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

May 2, 1995

Jim Hands, PE
Red Mountain Eng.
P.O. Box 16115
Santa Fe, NM 87506-6115

RE: ENGINEER'S CERTIFICATION FOR A-1 SELF STORAGE (M-16/D32)
RECEIVED APRIL 25, 1995 FOR CERTIFICATE OF OCCUPANCY
ENGINEER'S STAMP DATED 4-19-95

Dear Mr. Hands:

Based on the information included in the submittal referenced above, City Hydrology accepts the Engineer's Certification of grading & drainage for a permanent Certificate of Occupancy. Contact Vickie Chavez at Code Administration for the Certificate for 2636 Baylor SE.

If I can be of further assistance, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

DRAINAGE INFORMATION SHEET

PROJECT TITLE: A-1 Self Storage ZONE ATLAS/DRNG. FILE #: M16/D32

DRB #: 93-420 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Lot 15 Block 2 Airport Industrial Park

CITY ADDRESS: 2636 Baylor Dr.

ENGINEERING FIRM: Red Mountain Eng. CONTACT: Arlin Lords / Jim Hands

ADDRESS: 201 Coal Ave. S.W. Alb. PHONE: 247-3042 / 343-1517 889-3004

OWNER: The Brott Company CONTACT: Murry Brott

ADDRESS: Rt 3 Box 109 RF Santa Fe PHONE: 505 982-9400

ARCHITECT: none CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: Red Mtn. Eng. CONTACT: Richard Morris

ADDRESS: _____ PHONE: 343-1517

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

X ENGINEER'S CERTIFICATION

____ OTHER _____

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL

____ PRELIMINARY PLAT APPROVAL

____ S. DEV. PLAN FOR SUB'D. APPROVAL

____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL

____ SECTOR PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ BUILDING PERMIT APPROVAL

X CERTIFICATE OF OCCUPANCY APPROVAL

____ GRADING PERMIT APPROVAL

____ PAVING PERMIT APPROVAL

____ S.A.D. DRAINAGE REPORT

____ DRAINAGE REQUIREMENTS

____ OTHER _____ (SPECIFY)

DATE SUBMITTED: 3/17/95 4/25/95

BY: David G. Stockly, Jr.

RECEIVED APR 25 1995

PUBLIC WORKS DEPARTMENT

SIDEWALK & DRIVEPAD INSPECTION

APPROVED

Inspector

	Permits	Dispatch	Insp. Office
Phone:	768-2551	857-8025	857-8036

Date 4-20-95 Permit No. 160282

Contractor T & C

Location 1636 Bayloh St

Time

APR 25 1995

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

April 6, 1995

Jim Hands, PE
Red Mountain Eng.
P.O. Box 16115
Santa Fe, NM 87506-6115

RE: ENGINEER'S CERTIFICATION FOR A-1 SELF STORAGE.(M-16/D32)
RECEIVED MARCH 17 FOR CERTIFICATE OF OCCUPANCY
ENGINEER'S STAMP DATED 3-17-95

Dear Mr. Hands:

Based on the information included in the submittal referenced above, City Hydrology accepts the Engineer's Certification of grading & drainage for a temporary Certificate of Occupancy. Contact Vickie Chavez at Code Administration for the temporary Certificate for 2636 Baylor SE.

The following comments must be addressed before a Permanent Certificate of Occupancy will be released:

Place a check mark by any proposed elevation that matches the as-built elevation exactly. If a proposed elevation does not have an as-built elevation or a check mark next to it, City Hydrology assumes that it has not been checked.

Submit a copy of the "green tag" for the S.O.19 (sidewalk culvert).

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

Red Mountain
Engineers,
Inc.

ENGINEERS • SURVEYORS • PLANNERS

March 17, 1995

Mr. John Curtain, P.E.
Hydrology Division
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Lot 15 Block 2
Airport Industrial Park

Dear Mr. Curtain:

Our survey crew field verified the "as-built" conditions of the site. It is our opinion that the site was constructed in substantial conformance with the grading and drainage plan. Attached to this letter is a blueline copy of the revised Grading and Drainage Plan. We did note that the swale in two places are at a slope of less than 1% (i.e. 0.724% and 0.412%). These flat slopes may cause some minor ponding in these areas but should not significantly affect the overall drainage plan.

If you have any questions, please do not hesitate to call me.

Sincerely,

Morey E. Walker, P.E.

MEW/jh

enclosure

MAR 17 1995

P.O. BOX 16115, SANTA FE, NM 87506-6115 PHONE: (505) 473-7373 FAX: (505) 473-4865

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

March 25, 1994

Jim Hands
Red Mountain Engineers
P.O. Box 16115
Santa Fe, N.M. 87506-6115

RE: GRADING & DRAINAGE PLAN FOR A-1 STORAGE (M-16/D32)
RECEIVED MARCH 24, 1994 FOR BUILDING PERMIT APPROVAL
ENGINEER'S STAMP DATED 3/24/94

Dear Mr. Hands:

Based on the information included in the submittal referenced above, City Hydrology approves this project for Building Permit.

Include a copy of the approved Grading & Drainage Plan dated 3/24/94 in the set of construction documents that will be submitted to the "One Stop" for the Building Permit.

A separate permit is required for construction of private drainage facilities within the City right of way. A copy of this letter must be on hand when applying for the excavation permit.

Engineer's Certification of grading & drainage per DPM checklist must be approved before any Certificate of Occupancy will be released.

Further review has determined that the detention pond is not large enough to require a Private Facilities Drainage Covenant. Thank You for submitting a covenant even if it wasn't necessary.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely.

John P. Curtin, P.E.
Civil Engineer/Hydrology

c. Andrew Garcia
Darlene Saavedra

WPHYD/8351/jpc

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

DRAINAGE INFORMATION SHEET

PROJECT TITLE: A-1 SELF STORAGE ZONE ATLAS/DRNG. FILE #: M16/D32

DRB #: 93-420 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOT 15 BLOCK 2 AIRPORT INDUSTRIAL PARK

CITY ADDRESS: 2636 BAYLOR DR

ENGINEERING FIRM: Red Mountain Eng. CONTACT: ARLIN LORDS/JIM HANDS

ADDRESS: 201 COAL AVE. S.W. ALB. PHONE: 247/3047 343-1517

OWNER: THE BROTT COMPANY CONTACT: Murry Brott

ADDRESS: RT 3 Box 109 RF. SANTA FE PHONE: 505 982 9400

ARCHITECT: NONE CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: RED MTN ENG. CONTACT: Richard Morris

ADDRESS: _____ PHONE: 343-1517

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
✓ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
✓ GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEER'S CERTIFICATION
____ OTHER _____

PRE-DESIGN MEETING:

✓ YES
____ NO
✓ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL
____ PRELIMINARY PLAT APPROVAL
____ S. DEV. PLAN FOR SUB'D. APPROVAL
____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
____ SECTOR PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ FOUNDATION PERMIT APPROVAL
✓ BUILDING PERMIT APPROVAL
✓ CERTIFICATE OF OCCUPANCY APPROVAL
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ S.A.D. DRAINAGE REPORT
____ DRAINAGE REQUIREMENTS
____ SUBDIVISION CERTIFICATION
____ OTHER _____ (SPECIFY)

DATE SUBMITTED: Arlin J. Lords
BY: 3/24-94

RECEIVED
MAR 24 1994

A-1 Storage M-16/D32

Note to File.

Verbal Comments to Arlen Lord 3-23-94.

1. Erosion Control Notes must be on the Grading & Drainage Plans submitted.

2. Signature Block is required for S.O. 14.

John D Austin

3-23-94

M-16-2

DRAINAGE INFORMATION SHEET

PROJECT TITLE: A-1 SELF STORAGE ZONE ATLAS/DRNG. FILE #: M16/D32

DRB #: 93-420 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOT 15 BLK 2 AIRPORT INDUSTRIAL PARK

CITY ADDRESS: 2636 BAYLOR DR.

ENGINEERING FIRM: RED MTN ENG 247-3047 CONTACT: JIM HANDS

ADDRESS: 201 COAL AV SW. ALB. PHONE: 343-1517

OWNER: ~~A-1 STORAGE~~ (THE BROTT COM) CONTACT: Murray BROTT

ADDRESS: RT 3 BOX 109 RF Santa Fe 87505 PHONE: 505-982-9400

ARCHITECT: NONE CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: RED MTN ENG. CONTACT: Richard Morris

ADDRESS: 201 COAL AVE SW. ALB PHONE: 343-1517

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- ___ DRAINAGE REPORT
- ✓ DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- ✓ GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION
- ___ OTHER _____

PRE-DESIGN MEETING:

- ✓ YES
- ___ NO
- ✓ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SKETCH PLAT APPROVAL
- ___ PRELIMINARY PLAT APPROVAL
- ___ S. DEV. PLAN FOR SUB'D. APPROVAL
- ___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- ✓ BUILDING PERMIT APPROVAL
- ✓ CERTIFICATE OF OCCUPANCY APPROVAL
- ___ GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ S.A.D. DRAINAGE REPORT
- ___ DRAINAGE REQUIREMENTS
- ___ OTHER _____ (SPECIFY)

DATE SUBMITTED: 3/11/94

BY: _____

MAR 1 4 1994

Red Mountain
Engineers,
Inc.

ENGINEERS • SURVEYORS • PLANNERS

March 8, 1994

Mr. John P. Curtin, P.E.
Civil Engineer/Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re Grading & Drainage Plan for A-1 Storage (M-16/D32)
Review Comments of March 4, 1994

Dear Mr. Curtin,

Per your reference comments and our telephone conversation, Red Mountain Engineers, Inc. have revised the grading & drainage plans accordingly. Our response to your comments are as follows:

1. The offsite drainage area has been shown on the vicinity map. The peak discharges and volumes of runoff are shown on the grading and drainage plan. Since the final as-built conditions of the offsite area is not shown on the city topography, each flow rate and volume was estimated by using the design data for this site. Since the A-1 site is a fully developed, this would be conservative.

2. The hydrograph for the pond is now included in the drainage calculation package (attached). The pond volume is more than adequate for the developed conditions. The Private Facility Drainage Covenant has been signed by the owner and the original is included in this submittal.

3. The emergency spillway capacity is more than adequate to convey the 100 year discharge. In the attached calculation package, the analysis assumed the 6" orifice was clogged and the flow was from the top of the "D" inlet. The velocity is greater than the minimum of 3 fps.

4. Additional invert elevations are shown on Section B-B to indicated adequate flow velocity. The owner will obtain all required permits and maintain the facility in accordance with S.O. 19. The sidewalk culvert will be installed per Dwg. 2236.

5. Per our telephone conversation, the slotted drain pipe is manufactured (specifications attached) and the detail is adequate for this type of pipe.

6. The Erosion Control Notes are shown on the plans. The contractor will obtain the necessary "Topsoil Disturbance Permit".

RECEIVED
MAR 1 4 1994

P.O. BOX 16115, SANTA FE, NM 87506-6115 PHONE: (505) 473-7373 FAX: (505) 473-4865

7. The runoff calculations have been removed from the drawings and are included in the attached package. The roof drainage is shown being routed to the pond.

This submittal should take care of all your comments. If you have any questions or need further information please do not hesitate to contact Jim Hands or myself at 343-1517.

Sincerely,
Red Mountain Engineers, Inc.

