DRAINAGE INFORMATION SHEET

C19 / D12

PROJECT TITLE: Lower North Domingo Baca Arroyo Detention Dam ZONE ATLAS/DRNG. FILE #: ~~[illegible]~~

DRB #: N/A EPC #: N/A WORK ORDER #: N/A

LEGAL DESCRIPTION: North Albuquerque Acres, Tract 2, Unit 3, ~~Block~~ 7, Lots 1-8, 25-32
Block 8, Lots 1-5, 28-32
Block 9, Lots 5 & 28

CITY ADDRESS:

ENGINEERING FIRM: Resource Technology Inc CONTACT: Don Dixon

ADDRESS: 2920 Osuna N.E. Alb NM PHONE: 345-3115

OWNER: AMAFCA CONTACT: John Kelly

ADDRESS: 2600 Prospect NE Alb NM PHONE: 884-2215

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: N/A CONTACT:

ADDRESS: PHONE:

CONTRACTOR: N/A Completed Project CONTACT:

ADDRESS: PHONE:

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEER'S CERTIFICATION
X OTHER LOMR

PRE-DESIGN MEETING:

____ YES
X NO
____ COPY PROVIDED

JUN - 6 1995

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
X OTHER LOMR (SPECIFY)

DATE SUBMITTED: June 6, 1995

BY: John Kelly, AMAFCA
Field Engineer

Resource Technology, Inc.

2129 OSUNA ROAD NE, SUITE 200
ALBUQUERQUE, NEW MEXICO 87113
(505) 345-3115
FAX (505) 345-4132

May 8, 1995

Ms. Susan Calongne, P.E.
City of Albuquerque Floodplain Administrator
Public Works Department - Hydrology
P.O.Box 1293
Albuquerque, New Mexico 87103

Re: LOMR Submittal to FEMA for existing Lower North Domingo Baca Detention Dam RTI File No. 94-200-1

Dear Ms. Calongne:

The purpose of this letter is to request that you write a letter (required by FEMA as part of LOMR), which must be included with Form 1 (LOMR). After your review and approval of the LOMR, your letter (addressed to FEMA) should state that you have reviewed and approved the hydrology and floodplain revisions included in the LOMR. Also, you need to sign and date Page 4 of 4, Form 1 before you send this LOMR to FEMA.

Please make sure that you send the following items as a part of this LOMR:

1. Two volumes of "FEMA copy of the LOMR".
2. One map tube containing "As-Builts for Lower North Domingo Baca Detention Dam and Sediment Pond".
3. One copy of "Final Design Report for Lower North Domingo Baca Detention Dam", (Resource Technology Inc., May 1995).

Sincerely,

RESOURCE TECHNOLOGY, INC.

Donald S Dixon

Donald S. Dixon, P.E.

RR/hew

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

July 10, 1995

Bob Hendrix, Branch Chief
Federal Emergency Management Agency
Region VI, Federal Center
800 North Loop 288
Denton, Texas 76201-3698

RE: REQUEST FOR A LETTER OF MAP REVISION FOR THE LOWER NORTH DOMINGO BACA DETENTION DAM, CITY OF ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO, COMMUNITY PANEL NO.S 350002-0009 AND 350002-0010.

Dear Mr. Hendrix:

The purpose of this letter is to request a Letter of Map Revision for the above referenced project. The request consists of the construction of the Lower North Domingo Baca Detention Dam and Sediment Pond. These improvements were constructed by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) in 1995. No request was made to FEMA for a Conditional Letter of Map Revision.

Enclosed with this letter are the following:

- the application and certification forms for requesting revisions to the National Flood Insurance Program (NFIP) maps. Along with the forms is a detailed technical analysis and NFIP-related information presented in an organized fashion to facilitate an efficient review.
- The As-built construction plans for the above referenced project.

Our Community would greatly appreciate your expeditious cursory review and the forwarding of this document to Headquarters for their technical review. If you have any questions regarding this submittal, please do not hesitate to call me at (505) 768-2666.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: John Kelly, AMAFCA
Don Dixon, Resource Technology, Inc.
File

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

DESIGN FILE

FINAL DESIGN ANALYSIS REPORT

FOR

LOWER NORTH DOMINGO BACA DETENTION DAM

BY

RESOURCE TECHNOLOGY, INC.

May 1995

FOR

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

FINAL DESIGN ANALYSIS REPORT

FOR

LOWER NORTH DOMINGO BACA DETENTION DAM

BY

RESOURCE TECHNOLOGY, INC.

May 1995

FOR

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

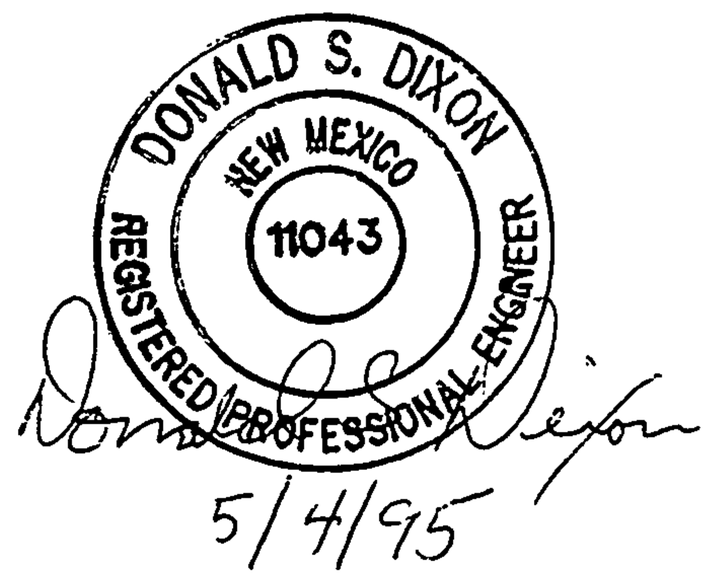


TABLE OF CONTENTS

Section 1.0 Introduction

Section 2.0 Dam Site Description and Design Parameters

Section 3.0 Sediment

Section 4.0 Reservoir Routings and Hydraulic Analysis

Section 5.0 Recommendations

Appendix A Sediment Study

Appendix B Revised Hydrology

Appendix C Miscellaneous Hydraulic Calculations

Appendix D Environmental Assessment

Appendix E Geotechnical Report

Appendix F Anaheim Outfall Pipe Supplemental Letter

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to summarize the final design analysis of the recently constructed detention dam located on the North Domingo Baca Arroyo at Louisiana Boulevard, between Carmel and Corona. The dam location went through several iterations and the present site is some 500 feet south of the proposed site presented in the **Preliminary Design Report for the Lower North Domingo Baca Arroyo Detention Dam** (RTI, 12/1992). Other dam design features were modified to reflect the new location and the revised inflow hydrology due to the diversion of the South Branch of the La Cueva Arroyo to the North Domingo Baca Dam, upstream from this site. Additionally, the hydrology routings through the dam reservoir reflect the "As-Built" condition based on field surveys. The design work was based on the findings and recommendations of the **"North and South Domingo Baca Arroyos and Paseo del Norte Corridor Drainage Management Plan"** (RTI, 12/1991). Other relevant design reports included the following:

- **Preliminary Analysis of Four Alternate Detention Dam Sites on the North Domingo Baca Arroyo** (RTI, 7/1992).
- **Study of Signal Avenue Dike Extension/La Cueva Arroyo Tributary Diversion** (RTI, 8/1993).
- **Design Analysis Report for La Cueva Diversion Channel** (RTI, 2/1994).
- **North Arroyo De Domingo Baca Detention Dam and La Cueva Dikes Engineering Report** (Wilson, 10/1980).

SECTION 2

2.0 DAM SITE DESCRIPTION AND DESIGN PARAMETERS

2.1 SITE DESCRIPTION

"The Preliminary Analysis of Four Alternate Detention Dam Sites on the North Domingo Baca Arroyo" (RTI, July 1992) recommended Option J2, a site located some 900 feet east of Louisiana Boulevard between Anaheim Avenue and Wilshire Avenue. Subsequent discussion by AMAFCA with property owners and other concerned parties resulted in a modification of this location. The new location was immediately adjacent to Louisiana Boulevard between Anaheim Avenue and Wilshire Avenue. However, as a result of additional engineering analysis, cost evaluation and property acquisition problems, the final site selected was located between Corona and Carmel on Louisiana (see Figure 2-1). A sediment pond at Holly redirects additional flows to the dam.

An apparent former unauthorized landfill site was located east of the dam. An environmental assessment was performed in July, 1993, concluding that "the site was not used as a general landfill but rather, it was (and still is) a site where construction debris, yard waste and general household trash has been disposed of illegally." A copy of this report is in the Appendix. Over 2,000 cubic yards of this material was hauled to an authorized landfill during the construction of the dam.

2.2 DESIGN PARAMETERS

The structure is an earthfill dam with a piped outlet to the 4- 4' x 9' CBC's at I-25 and a soil cement emergency spillway discharging onto Louisiana Boulevard. After discussions with City of Albuquerque Parks and Recreation officials it was decided to incorporate some features that would allow the facility to be used for future trails and recreational developments. These features included a 10-year pool for sediment and 10-year runoff that would leave the remaining reservoir volume available for other uses and an additional 10-foot setback to the required 20-foot setback to allow for benching the embankment if trail facilities are constructed. In addition, the City water utility requested a 100' x 100' well site at Corona and Louisiana, but this was abandoned when they ran into legal problems with the well.

Additional design criteria were as follows:

1. The facility was to be fully fenced.

2. Access roads were provided on both the north and south sides serving the dam crest road as well as the reservoir area. The recreation areas are ADA accessible.

3. Top (crest) width of 20 feet.

4. Side slopes of 3H:1V for dam embankment.

5. Emergency spillway was designed for full PMF.

6. Since Anaheim Avenue, an improved but unpaved road, was bisected by the dam reservoir, Corona Avenue was improved and paved to provide an alternate east-west route.

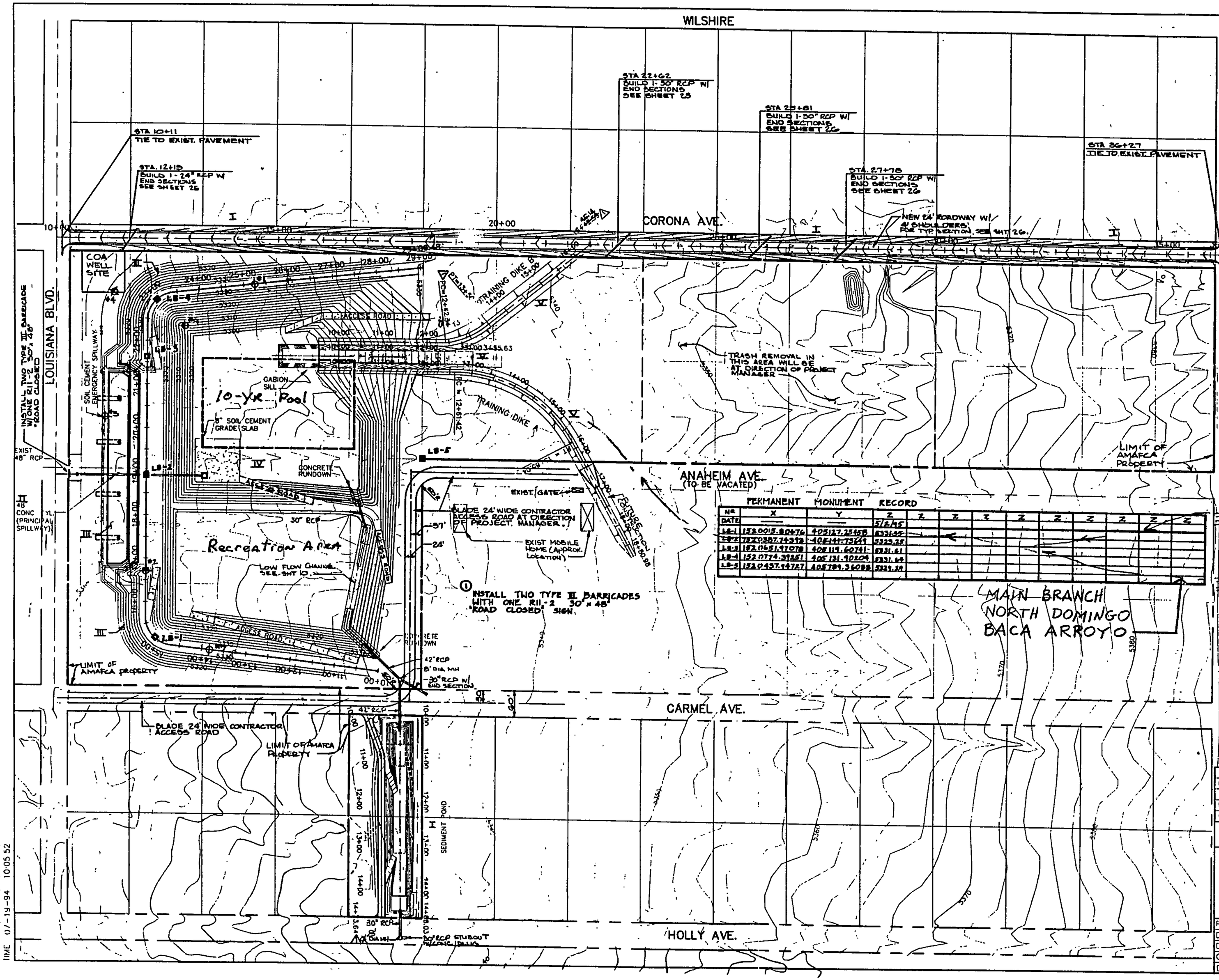
The following criteria pertaining to the design sediment volume were set by AMAFCA.

1. The dam and reservoir were designed based on runoff characteristics for future development conditions assuming full basin development.

2. Drainage areas contributing to the upstream North Domingo Baca Dam were excluded from the sediment wash load calculations since that facility will remove most of the sediment reaching it.

3. The design sediment storage volume in the reservoir was computed as four times the representative annual storm sediment volume plus the 100-year storm sediment volume.

4. The design sediment storage volume for the sediment pond was based on existing conditions flows and computed as four times the representative annual storm sediment volume plus the 100-year storm sediment volume.



PERMANENT MONUMENT RECORD

NO	X	Y	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
DATE			5/2/95									
LB-1	1520015.80476	405127.25488	5331.05									
LB-2	1520387.74572	405141.73149	5329.25									
LB-3	1520651.97078	405119.60781	5331.61									
LB-4	1520774.51251	405131.90209	5331.69									
LB-5	1520937.94727	405789.36088	5329.28									

NOTE:

- FOR RESERVOIR DETAILS, SEE SHEET 9.
- FOR RISER DETAILS, SEE SHEET 13
- FOR PRINCIPAL SPILLWAY DETAILS, SEE SHEET 11.
- FOR EMERGENCY SPILLWAY DETAILS, SEE SHEETS 20-24
- FOR TRAINING DIKE B, SEE SHEET 18.
- FOR TRAINING DIKE A, SEE SHEET 17
- FOR CHUTE DETAILS, SEE SHEET 14.
- FOR CORONA AVE., SEE SHEETS 25 & 26
- FOR FENCING AND REVEGETATION, SEE SHEET 27.
- FOR SEDIMENT POND, SEE SHEET 19.

CONSTRUCTION SEQUENCE

I SEDIMENT POND AND ROADWAY
II PRINCIPAL SPILLWAY PIPE
III EMBANKMENT AND EMERGENCY SPILLWAY
IV RESERVOIR EXCAVATION AND RISER
V CONCRETE CHUTE AND TRAINING DIKES

DONALD S. DIXON NEW MEXICO 7043 REGISTERED PROFESSIONAL ENGINEER
8/26/94

REVISIONS

NO	DATE	REMARKS	BY
1	8/23/94	ADDENDUM #1	DSD
1	9/19/95	FIELD ORDER # 14	REF

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
D R C Chair			WATER		
TRANS DEV			WASTE WATER		
HYDROLOGY			TRAF OPER		
OTHER			OTHER		

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

LOWER NORTH DOMINGO BACA DETENTION DAM

FIGURE 2-1a

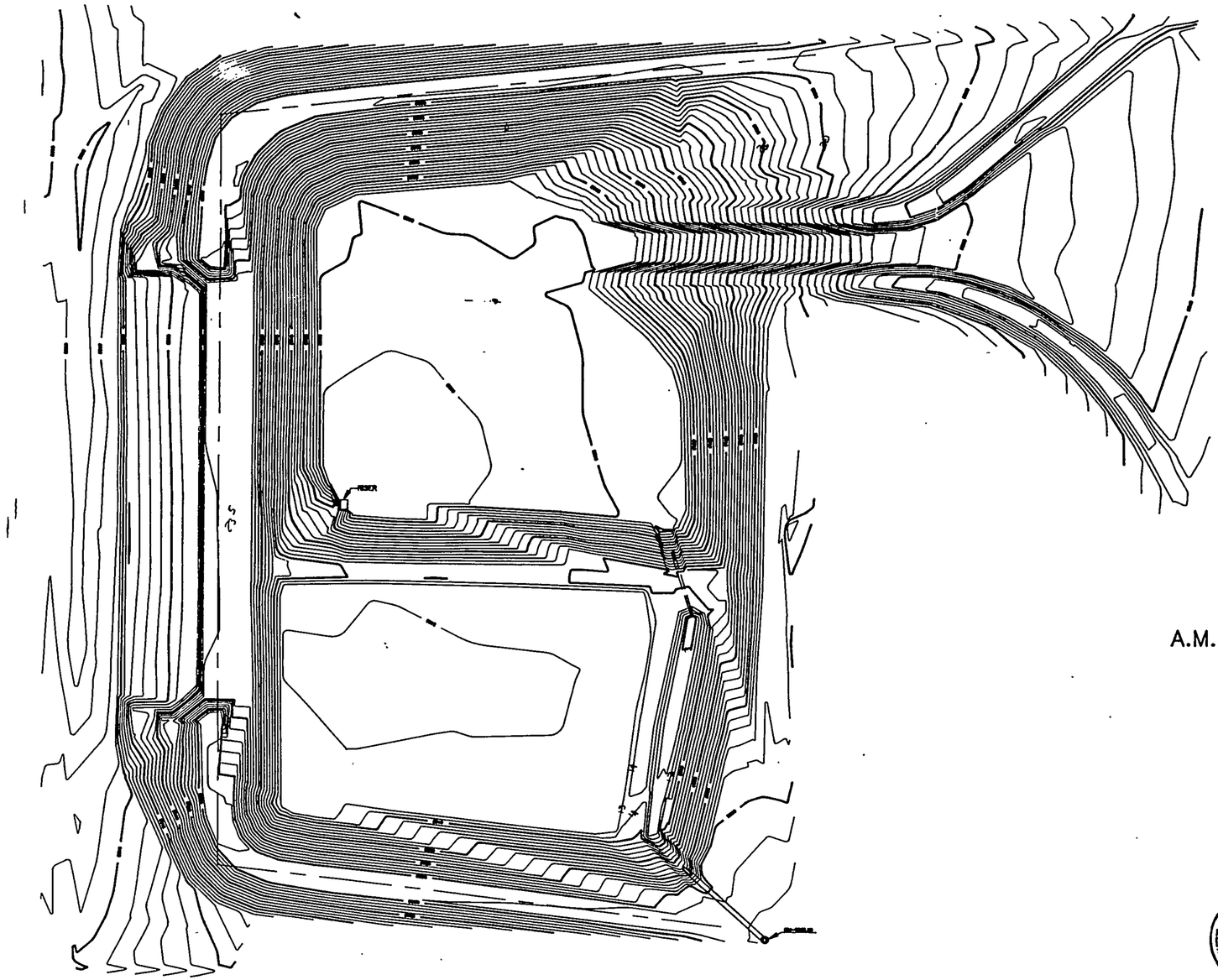
PROJECT LAYOUT

PROJECT NO.:	94-200
DESIGNED BY:	DSD
DRAWN BY:	PMT
CHECKED BY:	DSD
DATE:	08/94

Resource Technology, Inc.
CONSULTING & ENVIRONMENTAL SERVICES
CIVIL, ENVIRONMENTAL, WATER RESOURCES, PLANNING & MANAGEMENT
7770 BROADWAY NE - SUITE 200, ALBUQUERQUE, NEW MEXICO 87113
TELEPHONE - (505) 343-3115

SHEET 7 OF 41

DWG. H:\22/08\D\22708\DAM100
TIME 07-19-94 10:05:52



TOPOGRAPHIC SURVEY OF

A.M.A.F.C.A. PROJECT, DOMINGO BACA, PHASE II

MARCH, 1995

NOTES:

1. ELEVATION BASE IS THE CITY OF ALBUQUERQUE CONTROL SYSTEM.
2. PROJECT BENCH MARK IS 1-C15.
3. FIELD SURVEYS PERFORMED FROM 1992-1995.
4. PURPOSE OF THIS TOPOGRAPHIC SURVEY IS TO DETERMINE THE FINAL AS-BUILT CONSTRUCTION OF THE NORTH DOMINGO BACA ARROYO DAM

I, BERNARD W. SETTZ, JR., A REGISTERED PROFESSIONAL SURVEYOR IN THE STATE OF NEW MEXICO, DO HEREBY CERTIFY THE TOPOGRAPHIC SURVEY AS SHOWN HEREON IS BASED ON AN ACTUAL FIELD SURVEY AND MEETS THE MINIMUM SURVEY REQUIREMENTS FOR SURVEYING IN THE STATE OF NEW MEXICO ON THIS DATE.

03-28-95

BERNARD W. SETTZ, JR. N.M.P.S. NO. 6478 DATE

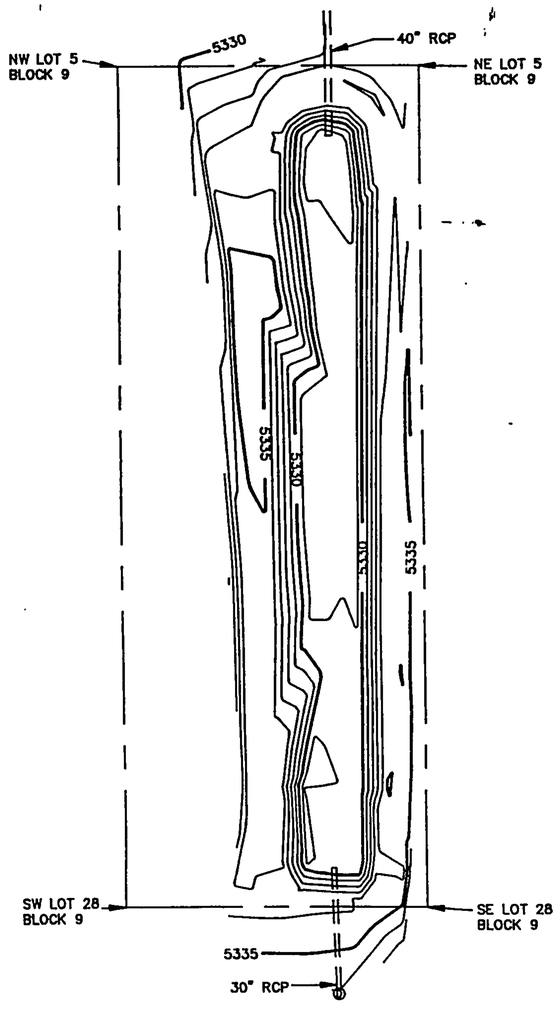
6478

SCALE: 1" = 60'

FIGURE 2-1b

AS–BUILT TOPOGRAPHIC SURVEY OF
SEDIMENT POND
NORTH DOMINGO BACA ARROYO DAM

FEBRUARY, 1995



NOTES:

1. ELEVATION BASE IS THE CITY OF ALBUQUERQUE CONTROL SYSTEM.
2. PROJECT BENCH MARK IS 1–C19.
3. FIELD SURVEYS PERFORMED FROM 1992–1995.
4. PURPOSE OF THIS TOPOGRAPHIC SURVEY IS TO DETERMINE FINAL AS–BUILT CONSTRUCTION OF SEDIMENT POND.

