City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 1, 1992

Paul Brasher
Brasher Engineering
11920 Menaul Blvd. NE
Albuquerque, NM 87112

RE: REVISED ENGINEER CERTIFICATION FOR S.O. 19, SIDEWALK CURB AND RAILROAD TIE, EARTH RETAINING STRUCTURE (D19/D1C) REVISION DATED 8/25/92

Dear Mr. Brasher:

Based on the information provided on your August 23, 1992 resubmittal, Engineer Certification for the Final Plat approval on the above referenced site is acceptable.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, C.E.
Engineering Assistant

BJM/ses/WPHYD3563

cc: Alan Martinez
Roger Green
File

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

August 21, 1992

Paul Brasher
Brasher Engineering
11920 Menaul Blvd. NE
Albuquerque, NM 87112

RE: ENGINEER CERTIFICATION FOR S.O. 19 AND INFRASTRUCTURE ITEMS FOR SANTA BARBARA SUBDIVISION (D19/D1C) REVISION DATED 7/29/92 AND 8/14/92 AND 8/21/92

Dear Mr. Brasher:

Based on the information provided on your July 29, 1992, August 14, 1992 and August 21, 1992 submittals listed are some concerns that will need to be addressed prior to final approval:

1. Plan drawing must include Engineer Certification Statement which identifies that the site was built in close compliance to the original approved drainage plan. Must be stamped, signed and dated.

2. As-built information must be provided for the drainage run-down, new 8" inch and 3" inch sidewalk curb and top of railroad retaining wall structure.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, C.E.
Engineering Assistant

BJM/ses/WPHYD3540

cc: Roger Green
File

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 24, 1992

Paul Brasher
Brasher Engineering
11930 Menaul Boulevard, NE
Albuquerque, New Mexico

RE: REVISED DRAINAGE PLAN FOR S.O. #19 @ SANTA BARBARA SUBDIVISION
DRAINAGE CHANNEL (D-19/D1C) REVISION DATED JULY 1, 1992

Dear Mr. Brasher:

Based on the information provided on your resubmittal of July 13, 1992, revisions as indicated are acceptable.

Please be advised that all preliminary inspections must be conducted by Glenn Jurgensen from Storm Drainage Maintenance.

Also, after completion of the proposed alterations to the existing rundown, the following must be submitted prior to final plat approval:

1. Engineer's Certification per the DPM Certification Checklist.

2. Concurrence from Glenn Jurgensen.

If I can be of further assistance, please feel free to call me at 768-2650.

Cordially,

Bernie J. Montoya

Bernie J. Montoya, C.E.
Engineering Assistant

xc: Alan Boyer
Alan Martinez
Glenn Jurgensen

BJM/bjf
(WP+2984)

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 24, 1992

Paul Brasher
Brasher Engineering
11930 Menaul Boulevard, NE
Albuquerque, New Mexico

RE: AS-BUILT INFORMATION FOR S.O. #19 @ SANTA BARBARA SUBDIVISION
DRAINAGE CHANNEL (D-19/D1) ENGINEER'S STAMP DATED JUNE 1, 1992

Dear Mr. Brasher:

I am in receipt of your drainage plan for the referenced site. On your submittal, you indicate that the plan update is for as-built information for the rundown channel sections.

A field investigation was conducted on June 23, 1992 and it was found that what your updated plan indicates as as-built information does not exist out in the field.

I am confused as to what you are requesting. It is my understanding that a new design for the maintenance road crossing was supposed to be submitted for review and approval by myself and Mr. Glenn Jurgensen from Arroyo Maintenance. Once the new design is accepted and constructed, the Engineer's Certification is required prior to final plat approval.

If I can be of further assistance, please feel free to call me at 768-2650.

