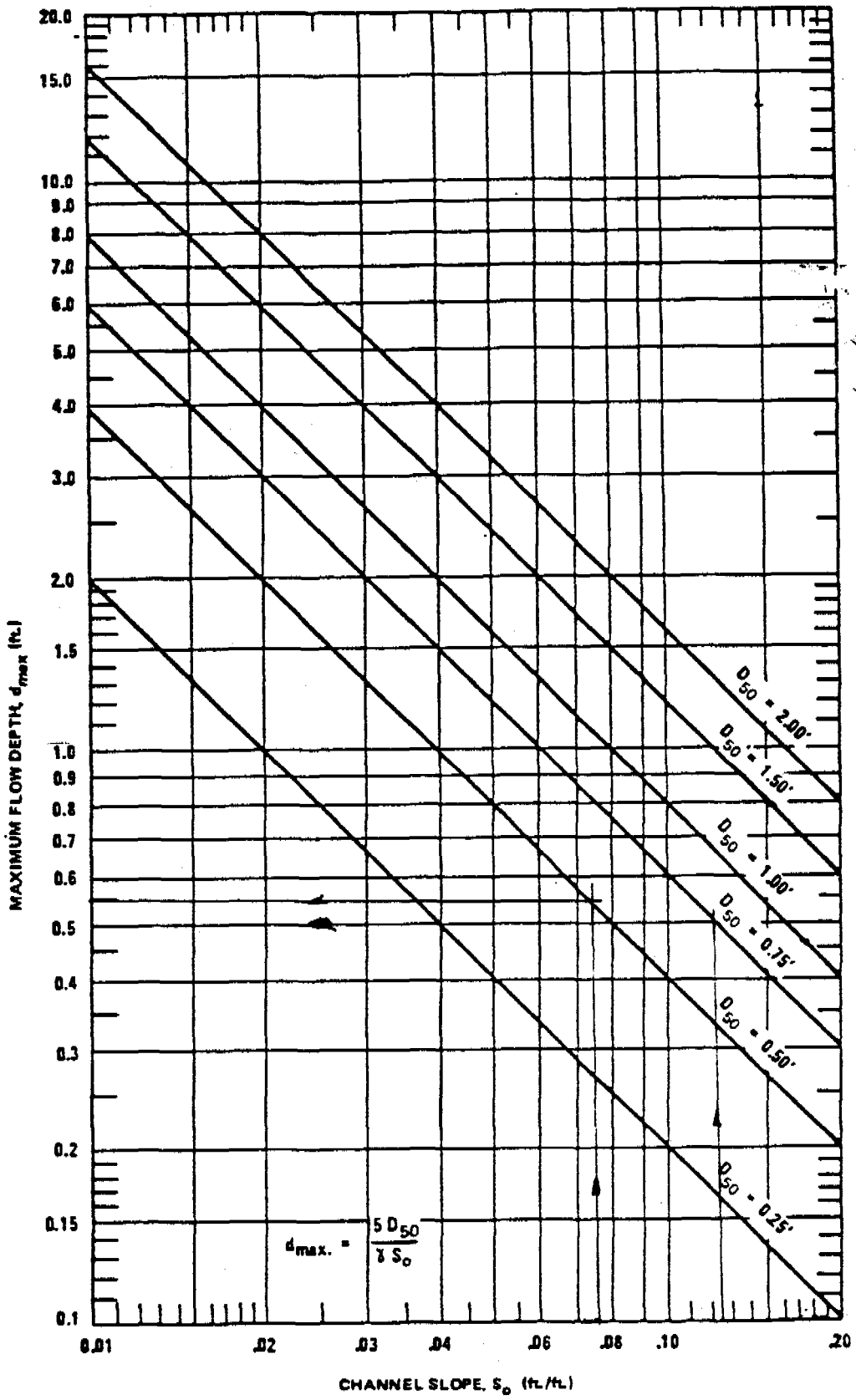
S_o = VARIES - SEE REMARKS

AVAILABLE LININGS:
grass - retardance
rip rap

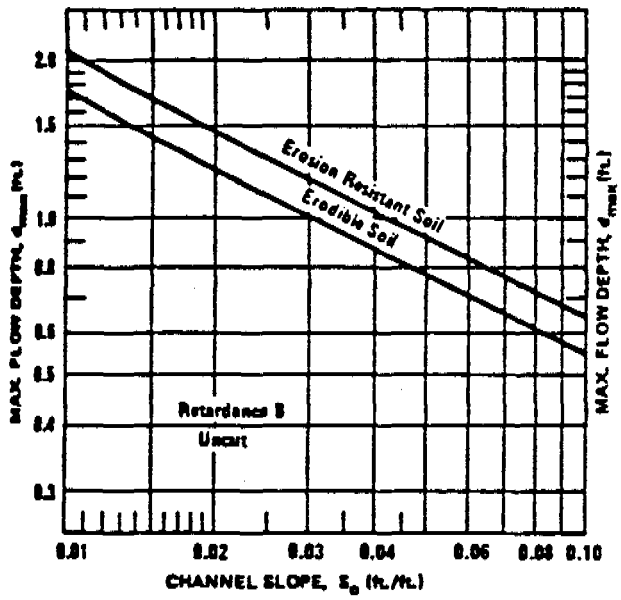
note mannings no. = grass n=.03
6" riprap n=.035
9" riprap n=.038
12" riprap n=.039

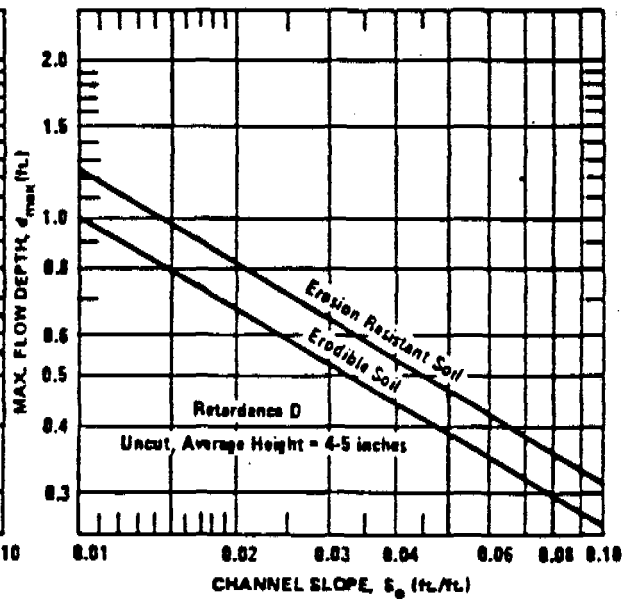
LINING	d_{max}	B	$\frac{d_{max}}{B}$	$\frac{A}{Bd}$	A (ft²)	$\frac{R}{d}$	R	V (fps)	Q=AV (cfs)	T (ft)	REMARKS	
Grass	0.7	—	—	—	.86	.43	.30	4.16	3.58	2.45	SLOPES TO 3.5% OK	OK
6" RIPRAP	0.55	—	—	—	.53	.45	.24	4.53	2.4	1.93	SLOPES TO 7.5%	OK
9" RIPRAP	0.5	—	—	—	.44	.44	.22	5.09	2.24	1.75	SLOPES TO 12.5%	OK
12" RIPRAP	0.48	—	—	—	.40	.43	.21	5.78	2.31	1.68	SLOPES TO 18%	OK