I, BERNARD W. SEITZ, JR., A REGISTERED PROFESSIONAL SURVEYOR IN THE STATE OF NEW MEXICO, DO HEREBY CERTIFY THE TOPOGRAPHIC SURVEY AS SHOWN HEREON IS BASED ON AN ACTUAL FIELD SURVEY AND MEETS THE MINIMUM SURVEY REQUIREMENTS FOR SURVEYING IN THE STATE OF NEW MEXICO ON THIS DATE.

BERNARD W. SEITZ, JR. N.M.P.S. NO. 8478 02-27-95 DATE

FIGURE 2—1c

SECTION 3

3.0 SEDIMENT TRANSPORT ANALYSIS

3.1 METHODOLOGY

The Modified Universal Soil Loss Equation (MUSLE) was used to calculate sediment yield for the contributing basins, excluding those that are routed through the upstream North Domingo Baca Dam. Sediment transport in the natural arroyo channels was evaluated using the Meyer-Peter, Muller (MPM) - Einstein approach. Detailed calculation and documentation is in the Appendix.

3.2 RESULTS

Based on the analysis referenced above the total sediment allowance for the dam reservoir was 14.7 ac-ft. This represented the 100-year sediment volume plus four times the average annual sediment volume. The small sediment pond to the south between Holly and Carmel had calculated sediment allowance of .36 ac-ft based on the same criteria.

SECTION 4

4.0 RESERVOIR ROUTINGS AND HYDRAULIC ANALYSIS

4.1 HYDROLOGY

The **Preliminary Design Report for the Lower North Domingo Baca Detention Dam** (RTI, 12-1992) presented reservoir routings based on the findings of the **North and South Domingo Baca Arroyos and Paseo and Paseo del Norte Corridor Drainage Management Plan** (RTI, 12-1991). Since that time, drainage improvements upstream from this project have been constructed that have an impact on downstream facilities. Therefore, the hydrology for this project has been updated to show the effects of the South Tributary of La Cueva Arroyo Diversion Channel and extensive subdivision development on this facility. Table 4.1 lists the basin designations, areas and land treatments of all upstream basins. Figures 4-2 and 4-3 show the La Cueva Diversion, North Domingo Baca Dam and Lower North Domingo Baca Dam basins. Table 4.2 lists 100-year peak flow rates at selected locations. Throughout the tables and text of this report existing conditions refers to conditions after the dam is constructed but prior to any proposed additional drainage improvements. Future conditions reflect full upstream development including other proposed drainage improvements.

4.2 PRINCIPAL SPILLWAY DESIGN

The primary design criterion for the principal spillway was to limit discharge at the 100-year reservoir stage so that the outfall pipe could be designed for non-pressurized flow conditions. Slopes on the 48" outfall pipe from the dam site to the I-25 box culverts range from 1.8 to 3.0%. This pipe, constructed in the winter of 1993-1994, was designed for a flow rate of 225 cfs. The maximum peak flow rate when the water surface is at the emergency spillway crest elevation is 210 cfs.

Wilson & Co., designed a Special Assessment District project (SAD 221) that addresses drainage problems in the mobile home park at Anaheim and San Pedro. It was their intent to discharge into the 48" diameter outlet pipe west of San Pedro. Their design was based on the assumption that in the future additional drainage from the mobile home park north of San Pedro would be conveyed to the 48" outfall pipe at San Pedro. These discharges as well as possible additional future local runoff discharges to the outfall pipe peak at 1.5 hours to 1.60 hours while the dam discharge peaks at 3.1 hours. At AMAFCA's request this potential additional capacity was evaluated more extensively and a supplemental letter addressing this issue is contained in the Appendix. Stubouts were provided at manholes to accommodate local inflows. The final 763 feet (from Ute St. to I-25) of the outfall pipe was up-sized to 54" to accommodate unanticipated future local flow interceptions.

The principal spillway consists of a concrete riser with a series of round openings at multiple elevations. A 40" diameter steel orifice plate at the entrance to the 48" outlet pipe provides the inlet control required to limit the discharge to the 225± cfs capacity of

the downstream pipe. The riser is open on the top and extends to within one foot of the 100-year water surface elevation. Stage vs. discharge curves are shown in Figure 4-1.

4.3 RESERVOIR ROUTINGS

Stage vs. storage curves were developed from Figure 2-2 , the "As-Built" Topographic Survey. Reservoir volume in the 10-year pool was reduced by 14.6 ac-ft to allow for sediment storage. The inlet control rating curve from Figure 4-1 was used for the 10- and 100-year hydrograph routings and the weir equation (with a weir coefficient of 3.0) was used for routing the PMF over the spillway. The results are shown in Table 4.3.

4.4 EMERGENCY SPILLWAY

SPILLWAY CONFIGURATIONS

The soil cement emergency spillway, shown in Figure 4-4, has an overall length of 440 ft. at the 100-year pool crest elevation of 5322.5 feet. At the full PMF flow rate of 30185 cfs for future conditions, the maximum stage is 5331.3 feet. The emergency spillway is located on the west face of the dam and consists of soil cement paved crest and a two-step 14-foot soil cement drop chute discharging to a stilling basin adjacent to Louisiana Boulevard. (See Figure 2-1). This design took advantage of research already done for Black Arroyo Dam and Denison Dam. Model studies by Dr. Richard Heggen of UNM demonstrated that chutes with 2 or 3 steps with sill blocks at the end of each apron provided the best performance. However, the final construction drawings indicated that the sills had been deleted, reportedly because of constructability considerations. The Lower North Domingo Baca Dam Emergency Spillway was designed and constructed without sill blocks.

4.5 INTERCEPTION OF ARROYO FLOWS

The "**North and South Domingo Baca Arroyos and Paseo del Norte Corridor Drainage Management Plan**" (RTI 12-1991) indicates future plans to intercept the major branches of the arroyo east of the dam and an improved channel along Anaheim to route these flows to the reservoir. Except for the sediment pond at Holly, these facilities are not under design as part of this project. Instead, training dikes extend north and east and south and east from a concrete lined entry chute to intercept the major branches of the North Domingo Baca Arroyo.

The function of the training dikes is to align flows with the entry chute that outfalls to the 10-year pool and thereby limits flows entering the reservoir at the recreation area to those coming from the sediment pond. While the lined chute was designed for the future condition 100-year flow, the earthen training dikes were not because the recreation area will be inundated by storms of a greater magnitude than the 10-year storm and even without the dikes the main branches of the arroyo will be intercepted by the dam. In addition, because City of Albuquerque Parks and General Services Department was unable to complete Right-of-Way acquisition in the area prior to construction of the Dam, Anaheim Avenue up to the dam had to be kept open. This prevented the completion of

the southern training dike. This will potentially allow a major branch of the North Domingo Baca Arroyo to enter the dam at the recreation area. Prior to facilities development for this area the southern dike must be extended to the south and east to insure that this arroyo is directed to the inlet chute. If permanent structures are to be built in the future between the training dikes and the dam reservoir, the dikes will have to be upgraded by providing erosion protection and/or additional freeboard to meet FEMA criteria before that area can be removed from the floodplain.

In addition, Corona Avenue between Wyoming and Louisiana is being raised to 1 to 2 feet and surfaced to insure that even if there are future avulsions on one of the major arroyos they will be prevented from bypassing the dam. A minor northern branch of the North Domingo Baca Arroyo will cross under Corona in two culverts east of the Training Dikes.

4.6 SEDIMENT POND/DIVERSION CHANNEL

The sediment pond located between Holly and Carmel, southeast of the dam, discharges to the dam through a 42" RCP. It intercepts one of the minor branches of the North Domingo Baca Arroyo and routes the flow to the dam. The 1.8 acre-foot capacity includes the .36 Ac-ft sediment storage requirement indicated in Section 3 for analysis point 937.99. The 42-inch culvert outlet creates a backwater in the pond that restricts the mean velocity to 1 ft/sec at the 100-year peak discharge of 121 cfs. With the full sediment allowance the 100-year water surface elevation in the "As-Built" pond is 5333.42 feet while the emergency spillway crest is at 5333.20 feet. The pond is partially lined with soil cement slope paving to reduce maintenance requirements. Stubouts at Holly and Carmel have been provided to allow for future storm drain connections if required.

Table 4.1

BASIN CHARACTERISTICS

BASIN ID	HYDROLOGIC CONDITION	BASIN AREA (mi²)	LAND TREATMENT (%)				Tp (hrs)
			A	B	C	D	
900	Future Existing	0.4410 0.4410	0 0	57 57	18 18	25 25	.284
901	Future Existing	0.1180 0.1180	8 8	67 67	0 0	25 25	.133
902	Future Existing	0.3270 0.3270	20 35	10 15	50 30	20 20	.258
910.1	Future Existing	0.1180 0.1180	20 35	37 0	18 0	35 10	.250
910.2	Future Existing	0.1260 0.1260	10 85	37 0	18 5	35 10	.133
910.3	Future Existing	0.0550 0.0550	38 90	37 0	22 5	17 5	.133
912.1	Future Existing	0.1150 0.1150	38 95	23 0	22 5	17 5	.133
912.2	Future Existing	0.0710 0.0550	38 84	23 0	22 8	17 8	.133
914.3	Future Existing	0.0580 0.0580	38 95	23 0	22 5	17 5	.133
914.1	Future Existing	0.1270 0.0820	38 70	23 0	22 25	17 5	.133
402.5	Future Existing	0.0240 ---	0	30	20	50	.133
402.6	Future Existing	0.026 ---	0	30	20	50	.133
408.1	Future Existing	--- 0.019	80	0	10	10	.150
915.2	Future Existing	--- 0.028	95	0	0	5	.133
915.1	Future Existing	0.026 0.009	0 80	30 0	20 10	50 10	.133

Table 4.1 cont.

BASIN ID	HYDROLOGIC CONDITION	BASIN AREA (mi^2)	LAND TREATMENT (%)				Tp (hrs)
			A	B	C	D	
103.2*	Future Existing	0.0543 0.0543	25 25	5 30	40 25	30 20	.143
103.4*	Future Existing	0.0925 0.0925	25 55	5 0	40 35	30 10	.136
103.5*	Future Existing	0.0693 0.0693	20 20	5 0	40 45	35 35	.133
104.1*	Future Existing	0.1318 0.1318	33 50	15 10	22 15	30 25	.133
104.2*	Future Existing	0.0929 0.0929	38 84	20 0	22 8	20 8	.160
103.0*	Future Existing	0.1760 0.1760	6 6	41 41	27 27	26 26	.147
103.6*	Future Existing	0.0684 0.0684	58 58	8 8	6 6	28 28	.137
103.1*	Future Existing	0.2680 0.2680	27 27	33 33	15 15	25 25	.233
105.1*	Future Existing	0.1171 0.1171	38 70	20 0	22 15	20 15	.133
105.2*	Future Existing	0.1034 0.1034	38 84	20 0	22 8	20 8	.133
914.2	Future Existing	0.035 0.035	38 50	23 0	22 50	17 0	.133
919.1	Future Existing	0.079 0.079	0 50	34 5	16 40	50 5	.133
919.2	Future Existing	0.051 0.051	0 65	34 5	16 25	50 5	.133
913.1	Future Existing	0.049 0.049	38 95	23 0	22 0	17 5	.133
917.0	Future Existing	0.050 0.050	0 90	34 0	16 0	50 10	.133
913.2	Future Existing	0.017 0.017	38 80	23 0	22 10	17 10	.133

* Basins part of Diversion from La Cueva Arroyo Basin.

Table 4.1 cont.

BASIN ID	HYDROLOGIC CONDITION	BASIN AREA (mi^2)	LAND TREATMENT (%)				Tp (hrs)
			A	B	C	D	
911.0*	Future Existing	0.0640 ---	0	44	22	34	.170
103.3*	Future Existing	0.03320 0.03320	25 45	5 20	40 25	30 10	.148
918.0	Future Existing	0.114 0.114	0 80	34 0	16 10	50 10	.260
921.1	Future Existing	0.046 0.046	0 80	34 0	16 10	50 10	.140
921.2	Future Existing	0.099 0.085	0 80	34 0	16 10	50 10	.133
922	Future Existing	0.021 0.021	0 80	34 0	16 10	50 10	.133
923.0	Future Existing	0.013 0.013	0 20	34 20	16 10	50 50	.133
920.0	Future Existing	0.105 0.105	0 80	34 0	16 10	50 10	.160
926.0	Future Existing	0.117 0.098	0 50	30 10	15 25	55 15	.133
924	Future Existing	0.064 0.064	0 70	27 0	13 15	60 15	.133
925	Future Existing	0.077 0.077	0 20	29 20	8 10	63 50	.190
930	Future Existing	0.135 0.148	0 40	31 10	15 20	54 30	.133
929	Future Existing	0.024 0.024	0 0	15 15	20 20	65 65	.133
931	Future Existing	0.040 0.040	0 0	45 50	5 5	50 45	.260

* Basins part of Diversion from La Cueva Arroyo Basin.

Table 4.1 cont.

BASIN ID	HYDROLOGIC CONDITION	BASIN AREA (mi^2)	LAND TREATMENT (%)				Tp (hrs)
			A	B	C	D	
932	Future Existing	0.078 0.078	0 10	20 5	10 45	70 40	.133
935.1	Future Existing	0.097 0.0184	0 85	34 0	16 10	50 5	.133
935.2	Future Existing	--- 0.0786	85	0	10	5	.133
933	Future Existing	0.041 ---	0	34	16	50	.133
933.1	Future Existing	--- 0.021	85	0	10	5	.133
933.2	Future Existing	--- 0.040	85	0	10	5	.133
934	Future Existing	0.065 0.065	0 80	34 0	16 10	50 10	.133
937	Future Existing	0.012 0.044	0 80	34 0	16 10	50 10	.133
421.4	Future Existing	--- 0.012	85	0	5	10	.133

TABLE 4-2

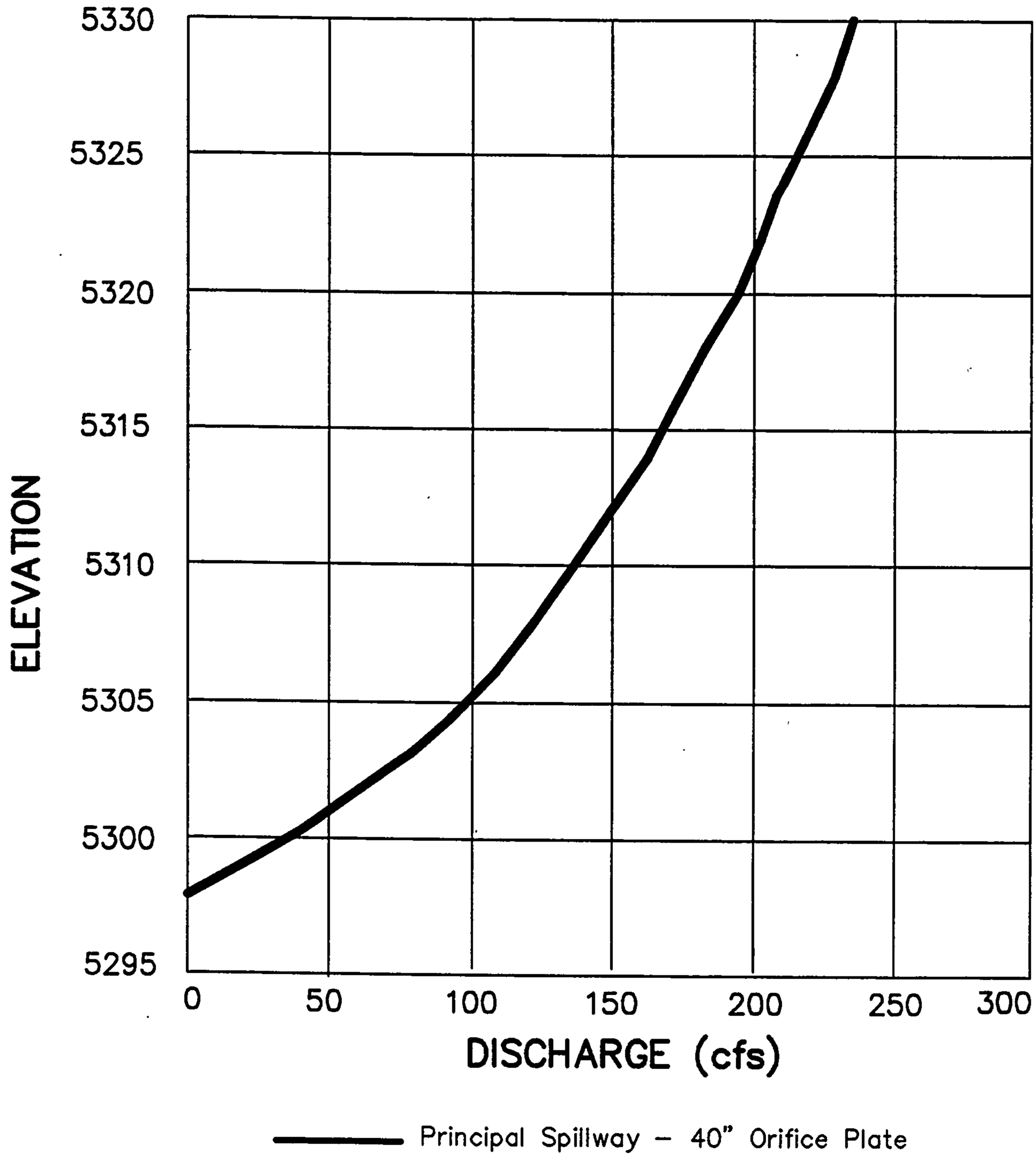
PEAK FLOW RATES AT SELECTED LOCATIONS

LOCATION	AREA (sq mi)	Q_{100} (cfs)	ANALYSIS POINT
Wyoming, between Anaheim and Carmel			
Existing	3.863	715	930.99
Future	3.957	2289	930.99
Wyoming, between Corona and Anaheim			
Existing	.078	192	932.0
Future	.078	218	932.0
Wyoming and Wilshire			
Existing	.060	55	931.99
Future	.064	116	931.99
Holly, between Wyoming and Louisiana			
Existing	.160	122	937.99
Future	.012	30	937.00
Corona, between Wyoming and Wilshire			
Existing	.140	180	931.99 + 934 (3/4)
Future	.049	123	934.19
Louisiana and Wilshire			
Existing	.146	120	933.99
Future	.041	103	933.00
San Pedro and Wilshire			
Existing	.073	74	938.99
Future	.077	184	938.99
San Pedro, between Wilshire and Corona			
Existing	.148	113	939.29
Future	.072	190	939.29
San Pedro, between Carmel and Anaheim			
Existing	.091	93	943.29
Future	.091	246	940.19
I-25 CBC at Anaheim			
Overland			
Existing	.117	143	943.18
Future	.125	333	943.99
Pipe			
Existing	4.220	177	930.89
Future	4.287	208	940.87
I-25 8-48" at Corona			
Existing	.274	277	942.99
Future	.225	547	942.99

TABLE 4.3

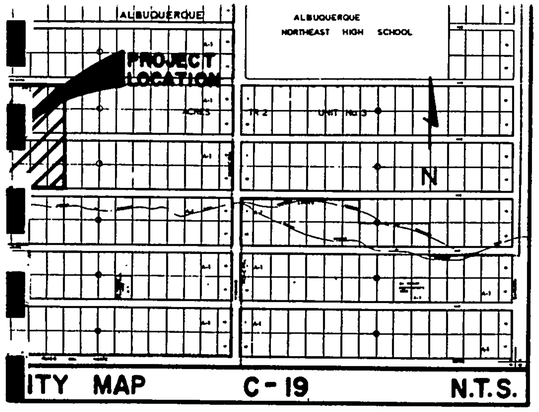
DAM ROUTINGS

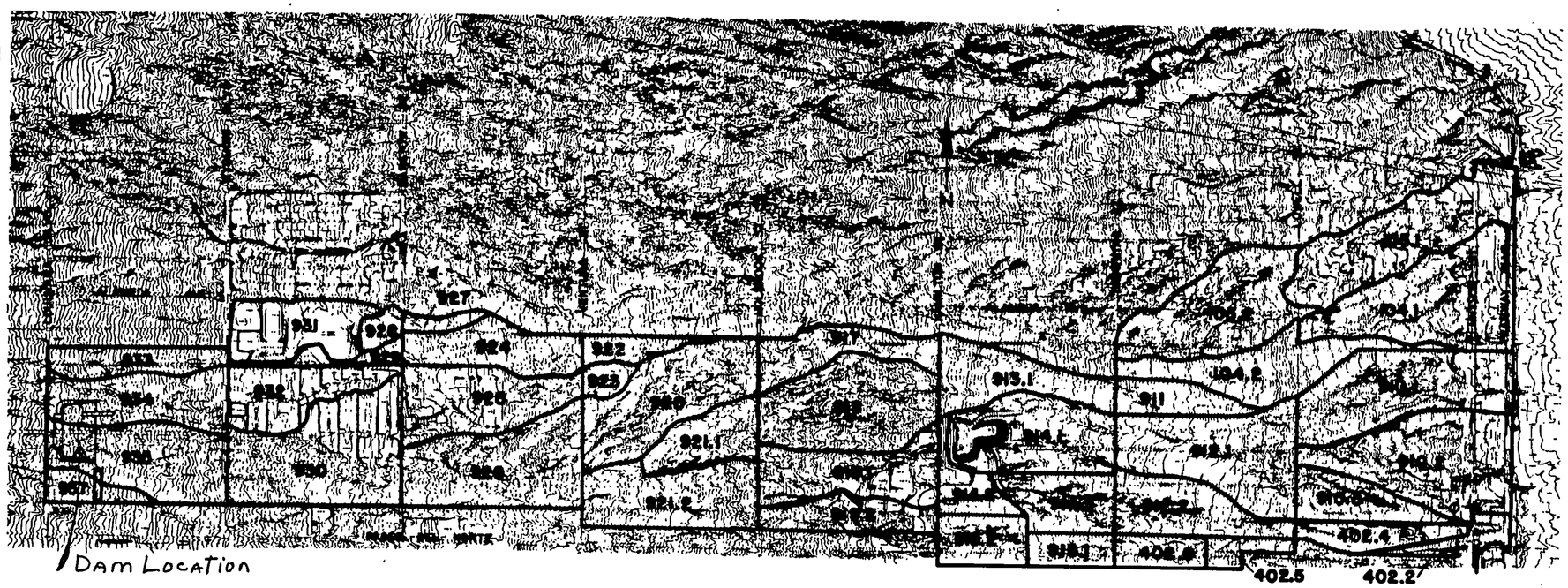
	AREA (mi^2)	PEAK FLOW IN (cfs)	PEAK FLOW OUT (cfs)	RUNOFF VOLUME (Ac-ft)	STORAGE VOLUME (Ac-ft)	MAXIMUM STAGE (ft)
Existing Condition						
100-year with sediment	4.220	957	177	294	60.5	5316.9
Future Condition						
100-year without sediment	4.257	2930	198	394	110	5321.2
100-year with sediment	4.257	2930	203	394	108	5322.3
PMF without sediment	3.826	30184	30019	2438	199	5331.3



Principal Spillway Rating Curve

FIGURE 4–1





DRAINAGE AREA MAP

SCALE ~~1" = 1000'~~ N.T.S.