Cordially,

Bernie J. Montoya

Bernie J. Montoya, C.E.
Engineering Assistant

xc: Alan Boyer

BJM/bjf
(WP+2984)

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 28, 1992

Paul Brasher, P.E.
Brasher Engineering
11930 Menaul Boulevard, NE Suite #111
Albuquerque, New Mexico 87112

RE: S.O. #19 APPROVAL FOR SANTA BARBARA SUBDIVISION DRAINAGE - CHANNEL (D-19/D1) ENGINEER'S STAMP DATED NOVEMBER 5, 1991

Dear Mr. Brasher:

Based on the information provided on your submittal of January 22, 1992, the referenced site is approved for S.O. #19.

Please be advised that prior to Preliminary Plat approval, the hydraulics for the rundown must be submitted with the revised drainage plan (recommend that you check the entrance using the weir equation and then the Mannings Equation for the channel).

Also, a separate permit is required for construction within City right-of-way. A copy of this approval letter must be on hand when applying for the excavation permit. Field inspection will be conducted by Glenn Jurgensen.

If I can be of further assistance, please feel free to call me at 768-2650.

Cordially,

Bernie J. Montoya, C.E.
Engineering Assistant

xc: Alan Martinez
Darlene Saavedra

BJM/bsj
(WP+2984)

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

October 6, 1987

Joe Jones
Fred Denney & Associates, Inc.
2400 Comanche Road, NE
Albuquerque, New Mexico 87107

RE: GRADING & DRAINAGE PLAN FOR TRACT F, SANTA BARBARA SUBDIVISION
RESUBMITTED SEPTEMBER 29, 1987 FOR FINAL PLAT APPROVAL
(D-19/D1C)

Dear Joe:

Your submittal, referred to above, with an engineer's stamp dated September 25, 1987, is approved for final plat sign-off by the Hydrology Section.

If you have any questions, call me at 768-2650.

Cordially,

Stuart Reeder

G. Stuart Reeder, P.E.
C.E./Hydrology Section

GSR/bsj

xc: Owner

DRAINAGE MANAGEMENT PLAN
FOR
SANTA BARBARA SUBDIVISION
SOUTH OF THE DOMINGO BACA

PREPARED FOR

MR. ALLAN BOYAR

MAY, 1987

DTM JOB No. 808.42

PREPARED BY:

DENNEY-TIBLJAS-McLEAN & ASSOCIATES, INC.
CONSULTING ENGINEERS, SURVEYORS, PLANNERS
2400 COMANCHE ROAD NE
ALBUQUERQUE, NM 87107
(505) 884-0696

I, Fred Denney, hereby certify that the enclosed documents and drawings were prepared under my supervision and are true and correct to the best of my knowledge and belief.

New Mexico Registered Professional Engineer and Land Surveyor No. 1967

SEAL

DRAINAGE MANAGEMENT PLAN

SANTA BARBARA SOUTH

I. PURPOSE

The purpose of this report is to determine an economical and effective stormwater management plan for subject project.

II. GENERAL

The proposed development site consists of approximately 32 acres and is located adjacent to the west right-of-way of Wyoming Boulevard, N.E., and adjacent to the south right-of-way of the Domingo Baca Arroyo (see Exhibit I). Presently the site slopes from east to west at approximately 3%, and the site is not located within a floodplain (see Exhibit II). Onsite soils are of the Embudo and Tijeras Series Type "B". Due to the existing topography, no offsite flows cross the site.

III. DRAINAGE

The development site will be graded such that all lots drain to the fronting street (see Exhibit III).

All of the stormwater runoff generated by development will street flow to selected outfall locations and discharge into the Domingo Baca Arroyo. The Domingo Baca Arroyo will be concrete lined as part of the infrastructure improvements required for this subdivision.

The proposed development will be constructed in phases, generally from east to west. It is understood that drainage for each phase must stand alone; therefore, temporary and permanent drainage improvements will be constructed to transport stormwater runoff to the selected outfall locations throughout the phasing process.