Morey Walker, P.E.
Project Manager

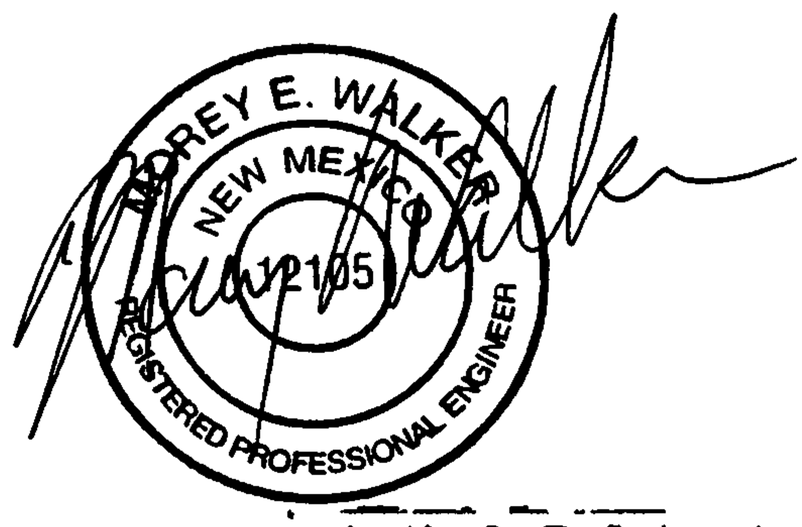
MAR 1 4 1994

A-1 SELF STORAGE UNITS
DRAINAGE REPORT
(M-16/D32)

by

RED MOUNTAIN ENGINEERS
1216 Parkway Dr. Suite A
Santa Fe, NM 87501

March 8,1994



RECEIVED
MAR 1 4 1994

City of Albuquerque Stormwater Runoff Calculations
For Small Watersheds (< 40 Acres)

Proposed Development Area (Old Lot 15)

A-1 Self Storage Units

2638 Baylor Street (South of Gibson Blvd.)

Albuquerque Precipitation Zone	2
100 Yr. Design Storm Intensity	2.35 In./Hr.

Total Lot Area	20599.61 Sq. Ft.	0.473 Acres

EXISTING CONDITIONS

Land Treatment	Treatment Area	Treatment Area	Excess Precip.	Peak Discharge
	[sq. ft.]	[Acres]	[in.]	[c.f.s./Ac.]
A	0.00	0.000	0.00	0.00
B	0.00	0.000	0.00	0.00
C	13376.88	0.307	1.13	3.14
D	7222.73	0.166	2.12	4.70

Total Area 20599.61 0.473

Peak Discharge Calculation Qp = (Qpa)(Aa)+(Qpb)(Ab)+(Qpc)(Ac)+(Qpd)(Ad)

Qp = 1.74 c.f.s. (On site)	

Volume of Runoff Calculation V = [(Ea)(Aa)+(Eb)(Ab)+(Ec)(Ac)+(Ed)(Ad)]/12

V = 0.058 acre-ft.	2535.67 ft.^3

DEVELOPED CONDITIONS

Land Treatment	Treatment Area	Treatment Area	Excess Precip.	Peak Discharge
	[sq. ft.]	[Acres]	[in.]	[c.f.s./Ac.]
A	0.00	0.000	0.00	0.00
B	0.00	0.000	0.00	0.00
C	2543.97	0.058	1.13	3.14
D	18055.64	0.415	2.12	4.70

Total Area 20599.61 0.473

Peak Discharge Calculation Qp = (Qpa)(Aa)+(Qpb)(Ab)+(Qpc)(Ac)+(Qpd)(Ad)

Qp = 2.13 c.f.s. (On Site)	

Volume of Runoff Calculation V = [(Ea)(Aa)+(Eb)(Ab)+(Ec)(Ac)+(Ed)(Ad)]/12

V = 0.079 acre-ft.	3429.39 ft.^3

A-1 Self Storage Units
POND DESIGN PER CITY OF ALBUQUERQUE STANDARDS

TIME OF CONCENTRATION CALCULATIONS

REACH	LENGTH FEET	ELEV UPPER	ELEV LOWER	SLOPE FT/FT	K	VELOCITY FPS	TRAVEL TIME (SEC)
A-B	18	71.06	70.71	0.019	2	2.8	6.5
B-C	176	70.71	66.39	0.025	3	4.7	37.4
C-D	56	64.89	64.5	0.007	3	2.5	22.4

Time of Concentration =	1.10	Minutes
Use =	**10**	**Minutes**

HYDROGRAPH CALCULATIONS

Drainage Area =	0.473	Acres (On Site)
=	0.22	Acrs (Off Site to Pond)
=	0.693	Acres (Total)
Area of D =	0.608	Acres (Total)
Peak Discharge =	2.13	cfs (On Site)
=	1.00	cfs (Off Site to Pond)
=	3.13	cfs (Total)
E =	4.51	
Tp =	0.177	Hours
Tb =	1.88	Hours
Duration of Peak =	0.22	Hours

HYDROGRAPH VALUES
(Including On & Offsite Flows)

Time Hour	Discharge (cfs)
0	0
0.18	3.13
0.40	3.13
1.88	0

MAXIMUM ALLOWABLE DISCHARGE =	1.74	CFS FROM ONSITE
FROM THE POND	1.00	CFS FROM OFFSITE
	2.74	**CFS TOTAL**

Red Mountain Engineers, Inc.

P.O. BOX 16115
SANTA FE, NM 87506-6115

(505) 473-7373
FAX (505) 473-4865

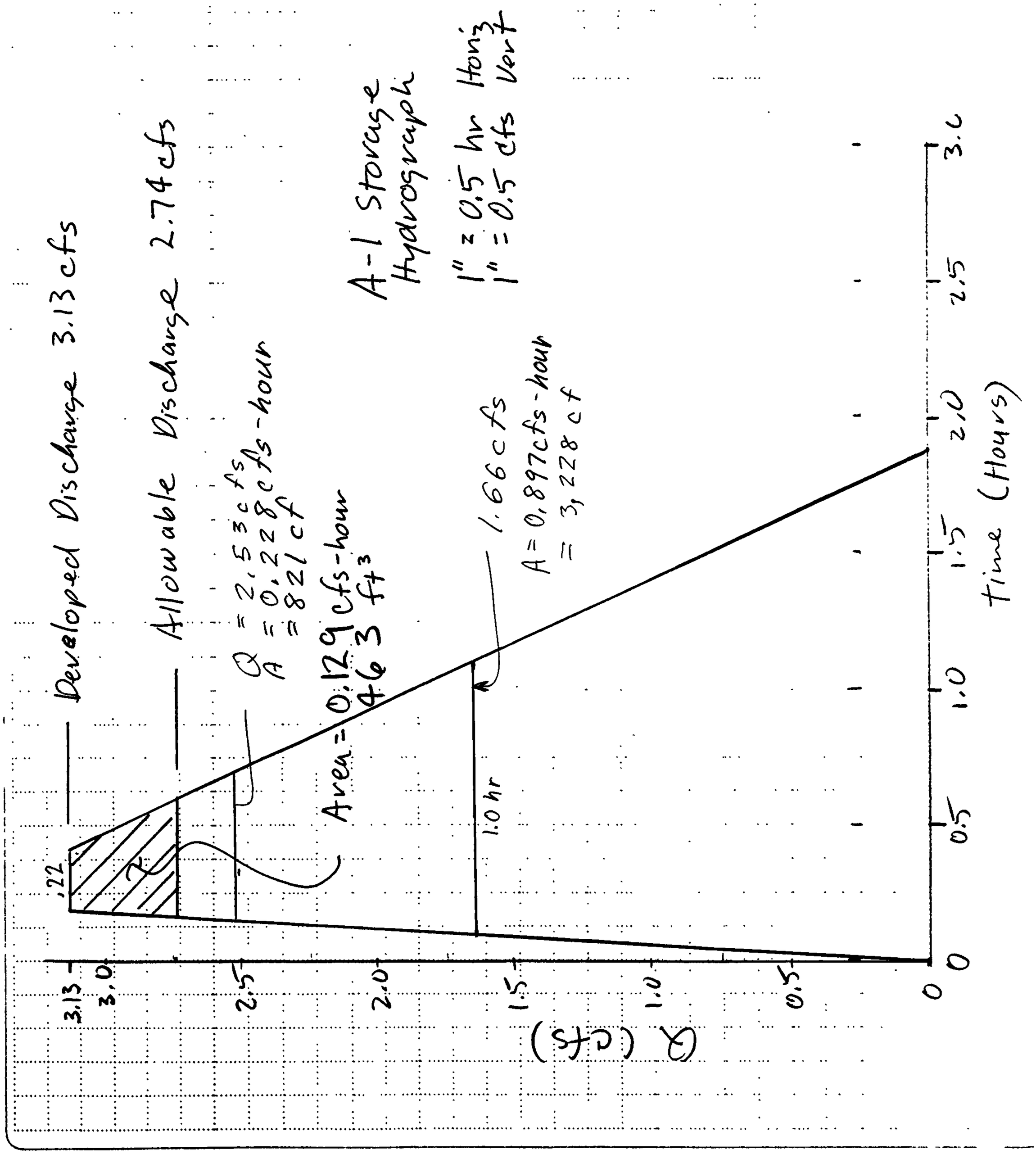
JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____



SUMMARY OF POND DESIGN

FROM HYDOGRAPH PLOT (ATTACHED)

VOLUME INCREASE	=	0.021	acre-ft.	463.00	ft.^3
DISCHARGE INCREASE	=	0.39	c.f.s.		

POND VOLUME PROVIDED	=	930.00	cu.ft.
MAXIMUM ALLOWABLE DISCHARGE	=	2.74	cfs
BOTTOM OF POND	=	64.5	ft
TOP OF INLET STRUCTURE	=	67.8	ft
MAXIMUM H FROM CENTER OF ORIFICE	=	3.05	ft
ORIFICE COEFFICIENT	=	0.6	
MAXIMUM ALLOWABLE ORIFICE AREA	=	0.32	sq.ft.
MAXIMUM ALLOWABLE ORIFICE DIAMETER	=	0.64	ft
ACTUAL ORIFICE SIZE	=	6" Dia.	

$H = 67.83 - 64.5 - .25 = 3.08'$

$Q = .6\,(.196)\sqrt{64.4(3.08')} = 1.66 \text{ cfs} < 2.74$

Weir

$P \approx 50\%\,(2)\,2'(3') = 6'$

$Q = 2.7\,(6')(H)^{3/2}$

$Q = 2.74 \text{ cfs} \qquad H = 0.306'$

$Q = 1.08 \text{ cfs} \qquad H = 0.164'$

Red Mountain Engineers, Inc.
P.O. BOX 16115
SANTA FE, NM 87506-6115
(505) 473-7373
FAX (505) 473-4865

JOB
SHEET NO OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

$H = 67.83 - 64.5 - .5 = 2.83'$

Spillway Calculations

$Q = .6(.785)\sqrt{64.4(2.83)}$
$= 6.36 \text{ cfs} > 3.13 \text{ cfs}$
OK

Assume 6" is clogged

- Check Pipe

Design Q = 3.13 cfs (total)

Dia = 12" RCP n = 0.013

Slope of Pipe = 0.0143

$$\frac{AR^{2/3}}{D^{8/3}} = \frac{3.13(0.013)}{1.49(0.0143)^{1/2}} * \frac{1}{1^{8/3}}$$