REVISIONS

NO.	DATE	REMARKS	BY

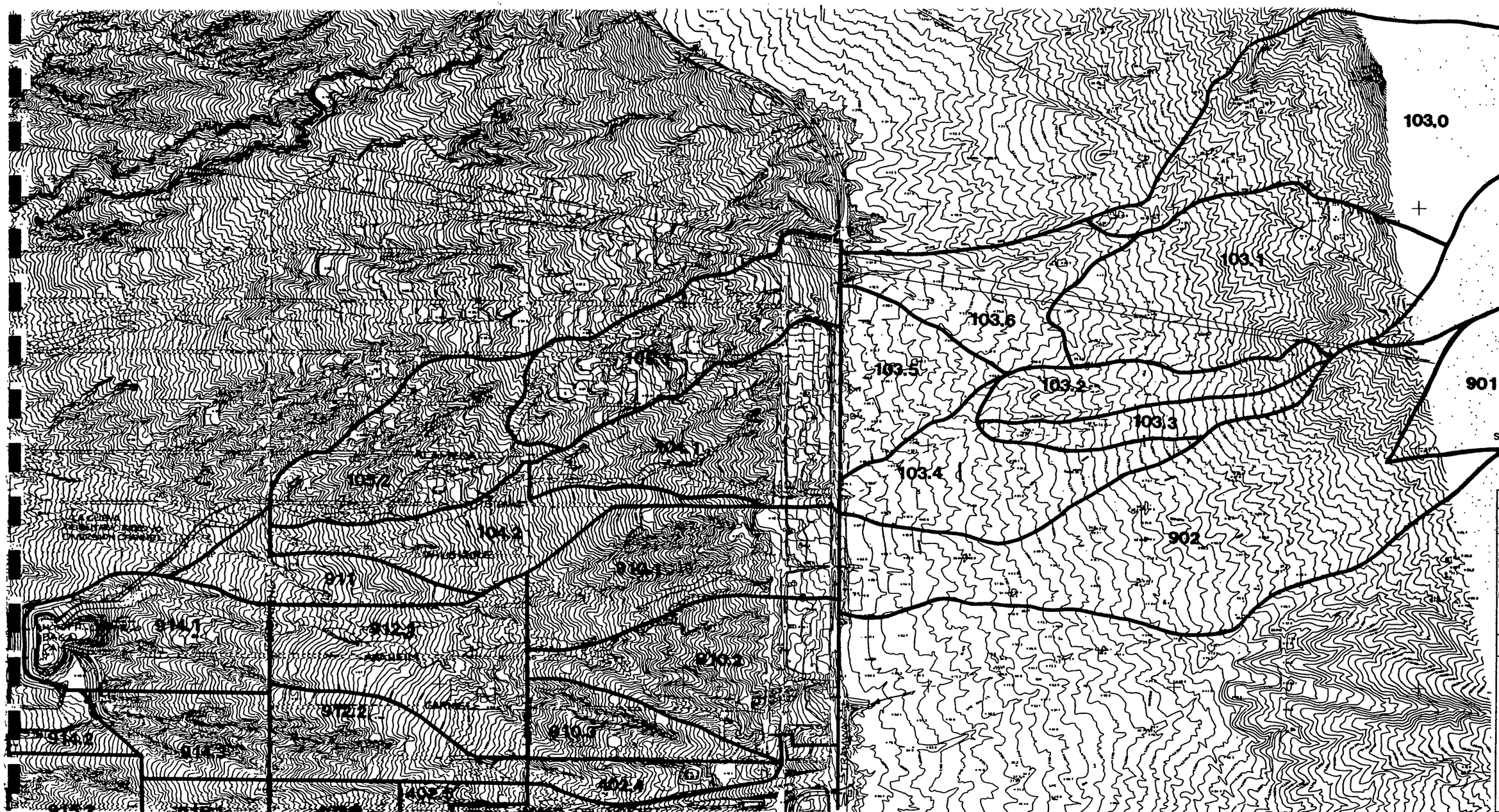
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

LOWER NORTH DOMINGO BACA DETENTION DAM

DRAINAGE BASIN MAP

PROJECT NO.:	92-277
DESIGNED BY:	DSD
DRAWN BY:	GCC
CHECKED BY:	DSD

Resource Technology, Inc.



SO. LA CUEVA ARROYO BASINS	DOMINGO BACA ARROYO BASINS
103.0	901
103.1	902
103.2	910.1
103.4	910.2
103.5	910.3
103.6	402.4
104.1	402.5
104.2	402.6
105.2	912.1
105.1	912.2
	914.1
	914.2
	914.3
	915.1
	915.2
	911
	900

FIGURE 1-2

ENGINEERS SEAL

NO.	DATE	REMARKS	BY
		REVISIONS	

DESIGNED BY DSD DATE 01/84
DRAWN BY PMT DATE 01/84
CHECKED BY DSD DATE 01/84

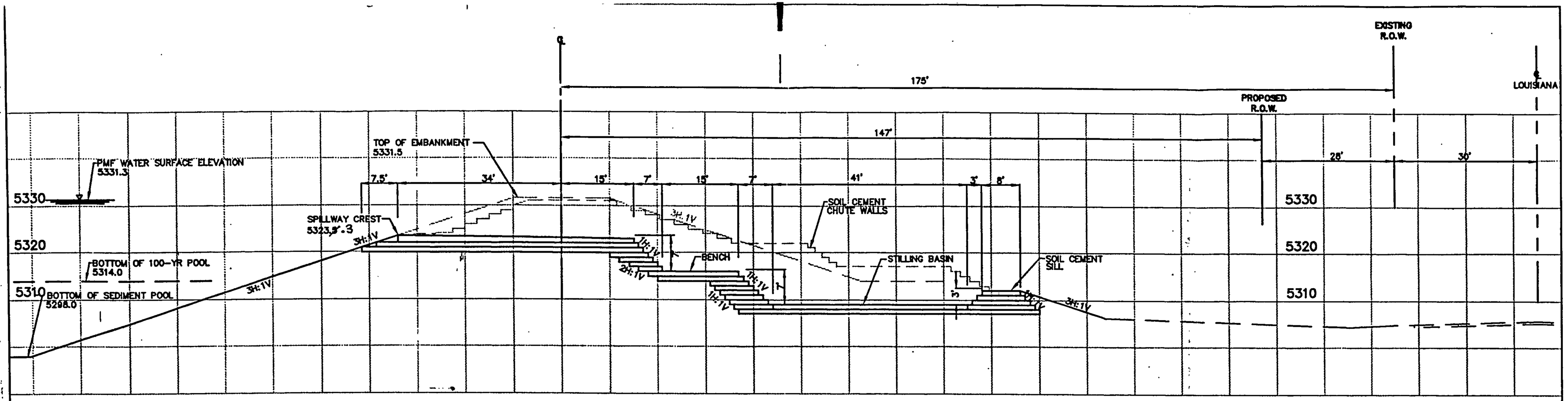
Resource Technology, Inc.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
CIVIL, ENVIRONMENTAL, WATER RESOURCES, RECREATION, & PLANNING
8120 BYRAM NE - SUITE 200, ALBUQUERQUE, NEW MEXICO 87113
TELEPHONE - (505) 343 - 3113

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

TITLE:
LA CUEVA ARROYO DIVERSION CHANNEL
AND
NORTH DOMINGO BACA DETENTION DAM
DRAINAGE BASIN MAP

(FOR INFORMATION ONLY)

PROJECT NO. 82-277 | MAP C-21 | SHEET 3 OF



STA. 19+05

GRAPHIC SCALE

0 10 20 30

REVISIONS			
NO.	DATE	REMARKS	BY

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

EMERGENCY SPILLWAY PROFILE

FIGURE 4-4

PROJECT NO.:	Resource Technology, Inc.
DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
DATE:	SHEET OF

SECTION 5

5.0 RECOMMENDATIONS

5.1 WYOMING STORM DRAIN

The Drainage Management Plan recommended a major storm drain in Wyoming Boulevard that would discharge to the Lower North Domingo Baca Dam. This storm drain would serve as a collector for some of the minor arroyo flows passing north of the dam. Without it some flows will bypass the dam or have to be picked up by a culvert crossing on Corona referred to in Section 4.5. AMAFCA has attempted to interest private parties owning property that would be favorably impacted this storm drain to make financial commitments so that it could be designed and constructed as part of this project. This project is currently under design. When construction is complete a Letter of Map Revision (LOMR) will have to be submitted to FEMA in order to remove downstream areas from the floodplain.

5.2 RIGHT-OF-WAY ISSUES

Both the City of Albuquerque Parks and General Services Department and AMAFCA are acquiring property in Blocks 7 and 8. Between them they will eventually own both of these entire blocks. At that time, in order to avoid the cost of providing an alternate connection for Anaheim Avenue to either Corona or Carmel, the Anaheim Right-of-Way from Louisiana to Wyoming should be vacated.

5.3 REVEGETATION

There are several unique revegetation measures undertaken as part of this project. These included seed selection as well as the use of treated sludge as a soil amendment. In order to determine the effectiveness of these measures, a monitoring program should be initiated.

5.4 FUTURE FACILITIES

In addition to the Wyoming Storm Drain referred to in 5.1 above, there are several other major facilities recommended in the **North and South Domingo Baca Arroyos and Paseo del Norte Drainage Management Plan** that impact this general area. These include an improved channel for the main branch of the North Domingo Baca Arroyo from Wyoming Boulevard to the Lower North Domingo Baca Dam and a bridge crossing over the arroyo at Wyoming Boulevard. Given the rapid pace of development in the area it would be highly desirable to develop plans for these facilities, at least through the preliminary design phase, so that related structures that might be built by private developers can be tied into the over-all scheme of things without expensive alterations in the future. This would also benefit the City of Albuquerque Parks and General Services Department in their planning efforts on the adjoining properties.

APPENDIX A

Sediment Study

SECTION 3

3.0 SEDIMENT YIELD, TRANSPORT AND TOTAL DESIGN SEDIMENT VOLUME

3.1 GENERAL

In order to allow for the deposition of the sediment volume within the reservoir, the total sediment inflow volume from the contributing watershed (upstream from the proposed dam site and downstream from the existing North Domingo Baca Dam) was computed. The purpose for computing the sediment volume is to design the reservoir, diversion channels and sediment basins with adequate capacity for the sediment volume.

This section presents the criteria, assumptions, data and computational procedures for determining the sediment yield (wash load) and sediment transport (bed material load) which together equal the total sediment load expected to be delivered at the dam site, diversion channels and sediment basins.

3.2 DATA AND ASSUMPTIONS

The following information and assumptions were obtained from the "Management Plan".

1. The sub-basin drainage areas and the 2-, 10- and 100-yr. total basin future development condition hydrographs and associated runoff results as determined with the AHYMO991 model.

The same information was also obtained for existing development conditions (excluding the hydrographs).

2. The percent of Land Treatment Types for most of the sub-basins of concern are as follows:

	Percent of Land Treatment Type			
	A	B	C	D
Future Development Conditions	0	34	16	50
Existing Development Conditions	88	0	7	5

3. Part of the HEC-2 model for the main North Domingo Baca Arroyo - between Wyoming Blvd. and Louisiana Blvd.

4. Soil gradation analysis for the main North Domingo Baca Arroyo from a soil sample (Sample #11) taken in the arroyo bed approximately 1,100 feet west of Wyoming Blvd.

3.3 HYDROLOGIC ANALYSIS

<u>Objective</u>

Interpolate the 5-, 25- and 50-yr. hydrographs from the 2-, 10- and 100-yr. hydrographs obtained from the Management Plan.

Procedure

1. Plot the 2-, 10- and 100-yr. peak discharges and runoff volumes on Log-Pearson Type III frequency distribution graphing paper and obtain the corresponding 5-, 25- and 50-yr. values. Figures 3-1 and 3-2 illustrate the Log-Pearson Type III graphs used to obtain the required information. Table 3-1.1 summarizes the information from Figures 3-1 and 3-2.

2. Compute the 5-yr. hydrograph ordinates by applying a peak discharge ratio to each ordinate of the 10-yr. hydrograph; the peak discharge ratio equals:

5-yr. Qp / 10-yr. Qp = 1100 cfs / 1241 cfs = 0.886

Similarly, compute the 25-yr. and 50-yr. hydrographs by applying a peak discharge ratio to each ordinate of the 100-yr. hydrograph; these peak discharge ratios equal:

25-yr. Qp / 100-yr. Qp = 1800 cfs / 2626 cfs = 0.685
50-yr. Qp / 100-yr. Qp = 2100 cfs / 2626 cfs = 0.799

Figure 3-3 illustrates the modeled 2-, 10- and 100-yr. hydrographs and the interpolated 5-, 25- and 50-yr. hydrographs. The modeled hydrographs were printed at a 6-minute interval (0.1 hours) and therefore the interpolated hydrographs were computed at the same interval. All hydrographs were computed for a total duration of 29.9 hours at which time the discharge ranges from 0.5 cfs for the 2-yr. hydrograph to 2.6 cfs for the 100-yr. hydrograph.

Plates 1A and 1B (located in pocket at back of the report) illustrate the drainage basins, and locations of analysis points between Wyoming Blvd. and Interstate 25 (I-25). Table 3-1.2 contains the existing and future condition runoff results (Management Plan) for all analysis points shown on Plates 1A and 1B. The future conditions reflect full watershed development with the proposed dam and the existing conditions represent existing watershed development without the proposed dam.

3.4 SEDIMENT YIELD ANALYSIS

The Modified Universal Soil Loss Equation (MUSLE) was applied to the drainage area contributing to the proposed dam (excluding the drainage area contributing to the existing North Domingo Baca Dam or its discharge) to compute the sediment yield for existing and future development conditions which are described in the Management Plan.

The MUSLE Equation is :

$$Ys = Rw * K * LS * C * P$$

where :

Ys = sediment yield (wash load) in tons

Rw = storm runoff energy factor

K = soil erodibility factor

LS = topographic factor representing the slope length and gradient

C = cover management factor

P = support practice factor

The definition, assumptions and determination of each factor are presented as follows:

<u>Rw - Storm Runoff Energy Factor</u>

$$Rw = a * (V * q_p)^b$$

where :

a and b are coefficients; values of 95 for a and 0.56 for b are assumed for Albuquerque (RCI, March 1992). However, " a" was increased by a factor of 3 as previously determined for Borrega Arroyo Watershed by RCI (June, 1992) and La Cueva Tributary Arroyo Watershed by RCE (August, 1992).

V = the runoff volume in acre-feet

q_p = the peak discharge in cfs

Drainage Basin Size-

The AHYMO991 results (peak discharge and runoff volume) for the inflow to the proposed dam from the main North Domingo Baca Arroyo (from the Management Plan) include the runoff from the existing North Domingo Baca Dam and consequently are invalid for the drainage area criterion in this analysis. However, the individual sub-basin runoff results from the Management Plan are valid. Therefore, the following procedure and assumptions were implemented to determine the required runoff volume and peak discharge for use in the Rw factor and to compute the total sediment yield for the drainage area excluding the area draining to the existing North Domingo Baca Dam.

Objective, Procedure and Assumptions -

The objective is to determine the runoff volume and peak discharge for the 2-, 5-, 10-, 25-, 50- and 100-yr. storms for an average sub-basin contributing to the proposed dam. The sediment yield from the average sub-basin will then be increased by a drainage area ratio to account for each drainage sub-basin contributing to the proposed dam.

The procedure is as follows:

Four sub-basins from the Management Plan were selected to be used to determine the runoff characteristics for an average sub-basin. Figure 3-4 is the future condition drainage basins map obtained from the Management Plan. The existing condition internal basin boundaries are the same as the future condition basins (Figure 3-4). The 2-, 10- and 100-yr. peak discharge and runoff volume results using AHYMO991 were obtained for basins 920, 926, 930 and 926, 930 and 935. (Only four sub-basins were selected to simplify computation of an average for each of the return periods.)

Tables 3-2 and 3-3 summarize the existing and future condition 2-, 10- and 100-yr. AHYMO991 model results for these basins. The 2- and 10-yr. factors to be used later for flow proportioning were determined as ratios of the 2-yr. average / 100-yr. average values and 10-yr. average / 100-yr. average values from basins 920, 926, 930 and 935 as previously determined. Tables 3-2 and 3-3 include the computation of average conditions.

The 100-yr. AHYMO991 model results for all sub-basins contributing to the proposed dam were obtained (excluding those contributing to the North Domingo Baca Dam) and an average drainage area, runoff depth, runoff volume and peak discharge was determined. Tables 3-4 and 3-5 contain the sub-basin AHYMO991 results and the averages for existing and future conditions, respectively. The average 2- and 10-yr. runoff results for all sub-basins were computed by applying the previously computed runoff depth ratio and peak discharge ratio to the 100-yr. averages for all sub-basins.

These factors were applied to the 100-yr average values (as determined from all sub-basins) to obtain the average 2- and 10-yr runoff volumes and peak discharges from all sub-basins. Table 3-6 contains the factors used and resulting 2-, 10- and 100-yr. runoff volumes and peak discharges for the average sub-basin.

The 5-, 25- and 50-yr average runoff volumes and peak discharges were obtained by plotting the 2-, 10- and 100-yr. average values on Log-Pearson Type III frequency distribution graphing paper. Figures 3-5 and 3-6 contain these plots for existing and future development conditions, respectively. Table 3-7 summarizes the average runoff volumes and peak discharges for all return periods which were used to compute the Rw factor for each return period

for the average sub-basin. The peak discharge and runoff volumes and computed Rw factor are presented in Tables 3-8.1 and 3-8.2, for existing development conditions, and in Tables 3-9.1 and 3-9.2 for future development conditions.

K- Soil Erodibility Factor

The soil erodibility factor is a function of the soil particle size distribution, percent organic matter, the soil structure and the permeability. The areal extent of each soil type was determined by plotting the drainage sub-basin on a copy of the SCS soils maps (SCS, June 1977) as shown on Figure 3-7. The soil survey also listed sieve analysis data for most of the soil types and the average value within each given range was used to plot gradation curves as shown on Figures 3-8 and 3-9. The percentage of clay was not given and was assumed to be negligible.

The percent organic matter was assumed to be 1 percent. The soil structure code (used in soil classification) was assumed to be 2 or 3 depending on the description (very general) given for that soil type (SCS, June 1977). A range was given for the permeability (SCS, June 1977) and these values are also listed on Figures 3-8 and 3-9.

The formula to compute K is as follows:

$$K = 2.1*M^{1.14}*(10^{-4})*(12-\%ORG)+3.25*(STRUCT-2)+2.5*(PERM-3)$$

where :

M = %Silt (0.1 to 0.022 mm) * (100-%Clay)
% ORG = Percent Organic Matter
STRUCT = Soil Structure
PERM = Permeability

K was computed for each soil type and a weighted K was computed based on the percentage of each soil type present. Table 3-8.1 presents the percent of each soil type, the computed K for that soil type and the weighted K.

However, the Soil Conservation Service recently published (10-13-92) a list of physical and chemical properties of soils which includes K factors for the soils of concern. The K factor is 0.15 for each soil in the drainage area and this value was applied in the MUSLE Equation.

LS - Topographic Factor

The LS factor is a combination of the length (L) and slope (S) computed with the following formula:

$$LS = (L/72.6)^m * (0.065 + 0.0454 * S + 0.0065 * S^2) \text{ where :}$$

$$m = 0.3 \text{ if } S <= 3\%$$

m = 0.4 if S = 4%

m = 0.5 if S >= 5%

L = slope length from the top of the basin to the point where the flow becomes concentrated into a gully, arroyo or watercourse.

In North Albuquerque Acres, the typical lot length is 240 feet at which time the flow is assumed to be concentrated in a street or gully. The typical slope was determined to be 5 percent, therefore m = 0.5 and LS = 0.83.

C - Cover and Management Factor

The cover and management factor is computed based on three factors which include:

C1 - Percent cover by canopy (assumed 20% and an average fall height of 0.5 meters)

C2 - Percent of soil surface covered by mulch (assumed 20%)

C3 - Root network in topsoil relative to good rotation meadow (assumed 20% in grass).

These three values were estimated from the graphs shown on Figure 3-10. The equation to compute C is as follows:

C = C1 * C2 * C3

C = 0.83 * 0.58 * 0.43 = 0.21

However, a value of 0.24 was obtained from U.S. Department of Agriculture, Agriculture Handbook 537, December, 1978, assuming no appreciable canopy and 20 percent ground cover. The C value of 0.24 was applied in the MUSLE Equation.

P - Support Practice Factor

By definition, factor P in the MUSLE is the ratio of soil loss with a specific support practice to the corresponding loss with up-and-down slope culture. The watershed has no support practice and therefore P is assumed to be 1.0.

Reduction for percent Imperviousness

The MUSLE Equation does not account for reduction in sediment yield as a result of imperviousness or noncontributing areas such as lawns or parks (grass).

Therefore, the results from the MUSLE Equation were reduced by the fractions of the Land Treatment B (assumed to be grass-lawns) and D (assumed to be streets, concrete and roofs). As shown on Table 3-8.1, the percentages of Land Treatments B and D are 0 and 5 respectfully for existing development conditions. Consequently, 95% of the watershed will be available to contribute to the sediment yield. As shown on Table 3-9.1, the percentages of Land Treatments B and D are 34 and 50, respectively for future development conditions. Consequently, only 16% of the watershed will be available to contribute to the sediment yield.

MUSLE Results

As discussed previously, the MUSLE Equation was applied to the average sub-basin and its peak discharge and runoff volume corresponding to the average sub-basin area. The results from the MUSLE Equation were then increased by a drainage area ratio to compute the sediment yield from the total drainage area. The ratio of the total drainage area (1.33 sq mi) to the average sub-basin drainage area (0.0532 sq mi) is 25 for future development conditions. The equivalent ratio for existing development conditions is (1.552 sq. mi./0.0575 sq. mi.) = 27.

Tables 3-8.1 and 3-8.2 summarize the input data and MUSLE factors Table 3-8.2 contains the MUSLE factors and results for each of the return periods for existing development conditions. Tables 3-9.1 and 3-9.2 contain similar information for future development conditions.

3.5 HYDRAULIC ANALYSIS - FUTURE CONDITION HYDROLOGY, EXISTING ARROYO

A hydraulic analysis of the main North Domingo Baca Arroyo was completed using the HEC-2 model prepared for the Management Plan. The arroyo hydraulics were necessary to complete the sediment transport analysis and to quantify the bed material load. The HEC-2 cross-sections used in the model represent the existing unlined arroyo, but the peak discharges modeled represent full watershed development conditions. The existing condition peak discharges are much smaller than future condition peak discharges (see Table 3-1.1) and were not modeled because the future condition peak discharges will produce much larger velocities, flow top widths and other hydraulic parameters. The larger hydraulic parameters for future conditions will produce a much greater sediment yield than existing conditions. Therefore, the existing condition peak discharges were not modeled.

The reach of concern is illustrated on Figure 3-11 and is located between Wyoming Blvd. and the existing house where the arroyo is diverted to Anaheim Ave. Wyoming Blvd. will act as a grade control and also control flow conditions where the flow overtops the road. Therefore, the selected reach was divided into two subreaches labeled Subreach 1 (upstream portion) and Subreach 2

(downstream portion). Three cross sections at 200 ft. intervals are located in each subreach. The cross sections in Subreach 1 are generally wide and those cross sections in Subreach 2 are generally narrow relative to Subreach 1.