DRAINAGE MANAGEMENT PLAN

SANTA BARBARA SOUTH

(CONTINUED)

IV. CONCLUSION

Santa Barbara Subdivision is located adjacent to the south right-of-way of the Domingo Baca Arroyo. Prior to completion of this development, the Domingo Baca Arroyo will be concrete lined from Wyoming Boulevard, N.E., to the northwest corner of Santa Barbara. Stormwater runoff from this development will be directed to selected outfall locations and will free discharge into the Domingo Baca Arroyo. Bank stability analysis of the Domingo Baca is not a part of this report due to the fact that no development will occur adjacent to the bank of the arroyo until the concrete lining is in place.

HYDROGRAPH COMPUTATION WORKSHEET

DATE 5/6/87
COMPUTED BY JJ
CHECK BY

Soil Series Tgb & Emb Type "B"

PROJECT Santa Barbara

LOCATION Phase I

ANALYSIS POINT # Domingo Baca

(DR. AREA) A = 6.4 ACRES

T_c 10 MIN

POINT RAINFALL 2.4 IN. FROM PLATE 22.2 D-1

CN = 75 FROM PLATES 22.2 C-2, 22.2 C-3

RUNOFF VOLUME R = 0.6 IN. FROM PLATE 22.2 C-4

COMPUTED T_p = 10 MIN. $T_p = T_c$
(Rounded to even minute)

$q_p = \frac{45.4A}{T_p}$ = 29.1 CFS./INCH OF RUNOFF

$(R \times q_p) = Q_{peak}$ = 17.5 CFS

$t(COLUMN)=(t/T_p)$ $t=T_p(t/T_p)$

$y = \frac{Q}{Q_{peak}}$ $Q = y(Q_{peak})$

NOTE: 1.9 Acre Park is included in CN Factor

	(t/T_p)	t (min.)	y	Q (cfs)
1	0	0	0	0
2	.1		.03	
3	.2		.10	
4	.3		.190	
5	.4		.310	
6	.5		.470	
7	.6		.660	
8	.7		.820	
9	.8		.930	
10	.9		.990	
11	1.0		1.00	
12	1.1		.990	
13	1.2		.930	
14	1.3		.860	
15	1.4		.780	
16	1.5		.680	
17	1.6		.560	
18	1.7		.460	
19	1.8		.390	
20	1.9		.330	
21	2.0		.280	
22	2.2		.207	
23	2.4		.147	
24	2.6		.107	
25	2.8		.077	
26	3.0		.055	
27	3.2		.040	
28	3.4		.029	
29	3.6		.021	
30	3.8		.015	
31	4.0		.011	
32	4.5		.005	
33	5.0		.000	

PLATE 22.2 F-1

DENNEY - GROSS & ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
2400 COMANCHE ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0695

LOCATION SANTA BARBARA SOUTH

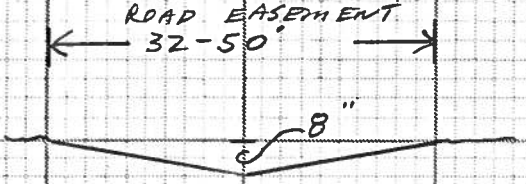
PROJ. NO. 808.42

DATE 5/6/87

DESIGNER J JONES

PAGE 1

EARTHEN SWALE CAPACITY



TEMPORARY SWALE SECTION

MANNING'S AT AP1

$$Q = \frac{1.486}{n} S^{1/2} A R^{2/3}$$

$S = 0.0075$

$n = 0.02$

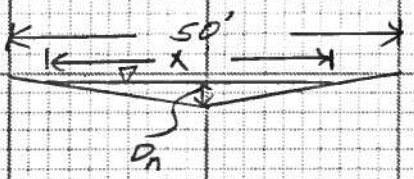
$A = \frac{1}{2}(50 \times .67) = 16.75$

$R = \frac{A}{P} = 0.33$

$$Q = \frac{1.486}{0.02}(0.0075)^{1/2}(16.75)(0.33)^{0.67}$$

$Q_{100} = 51.3$ cfs >> 17.5 cfs (FROM PHASE I)