$= 0.228$

Flow Area $= 0.52 * 1^2 = 0.52 \text{ ft}^2$

Velocity $= 3.13/0.52 = 6.0 \text{ fps} > 3.0 \text{ fps}$

OK

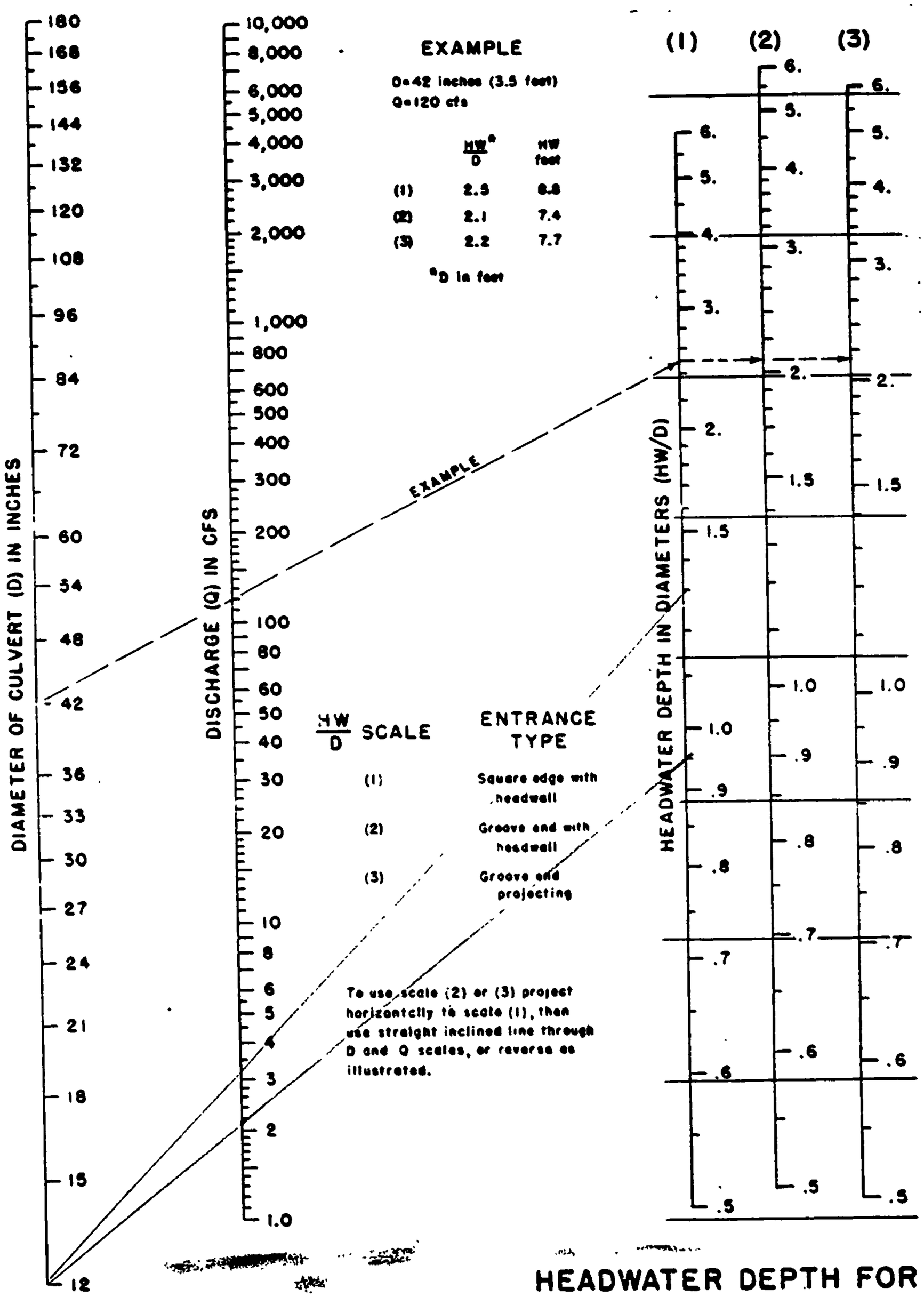
- Check Entrance to Pipe

$\frac{Hw}{D} = 1.3$ Inlet Control

$Hw = 1.3 + 5264.5 = 5265.8 \text{ ft} < 5267.83$

Invert of pipe Top of Weir

OK



HEADWATER SCALES 2 & 3
REVISED MAY 1964

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

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

March 4, 1994

Jim Hands
Red Mountain Engineers
P.O. Box 16115
Santa Fe, N.M. 87506-6115

RE: GRADING & DRAINAGE PLAN FOR A-1 STORAGE (M-16/D32)
RECEIVED MARCH 1, 1994 FOR BUILDING PERMIT APPROVAL
ENGINEER'S STAMP DATED 2/14/94

Dear Mr. Hands:

Based on the information included in the submittal referenced above, City Hydrology has the following comments that must be addressed prior to Building Permit approval:

1. Identify the off-site drainage basin to the east. Calculate the flow rate and volume entering the site. Show the boundary of the basin on the Grading & Drainage Plan (on the vicinity plan would work).

2. Provide hydrograph for pond to determine storage requirements (see attached sketch). Provide calculations determining the storage volume provided. A Private Facility Drainage Covenant must be executed & recorded for the detention pond.

3. The emergency spillway must be designed to carry Q100. Provide orifice calculations for the 12" emergency spillway and the 6" orifice. Remember, H is measured from the water surface to the CENTER of the opening not the BOTTOM.

4. Section B-B must have sufficient inverts to install the outlet system. The sidewalk culvert requires the S.O. 19 process for Private Storm Drain Improvements Within City Rights of Way. Sidewalk culvert must be installed per City of Albuquerque Dwg. 2236.

5. Section A-A does not provide sufficient detail to construct Slotted Drain. When the slot is cut in the 12" CMP the structural integrity will be effected. City Hydrology recommends that the Slotted Drain be constructed similar to City of Albuquerque Dwg. 2225.

CONTINUED ON PAGE 2

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

6. Grading & Drainage Plan must include Erosion Control Notes. Notes must address how sediment will be contained on site; what the Contractors responsibilities are if sediment enters adjacent property. The Contractor must obtain a "Topsoil Disturbance Permit" from the Environmental Health Department prior to any grading or construction.

7. The runoff calculation's sticky-back is hard to read. All letters must be atleast 0.10" tall per DPM standards. Is there a gap in the retaining wall at the SE corner? A bolder line would help the retaining walls stand out from the other lines. Show how roof drainage is routed to the pond.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely.

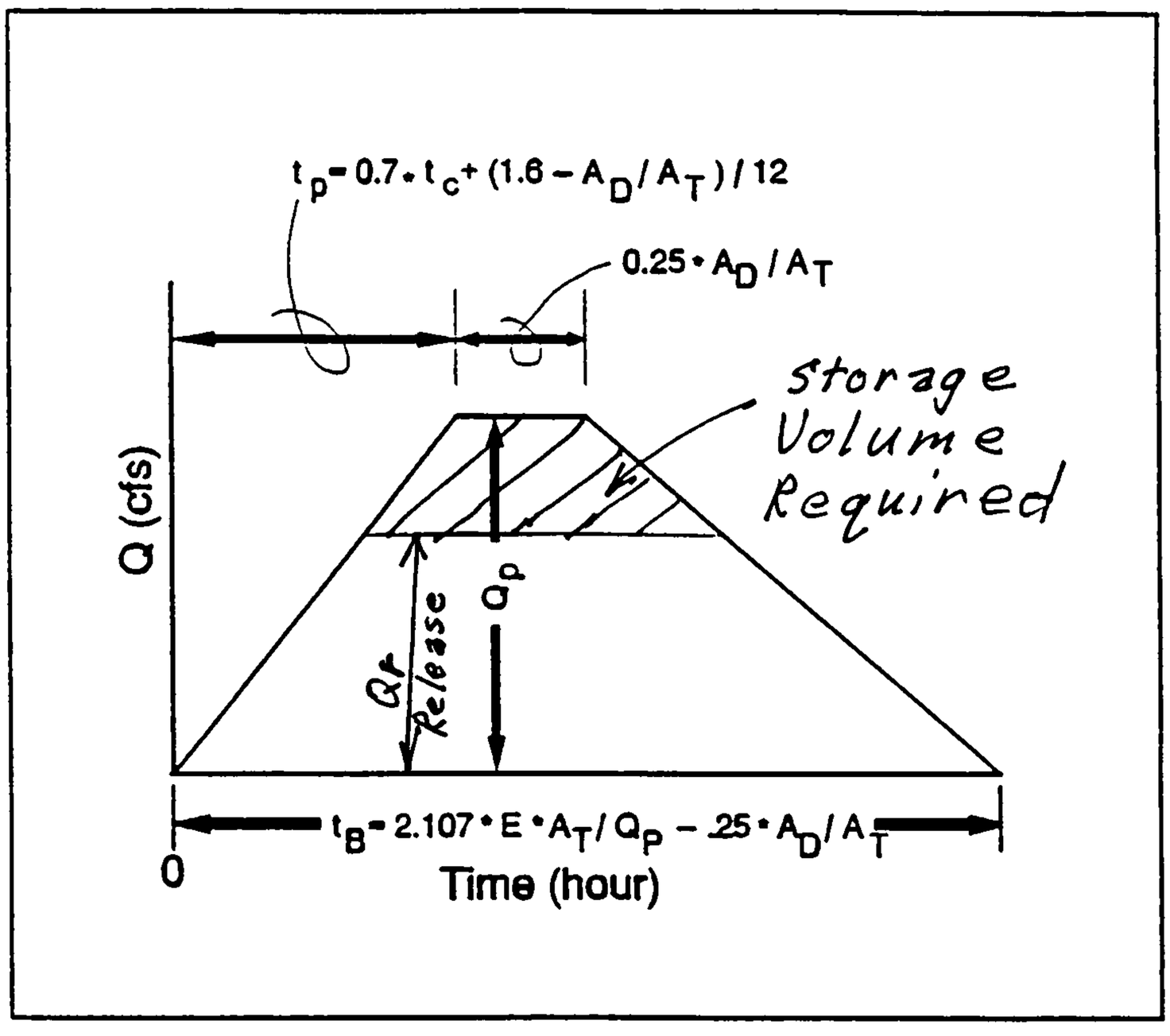
John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

WPHYD/8351/jpc

Continue the peak for 0.25 * A_D / A_T hours. When A_D is zero, the hydrograph will be triangular. When A_D is not zero, the hydrograph will be trapezoidal. FIGURE A-3 shows the hydrograph in graphic form.

FIGURE A-3



Example A-8

Determine the hydrograph for Example A-5.