The objective of the HEC-2 analysis is to determine an average velocity, hydraulic depth and top width for each subreach based on the computed values at the cross sections within each subreach for a range of discharges. The peak discharges for the 2-, 5-, 10-, 25-, 50- and 100-yr. storms were modeled in addition to two smaller discharges which were 100 cfs. and 1/2 of the 2-yr. peak discharge (390 cfs) in order to have hydraulic information for lower flows. Manning's Roughness Coefficient - "n" was assumed to be 0.035 in the overbanks and 0.03 within the banks.

Table 3-10 lists the peak discharges, and the average velocity, hydraulic depth and top width per discharge per subreach. Appendix A lists the HEC-2 summary table and arroyo cross-section plots. Figures 3-12, 3-13 and 3-14 are plots of the average velocity, average hydraulic depth and average top width per discharge for Subreach 1. Figures 3-15, 3-16 and 3-17 are plots of the average velocity, average hydraulic depth and average top width per discharge for Subreach 2.

A least squares regression equation was developed for each parameter to compute the value of each parameter as a function of discharge. The regression equations are listed on Figures 3-12 through 3-17; these equations were developed to more accurately predict the sediment transport for any given discharge.

3.6 SEDIMENT TRANSPORT ANALYSIS - FUTURE CONDITION HYDROLOGY, EXISTING ARROYO

Six unit sediment transport equations were evaluated to determine the equation which would be most applicable for the sediment gradation and hydraulic parameters involved in the analysis. Four of the equations were based on the Meyer-Peter, Muller (MPM) - Einstein approach derived by Simons, Li & Associates (3 of the equations) and Resource Consultants & Engineers, Inc. (1 equation). These four equations are a power function which have the general form of:

$$qs = a * Y^b * V^c$$

where:

Y = hydraulic depth (ft)
V = velocity (ft/sec)

The fifth equation was determined by RTI by interpolating for the terms a, b and c based on the values of each for two of the previously derived equations.

The sixth unit sediment transport equation is the Zeller Fullerton Equation which has the following form:

$$qs = 0.0064 * n^{1.77} * V^{4.32} * G^{0.45} / (Y^{0.3} * D_{50}^{0.61})$$

where :

n = Manning's roughness coefficient

V = velocity (ft./sec)

G = gradation coefficient = $0.5* (D_{84}/D_{50} + D_{50}/D_{16})$

Y = hydraulic depth (ft.)

D_{50} = median sediment diameter (1.1 mm)
D_{84} = 84% finer sediment (3.2 mm)
D_{16} = 16% finer sediment (0.41 mm)

Figure 3-8 shows the gradation analysis for the main North Domingo Baca Arroyo from sample No. 11 which was taken in the arroyo bed approximately 1,100 feet west of Wyoming Blvd.

The parameters for the six equations are summarized on Table 3-11 which also compares the qs results from each equation for Y = 1.26ft and V = 10.1 ft/sec. which are the average values for Subreach 2.

Equation No. 3 was recently developed (RCE, July 1992) for a tributary of the La Cueva Arroyo which is near and most similar to the North Baca Arroyo as compared to the other equations. Therefore equation No. 3 was assumed to be the standard by which all other equations were to be compared and judged for applicability.

The supporting information (if any) for each equation is presented in Appendix B. The terms for equations no 1 and 2 were significantly different than those for Equation No. 3; and, consequently, were eliminated from further consideration. The qs computed from Equation No. 6 (0.394 cfs/ft) is approximately the same as that from Equation No. 3 (0.435 cfs/ft).

The values for a, b and c in Equation No. 4 were obtained by interpolating for a D_{50} of 1.1 mm and G of 2.8 between values of D_{50} and G presented in Simons, Li & Assoc. (June 1981). The interpolation will be discussed in more detail in a subsequent paragraph. The result from Equation No. 4 (0.436 cfs/ft) is very similar to that from Equation No. 3 (0.435 cfs/ft) which is assumed to be the standard.

Assuming that Equation No. 3 is the standard, the following procedure was developed to adjust terms a, b and c in Equation No. 3 for the actual D_{50} and G for the study reach of the North Domingo Baca Arroyo to obtain Equation No. 5

Procedure to Adjust a, b and c

A range of values for a, b and c corresponding to various sediment D_{50} size and gradation coefficient (G) was obtained from Table No. 5c in "Design Guidelines and Criteria, Channels and Hydraulic Structures on Sandy Soil" (Simons, Li & Assoc, 1981). Figures 3-18, 3-19 and 3-20 illustrate the relationships among a, b and c, respectively as obtained from Simons, Li & Assoc., 1981.

The relationships among a, b and c for a D_{50} of 1 mm to 2 mm and a G of 2 to 4 are assumed to be linear. Therefore, the following adjustments were applied.

Table 3-12 also describes the procedure used to adjust the values of a, b and c.

Figures 3-18, 3-19 and 3-20 which show values (for terms a,b and c) for D_{50} of 1 mm and 2 mm and varying values of G were used to interpolate values of a, b and c for the specific D_{50} (1.1 mm) and G (2.80) for the North Domingo Baca Arroyo and also for the D_{50} (1.9 mm) and G 3.08) for La Cueva Arroyo. The resulting values are listed in Table 3-12 in Columns 1 and 2.

The differences in the values of a, b and c between North Domingo Baca Arroyo and a, b and c of La Cueva Arroyo were computed and are listed in Table 3-12, Column 3.

The values of a, b and c as determined for La Cueva Arroyo by RCE (July 1992) are assumed to be the standard for comparison or adjustment of other equations. These values are listed in Table 3-12, Column 4.

The net difference as observed between columns 1 and 2 was applied to column 4 (either added or subtracted) in the same trend direction as observed between columns 1 and 2 (from larger sediment (column 2) to smaller sediment (column 1)). The adjusted values are listed in Table 3-12, column 5, for the North Domingo Baca Arroyo. These values were assumed to represent the appropriate adjustment to the La Cueva Arroyo values (RCE, July 1992) for the smaller sediment size in the North Domingo Baca Arroyo. The graphical solution is shown on Figures 3-18, 3-19 and 3-20 for a, b and c, respectively.

As shown in Table 3-11, qs computed from Equation No. 5 is 0.524 cfs/ft which is about 1.2 times the value of 0.435 cfs/ft obtained from Equation No. 3.

The increase seems reasonable because the actual sediment size (D_{50} = 1.1 mm, G = 2.80) for the North Domingo Baca Arroyo at the sample location is less than the La Cueva tributary arroyo sample (D_{50} = 1.9 mm, G= 3.08) and therefore should be more easily transported. Equation No. 5 was adopted as the unit sediment transport equation for the study reach of the North Domingo Baca Arroyo as follows:

$$qs = 6.5 * 10^{-5} Y^{-0.1} V^{3.9}$$

Sediment Transport Computation Procedure

The entire hydrograph (for each return period) with a duration of 29.9 hours at 6 minute intervals was used in the sediment transport analysis.

The unit sediment transport rate was computed for each hydrograph ordinate using the unit sediment transport equation with the corresponding hydraulic depth and velocity for that discharge using the previously derived regression equations for hydraulic depth and velocity.

The hydraulic depth and velocity regression equations were developed for both subreaches 1 and 2 because the hydraulics of each reach were different. Therefore, the unit sediment transport equations for each subreach are as follows:

The general form of the equation is:

$$q_s = 6.5*10^{-5} * Y^{-0.1} * V^{3.9}$$

for Subreach 1:

$$Y = 0.049 * Q^{0.399}$$

$$V = 0.912 * Q^{0.292}$$

for Subreach 2:

$$Y = 0.053 * Q^{0.412}$$

$$V = 1.430 * Q^{0.254}$$

The total sediment transport capacity was computed as the unit sediment transport capacity for each hydrograph ordinate multiplied by the time interval and the top width for each discharge. The top width was computed as a function of each discharge using the previously derived regression equation for top width.

The top width regression equations were developed for subreaches 1 and 2 because the hydraulics of each reach were different. Therefore, the total sediment transport equations for each subreach are as follows:

The general form of the equation is:

Q_s (cu ft) = q_s (cfs/ft) * 360 (sec) * Top width (ft)

note - 360 sec = 6 minutes = 0.1 hours

for Subreach 1:

$$Q_s = q_s * 360 * 35.711 * Q^{0.252}$$

for Subreach 2:

$$Q_s = q_s * 360 * 13.652 * Q^{0.332}$$

The total sediment transported was computed as the sum of the Q_s computed for each ordinate on the hydrograph for each return period storm, for subreaches 1 and 2.

Appendix B contains the spreadsheets containing the hydrographs and sediment transport computations as previously described.

Colby's Adjustment

The total sediment load was adjusted using Colby's procedure which increases the sediment transport capacity due to the wash load. The equation is as follows:

$$qs = (1 + (k_1 * k_2 - 1) * k_3) * qs_1$$

where :

k_1, k_2, k_3 are obtained from the nomograph reproduced in Figure 3-21.

qs_1 is the unadjusted unit sediment discharge.

The required assumptions include water temperature at 60° F. The washload (computed with the MUSLE) concentration was computed in units of parts per million (ppm) for each return period for each reach. The D_{50} = 1.1 mm and is also required. The hydraulic depth at each peak discharge per return period was used in all cases. Table 3-13 summarizes the Colby adjustment factor for each subreach and return period.

3.7 SEDIMENT AGGRADATION/DEGRADATION ANALYSIS - FUTURE CONDITION HYDROLOGY, EXISTING ARROYO

The comparison of transport capacities between subreaches 1 and 2 indicates that Subreach 2 will carry more sediment than will be delivered by Subreach 1. Therefore, Subreach 2 will degrade by an amount equal to the difference between its transport capacity and the transport capacity of Subreach 1. Table 3-14 summarizes the sediment transport capacities and aggradation/degradation volumes per subreach per return period. The unadjusted sediment volumes are presented for comparison to the adjusted volumes (adjusted for wash load by Colby's procedure).

3.8 TOTAL SEDIMENT LOAD - FUTURE CONDITION HYDROLOGY, EXISTING ARROYO

The total sediment load equals the sediment yield (wash load computed by use of the MUSLE) and the bed material load (computed from the sediment transport analysis). Table 3-15 summarizes the sediment yield volumes, sediment transport volumes and the total sediment load volumes for each return period. These values apply at the proposed reservoir site. The computed sediment transport is from the main arroyo only; however, the washload is from the total watershed contributing area including all tributaries to the main arroyo upstream from the proposed dam.

These totals do not include sediment transported (bed material load) from arroyos which are tributary to the reservoir but not affecting the main arroyo. This computation is described in a subsequent paragraph.

The sediment storage criterion for the proposed dam site is to allow for four times the representative annual storm sediment volume plus the 100-yr storm sediment volume. The representative annual storm considers the probability of storms of various return periods occurring in a given year. The equation to determine the representative annual storm (Ym) sediment volume is as follows (RCI, March 1992):

$$Ym = .015(Qs\ 100\text{-}yr) + .015(Qs\ 50\text{-}yr) + .04(Qs\ 25\text{-}yr) + .08(Qs\ 10\text{-}yr) + .2(Qs\ 5\text{-}yr) + .4(Qs\ 2\text{-}yr)$$

Table 3-15 also lists the representative storm sediment volume, four times the representative annual storm sediment volume, the 100-yr. storm sediment volume and the total sediment storage volume required which equals 14.27 ac-ft excluding sediment transported from the arroyos directly tributary to the reservoir.

However, to account for the sediment transported from these tributary arroyos into the proposed reservoir, the following simplified procedure was implemented.

The total sediment load from a tributary arroyo was computed assuming that the ratio of its total sediment load to its 100-yr. runoff volume is proportional to the total sediment load of the main North Domingo Baca Arroyo to its 100-yr. runoff volume.

Only two significant tributary arroyos drain into the proposed dam and are located in sub-basins 933 and 934 as shown on Figure 3-4. However, this analysis was based on future development criteria in the Management Plan which includes diversion of these arroyos at Wyoming Blvd. to the main North Domingo Baca Arroyo (see Figure 3-4). Therefore the tributary flow remaining in sub-basins 933 and 934 will be relatively small.

The computation of the tributary arroyos total sediment load is as follows:

Sub-Basin 933-

$$\frac{14.27 \text{ ac-ft}}{316 \text{ ac-ft}} * (2.236 \text{ ac-ft}) = 0.100 \text{ ac-ft of sediment}$$

Sub-Basin 934-

$$\frac{14.27 \text{ ac-ft}}{316 \text{ ac-ft}} * (6.458) = 0.292 \text{ ac-ft of sediment}$$

Therefore, the total design sediment volume from these two tributaries = 0.39 ac-ft. The results represent four times the representative annual storm plus the 100-yr. storm total sediment volume.

The total design sediment volume equals the sum of the sediment volume from the two tributary arroyos (0.39 ac-ft) and the main North Domingo Baca arroyo (14.27 ac-ft) for a total of 14.7 ac-ft. Table 3-15 summarizes the quantities of sediment yield, sediment transport and total design sediment volume.

3.9 TOTAL SEDIMENT LOAD - EXISTING CONDITIONS

The total sediment load that will enter the dam, diversion channels and sediment basins was estimated for existing development conditions based on the future development condition results. The total sediment load for existing development conditions was estimated using the following procedure.

The total sediment load from an arroyo directly tributary to the reservoir was computed assuming that the ratio of its total sediment load to its 100-yr. runoff volume is the same as the total sediment load of the main North Domingo Baca Arroyo to its 100-yr. runoff volume.

To be conservative, the computations were completed assuming the total drainage area of each arroyo or basin at Louisiana Blvd. Plate 1 (included in pocket at back of this report) illustrates the location of the Drainage Basins and Analysis Points at Louisiana Blvd. Table 3-16 is a summary of the quantities and results of the total sediment yield for existing conditions at Louisiana Blvd. These results represent four times the representative annual storm plus the 100-yr. storm total sediment volume.

3.10 REFERENCES

Resource Consultants & Engineers, Inc., "Pilot Course Sediment and Erosion Design Guide", Albuquerque Metropolitan Arroyo Flood Control Authority, Albuquerque, New Mexico, August 12-13, 1992.

Resource Consultants & Engineers, Inc., "Draft Prudent Line Analysis LaCueva Arroyo and Watershed Between Tennyson Street and Modesto Avenue", Albuquerque Metropolitan Arroyo Flood Control Authority, Albuquerque, New Mexico, July, 1992.

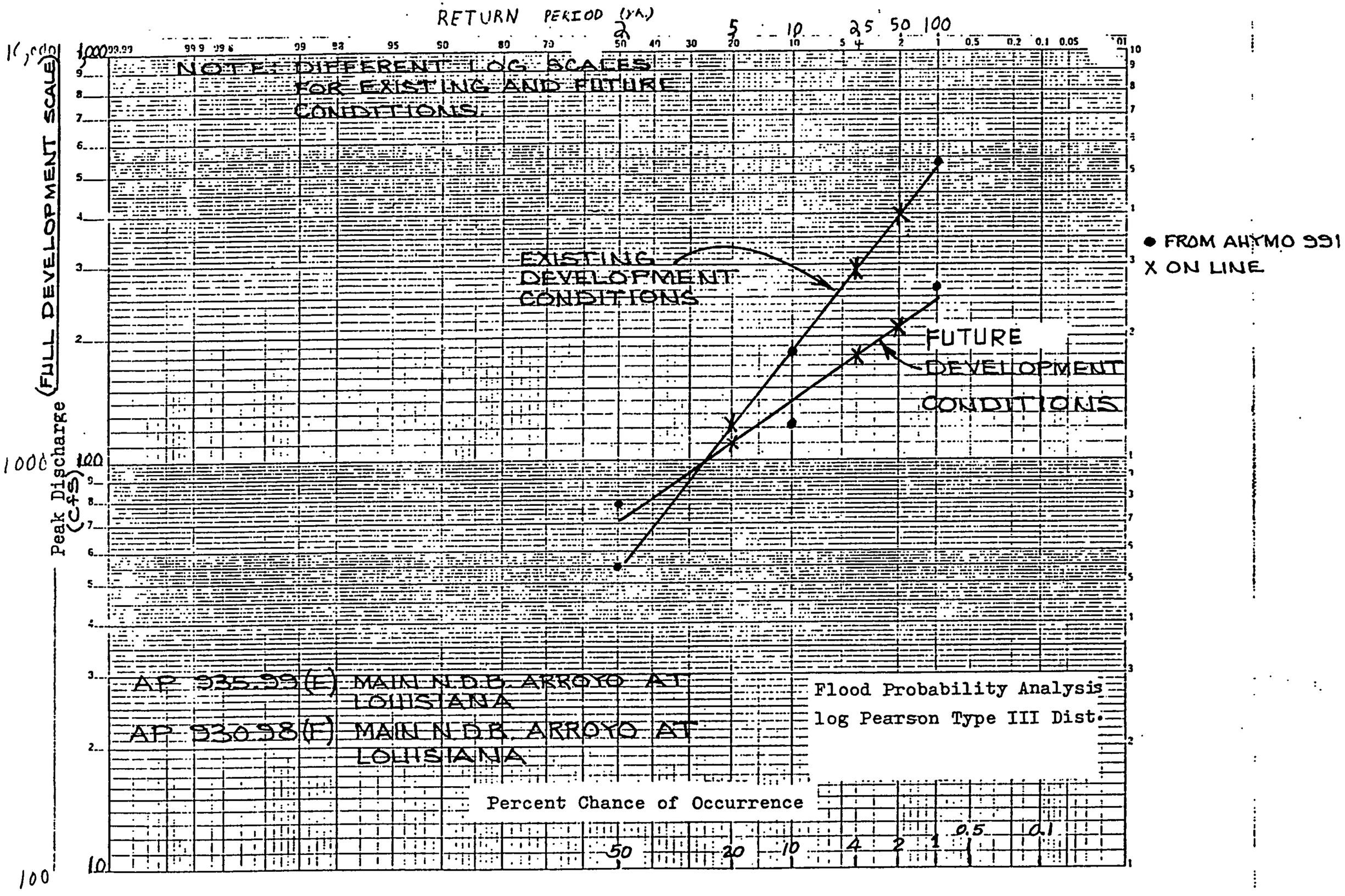
Resource Consultants, Inc., "Borrega Diversion Sediment Issues Floodplain Study for AMAFCA", Bohannan-Huston, Inc., Albuquerque, New Mexico, June, 1992.

Resource Consultants, Inc., "Draft Sediment and Erosion Design Guide", Albuquerque Metropolitan Arroyo Flood Control Authority, Albuquerque, New Mexico, March, 1992.

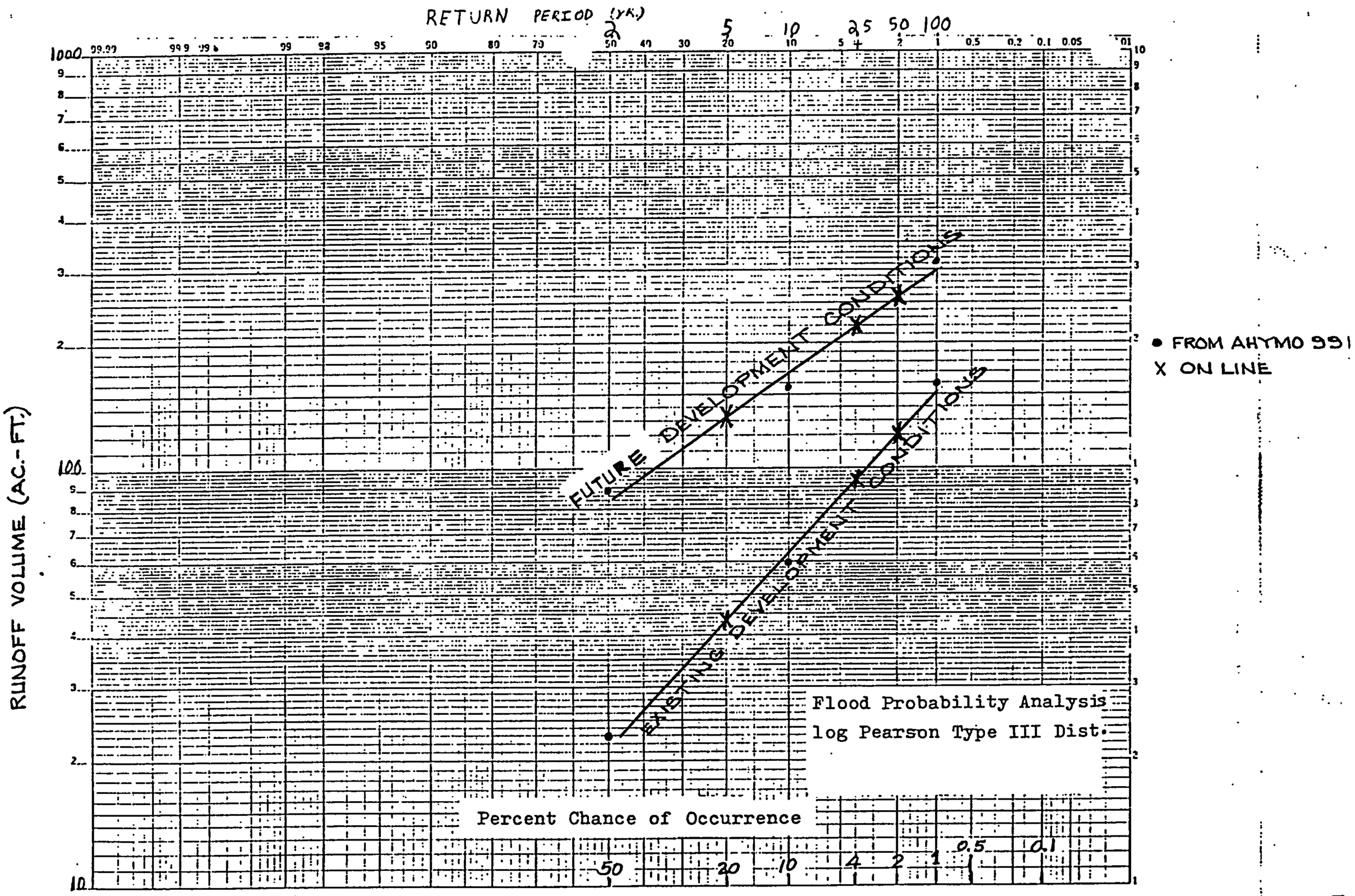
Simons, Li & Assoc., "Erosion Study to Determine Boundaries for Adjacent Development - Calabacillas Arroyo, Bernalillo County, New Mexico", Albuquerque Metropolitan Arroyo Flood Control Authority, Albuquerque, New Mexico, April, 1983.

Simons, Li & Assoc., " Engineering Analysis of Fluvial Systems", 1982.

Simons, Li & Assoc., "Design Guidelines and Criteria for Channels and Hydraulic Structures on Sandy Soils", Urban Drainage and Flood Control District Denver, Colorado and the City of Aurora, Colorado, June 1981.