CHECK NORMAL DEPTH



TRY $D_n = 0.45'$

$\frac{0.67}{50} = \frac{0.45}{X}$ $X = 33.6$

$A = \frac{1}{2}(0.45 \times 33.6) = 7.56$

$R = \frac{A}{P} = 0.22$

$$Q_{100} = \frac{1.486}{0.02}(0.0075)^{1/2}(7.56)(0.22)^{0.67} = 17.6 \text{ cfs}$$

∴ NORMAL DEPTH = 0.45'

$$V_{100} = \frac{Q}{A} = \frac{17.5 \text{ cfs}}{7.56 \text{ ft}^2}$$

$V_{100} = 2.3$ FPS (NO EROSION CONTROL REQUIRED)

TRAPEZOIDAL CHANNEL

Flow Rate	(cfs)	=	1940
Depth	(ft)	=	3.438195
Velocity	(ft/s)	=	33.43426
Mannings n		=	.013
Slope	(ft/ft)	=	.0284
Side Slope	(H:V)	=	2
Bottom Width	(ft)	=	10
Top Width	(ft)	=	23.75278
Area	(ft^2)	=	58.02431
Hydraulic Radius		=	2.286575
Freeboard	(ft)	=	0
Top Width (w/ freebrd)		=	23.75278
Froude Number		=	3.179077

STRIKE ANY KEY TO CONTINUE

DENNEY · GROSS & ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
2400 COMANCHE ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0695

LOCATION SANTA BARBARA
PROJ. NO. 808.42
DATE 9/23/87
DESIGNER J JAVES
PAGE 1

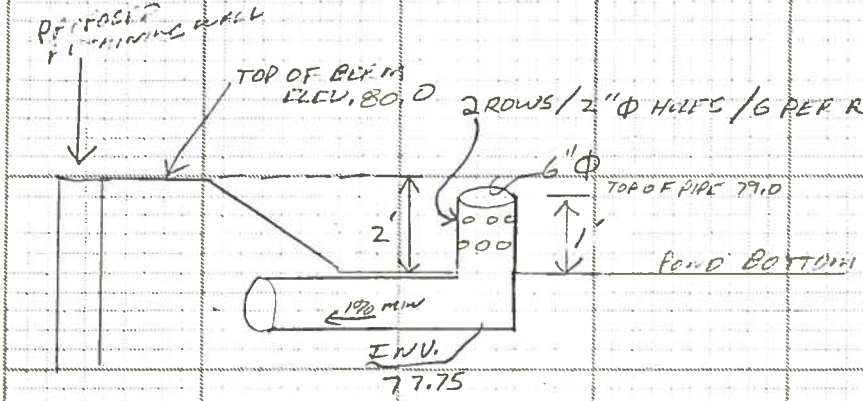
$Q = CiA$

100 YR $Q = 0.6(5.28)1.02 = 3.2$ cfs

$V_{100} = RA = \frac{0.5}{12}(1.02)(43560)$

$V_{100} = 1850$ cf

$V_{10} = 1215$ cf



POND VOL.

$\frac{1}{2}(50 \times 50) \times 2' = 2500$ cf

CRITICAL (TOP OF PIPE)

$Q = 0.6 A \sqrt{2gH}$

$A = \pi R^2 = 0.79$

$Q = 32.2$

$H = 1'$

$Q = 0.6(0.79)\sqrt{64.4(1)} = 3.8$ cfs @ INLET

MANNING'S

$Q = \frac{1.49}{0.013} R^{\frac{2}{3}} (0.01)^{\frac{1}{2}} (0.79)(0.25)^{.67} = 3.6$ cfs MAX FLOW @ 0.01 SLOPE

DENNEY - GROSS & ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
2400 COMANCHE ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0695

LOCATION Domingo Baca Arroyo
PROJ. NO.
DATE
DESIGNER J Jones
PAGE 1A

RUNOFF CALCULATIONS

FAR NORTHEAST HEIGHTS MASTER DRAINAGE PLAN

AP 432 Q_{100} = 1047 cfs (EXISTING CONDITIONS) @ WEST R of SANTA BARBARA

AP 406 Q_{100} = 420 cfs (EXISTING CONDITIONS)