A_T = 14.0 acres A_D = 4.0 acres t_c = 0.2 hour Q_P = 37.24 cfs

E = ((3 * .44) + (5 * .67) + (2 * .99) + (4 * 1.97)) / (3 + 5 + 2 + 4) = 1.038 inches

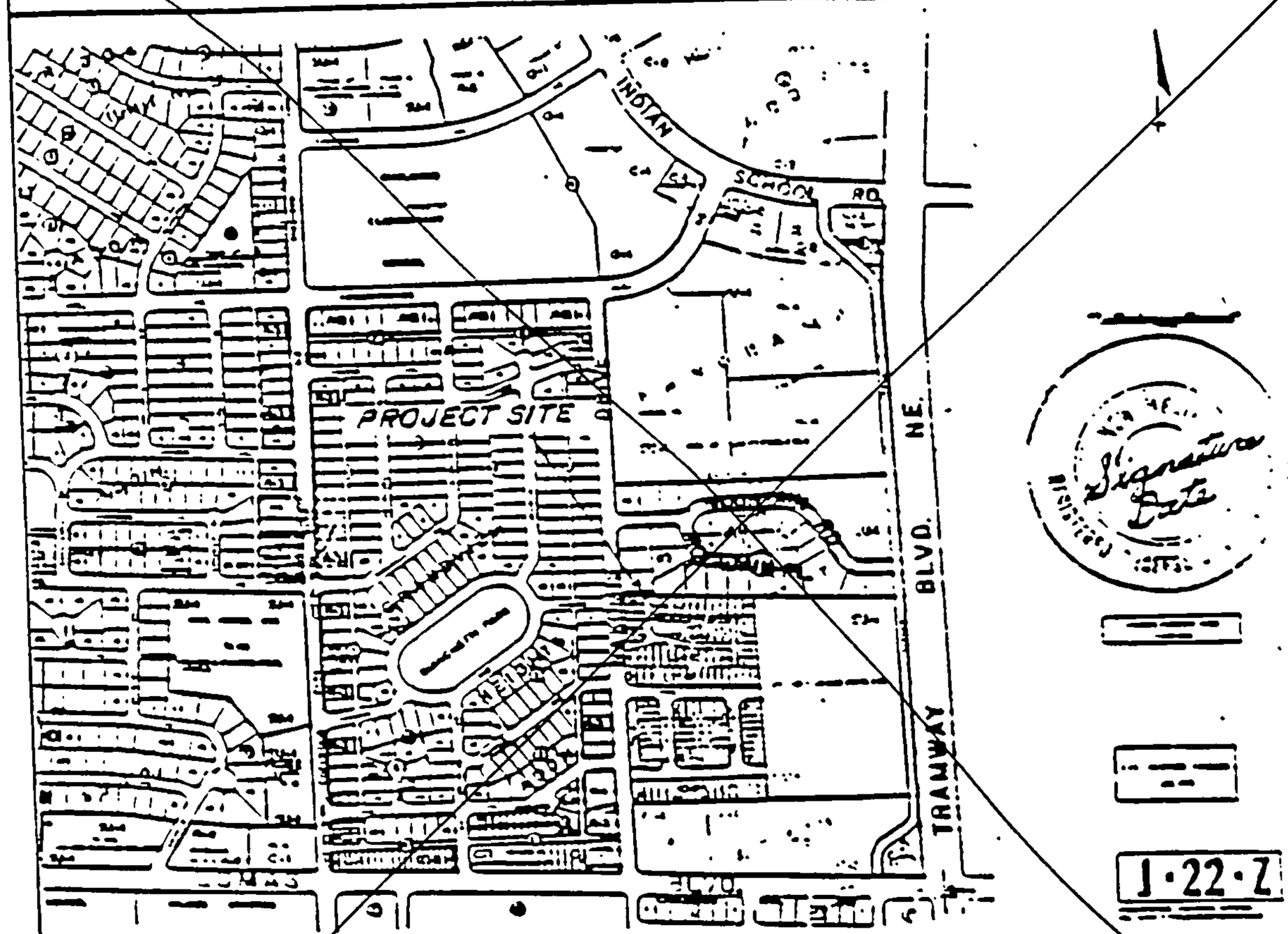
t_P = (0.7 * 0.2) + (1.6 - (4 / 14)) / 12) = 0.2495 hours

t_B = (2.017 * 1.038 * 14 / 37.24) - (0.25 * 4 / 14) = 0.7157 hours

Duration of peak = 0.25 * 4 / 14 = 0.0714 hours

CITY OF ALBUQUERQUE

DRAINAGE FACILITIES WITHIN CITY RIGHT-OF-WAY



LOCATION MAP

LEGAL DESCRIPTION OF PROPERTY SERVED: Lot 20, Block 2, Panorama Heights Addition

BENCH MARK: ACS No. 3-J22 ACS Brass cap, ENE ret of inter Lomas and Chelwood Park Blvd. Elevation 5664.77

NOTICE TO CONTRACTOR

1. An excavation/construction permit will be required before beginning any work within City right-of-way. An approved copy of these plans must be submitted at the time of application for this permit.
2. All work detailed on these plans to be performed, except as otherwise stated or provided hereon, shall be constructed in accordance with City of Albuquerque ~~Interim~~ Standard Specifications for Public Works Construction, ~~1985~~. 1986 including all Updates.
3. Two working Days prior to any excavation, contractor must contact Line Locating Service 260-1990 for location of existing utilities.
4. Prior to construction, the contractor shall excavate and verify the horizontal and vertical locations of all constructions. Should a conflict exist, the contractor shall notify the engineer so that the conflict can be resolved with a minimum amount of delay.
5. Backfill compaction shall be according to _____ street use.
6. Maintenance of these facilities shall be the responsibility of the Owner of the property served.

APPROVALS	NAME	DATE	TITLE:	
HYDROLOGY				
INSPECTOR			PERMIT NO.	MAP NO.
A.C.E./FIELD			SHEET ___ OF	

DRAINAGE INFORMATION SHEET

PROJECT TITLE: A-1 Storage ZONE ATLAS/DRNG. FILE #: M-16-Z / 832

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: Lot 15 Blk 2 Airport Industrial Park

CITY ADDRESS: Bayler Drive, SE

ENGINEERING FIRM: Red Mountain Engineers CONTACT: Jim Hands

ADDRESS: P.O. Box 16115 S.F. 87506-6115 PHONE: 505-343-1517

OWNER: The Brott Company CONTACT: Murray Brott

ADDRESS: Rt 3 Box 109 RF, Santa Fe 87505 PHONE: 505-982-9400

ARCHITECT: — CONTACT: _____

ADDRESS: — PHONE: _____

SURVEYOR: Red Mountain Engineers CONTACT: Richard Morris

ADDRESS: Same PHONE: Same

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- ___ DRAINAGE REPORT
- X DRAINAGE PLAN
- ___ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION
- ___ OTHER _____

PRE-DESIGN MEETING:

- X YES
- ___ NO
- X COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- ___ SKETCH PLAT APPROVAL
- ___ PRELIMINARY PLAT APPROVAL
- ___ S. DEV. PLAN FOR SUB'D. APPROVAL
- ___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- X BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY APPROVAL
- ___ GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ S.A.D. DRAINAGE REPORT
- ___ DRAINAGE REQUIREMENTS
- ___ OTHER _____ (SPECIFY)

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DATE SUBMITTED: 3/1/94

BY: [signature]

8351

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
UTILITY DEVELOPMENT DIVISION/HYDROLOGY SECTION

PRE-DESIGN CONFERENCE

DRAINAGE FILE/ZONE ATLAS PAGE NO.: M-16 DATE: September 20, 1993

EPC NO.: _____ DRB NO.: _____ ZONE: _____

SUBJECT: _____

STREET ADDRESS: _____

LEGAL DESCRIPTION: Lot 15 Blk 2 Airport I.P.

APPROVAL REQUESTED:

____	PRELIMINARY PLAT	____	FINAL PLAT
____	SITE DEVELOPMENT PLAN	____	BUILDING PERMIT
____	GRADING/PAVING PERMIT	____	OTHER

ATTENDANCE:

WHO	REPRESENTING
John Curtin	COA/PWD/Hyd
Kevin Daggett	Red Mtn Engineers

FINDINGS:

Although this project is an infill project, there are downstream problems. There is a floodplain (shown on Panel 35) at Baylor & Yale and the water that reaches Gibson drains to the arroyo that bothers the Mobile Home Park. Therefore Discharge is limited to the existing condition.

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MAR - 1 1994

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

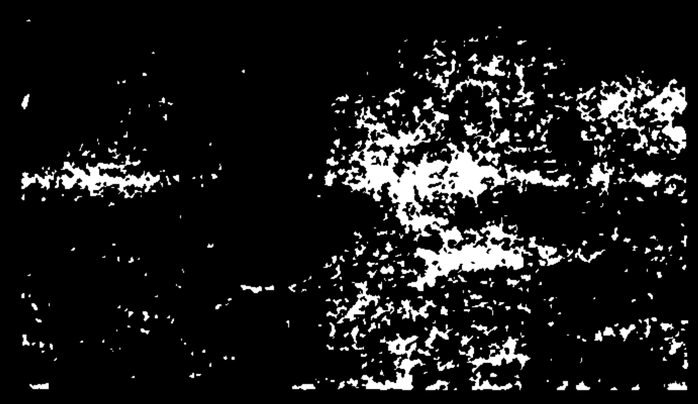
SIGNED: John P Curtin SIGNED: Kevin Daggett

TITLE: CE/Hydrology TITLE: CE/PROJECT ENGR.

DATE: 9-20-93 DATE: 9/20/93

NOTE PLEASE PROVIDE A COPY OF THIS PRE-DESIGN FORM WITH THE DRAINAGE SUBMITTAL.

CONTECH
CONSTRUCTION PRODUCTS INC.



What is Contech Slotted Drain?

The early removal of water from roadways and other prepared surfaces increases travel safety, provides erosion control and helps inhibit surface deterioration. Many methods and systems are used to remove surface water, but none is growing in use quite like Contech Slotted Drain.

Contech Slotted Drain is a practical, aesthetically pleasing inlet for the efficient removal of surface water on streets and highways. It also is widely used in parking lots and other similar locations, where it removes sheet flow without complex grades or water channeling devices like asphalt dikes, berms and curbs.

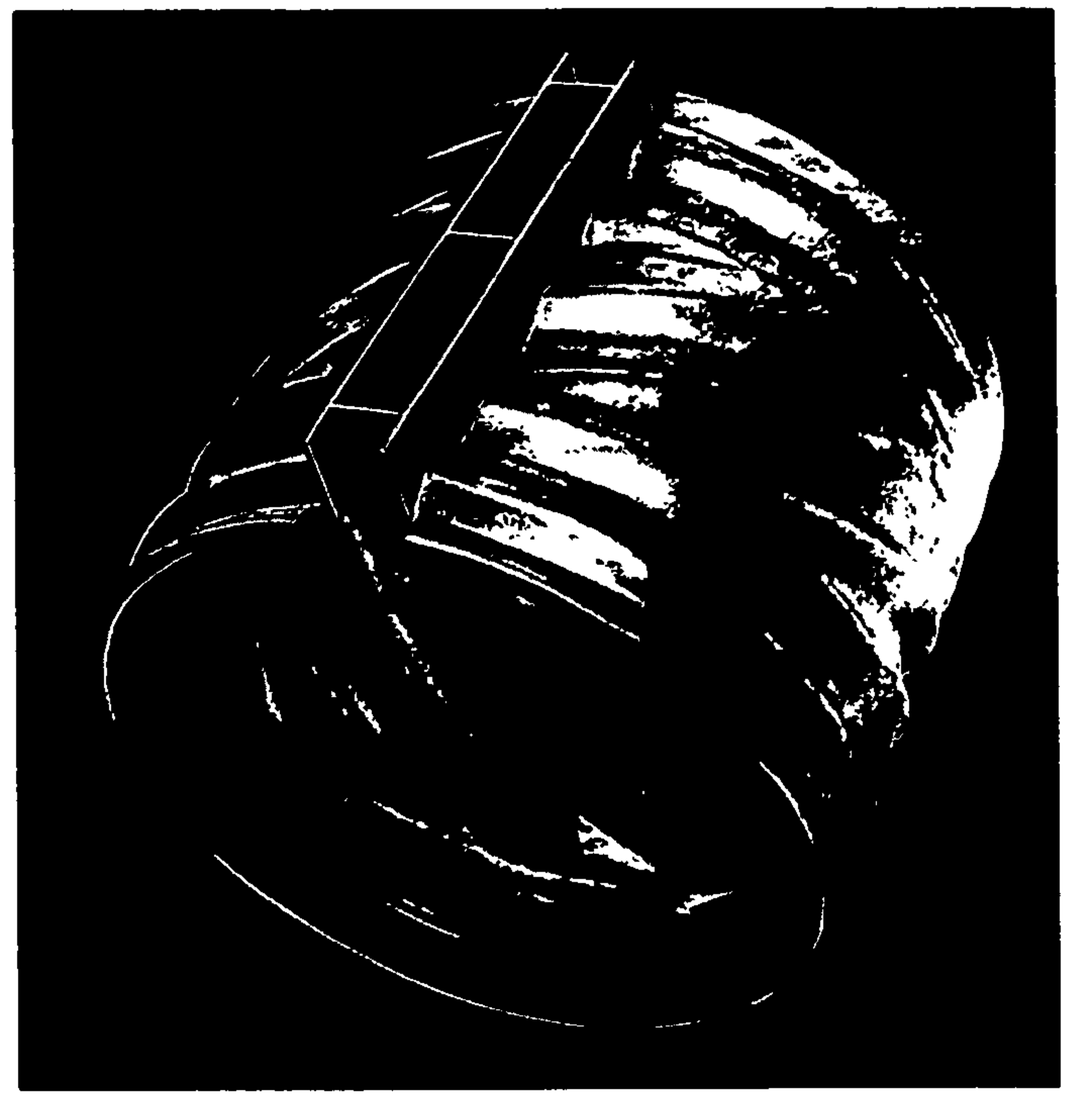
Slotted Drain is fabricated from Contech Corrugated Steel Pipe. The pipe is cut along a longitudinal axis, and a grate with trapezoidal reinforcing spacer bars is welded in place to form a 1¾-inch-wide slot opening. When the opening to the slot is installed flush to the surface, it collects runoff and channels it to the pipe below, from which it flows to the appropriate outlet.