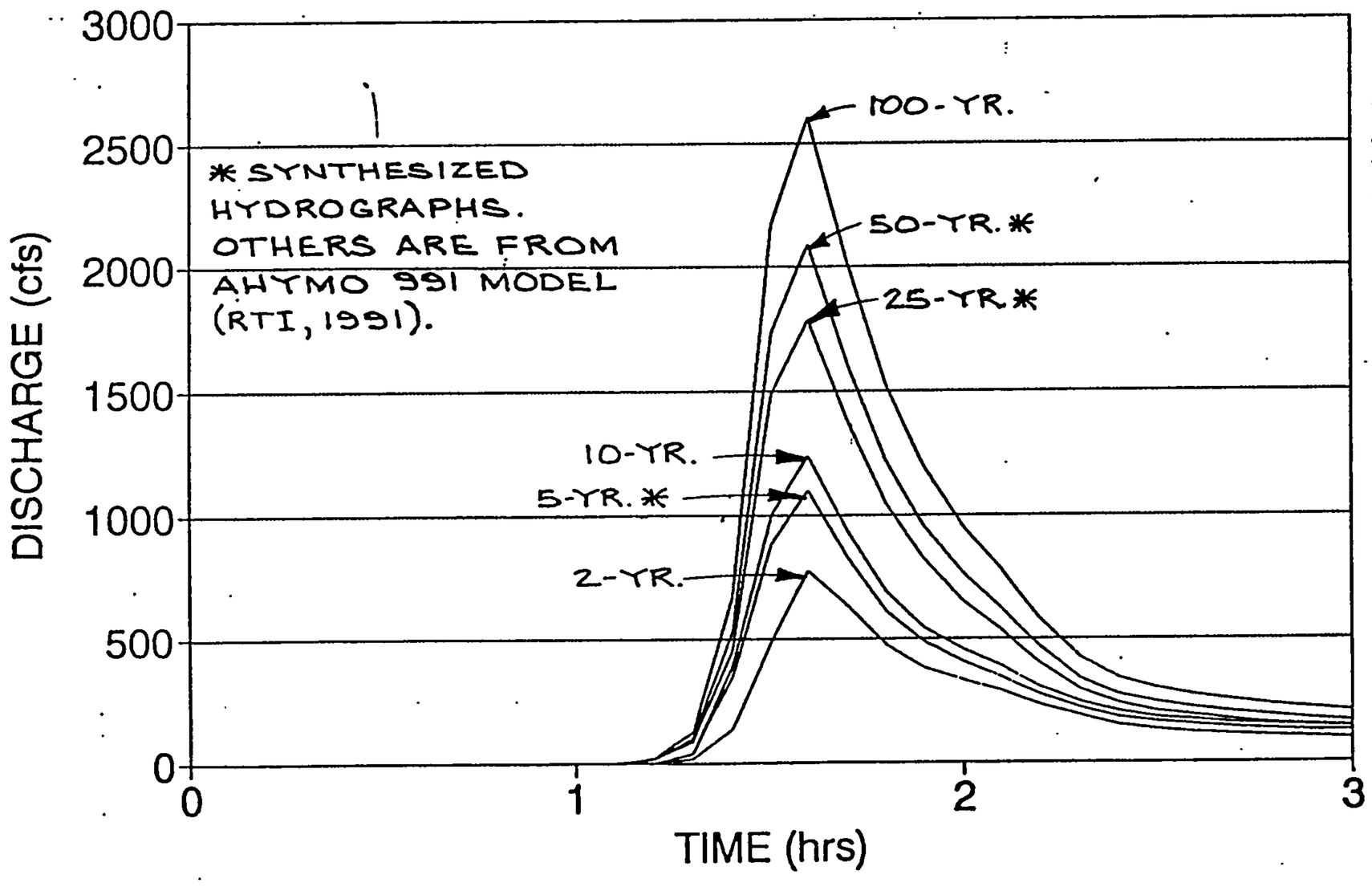


Peak Discharge Flood Probability Main North Domingo Baca Arroyo at Louisiana



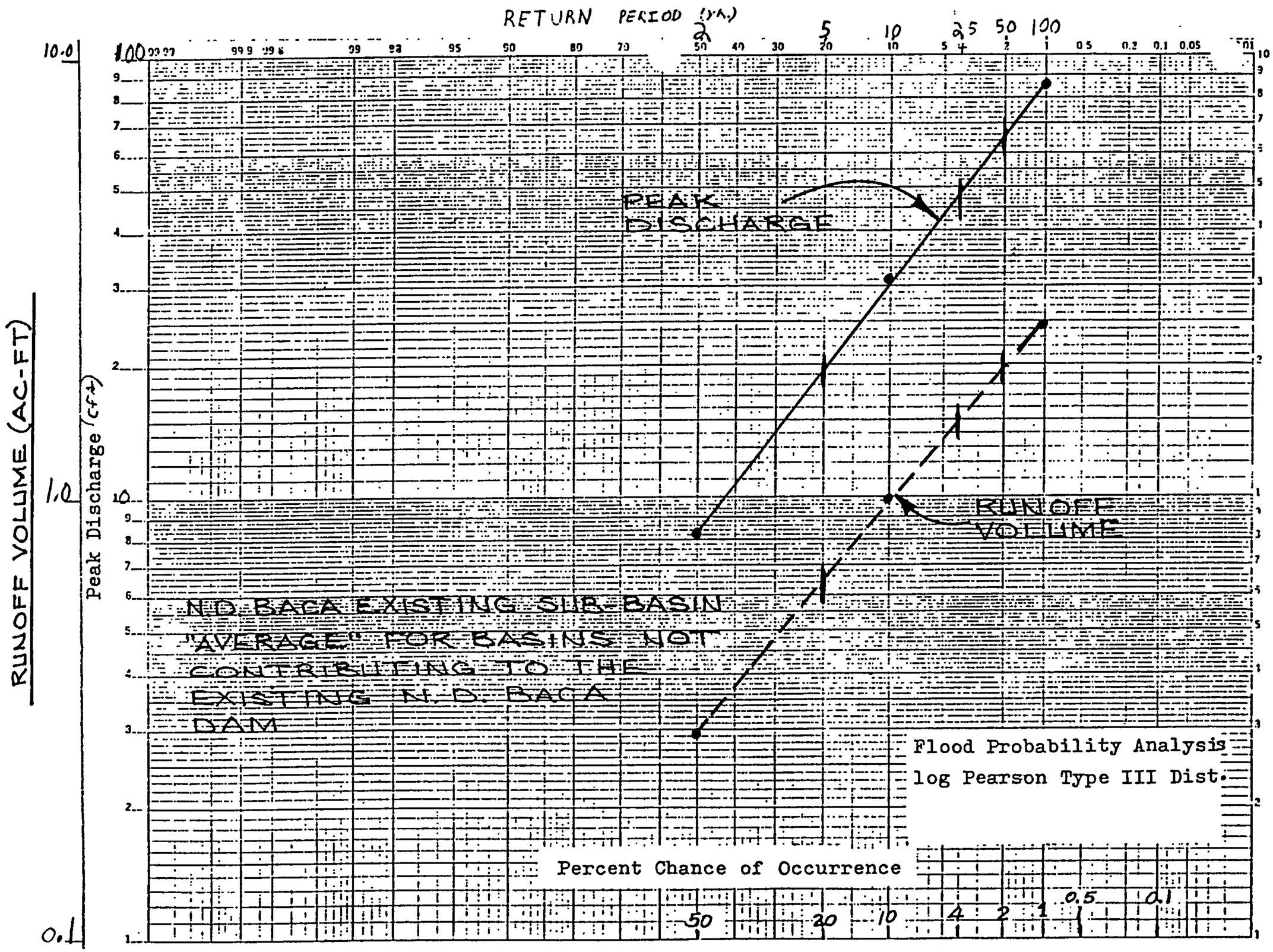
AP 935.99(E) MAIN NORTH D.B. ARROYO @ LOUISIANA
AP 935.98(F) " " " " " "

Runoff Volume Flood Probability Main North Domingo Baca Arroyo at Louisiana Blvd.

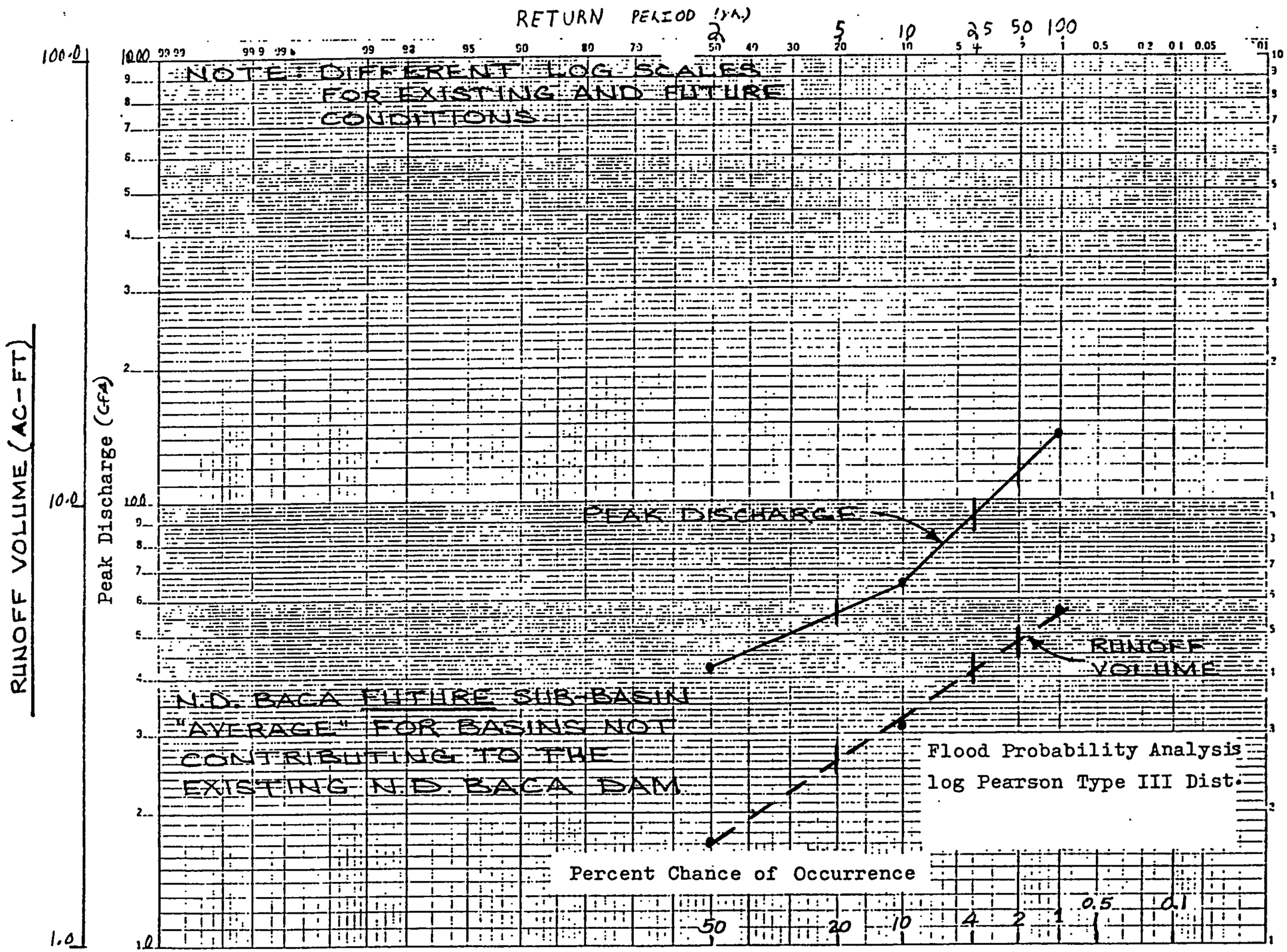


NOTE: ALL HYDROGRAPHS ARE NEARLY @ 0 cfs AT 29.9 hrs WHICH IS THE TOTAL HYDROGRAPH TIME USED IN THE SEDIMENT TRANSPORT CALCULATIONS.

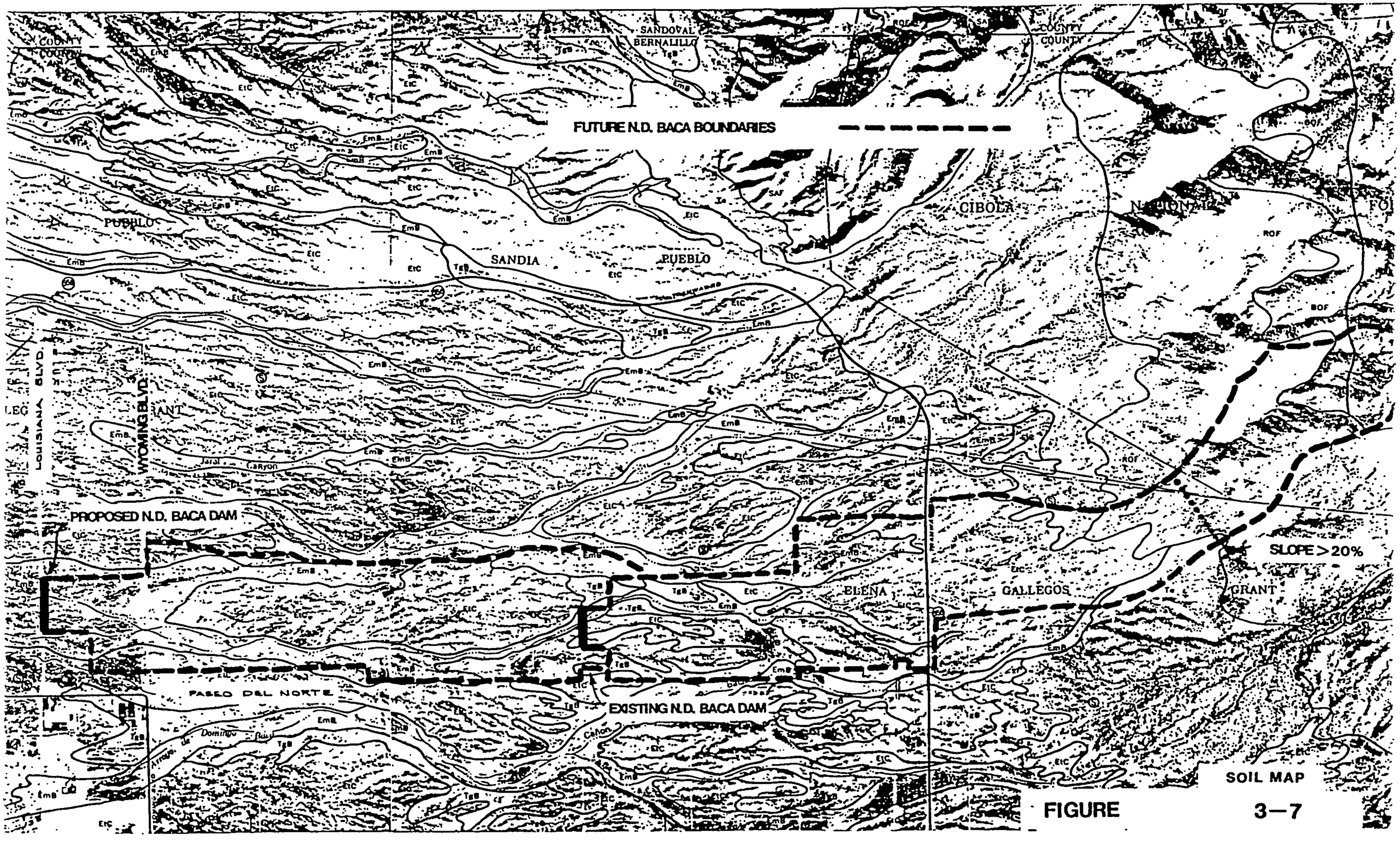
Main North Domingo Baca Arroyo Future Condition Hydrographs at Louisiana Blvd.



Peak Discharge and Runoff Volume
Flood Probability for an Average Sub-
Basin Existing Development Conditions



Peak Discharge and Runoff Volume
Flood Probability for an Average
Sub-Basin Future Development Conditions



SOIL MAP

FIGURE 3—7

TABLE 3-1.1

HYDROLOGIC SUMMARY FOR
MAIN NORTH DOMINGO BACA ARROYO AT LOUISIANA BLVD.
EXISTING AND FUTURE CONDITIONS

Street Name or Comment	Analysis Point *	Return Period	Drainage Area (sq.mi.)	Runoff Volume (ac-ft)	Peak Discharge (cfs)
			Existing Conditions		
Louisiana	935.99	100	2.6980	160	535
		50	"	120	400
		25	"	95	290
		10	"	60	182
		5	"	43	120
		2	"	23	55
			Future Conditions		
Louisiana	930.98	100	3.2581	316	2,626
		50	"	258	2,100
		25	"	219	1,800
		10	"	157	1,241
		5	"	132	1,100
		2	"	88	781
		1/2 (2-yr)			390
		(a)			100

a) Assumed 1/2 (2-yr) discharge (390 cfs) and 100 cfs for hydraulic analysis, not associated with a return period.

* See Plate 1 for location of Analysis Points.

TABLE 3-1.2

100-YR HYDROLOGIC SUMMARY NORTH DOMINGO BACA ARROYO (NEAR PROPOSED DAM)
EXISTING AND FUTURE CONDITIONS (c)

STREET NAME OR COMMENT	ANALYSIS POINT OR BASIN (a)	RETURN PERIOD/ CONDITION (b)	DRAINAGE AREA (sq mi)	RUNOFF DEPTH (in.)	RUNOFF VOLUME (ac-ft)	TIME TO PEAK (hrs)	PEAK DISCHARGE (cfs)
Wyoming**	931.99	100E	0.1850	1.10025	10.8558	1.65	210
"	931.99	100F	0.0900	1.87941	9.0211	1.60	147**
"	924.88	100E	0.1060	0.73486	4.1544	1.65	94
"	924.88	100F	0.0110	1.86292	1.0929	1.75	16
"	929.99	100E	0.1250	0.79489	5.2992	1.65	114
"	929.99	100F	0.0300	1.98490	3.1758	1.50	60
"	932	100E	0.0780	1.74970	7.2787	1.50	192
"	932	100F	0.0780	2.20449	9.1706	1.50	218
"	931.98	100F	0.0900	1.87942	9.0212	1.60	147
"	930.99	100E	2.6010	1.12385	155.8997	1.65	535
"	926.8	100E	2.4530	1.11867	146.3504	1.80	420
"	930.99	100F	3.1171	1.79157	297.8387	1.55	2311
"	925.97	100F	2.9821	1.78522	283.9290	1.55	2005
"	932.8	100F	0.1680	13.54796	121.3889	2.30	2216
"	932.82	100E	0.1705	1.39736	12.7066	1.60	233
"	931.81	100E	0.0925	1.10026	5.4279	1.75	94
"	932.81	100E	0.0780	1.74971	7.2787	1.55	175
Louisiana	933.99	100E	0.1455	0.98755	7.6634	1.65	118
"	931.88	100E	0.0925	1.10026	5.4279	1.75	87
"	933	100F	0.0530	0.79087	2.2355	1.50	73
"	934.99	100E	0.2355	1.20133	15.0886	1.65	247
"	932.83	100E	0.1705	1.39736	12.7066	1.70	201
"	934	100F	0.0650	1.86290	6.4580	1.50	163
"	935	100F	0.0970	1.86290	9.6373	1.50	245
"	935.29	100E	1.3490	1.11188	79.9953	1.75	268
"	930.8	100E	2.6018	1.12385	155.8992	1.80	495
"	930.98	100F	3.2851	1.80370	316.0213	1.55	2626
"	935.99	100E	2.6980	1.11188	159.9906	1.75	535
"	935.99	100F	3.5051	1.80744	337.8791	1.55	3113
"	935.19	100E	1.3490	1.11188	79.9953	1.75	268
"	937.99	100E	0.1598	0.94193	8.0277	1.75	110
"	937	100F	0.0170	1.86290	1.6890	1.50	43
"	940.57	100F	3.5051	1.60979	300.9310	10.00	144
"	935.99	100E	2.6980	1.11188	160	1.75	535
"	930.98	100F	3.2851	1.80373	316	1.55	2626
"	935.99	10E	2.6980	0.41756	60	1.75	182
"	930.98	10F	3.2851	0.89797	157	1.60	1241
"	935.99	2E	2.6980	0.16086	23	4.30(+)	55
"	930.98	2F	3.2851	0.50154	88	1.60	781

* Obtained from "North and South Domingo Baca Arroyos and Paseo del Norte Drainage Management Plan" (RTI, 1991).

** Upstream area diverted to main arroyo at Wyoming for Future Development Conditions.

a) See Figure

b) E = Existing Development Conditions, F = Future Development Conditions.

+) Due to North Domingo Baca Dam Detention

c) Future condition results reflect proposed dam, existing condition results do not include effect from dam.