NOTE: AREA WEST OF AP 406 IS DEVELOPED
AREA EAST OF AP 406 IS PRIMARILY UNDEVELOPED

SUBBASINS CONTRIBUTING TO AP 406

BASIN	AREA (SQ mi) (FROM WESTON REPORT MARCH 1987)
401	0.3408
402	0.1291
403	0.0933
404	0.1542
406	0.0430
TOTAL	0.7604

0.7604 x 640 Ac/SqMi = 487 Ac UNDEVELOPED

TIME OF CONCENTRATION

$$T_c = 0.0078 \frac{(L)^{0.77}}{S^{0.385}}$$

L = 10,800 (FROM EAST END OF AREA 402 TO AP 406)

S = 0.025 (ASSUMED)

$$T_c = 0.0078 \frac{(10,800)^{0.77}}{(0.025)^{0.385}}$$

T_c = 41.2 MINUTES

Q_{100} = 647 cfs DEVELOPED RUNOFF (PLATE 22.2 F-1)
-420 cfs EXISTING RUNOFF
227 cfs INCREASE IN RUNOFF DUE TO DEVELOPMENT

HYDROGRAPH COMPUTATION WORKSHEET

DATE _____
COMPUTED BY _____
CHECK BY _____

Soil Type 'B'

PROJECT Domingo Baca

LOCATION Offsite Areas

ANALYSIS POINT # AP 406

(DR. AREA) A = 487 ACRES

T_c 41.2 MIN

POINT RAINFALL 2.5 IN. FROM PLATE 22.2 D-1

CN = 85 FROM PLATES 22.2 C-2, 22.2 C-3

RUNOFF VOLUME R = 1.2 IN. FROM PLATE 22.2 C-4

COMPUTED T_p = 41 MIN. $T_p = T_c$
(Rounded to even minute)

$q_p = \frac{45.4A}{T_p}$ = 539 CFS./INCH OF RUNOFF

$(R \times q_p) = Q_{peak}$ = 647 CFS

t(COLUMN)=(t/T_p) $t=T_p(t/T_p)$

$y = \frac{Q}{Q_{peak}}$ $Q = y(Q_{peak})$

	(t/T_p)	t (min.)	y	Q (cfs)
1	0	0	0	0
2	.1		.03	
3	.2		.10	
4	.3		.190	
5	.4		.310	
6	.5		.470	
7	.6		.660	
8	.7		.820	
9	.8		.930	
10	.9		.990	
11	1.0		1.00	
12	1.1		.990	
13	1.2		.930	
14	1.3		.860	
15	1.4		.780	
16	1.5		.680	
17	1.6		.560	
18	1.7		.460	
19	1.8		.390	
20	1.9		.330	
21	2.0		.280	
22	2.2		.207	
23	2.4		.147	
24	2.6		.107	
25	2.8		.077	
26	3.0		.055	
27	3.2		.040	
28	3.4		.029	
29	3.6		.021	
30	3.8		.015	
31	4.0		.011	
32	4.5		.005	
33	5.0		.000	

PLATE 22.2 F-1

DENNEY - GROSS & ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
2400 COMANCHE ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0695

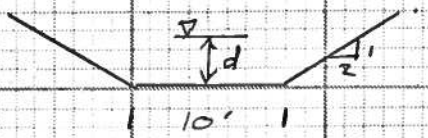
LOCATION Domingo Baca Arroyo
PROJ. NO. 808.72
DATE 5/87
DESIGNER J Jones
PAGE 1

CHANNEL CALCULATIONS

$Q = 1940$ cfs FROM GRIENER ENGINEERING: DESIGN Q FOR DOMINGO BACA IMMEDIATELY EAST OF WYOMING.