Slotted Drain is fabricated at plants throughout the United States, allowing fast delivery no matter where your project is located.

Contech Slotted Drain has a variety of applications for removal of surface water:

- Curb inlets.
- Pedestrian thoroughfares, malls and bicycle paths.
- Replacements for curbs and berms where those obstacles are undesirable for safety reasons.
- Ground-level floors with drainage requirements.
- Parking lots or any continuous grade surface.
- Sidelines of playing fields in stadiums.
- Airport aprons and taxiways.

New trapezoidal design of the slot plus slanted spacer bars improve the hydraulic efficiency of Contech Slotted Drain, and provide for easier maintenance than ever before.



Parallel side grate is still available in most locations.

Why Contech Slotted Drain is better than other drain systems

Easier to install
Field experience indicates that installation of Slotted Drain is much easier than installation of conventional catch basin systems.

Improved drainage efficiency
A standard 20-foot length of Slotted Drain will intercept up to 50% more runoff than most standard 2′ × 2′ grate inlets.* With solid cross bar spacers tipped at 30° against the direction of flow, runoff is directed into the open slot for more efficient interception. (The nomograph on Page 6 will help determine the lengths of Slotted Drain needed to meet your hydraulic requirements.)

*Source: Figure 15, Hydraulic Engineering Circular No. 12, U.S. Department of Transportation, March 1984 This document is available from the National Technical Information Service, Springfield, VA 22161.

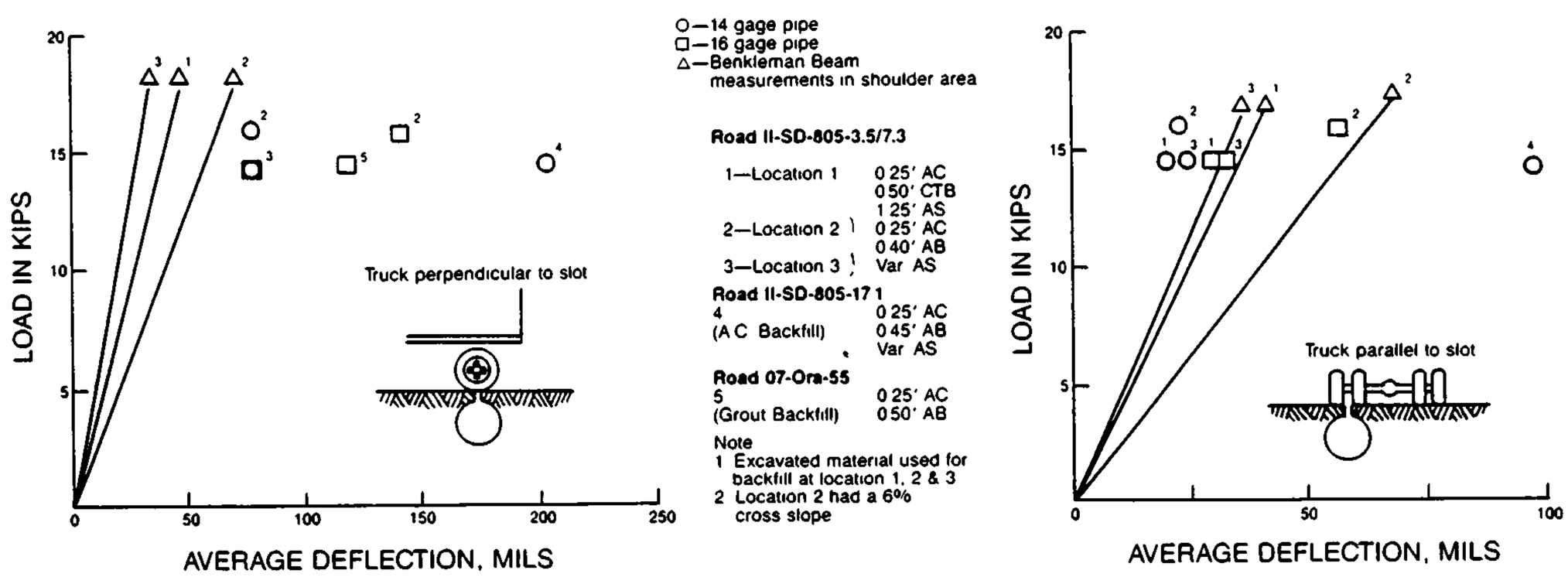
Easier to maintain
No hardware or heavy grates to remove. No protrusions that can be damaged with snow plows. Cleaned by flushing with water from hoses.

Fewer debris problems
Debris is less likely to wedge in Slotted Drain's trapezoidal slots. Anything large enough to fit through the top of the slot opening will fall harmlessly through to the bottom of the drain. And because of its long length, Slotted Drain will retain its effectiveness even when a blockage occurs in one area. Under similar conditions, a conventional drain would be severely restricted.

Better safety
Because Slotted Drain can be installed so that it extends only two inches from the curb, hazardous dips in grade are eliminated. And Slotted Drain poses no hazards to two-wheel vehicles.

No unusual freezing
When freezing occurs, Slotted Drain will handle ice, snow and runoff equally as well as any conventional drainage system.

Structurally sound
Contech Slotted Drain is constructed of heavy grate and heavy spacer bars to resist deformation under heavy traffic loads and thermal expansion. The design has been tested using the Benkleman Beam Method with truck loading parallel and perpendicular to the slot.



Key for Load Table Symbols:
AC - Asphaltic Concrete AB - Aggregate Base
AS - Aggregate Subbase CTB - Cement Treated Base

BENKLEMAN BEAM METHOD

Product details

Pipe
Slotted Drain made from Contech Corrugated Steel Pipe with HUGGER Joints meets applicable portions of AASHTO Designation M-36. Pipe is fabricated from galvanized steel for excellent durability, or from Armco ALUMINIZED STEEL Type 2 when more corrosion resistance is required. Pipe is available in 12-inch through 36-inch diameters and in 14-gage and 16-gage. Thirty- and 36-inch-diameter pipe also is available in 12-gage.

Grate
The Slotted Drain concept was developed in the early 1960s in California. From the beginning, a need for certain structural requirements was recognized in the grating design and in its attachment to the pipe wall. The Contech grating system and design is the result of many years of experience and is the only product of its type that will meet the State of California Department of Transportation qualification tests.

Joints and couplers
Standard 20-foot lengths of Slotted Drain normally are joined with a modified version of Contech's unique HUGGER Band. Because the grate is extended to within one inch of the end of the pipe (to provide a fully continuous slot), the band coupler is trimmed back to accommodate extension of the grating to the joint. A single band bolt is provided for band tensioning. Joints and couplers for Slotted Drain are designed to provide ring compression capability across the full width of the joint.

Heel guard
When Slotted Drain is installed in areas of heavy pedestrian traffic, expanded wire mesh can be specified for installation across the top of the drain opening. This helps to prevent shoe heels from being caught in the open slot. One-half-inch (#13) standard galvanized expanded metal mesh is welded directly to the grating at the plant.

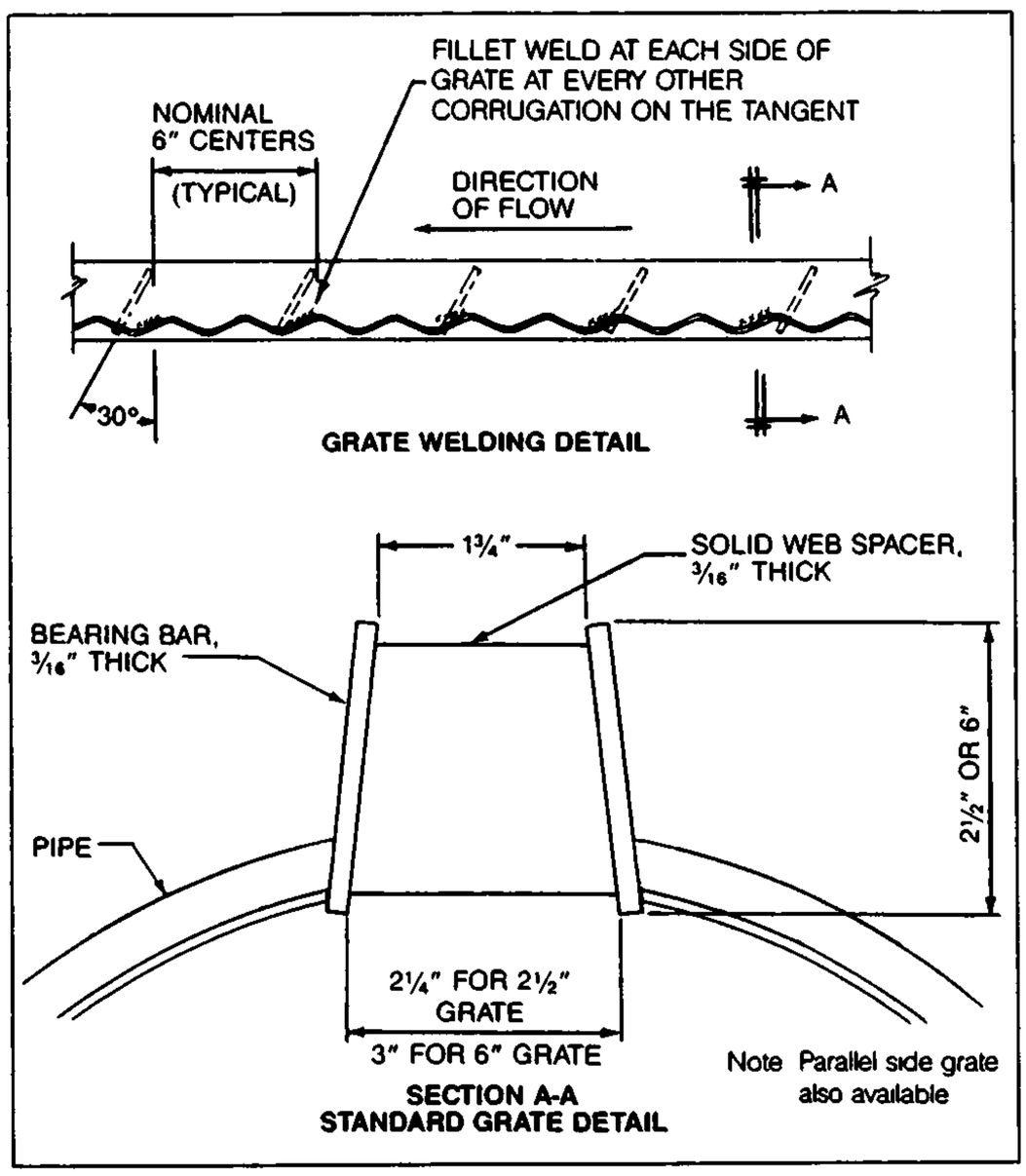
Fittings
A complete line of fittings is available to simplify installation of Slotted Drain under many conditions: on a curve, through a change in elevation, or through a change in pipe diameter.