TABLE 3-2

EXISTING CONDITIONS

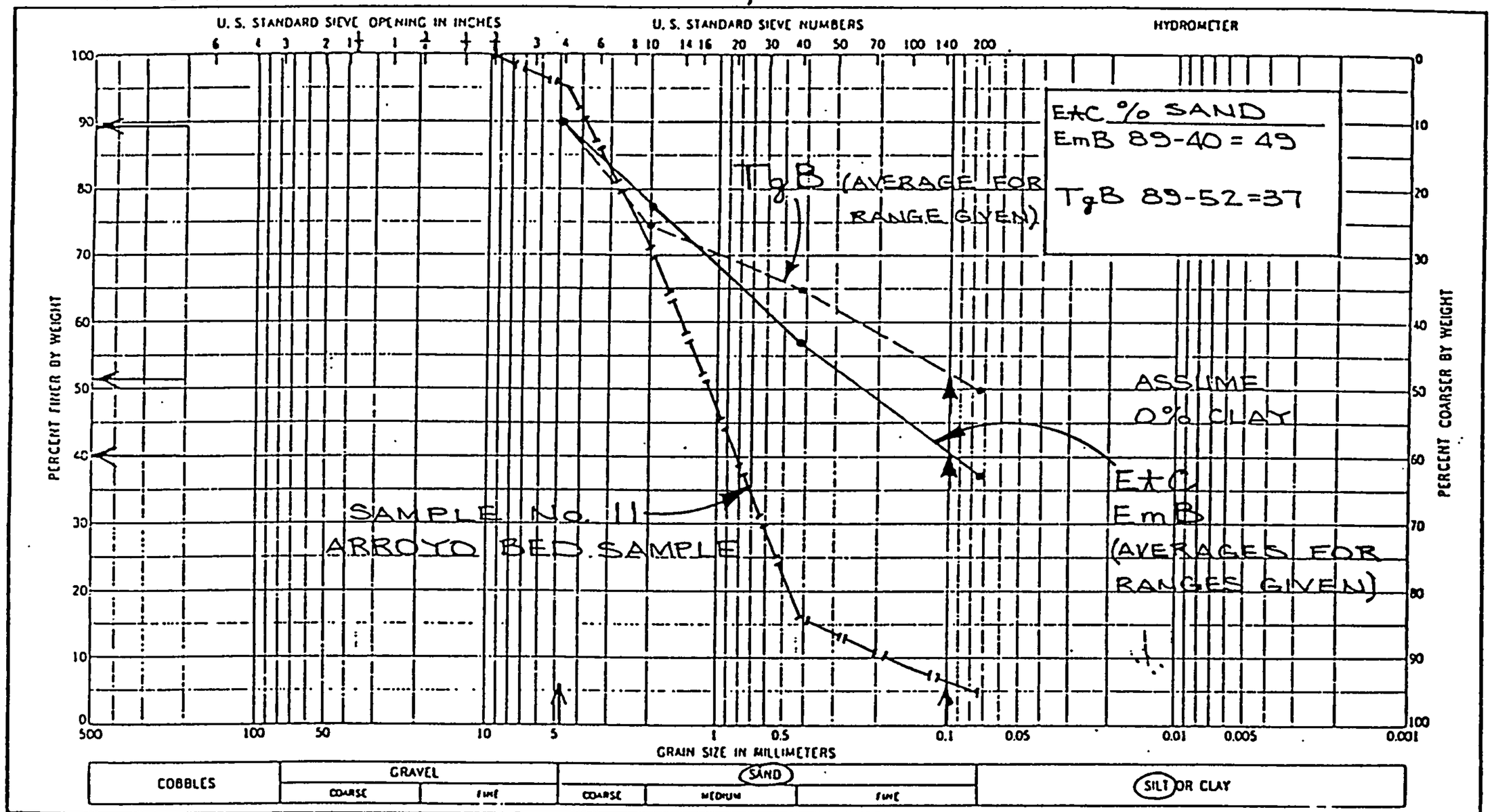
SUB-BASIN HYDROLOGIC SUMMARY*

Basin **	Drainage Area (sq mi)	Runoff Depth (in.)	Runoff Volume (ac-ft)	Peak Discharge (cfs)
		100-yr. 24-hr. Storm		
920	0.105	0.82	4	130
926	0.098	0.92	4	151
930	0.148	1.20	9	284
935	0.097	0.79	4	136
Sum	0.448	3.73	21	701
Average	0.112	0.93	5.25	175
		10-yr. 24-hr. Storm		
920	0.105	0.30	2	42
926	0.098	0.38	2	53
930	0.148	0.56	4	112
935	0.097	0.28	1	44
Sum	0.448	1.52	9	251
Average	0.112	0.38	2.25	63
		2-yr. 24-hr. Storm		
920	0.105	0.06	0	6
926	0.098	0.11	1	13
930	0.148	0.23	2	44
935	0.097	0.05	0	6
Sum	0.448	0.45	3	69
Average	0.112	0.1125	0.75	17.25

* Results from "Drainage Management Plan", RTI 1991

** See Figure 3-4 for basin locations.

* SOURCE: SOIL SURVEY OF BERNALILLO COUNTY AND PARTS OF SANDOVAL AND VALENCIA COUNTIES, NEW MEXICO

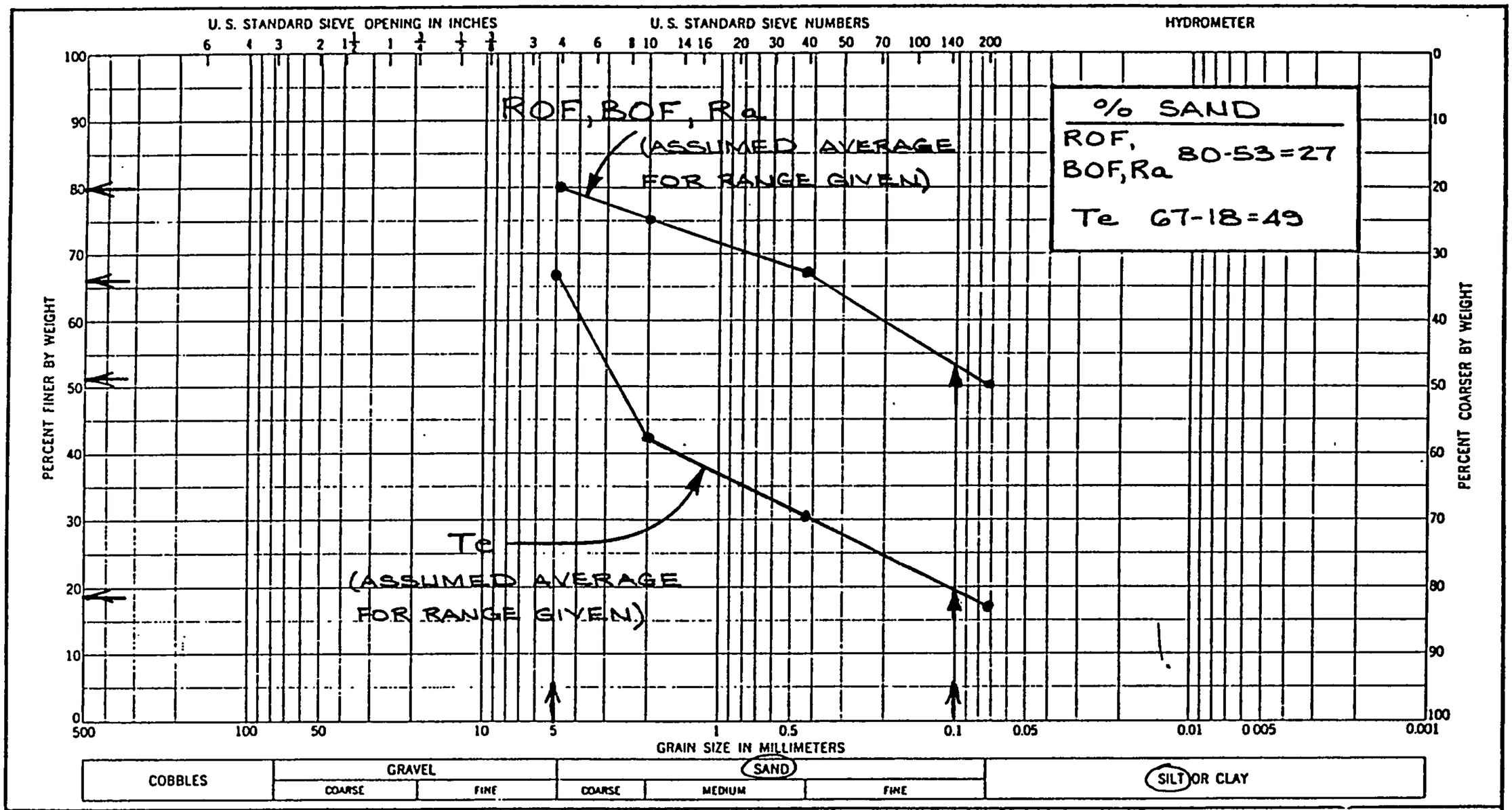


~~Sample No.~~	~~Elev. or Depth~~	% ~~Cumulative~~ PASSING				~~Hot %~~	~~LL~~	~~PL~~	~~PI~~
SOIL TYPE		No. 4	No. 10	No. 40	No. 200	PERM.	IN/HR.	% SAND	% SILT
EtC		85-95	70-85	40-75	25-50	.06-.20		49	40
EmB		"	"	"	"	"	"	49	40
TgB		80-100	60-90	50-80	35-65	0.60-2.0		37	52

GRADATION CURVES

SOIL GRADATIONS * FOR 3 SOIL TYPES LOCATED IN DRAINAGE AREA BELOW NORTH DOMINGO BACA DAM TO PROPOSED NORTH DOMINGO BACA DAM

Soil Gradation Curves for Three Soil Types and One Arroyo Bed Sample



~~Sample No~~	~~Elev or Depth~~	% ~~Classification~~ PASSING				~~Nat w%~~	~~LL~~	~~PL~~	~~PI~~
SOIL TYPE		No. 4	No. 10	No. 40	No. 200	PERM. IN./HR.		% SAND	% SILT
ROF (a)		70-90	65-85	55-80	40-60	0.6 -	2.0	27	53
Te		55-80	30-55	20-40	10-25	6.0 -	20.0	49	18
BOF (b)		70-90	65-85	55-80	40-60	0.6 -	2.0	27	53
Ra (b)		"	"	"	"	"	"	27	53

GRADATION CURVES

SOIL GRADATIONS * FOR 4 SOIL TYPES LOCATED IN DRAINAGE AREA FOR THE NORTH DOMINGO BACA DAM.

ENG FORM 1 MAY 63 2087

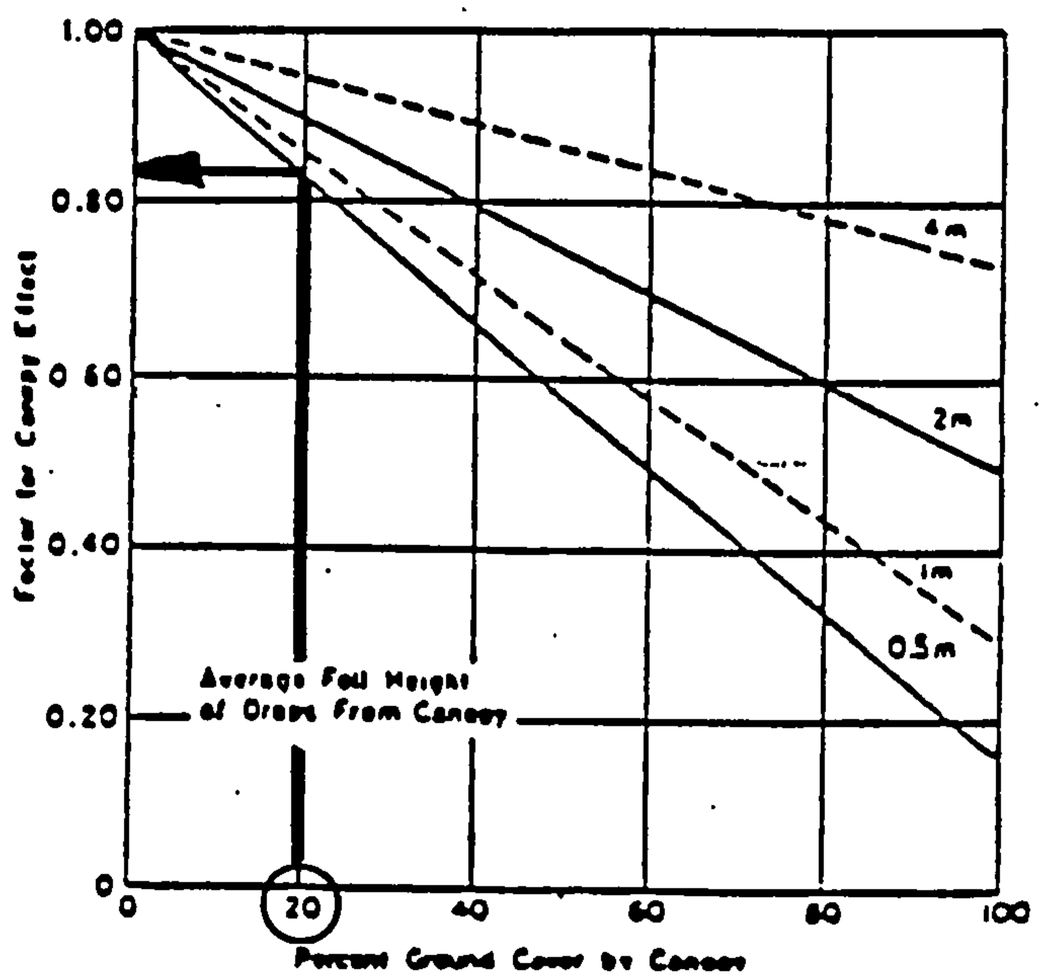
(a) NO DATA - SCS SUGGESTED USE LAPORTE SERIES

* SOURCE: SOIL SURVEY OF BERNALILLO COUNTY AND PARTS OF SANDOVAL AND VALENCIA

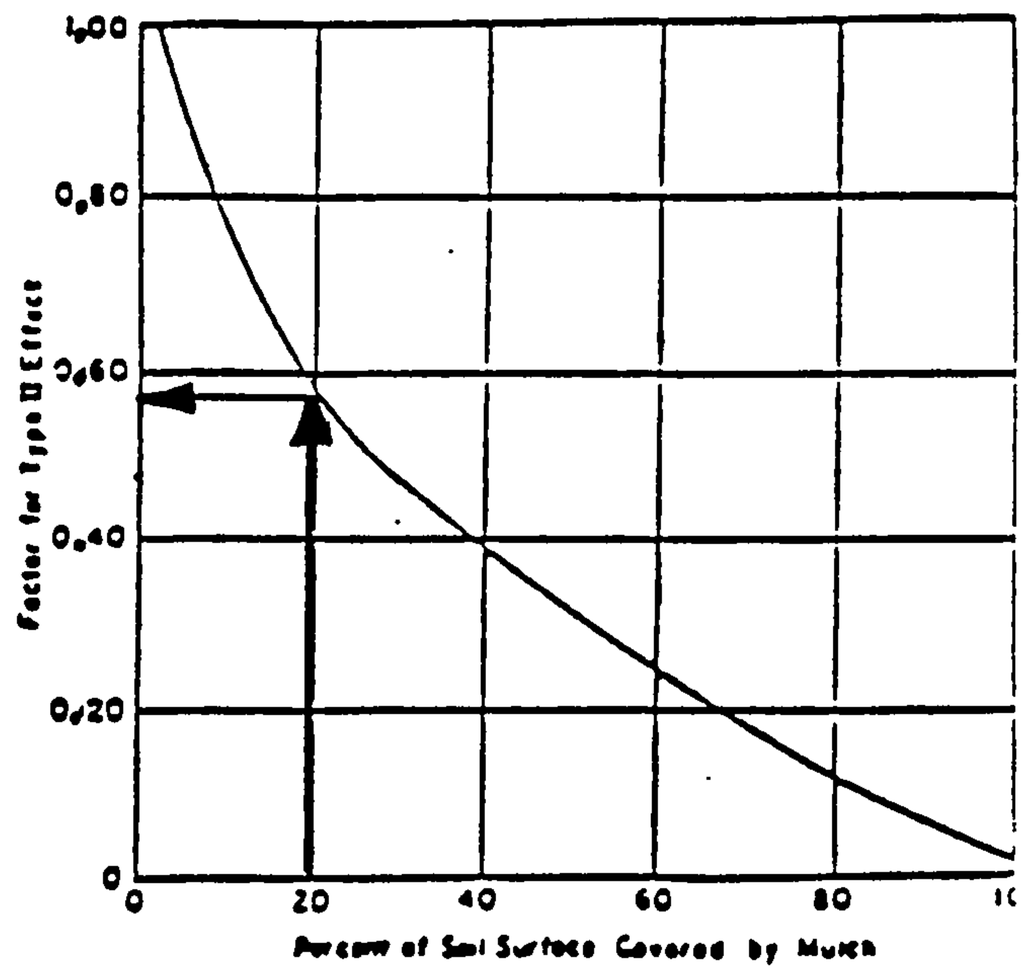
Soi

Gradation Curve

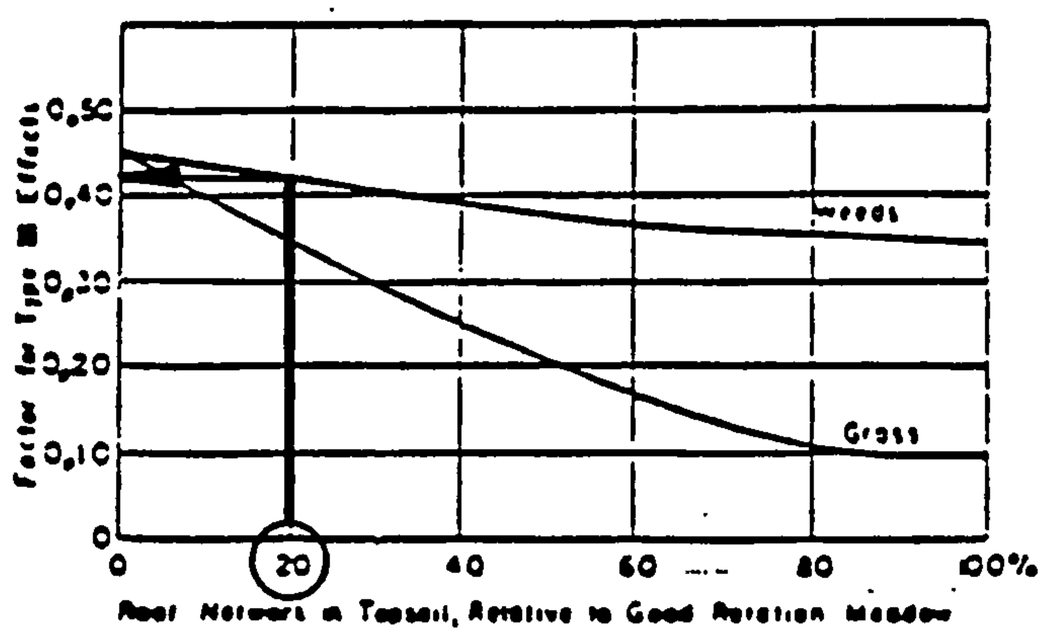
for Four Soil Type



C_1



C_2



C_3

FUTURE AND
EXISTING CONDITIONS

$C = C_1 * C_2 * C_3$

$C = 0.58 * 0.58 * 0.3$

$C = 0.10$

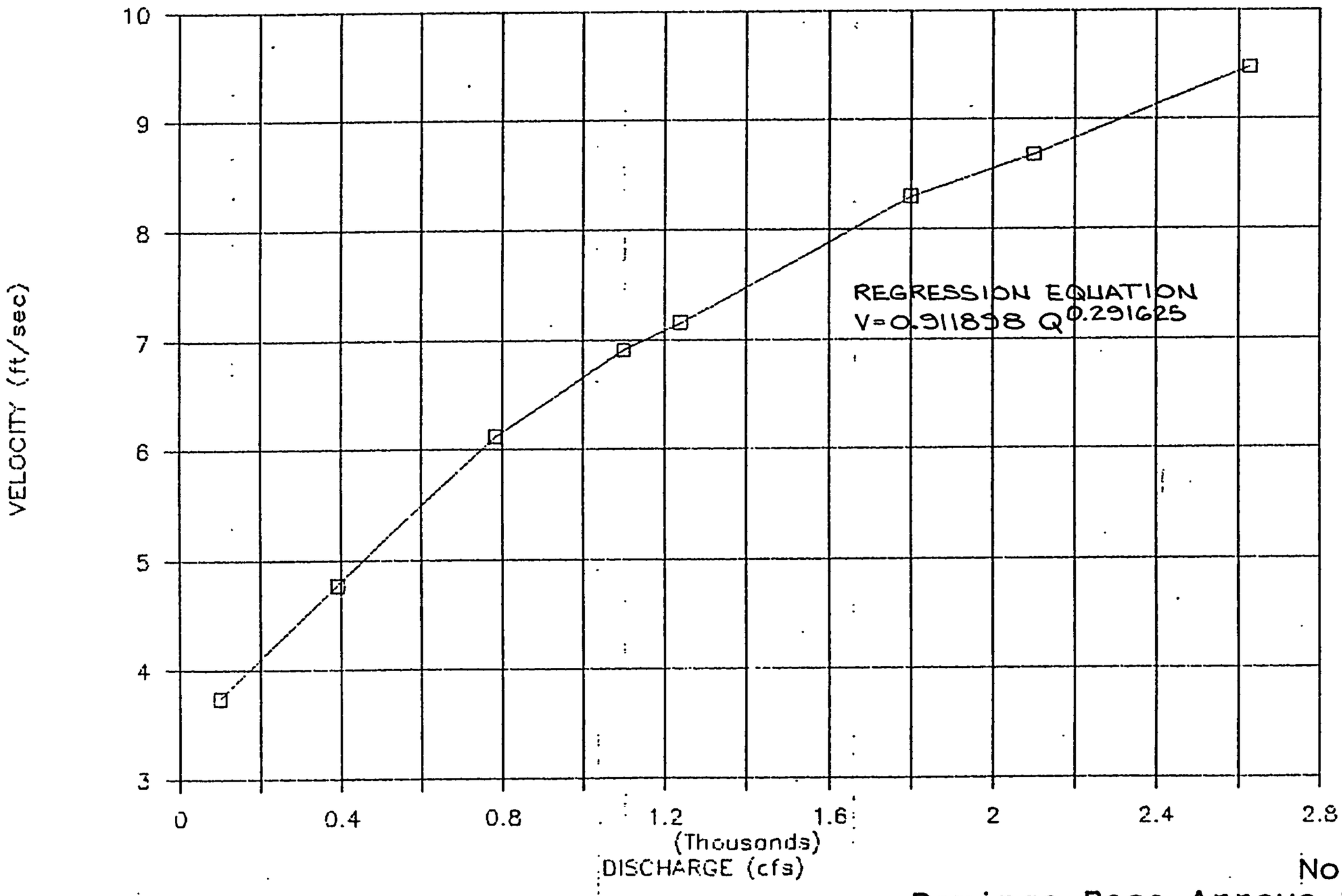
$C = .83 \ .58 \ .43$
$C = 0.21$

Graphs to Determine Cove
and Management Factor -"C

FIGURE 3—10

NORTH DOMINGO BACA ARROYO SUBREACH 1

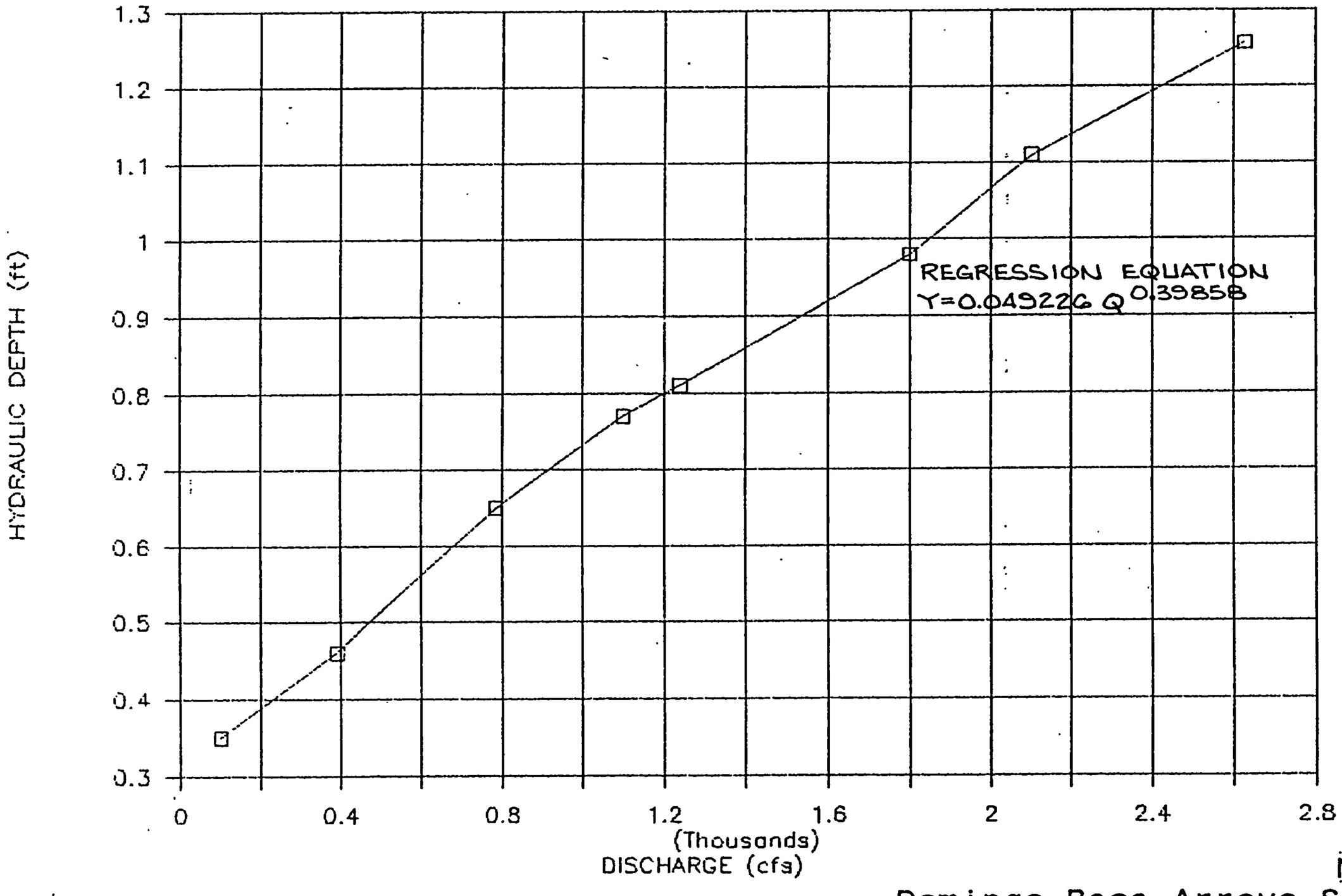
VELOCITY VS. PEAK DISCHARGE



North
Domingo Baca Arroyo Sub-Reach 1
Velocity vs. Future Condition Peak Discharge