MANNING'S EQUATION

$$Q = \frac{1.486}{n} S^{1/2} A R^{2/3}$$



TYPICAL SECTION

$S = 0.0284$
$n = 0.013$ (CONCRETE)
$Q = 1940$ cfs
$R = A/P$

SOLVE FOR d

$A = 10d + 2d^2$
$P = 10 + 2(2.2d) = 10 + 4.4d$

TRY $d = 3.4'$

$$1940 = \frac{1.486}{0.013}(0.0284)^{1/2} A R^{2/3}$$

$$100.7 = A R^{2/3}$$

$A = 34 + 23.12 = 57.12$
$P = 10 + 14.96 = 24.96$
$R = A/P = 2.29$

$AR^{2/3} = 57.12(2.29)^{2/3} = 99.5 \approx 100.7$

CONCLUSION: 100 YR STORMWATER DEPTH = 3.4'

$Q = VA$ $1940 = V(57.12)$ 100 YR STORMWATER VELOCITY = 34 FPS

$V = 34$ FPS

DENNEY - GROSS & ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
2400 COMANCHE ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0695

LOCATION Domingo Baca Arroyo
PROJ. NO. 808.72
DATE 5/87
DESIGNER J Jones
PAGE 2

SUPERELEVATION CALCULATIONS

$S = 1.3 V^2 \frac{(b + z \neq D)}{g r}$ (DPM 22.3 Pg 59)

V = 34 FPS
g = 32.2
D = 3.4
z = 2 = cot BANK SLOPE
b = 10'
r = 284 = RADIUS

$S = 1.3(34)^2 \frac{(10 + 2(2)(3.4))}{32.2(284)}$

S = 3.9'

DEPTH AT TURN 3.4' + 3.9' = 7.3'

FREEBOARD

$Fb = 0.7(2.0 + 0.025(V)(d^{1/3}))$ (DPM 22.3 Pg 61.1)

V = 34 fps
d = 3.4

$Fb = 0.7(2.0 + 0.025(34)(3.4)^{1/3})$

Fb = 2.3'

REQUIRED CHANNEL DEPTH IN STRAIGHT SECTION = 5.7'

REQUIRED CHANNEL DEPTH IN CURVED SECTION = 9.6'

DENNEY - GROSS & ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
2400 COMANCHE ROAD N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0695

LOCATION Domingo BACA
PROJ. NO. 808.72
DATE 8/87
DESIGNER J JONES
PAGE 3

RIPRAP DESIGN

$Q = 1950$ cfs
$V = 34$ FPS
$D_W = 3.4' = Y_E$
$T_W = 3.75'$

$F_r^2 = \frac{V^2}{gd} = \frac{34^2}{32.2(3.4)} = \sqrt{10.6} = 3.3$

$\frac{T_W}{Y_E} = \frac{3.7}{3.4} = 1.1$

TRY $\frac{d_{50}}{Y_E} = 0.61$ $d_{50} = 2.1'$

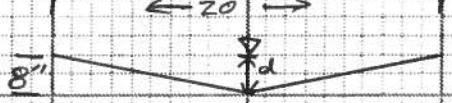
FROM FIG X1-2 $\frac{H_S}{Y_E} = 2.0$ $H_S = 6.8$

$\frac{H_S}{d_{50}} = \frac{6.8}{2} = 3.4$ $2 < H_S/d_{50} < 4$ (OK)

$L_S = 10(6.8) = 68'$
$L_S = 3(10) = 30'$
$L_B = 15(6.8) = 102'$ USE 100' LENGTH WITH $D_{50} = 2'$
$L_B = 4(10) = 40'$

RUNDOWN

$Q = 18$ cfs



TEMPORARY RUNDOWN
2% min SLOPE

$Q = \frac{1.486}{n} S^{1/2} AR^{2/3}$

$S = 0.02$
$n = 0.017$

TRY $d = 0.5'$

$A = 5$ $R = 0.33$

$Q = \frac{1.486}{0.017}(0.02)^{.5}(5)(0.33)^{.67}$

$Q = 29$ cfs > 18 cfs $\therefore d$ IS SLIGHTLY LESS THAN 0.5'