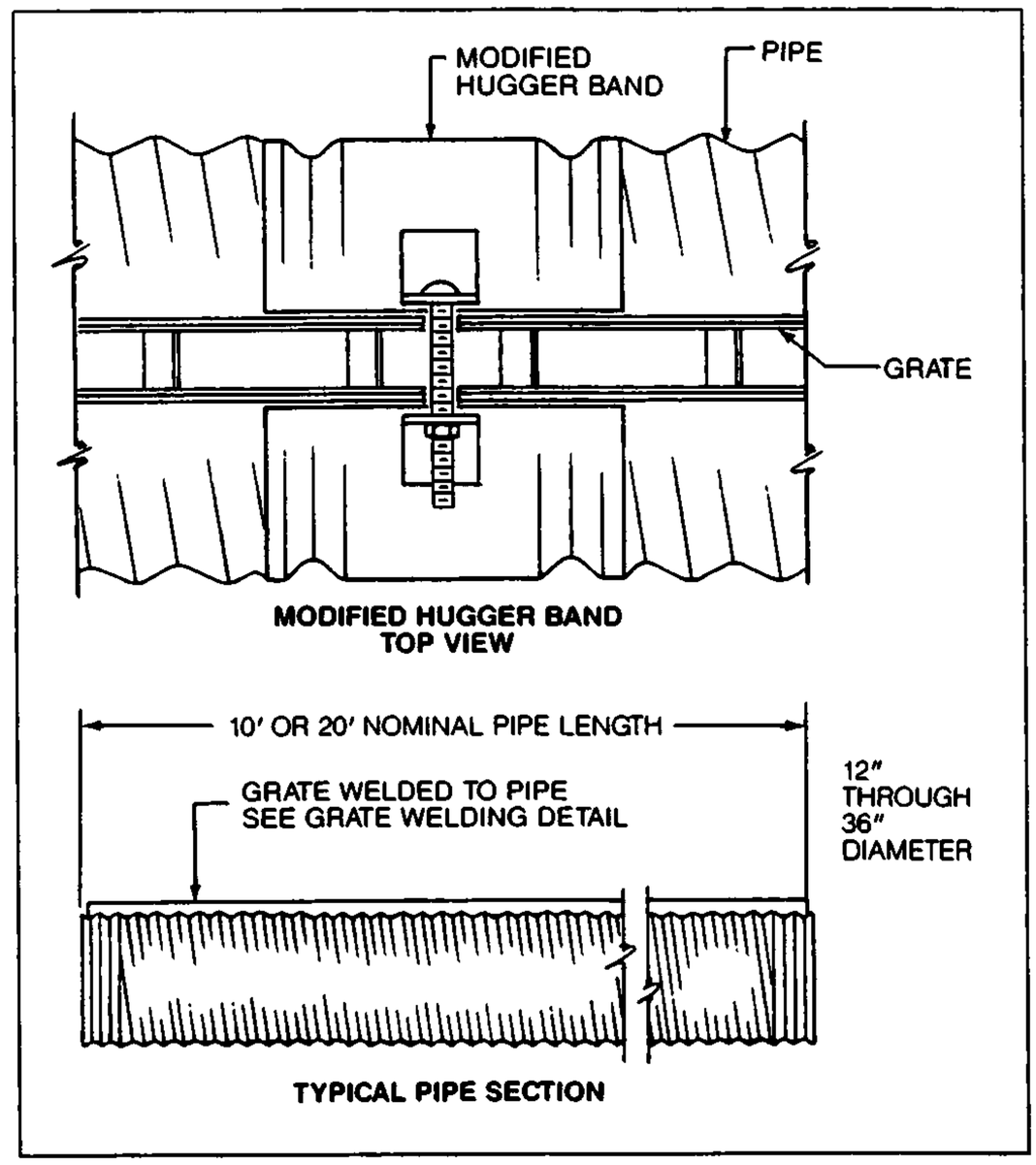
Fittings include 90-degree tees, wyes, and elbows with annular ends for the HUGGER Band; stubs, special junctions, angle/tee combinations, and special end caps. These fittings do not have a grate.

Variable-height grates (parallel side grate only) can be supplied for installation on flat grades.

Pipe diameters can be changed with a plate reducer.

Tolerances (20-foot length)
The design engineer should be able to work with the manufacturing tolerances of vertical bow ±3/8 inch, horizontal bow ±5/8 inch, and twist ±1/2 inch. On special requirements, the engineer should call the local Contech Sales Engineer.





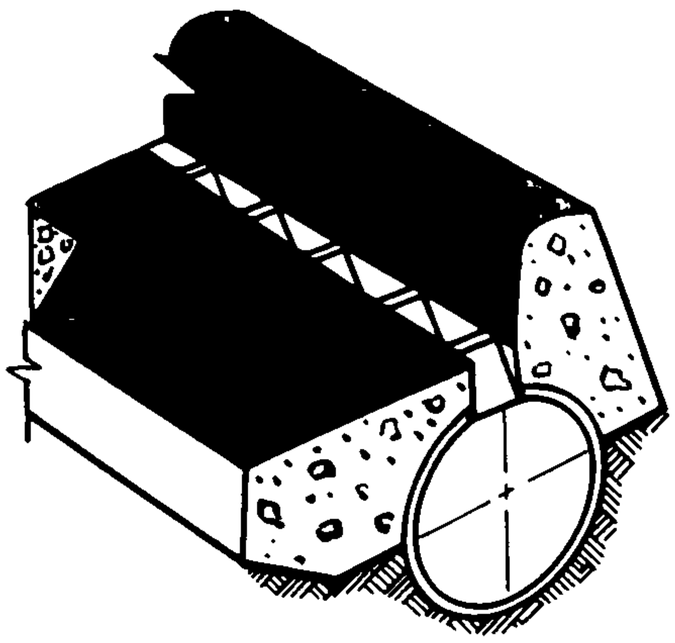
Hydraulics

Slotted Drain can be used to intercept runoff in any one of the following ways:

1. Installed in a typical curb-and-gutter as a slot-on-grade to carry flow from streets and highways.

2. Installed in a typical curb-and-gutter at a sag or low point in a grade to intercept surface runoff carried by the gutter, or to accommodate carryover from preceding drains.

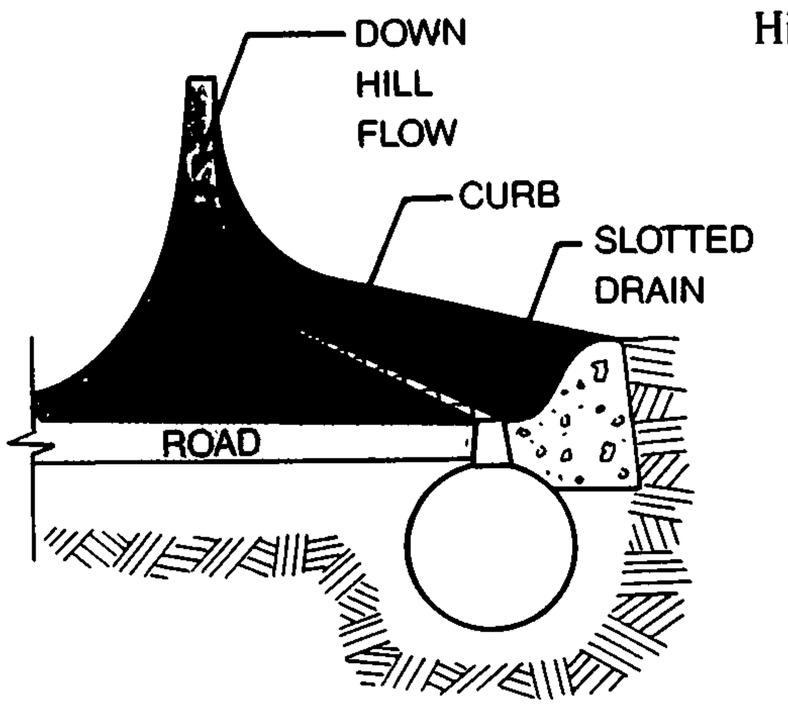
3. Installed in wide, flat areas to intercept overland or sheet flow (as on a parking lot).



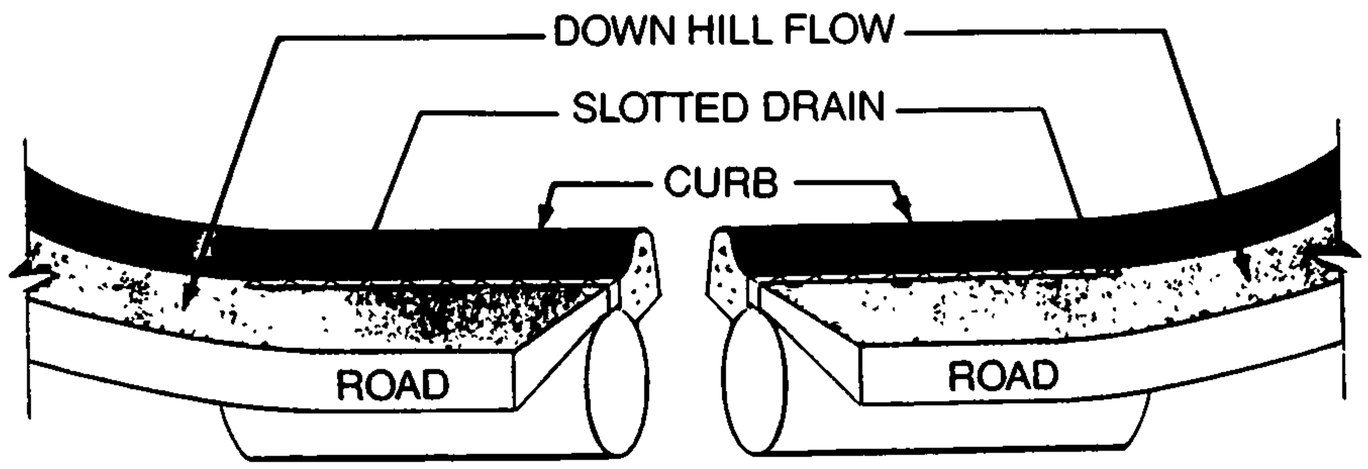
Slot-on-grade in typical curb and gutter

For any given cross slope, S_x, and longitudinal gutter slope, S, the required Slotted Drain length can be determined from the nomograph in Figure B on Page 7.

It is common practice to carry over up to 35 percent of the total discharge, Q_d, to the next inlet. See Figure C on Page 7 for the carry-over efficiency curve.



Typical cross section slot-in-sag



TYPICAL SLOT-IN-SAG INSTALLATION

Slot-in-sag

When Slotted Drain is installed in a sag or at a low point in grade, the length of the slot is calculated from the formula:

$$L_r = \frac{1.401Q}{\sqrt{d}}$$

The Depth of Flow, d, is found from Figure A on Page 6.