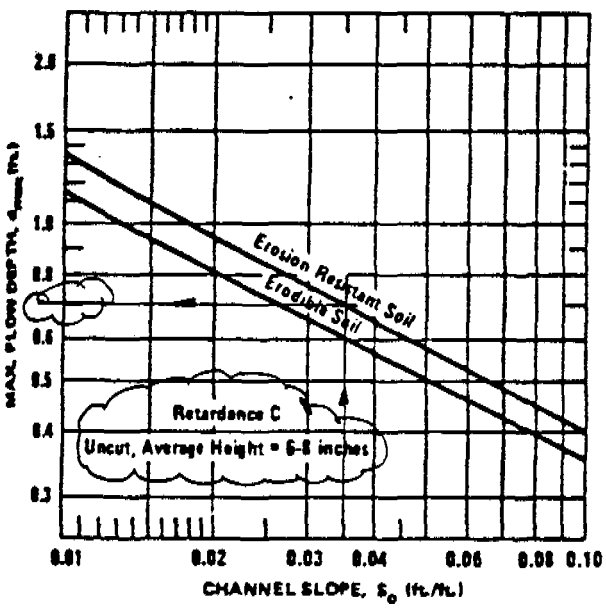
Chart 27



MAXIMUM PERMISSIBLE DEPTH OF FLOW (d_{max})
FOR CHANNELS LINED WITH ROCK RIPRAP



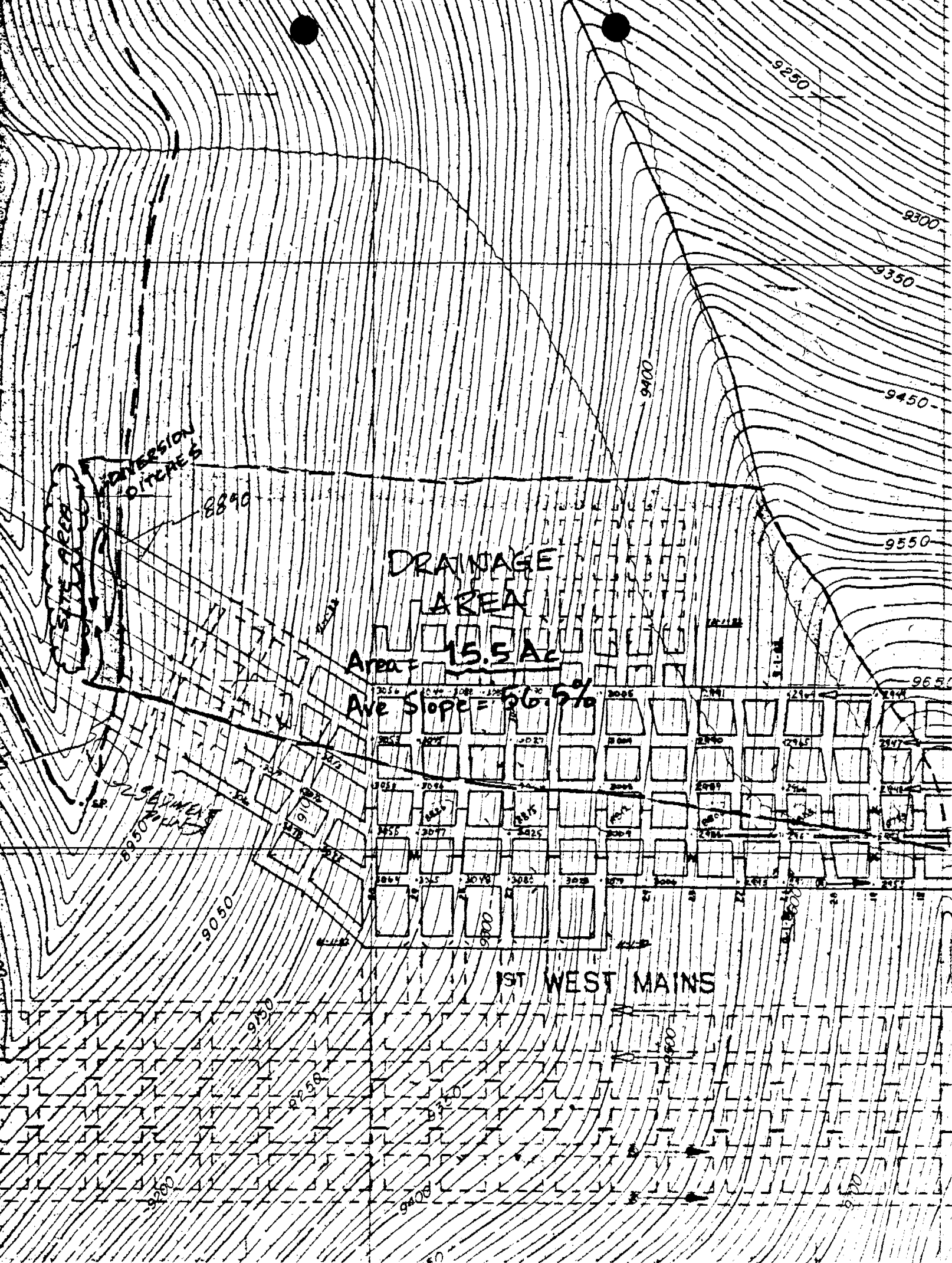




Retardance B: Native Grass Mixture
Little Bluestem, Blue Grama, Other
Long and Short Midwest Grasses.
Retardance C: Grass-Legume Mixture
Summer-Orchard Grass, Redtop,
Italian Ryegrass, Common Lespedeza
Retardance D: Grass-Legume Mixture
Fall, Spring – Orchard Grass, Redtop,
Italian Ryegrass, Common Lespedeza

MAXIMUM PERMISSIBLE DEPTH OF FLOW (d_{max}) FOR CHANNELS LINED WITH GRASS MIXTURES. GOOD STAND,UNCUT

NOTE: USE ON SLOPES STEEPER THAN 10 PERCENT IS NOT RECOMMENDED



DRAINAGE AREA
Area = 15.5 Ac
Ave Slope = 56.5%
DIVERSION DITCHES
SITE AREA
SEDIMENT POND
1ST WEST MAINS
8890
9250
9300
9350
9400
9450
9550
9650
9050
9150
9200