NORTH DOMINGO BACA ARROYO SUBREACH 1

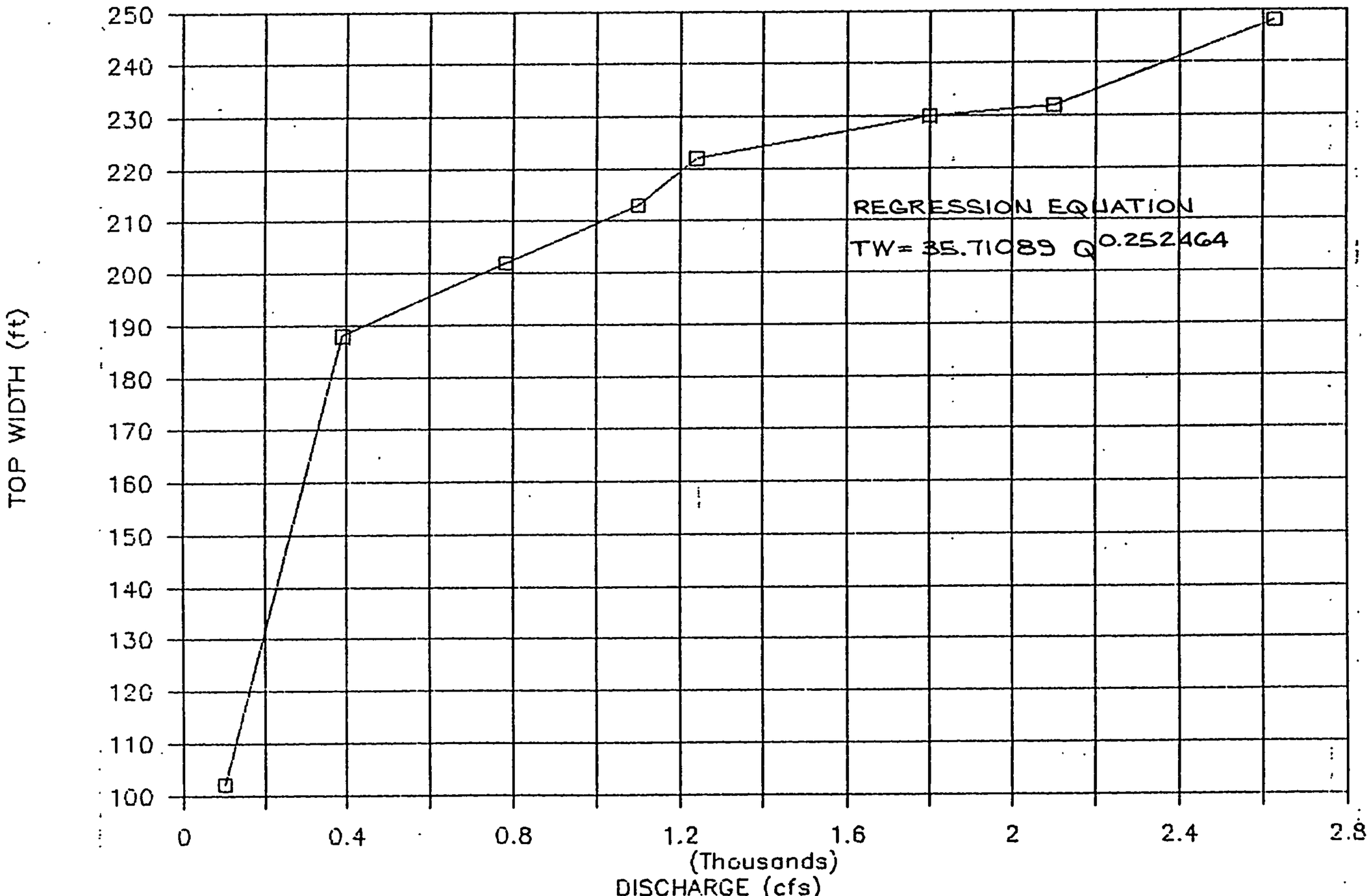
HYDRAULIC DEPTH VS. PEAK DISCHARGE



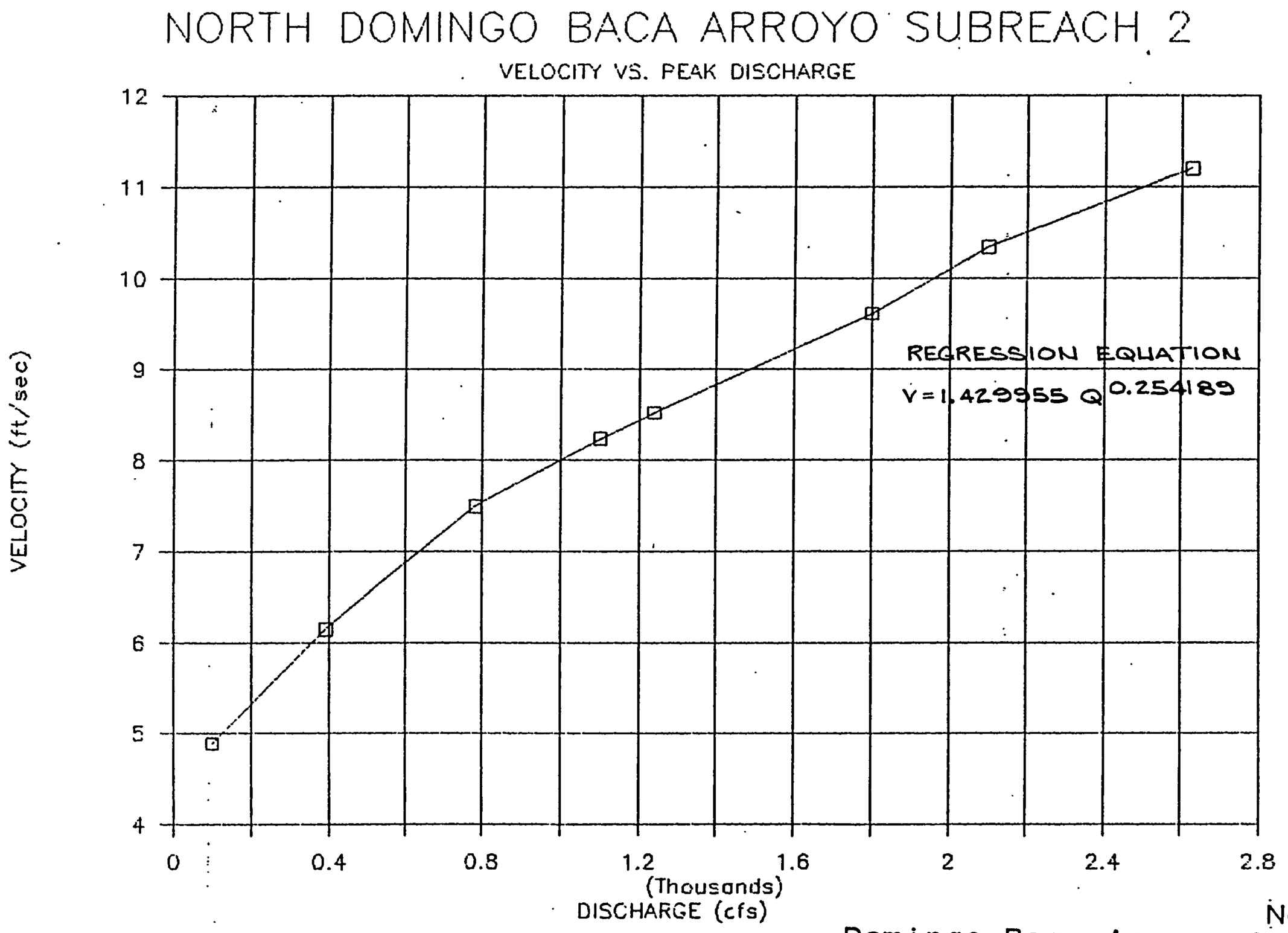
North
Domingo Baca Arroyo Sub-Reach 1
Hydraulic Depth vs. Future Condition Peak Discharge

NORTH DOMINGO BACA ARROYO SUBREACH 1

TOP WIDTH VS. PEAK DISCHARGE



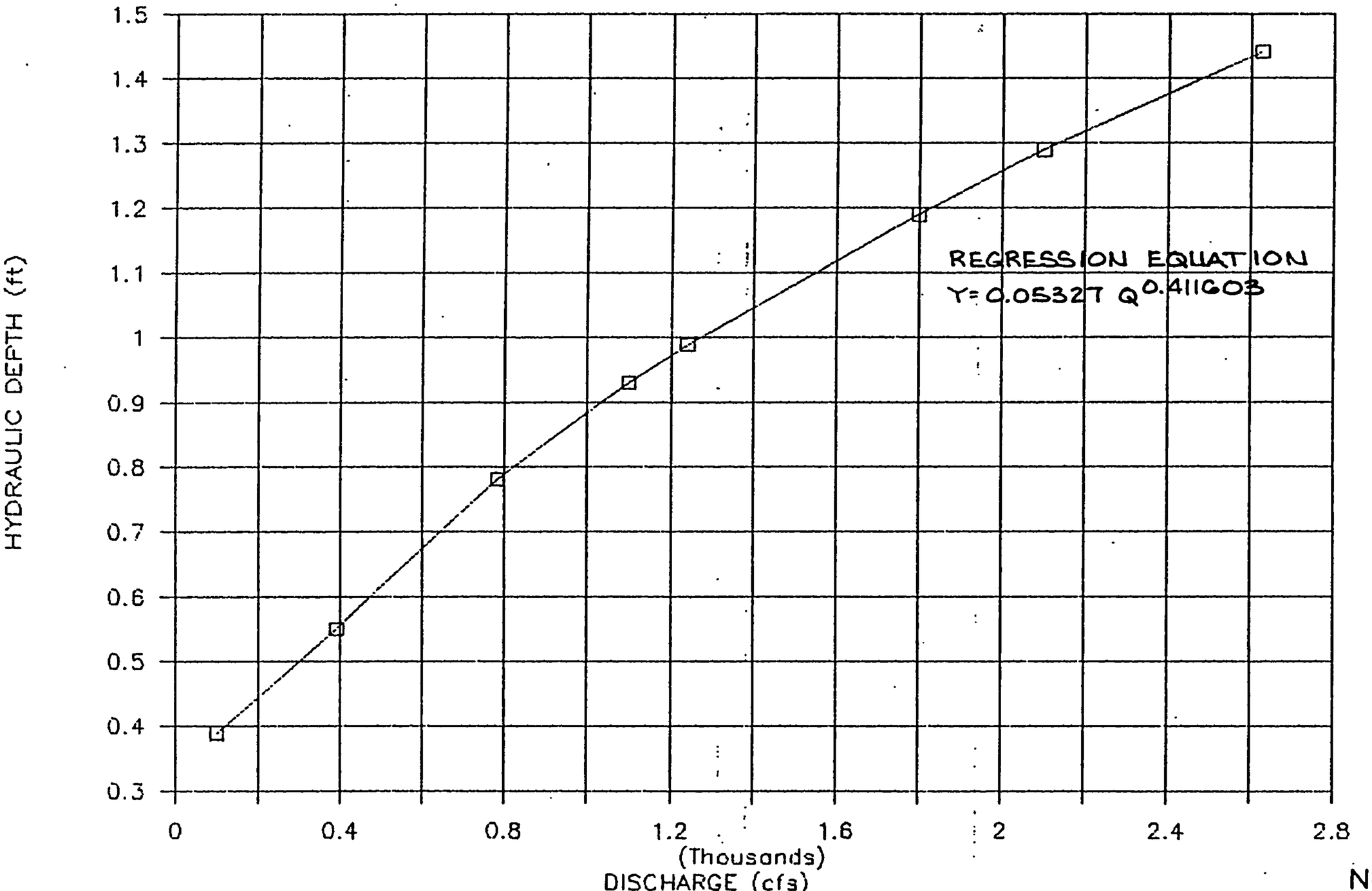
North
Domingo Baca Arroyo Sub-Reach 1
Top Width vs. Future Condition Peak Discharge



North Domingo Baca Arroyo Sub-Reach 2
Velocity vs. Future Condition Peak Discharge

NORTH DOMINGO BACA ARROYO SUBREACH 2

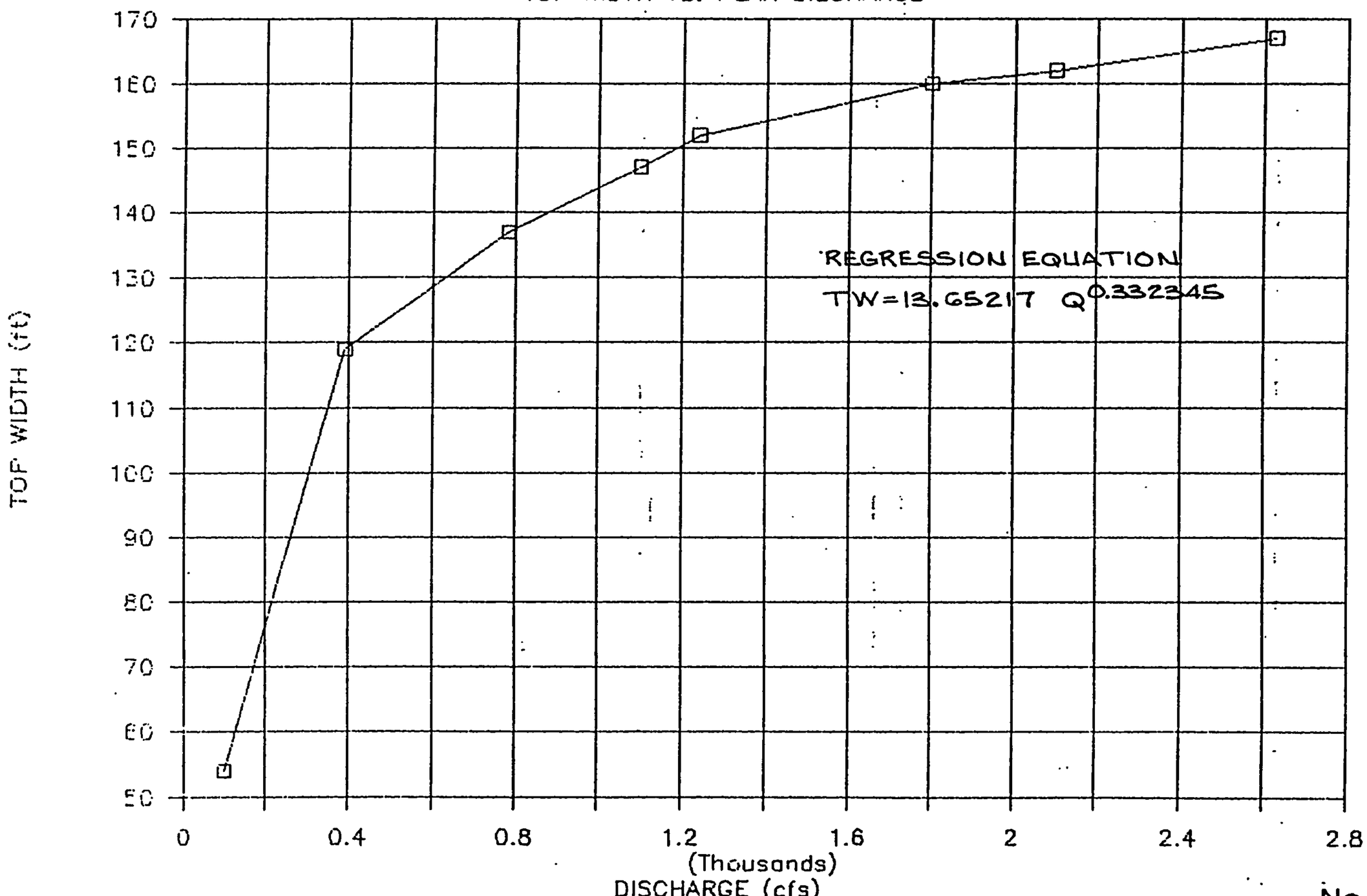
HYDRAULIC DEPTH VS. PEAK DISCHARGE



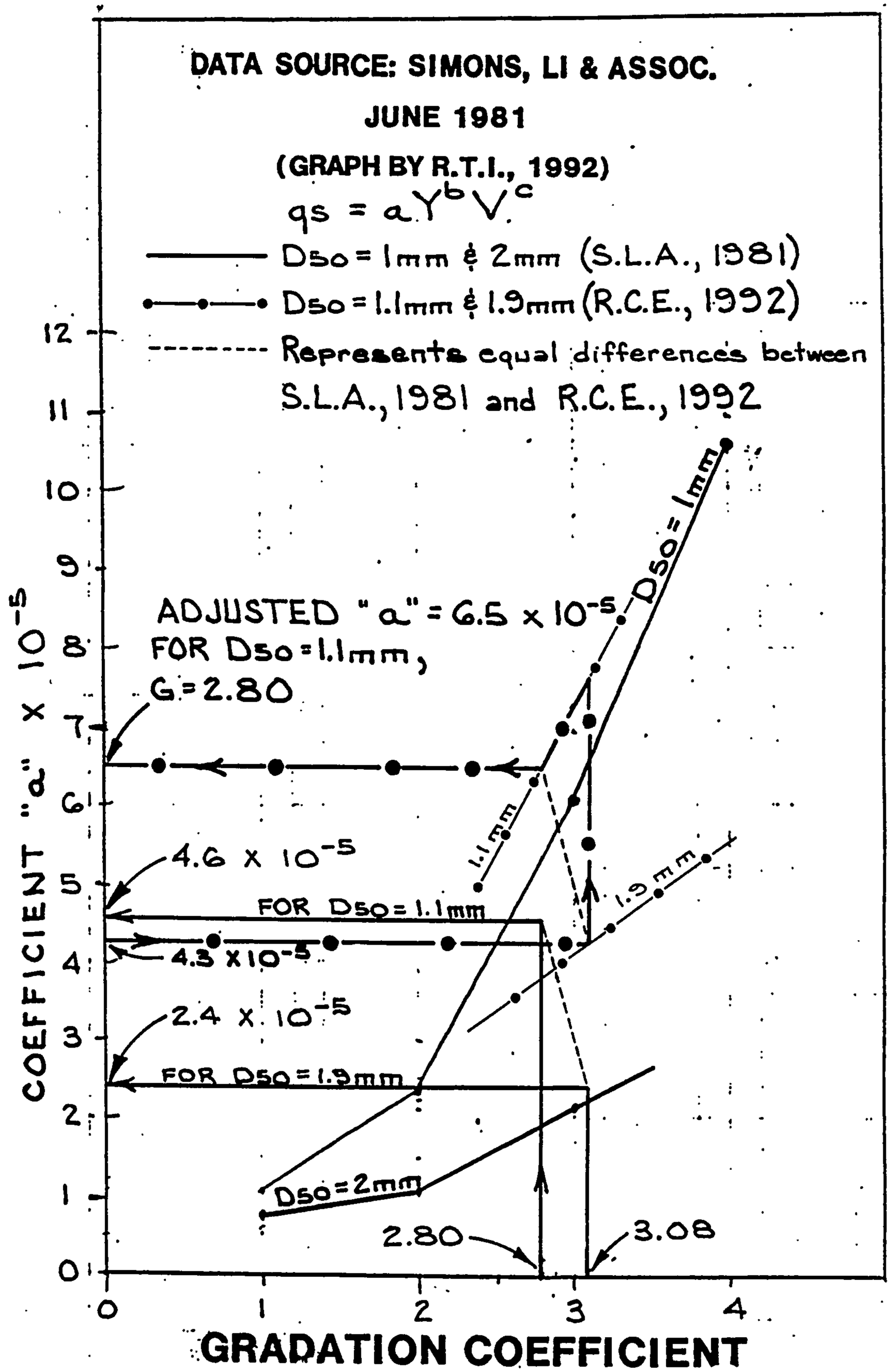
North Domingo Baca Arroyo Sub-Reach 2
Hydraulic Depth vs. Future Condition Peak Discharge

NORTH DOMINGO BACA ARROYO SUBREACH 2

TOP WIDTH VS. PEAK DISCHARGE



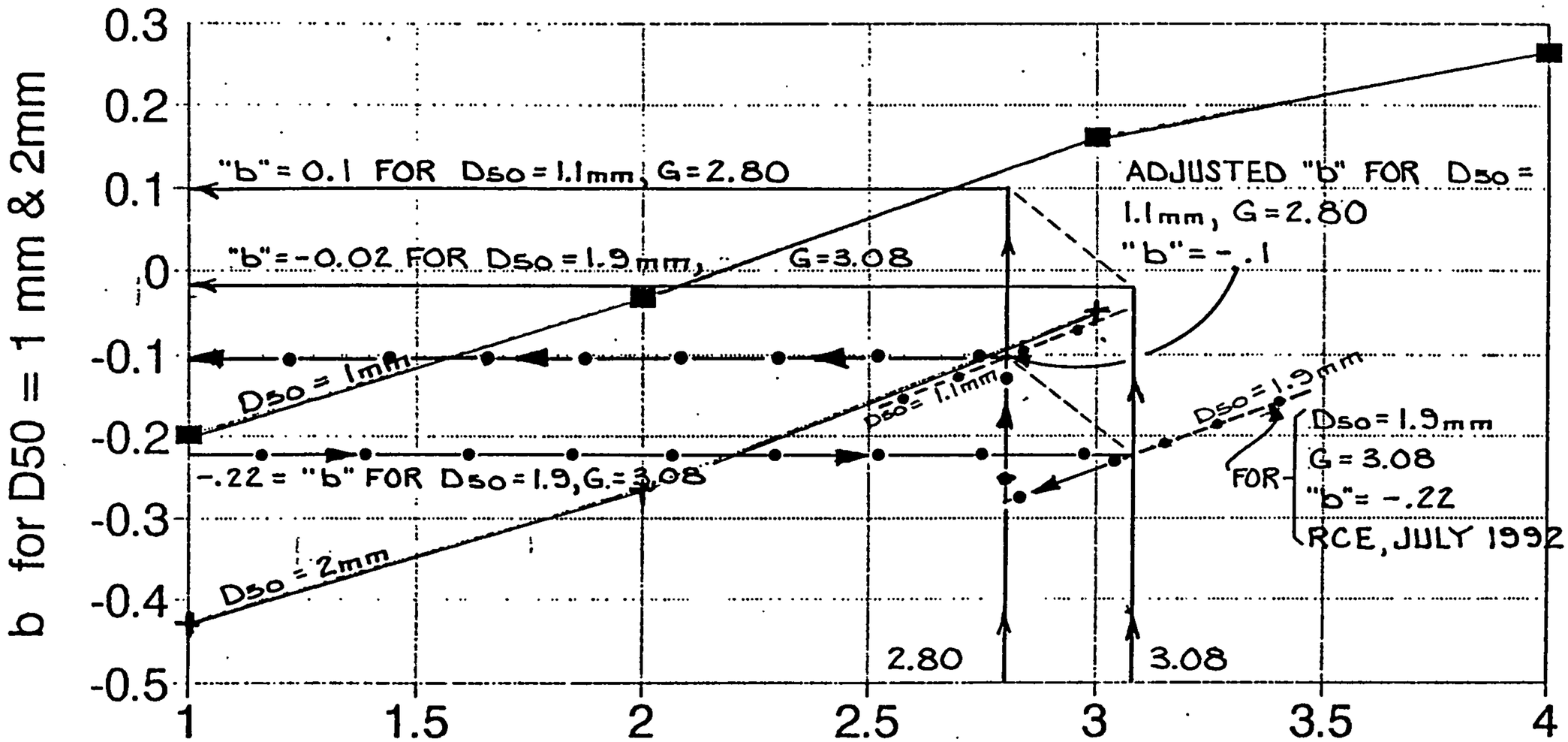
North
Domingo Baca Arroyo Sub-Reach 2
Top Width vs. Future Condition Peak Discharge



Interpolation for "a"

EXPONENT "b" vs GRADATION COEF.

qs = a Y ^ b V ^ c for S=.01 - .04 '/ft



DATA SOURCE: SIMONS, LI & ASSOC.