Overland flow

Slotted Drain is used effectively to intercept runoff from wide, flat areas such as parking lots, highway medians—even tennis courts and airport loading ramps. In these installations, the drain is placed transverse to the direction of flow, so that the open slot acts as a weir intercepting all of the flow uniformly along the entire length of the drain. The water is not collected and channeled against a berm, as required by a slot-on-grade installation.

Slotted Drain has been tested for overland flow (sheet flow). These results are published in Report No. FHWA-RD-79-106 by the Federal Highway Administration.

The tests included flows up to 0.040 cfs per foot of slot. The test system was designed to supply at least 0.025 cfs per foot, which corresponds to a rainstorm of 15 inches per hour over a 72-foot-wide roadway (6 lanes). Slopes ranged from a longitudinal slope of 9% and a Ƶ of 16, to a longitudinal slope of 0.5% and a Ƶ of 48. At the design discharge of 0.025 cfs per foot, it was reported that the total flow fell through the slot as a weir flow without hitting the curb side of the slot. Even at the maximum discharge of 0.04 cfs per foot and maximum slopes, nearly all the flow passed through the slot.

Definitions

S—Longitudinal gutter or channel slope, ft/ft

S_x—Transverse slope, ft/ft

Ƶ—Transverse slope reciprocal, ft/ft

d—Depth of flow, ft

L—Length of slot, ft

Q—Discharge, CFS

L_r—Length of slot required for total interception, ft

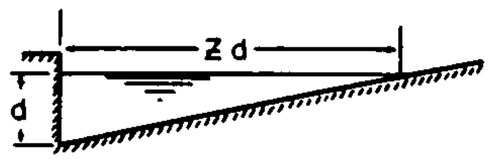
L_a—An assumed length of slot, ft

Q_d—Total discharge at an inlet, CFS

Q_a—An assumed discharge, CFS

FIGURE A

NOMOGRAPH FOR FLOW IN TRIANGULAR CHANNELS



EQUATION: $Q = 0.56 \frac{Z}{n} S^{1/2} d^{8/3}$

n IS ROUGHNESS COEFFICIENT IN MANNING FORMULA APPROPRIATE TO MATERIAL IN BOTTOM OF CHANNEL

Z IS RECIPROCAL OF CROSS SLOPE

REFERENCE: H. R B PROCEEDINGS 1946, PAGE 150, EQUATION (14)

EXAMPLE

GIVEN: S = 0.03

Z = 24, n = 02 → Z/n = 1200

d = 0 22

FIND Q = 2 0 CFS

INSTRUCTIONS

1 CONNECT Z/n RATIO WITH SLOPE (S) TO OBTAIN POINT ON TURNING LINE CONNECT DEPTH (d) WITH TURNING POINT TO DETERMINE DISCHARGE (Q).

2. FOR SHALLOW V-SHAPED CHANNEL AS SHOWN USE NOMOGRAPH WITH $Z = \frac{T}{d}$

3. TO DETERMINE DISCHARGE Q_x IN PORTION OF CHANNEL HAVING WIDTH X: DETERMINE DEPTH d FOR TOTAL DISCHARGE IN ENTIRE SECTION a THEN USE NOMOGRAPH TO DETERMINE Q_b IN SECTION b FOR DEPTH $d' = d - \frac{X}{Z}$

4. TO DETERMINE DISCHARGE IN COMPOSITE SECTION: – FOLLOW INSTRUCTION 3. TO OBTAIN DISCHARGE IN SECTION a AT ASSUMED DEPTH d; OBTAIN Q_b FOR SLOPE RATIO Z_b AND DEPTH d' THEN $Q_T = Q_a + Q_b$

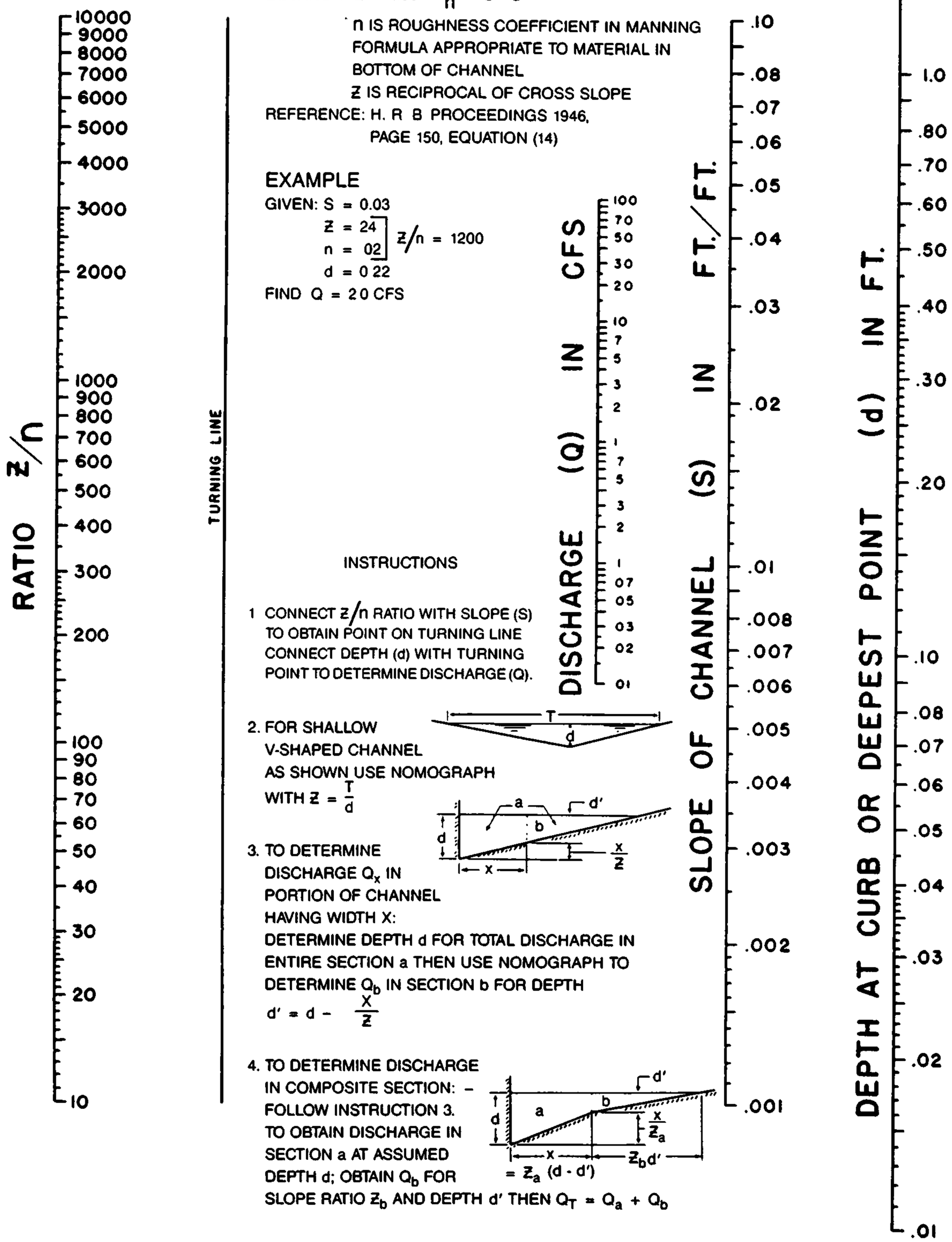
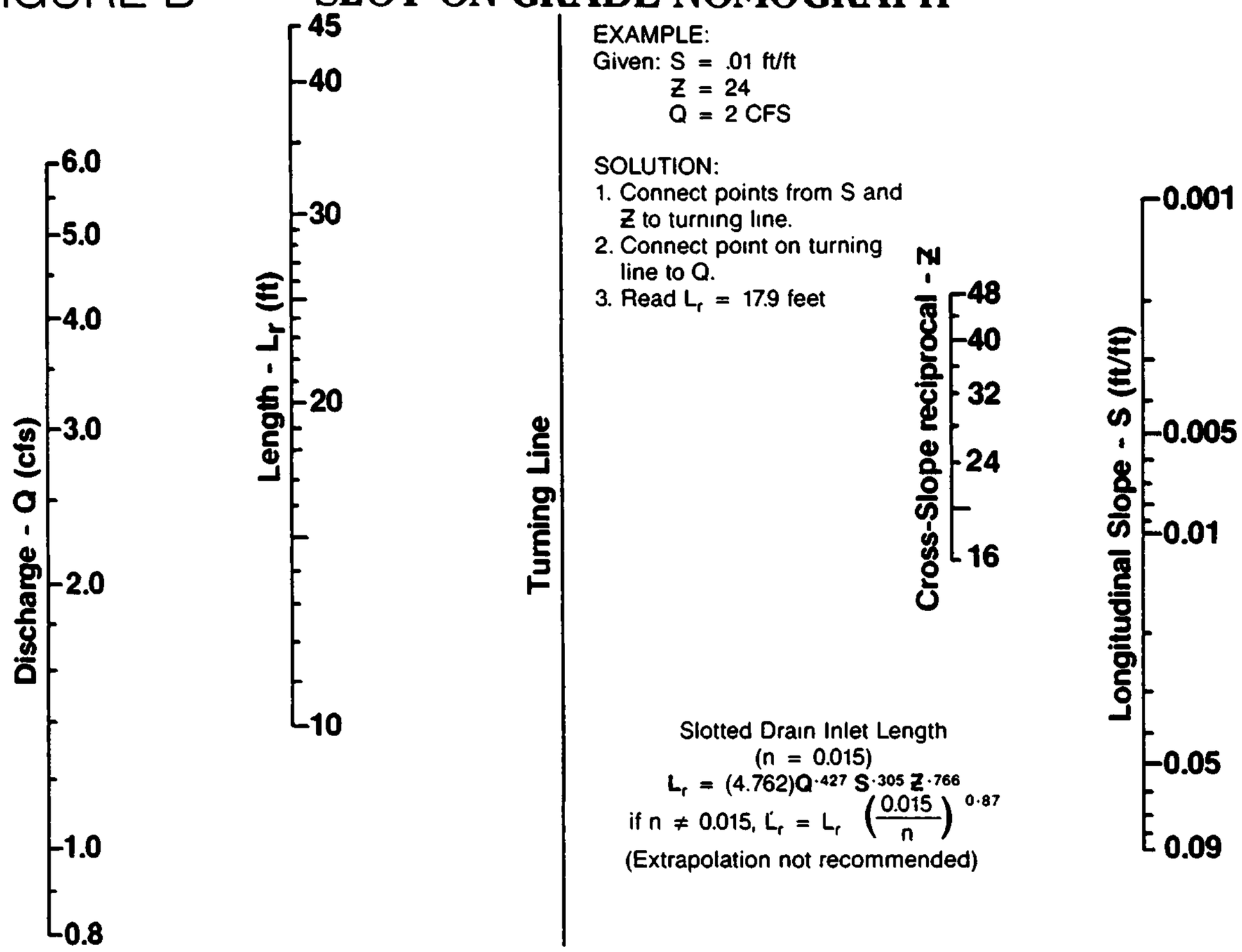


FIGURE B

SLOT ON GRADE NOMOGRAPH



EXAMPLE:
Given: S = .01 ft/ft
Z = 24
Q = 2 CFS

SOLUTION:
1. Connect points from S and Z to turning line.
2. Connect point on turning line to Q.
3. Read L_r = 17.9 feet