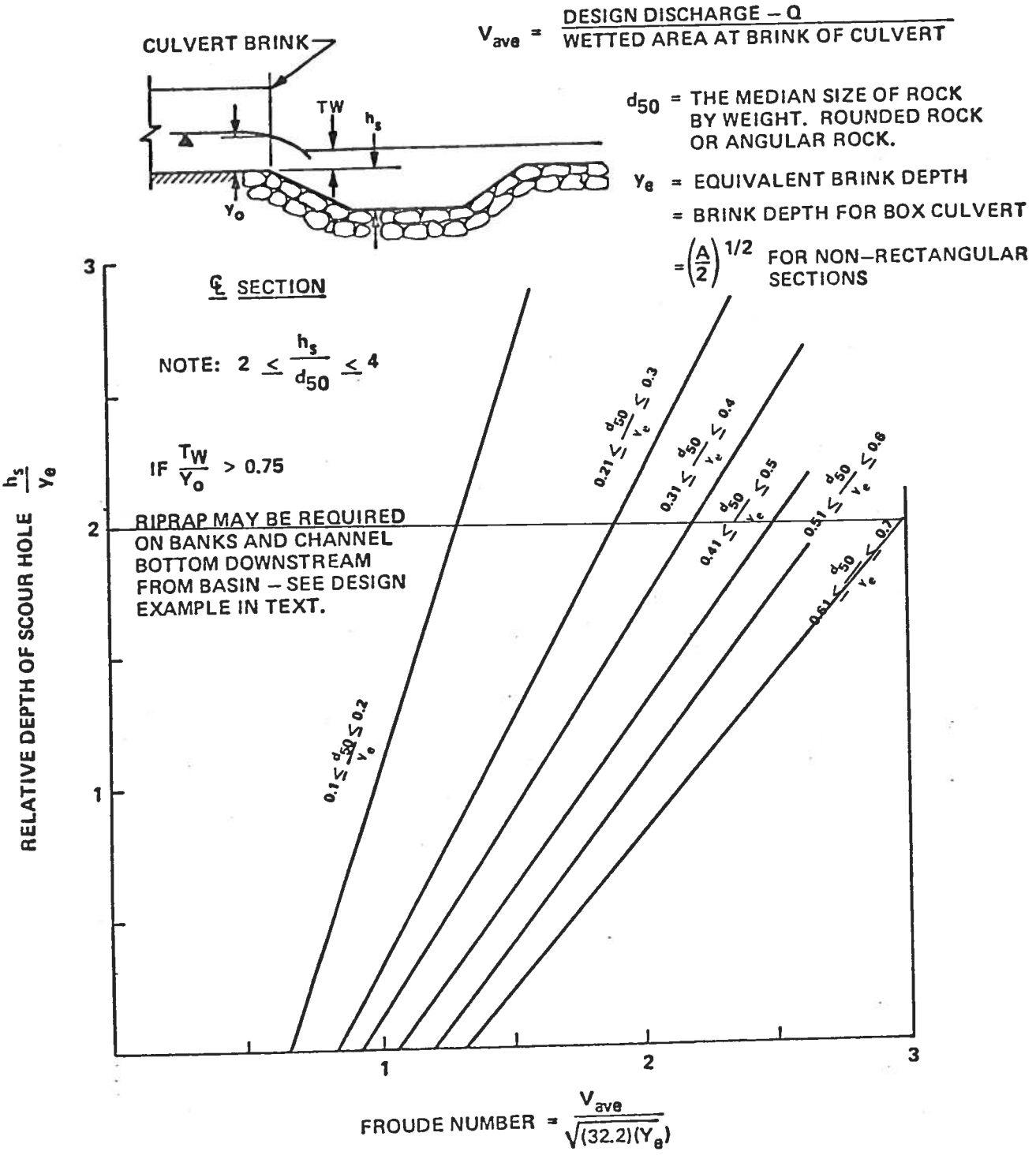


FIGURE X1–2. RELATIVE DEPTH OF SCOUR HOLE VERSUS FROUDE NUMBER AT BRINK OF CULVERT WITH RELATIVE SIZE OF RIPRAP AS A THIRD VARIABLE