Slotted Drain Inlet Length
(n = 0.015)

$$L_r = (4.762)Q^{.427}\,S^{.305}\,Z^{.766}$$

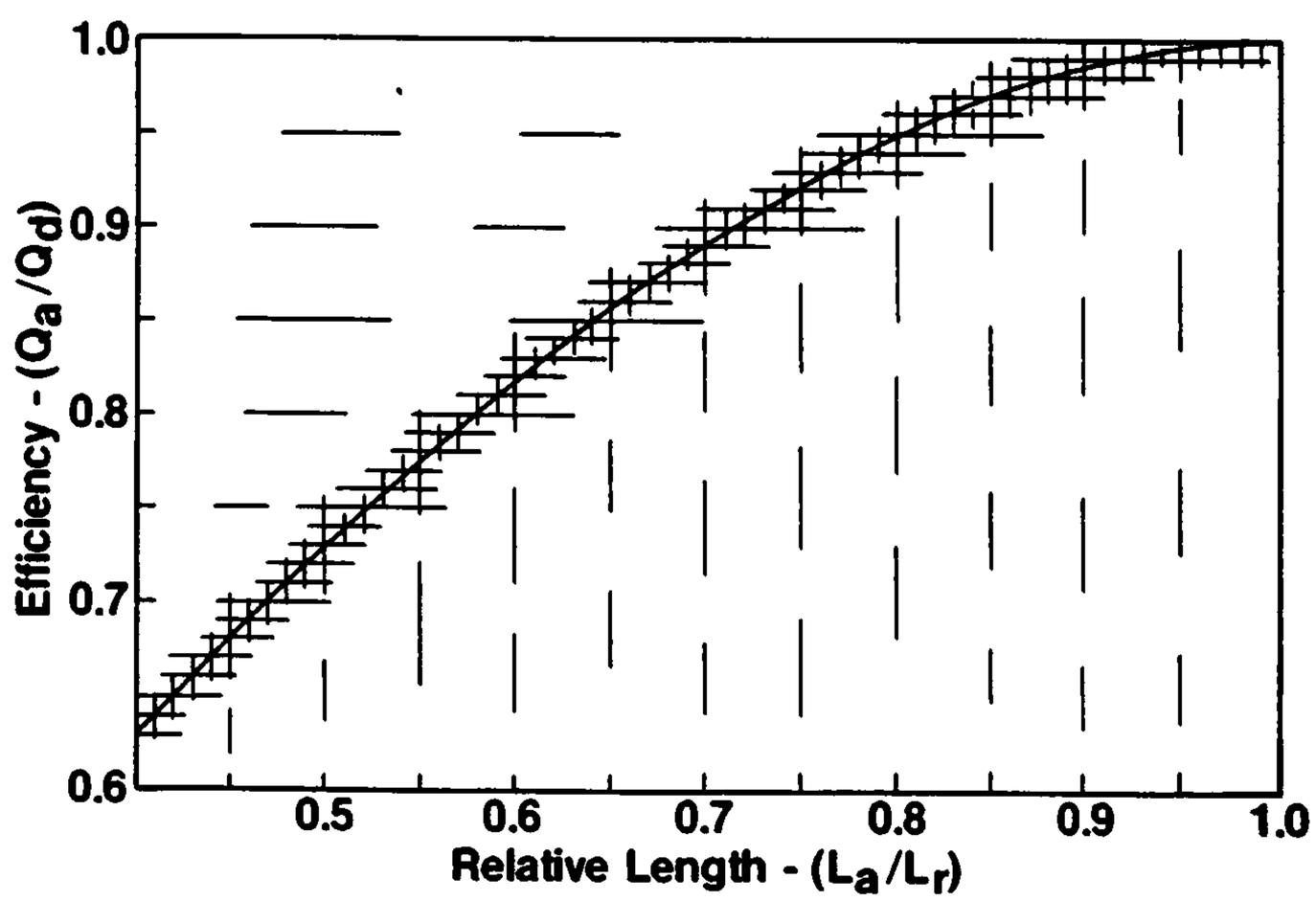
$$\text{if } n \neq 0.015,\ L_r' = L_r \left(\frac{0.015}{n}\right)^{0.87}$$

(Extrapolation not recommended)

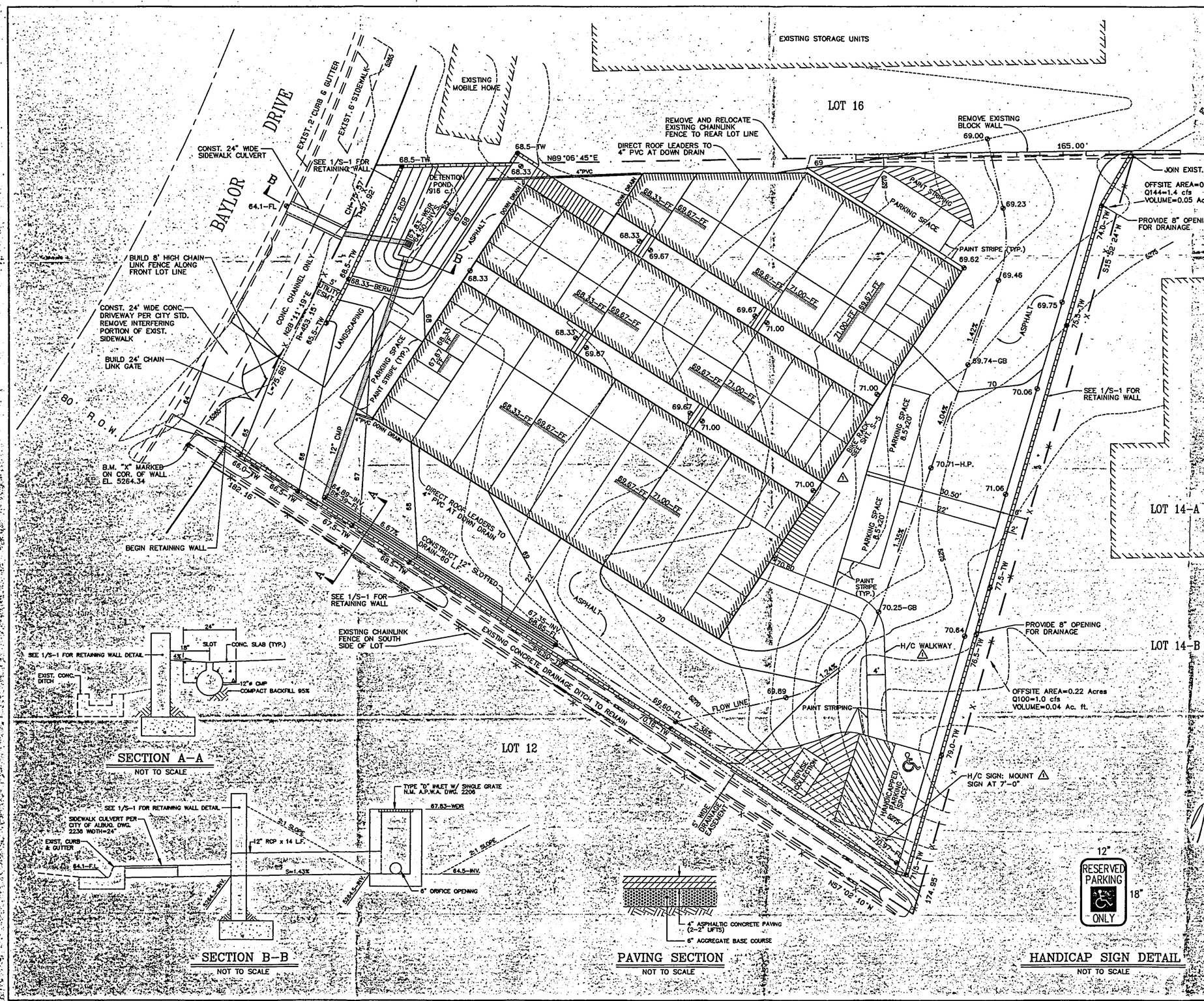
FIGURE C

SLOTTED DRAIN CARRYOVER EFFICIENCY

Example: If 20% carryover (Q_a/Q_d = 80%) is allowed, then only 58% (L_a/L_r) of the total slotted drain length is required resulting in a 42% savings in material and installation costs.



GRADING & DRAINAGE
LOT 15 BLOCK 2
AIRPORT INDUSTRIAL PARK
ALBUQUERQUE N.M.



SECTION A-A
NOT TO SCALE

SECTION B-B
NOT TO SCALE

PAVING SECTION
NOT TO SCALE

HANDICAP SIGN DETAIL
NOT TO SCALE

NOTICE TO CONTRACTOR

1. AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK CITY RIGHT-OF-WAY. AN APPROVED COPY OF THESE PLANS MUST BE SUBMITTED AT THE TIME OF APPLICATION FOR THIS PERMIT.
2. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HEREON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF ALBUQUERQUE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1988 INCLUDING ALL UPDATES.
3. TWO WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE 260-1990 FOR LOCATION OF EXISTING UTILITIES.
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
5. BACKFILL COMPACTION SHALL BE ACCORDING TO _____ STREET USE.
6. MAINTENANCE OF THESE FACILITIES SHALL BE THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY SERVED.

UTILITY NOTE:

IF ANY UTILITY LINES, PIPELINES, OR UNDERGROUND LINES ARE SHOWN ON THE DRAWING, THEY ARE SHOWN IN APPROXIMATE MANNER ONLY, AND LINES MAY EXIST WHERE NONE ARE SHOWN. IF ANY SUCH EXISTING LINES ARE SHOWN, THE LOCATION IS BASED UPON INFORMATION PROVIDED BY THE UTILITY OR PIPELINE COMPANY, THE OWNER, OR BY OTHERS, AND THE INFORMATION MAY BE INCOMPLETE, OR MAY BE OBSOLETE BY THE TIME CONSTRUCTION COMMENCES.

THE ENGINEER HAS UNDERTAKEN NO FIELD VERIFICATION OF THE LOCATION, DEPTH, SIZE OR TYPE OF EXISTING UTILITIES, PIPELINES OR UNDERGROUND UTILITY LINES, MAKES NO REPRESENTATION PERTAINING THERETO, AND ASSUMES NO RESPONSIBILITY OR LIABILITY THERFOR. THE CONTRACTOR SHALL INFORM HIMSELF OF THE LOCATION OF ANY UTILITY LINE, PIPELINE, OR UNDERGROUND UTILITY LINE IN OR NEAR THE AREA OF THE WORK IN ADVANCE OF AND DURING EXCAVATION WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE CAUSED BY ITS FAILURE TO LOCATE, IDENTIFY AND PRESERVE ANY AND ALL EXISTING UTILITIES, PIPELINES AND UNDERGROUND UTILITY LINES. THE CONTRACTOR IS URGED TO COMPLY WITH STATE STATUTES, MUNICIPAL AND LOCAL ORDINANCES, RULES AND REGULATIONS, IF ANY, PERTAINING TO THE LOCATION OF THESE LINES, IN PLANNING AND CONDUCTING EXCAVATION.

RECEIVED
MAR 24 1994
HYDROLOGY DIVISION

MOREY E. WALKER
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER
3/24/94

Design Approval	DRAINAGE FACILITIES WITHIN CITY RIGHT OF WAY HYDROLOGY SECTION	3-25-94 DATE
Inspection Approval	CONSTRUCTION SECTION	DATE
Acceptance	CONSTRUCTION/SECTION/PERMITS	DATE

1	2-28-94	JEC	HANDICAP PATH & SIGN

Red Mountain Engineers, Inc.
Engineers • Surveyors • Planners

1216 PARKWAY DRIVE, SUITE A
P.O. BOX 16115, SANTA FE, NM 87506-6115
PHONE: (505) 473-7373

DWG. NAME: A-1 SELF STORAGE OF ALBUQUERQUE	PROJECT NO. 94805	C-1
DATE: 3-9-94	DRAWING FILE: 94805GD	