JUNE 1981

(GRAPH BY R.T.I., 1992)

$qs = a Y^b V^c$

Dso = 1.1mm, 1.9mm (R.C.E., 1992)

Represents equal differences between S.L.A., 1981 and R.C.E., 1992

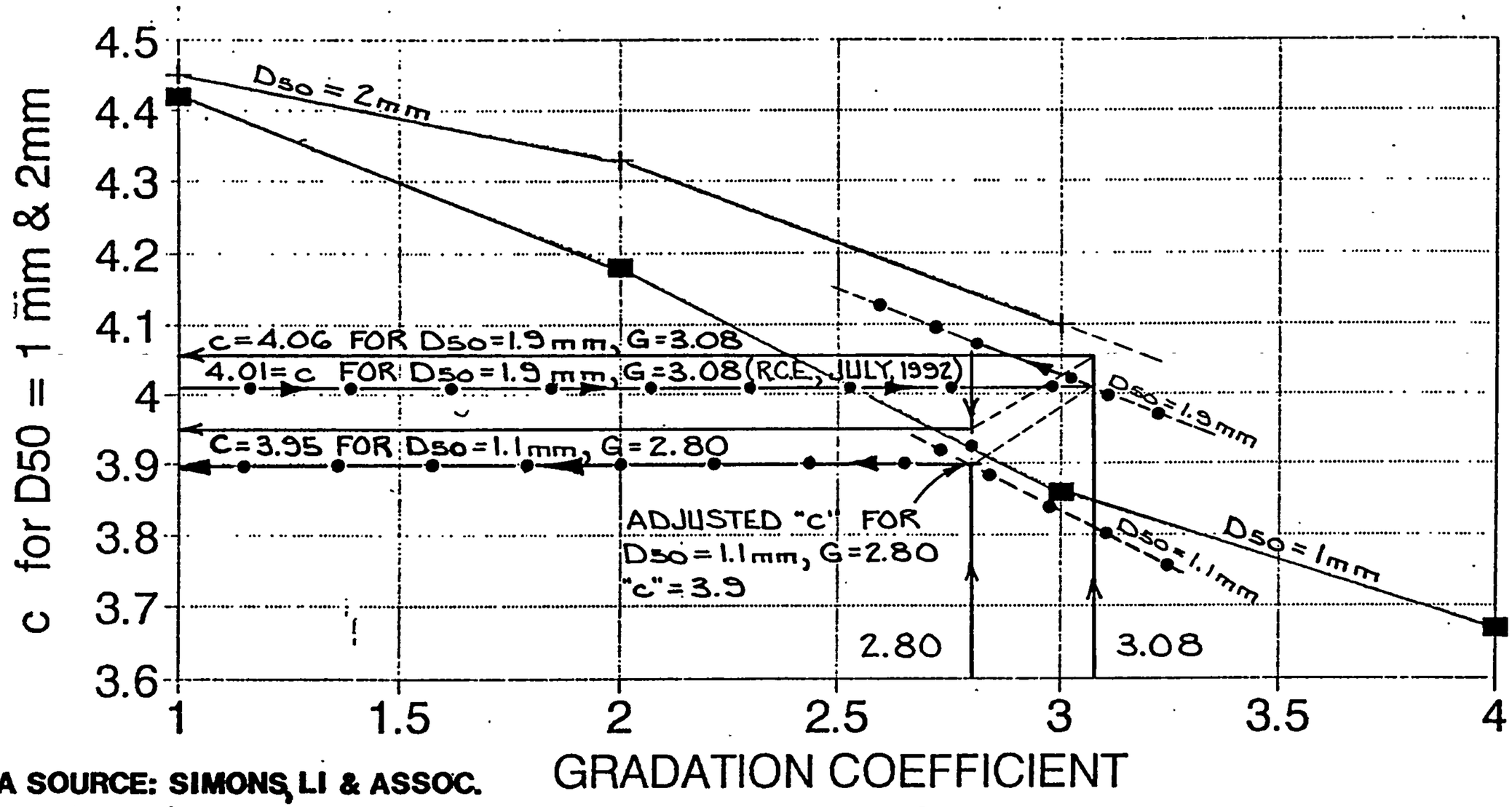
b FOR D50 = 1mm (S.L.A., 1981)

b FOR D50 = 2mm

Interpolation for "b"

EXPONENT "c" vs GRADATION COEF.

qs = a Y ^ b V ^ c for S=.01 - .04 '/ft



DATA SOURCE: SIMONS, LI & ASSOC.

JUNE 1981

(GRAPH BY R.T.I., 1992)

$qs = a Y^b V^c$

-•-•-• Dso=1.1mm, 1.9mm (R.C.E., 1992)
-------- Represents equal differences between S.L.A., 1981 & R.C.E., 1992

-■- c FOR D50=1mm (S.L.A., 1981) -+- c FOR D50 = 2mm

Interpolation for "c"

FIGURE 3—20

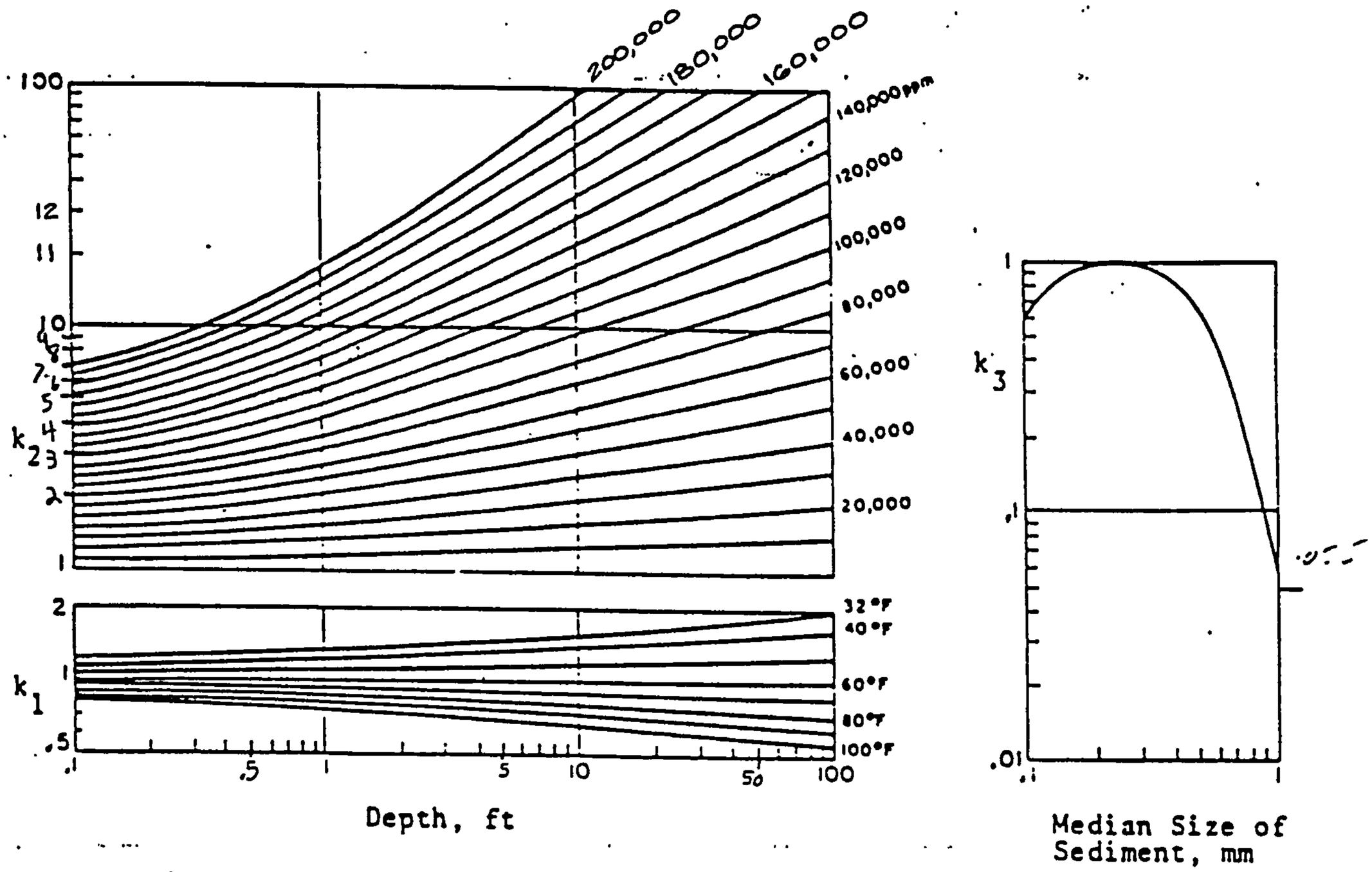


Figure 3.8. Colby's corrections factors (Colby, 1964).

Colby's Correction Factors

FIGURE 3–21

TABLE 3-3

FUTURE CONDITIONS

SUB-BASIN HYDROLOGIC SUMMARY*

Basin **	Drainage Area (sq mi)	Runoff Depth (in.)	Runoff Volume (ac-ft)	Peak Discharge (cfs)
		100-yr. 24-hr. Storm		
920	0.105	1.92	10	238
926	0.117	2.01	12	309
930	0.135	1.93	13	349
935	0.097	1.86	9	245
Sum	0.454	7.72	44	1141
Average	0.1135	1.93	11	285
		10-yr. 24-hr. Storm		
920	0.105	1.06	6	110
926	0.117	1.13	7	143
930	0.135	1.08	8	162
935	0.097	1.03	5	114
Sum	0.454	4.3	26	529
Average	0.1135	1.08	6.5	132
		2-yr. 24-hr. Storm		
920	0.105	0.59	3	69
926	0.117	0.64	4	93
930	0.135	0.61	4	103
935	0.097	0.57	3	71
Sum	0.454	2.41	14	336
Average	0.1135	0.603	3.5	84

* Results from "Drainage Management Plan", RTI 1991

** See Figure 3-4 for basin locations.

TABLE 3-4

NORTH DOMINGO BACA ARROYO SUB-BASINS
CONTRIBUTING TO PROPOSED DAM AND NOT TO EXISTING NORTH DOMINGO BACA DAM
EXISTING CONDITIONS 100-YR. 24-HR. STORM

SUB-BASIN **	ANALYSIS POINT	DRAINAGE AREA (sq mi) (a)	RUNOFF DEPTH (in.)	RUNOFF VOLUME (ac-ft)	TIME TO PEAK (hrs)	100-YR PEAK DISCHARGE (cfs)
914.2	914.20	0.035	0.99	1	1.50	63
919.1	919.10	0.079	1.06	4	1.50	144
919.2	919.20	0.061	0.97	3	1.50	102
913.2	913.20	0.017	0.83	0	1.50	24
918	918.00	0.114	0.74	4	1.65	90
921.1	921.10	0.046	0.70	1	1.50	56
921.2	921.20	0.085	0.82	3	1.50	122
911	911.00	0.032	0.87	1	1.55	39
913.1	913.10	0.052	0.83	2	1.50	73
917	917.00	0.050	0.94	2	1.50	75
920	920.00	0.105	0.82	4	1.55	130
926	926.00	0.098	0.92	4	1.50	151
923	923.00	0.013	0.71	0	1.50	17
925	925.00	0.077	1.23	5	1.55	114
930	930.00	0.148	1.20	9	1.50	284
935	935.00	0.097	0.79	4	1.50	136
937	937.00	0.044	0.74	1	1.50	57
936	936.00	0.018	0.88	0	1.50	27
922	922.00	0.021	0.71	0	1.50	28
924	924.00	0.064	0.74	2	1.50	86
927	927.00	0.010	0.69	0	1.50	13
928	928.00	0.011	0.73	0	1.65	8
929	929.00	0.019	1.12	1	1.50	36
931	931.00	0.060	1.73	5	1.65	96
933	933.00	0.053	0.79	2	1.50	73
932	932.00	0.078	1.74	7	1.50	192
934	934.00	0.065	0.68	2	1.50	83
	Sum =	1.552	24.97	68		2319
	Average =	0.0575	0.9248	2.4286		86

** See Figure 3-4 for basin locations.

TABLE 3-5

NORTH DOMINGO BACA ARROYO SUB-BASINS
CONTRIBUTING TO PROPOSED DAM AND NOT TO EXISTING NORTH DOMINGO BACA DAM
FUTURE COND. 100-YR. 24-HR. STORM

SUB-BASIN *	ANALYSIS POINT	DRAINAGE AREA (sq mi)	RUNOFF DEPTH (in.)	RUNOFF VOLUME (ac-ft)	TIME TO PEAK (hrs)	100-YR PEAK DISCHARGE (cfs)
914.2	914.20	0.03	1.73	3	1.50	85
919.1	919.10	0.07	2.03	8	1.50	208
919.2	919.20	0.05	2.03	5	1.50	134
913.2	913.20	0.01	1.73	0	1.50	24
918	918.00	0.11	2.03	12	1.65	205
921.1	921.10	0.04	1.92	4	1.50	113
921.2	921.20	0.09	1.92	10	1.50	254
913.1	913.10	0.02	1.73	2	1.50	53
917	917.00	0.05	2.03	5	1.50	132
920	920.00	0.10	1.92	10	1.55	238
926	926.00	0.11	2.01	12	1.50	309
923	923.00	0.01	1.92	1	1.50	33
925	925.00	0.07	2.14	8	1.55	174
930	930.00	0.13	1.93	13	1.50	349
935	935.00	0.09	1.86	9	1.50	245
937	937.00	0.01	1.86	1	1.50	43
922	922.00	0.02	1.92	2	1.50	54
924	924.00	0.06	2.10	7	1.50	173
927	927.00	0.01	2.62	1	1.50	31
928	928.00	0.01	1.86	1	1.65	19
929	929.00	0.01	2.05	2	1.50	56
931	931.00	0.06	1.82	5	1.65	100
933	933.00	0.04	1.86	4	1.50	103
932	932.00	0.07	2.20	9	1.50	218
934	934.00	0.06	1.86	6	1.50	163
	Sum =	1.33	49.08	140		3516
	Average =	0.0532	1.9632	5.6		141

* See Figure 3-4 for basin locations.

TABLE 3-6

AVERAGE SUB-BASIN HYDROLOGIC FACTORS AND THE RESULTING 2-YR. AND 10-YR. COMPUTATION RESULTS

Apply these factors to the 100-yr. averages of all sub-basins runoff vol. (ac-ft) and Qp (cfs)

		Average 100-yr. All Sub-Basins	10-yr. Factor	Average 10-yr.	2-yr. Factor	Average 2-yr.
Runoff Volume (ac-ft)	Existing	2.43	0.4086	0.992	0.122	0.30
	Future	5.60	0.5596	3.134	0.312	1.74
Qp (cfs)	Existing	86	0.36	30.96	0.0971	8.35
	Future	141	0.46	65.31	0.2947	41.55

TABLE 3-7

SUMMARY OF AVERAGE SUB-BASIN* HYDROLOGIC RESULTS

Return Period (Yr)	Existing Conditions			Future Conditions		
	Area (sq mi) (a)	Runoff Volume (ac-ft)	Peak Discharge (cfs)	Area (sq mi) (b)	Runoff Volume (ac-ft)	Peak Discharge (cfs)
2		0.295	8		1.74	42
5		0.650	19		2.60	56
10		0.992	31		3.134	65
25		1.450	48		4.10	94
50		1.950	65		4.80	115
100		2.429	86		5.60	141

(a) Average Sub-Basin Area = 0.0575
Total Basin Area = 1.552

(b) Average Sub-Basin Area = 0.0532
Total Basin Area = 1.33

* Represents the average of all sub-basins below the existing North Domingo Baca Dam and contributing to the proposed dam.

TABLE 3-8.1
MUSLE EQUATION DATA AND RESULTS
EXISTING DEVELOPED CONDITION WATERSHED DRAINING TO THE
PROPOSED DAM EXCLUDING THE AREA DRAINING TO THE
EXISTING NORTH DOMINGO BACA DAM

BASIN	RETURN PERIOD	DRAINAGE AREA	RUNOFF VOLUME		Qp	Qp PER AREA	LAND TREAT.				% SOIL TYPES						
							A	B	C	D	ROF	Te	EtC	Emb	TgB	BOF	Ra
		SQ MI	IN.	AC-FT	CFS	CFS/AC											
(a)		(a)		(a,b)	(a,b)			(b)					(c)				
AVE.	2	0.0575		0.30	8	0.22	88	0	7	5	0.00	0.00	0.68	0.30	0.02	0.00	0.00
BASIN	5	0.0575		0.65	19	0.52	88	0	7	5	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	10	0.0575		0.99	31	0.84	88	0	7	5	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	25	0.0575		1.45	48	1.30	88	0	7	5	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	50	0.0575		1.95	65	1.77	88	0	7	5	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	100	0.0575		2.43	86	2.34	88	0	7	5	0.00	0.00	0.68	0.30	0.02	0.00	0.00

(c) HSG							
(c) %SAND	0.27	0.49	0.49	0.49	0.37	0.27	0.27
(c) %SILT	0.53	0.18	0.40	0.40	0.52	0.53	0.53
(c) %CLAY	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(i) %ORG	0.01	0.01	0.01	0.01	0.01	0.01	0.01
(i) PERM	3	2	5	5	3	3	3
(i) STRUCT	3	3	2	2	2	3	3
(j) M	5300	1800	4000	4000	5200	5300	5300
(k) K	0.439	0.126	0.345	0.345	0.398	0.439	0.439

(a) AVERAGE OF ALL SUB-BASINS
(b) RESULTS FROM THE "DRAINAGE MANAGEMENT PLAN", RTI, 1991
(c) FROM SOIL SURVEY PUBLICATION
(d) ASSUME 100 LBS/CU FT BULKED DRY UNIT WEIGHT OF SEDIMENT
(e) Rw = 3 * 95 * (V * qp)^ 0.56
(f) K BASED ON SOIL CONSERVATION SERVICE 10/13/92
(g) S AND L BASED ON LOT LENGTH OF 240 FT. IN NORTH ALB. ACRES
(h) LS= (L / 72.6)^m * (0.065 + 0.0454 *S + 0.0065 * S^2)
m= 0.3 IF S <= 3%
m= 0.4 IF S = 4%
m= 0.5 IF S >= 5%
(i) ASSUMED BASED ON LIMITED INFORMATION IN SOIL SURVEY PUBLICATION
(j) M = %SILT (0.1 TO 0.002 mm) * (100 - % CLAY)
(k) K = 2.1 * M^1.14 * (10^-4) * (12 - % ORG) + 3.25 * (STRUCT - 2) + 2.5 * (PERM - 3)
(l) C WAS DETERMINED FROM 3 EXTERNAL GRAPHS
(m) TONS = (1 - (%LT B + % LT D) / 100) * Rw * K * LS * C * P
ASSUME LAND TREATMENT TYPES B AND D DO NOT CONTRIBUTE SEDIMENT
(n) Cs = 10^6 * (x TONS / y RUNOFF VOLUME AC-FT) *
(2000 LBS/TON / (43560 CU FT/AC-FT * 62.4 LBS/CU FT))

filename = DBMUSCL2.wq1
DATE - 11-25-92

TABLE 3-8.2
MUSLE EQUATION DATA AND RESULTS
EXISTING DEVELOPED CONDITION WATERSHED DRAINING TO THE
PROPOSED DAM EXCLUDING THE AREA DRAINING TO THE
EXISTING NORTH DOMINGO BACA DAM

MUSLE EQUATION FACTORS								RESULTS											
Rw (e)	K (f)	S % (g)	m	L FT (g)	LS (h)	C (i)	P	TONS (d,m)	Cs PPM (n)	TONS / SQ MI	TONS / ACRE	AC-FT (d)	AC-FT / SQ MI	CU FT (d)	DRAINAGE AREA TOTAL SQ MI	TONS TOTAL	Cs PPM (n)	AC-FT TOTAL	CU FT TOTAL
461	0.15	5	0.5	240	0.83	0.24	1	13.0	32494	226.6	0.35	0.00598	0.10403	261	1.552	351.6	877066	0.16145	7,033
1,165	0.15	5	0.5	240	0.83	0.24	1	32.9	37258	572.4	0.89	0.01511	0.26281	658	1.552	888.4	1005643	0.40789	17,768
1,941	0.15	5	0.5	240	0.83	0.24	1	54.9	40691	954.1	1.49	0.02519	0.43805	1097	1.552	1,480.7	1098300	0.67986	29,615
3,067	0.15	5	0.5	240	0.83	0.24	1	86.7	43984	1,507.4	2.36	0.03980	0.69211	1734	1.552	2,339.5	1187180	1.07416	46,790
4,290	0.15	5	0.5	240	0.83	0.24	1	121.3	45753	2,108.8	3.29	0.05567	0.96820	2425	1.552	3,272.8	1234923	1.50265	65,456
5,675	0.15	5	0.5	240	0.83	0.24	1	160.4	48588	2,789.5	4.36	0.07364	1.28078	3208	1.552	4,329.4	1311459	1.98777	86,587

NOTE - SEE TABLE 3-8.1 FOR FOOTNOTES

TABLE 3-9.1
MUSLE EQUATION DATA AND RESULTS
FUTURE DEVELOPED CONDITION WATERSHED DRAINING TO THE
PROPOSED DAM EXCLUDING THE AREA DRAINING TO THE
EXISTING NORTH DOMINGO BACA DAM

BASIN	RETURN PERIOD	DRAINAGE AREA	RUNOFF VOLUME		Qp	Qp PER AREA	LAND TREAT.				% SOIL TYPES						
							A	B	C	D	ROF	Te	EtC	Emb	TgB	BOF	Ra
(a)		SQ MI (a)	IN.	AC-FT (a,b)	CFS (a,b)	CFS/AC		(b)					(c)				
AVE. BASIN	2	0.0532		1.74	42	1.23	0	34	16	50	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	5	0.0532		2.60	56	1.64	0	34	16	50	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	10	0.0532		3.13	65	1.91	0	34	16	50	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	25	0.0532		4.10	94	2.76	0	34	16	50	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	50	0.0532		4.80	115	3.38	0	34	16	50	0.00	0.00	0.68	0.30	0.02	0.00	0.00
	100	0.0532		5.60	141	4.14	0	34	16	50	0.00	0.00	0.68	0.30	0.02	0.00	0.00

(c) HSG							
(c) %SAND	0.27	0.49	0.49	0.49	0.37	0.27	0.27
(c) %SILT	0.53	0.18	0.40	0.40	0.52	0.53	0.53
(c) %CLAY	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(i) %ORG	0.01	0.01	0.01	0.01	0.01	0.01	0.01
(i) PERM	3	2	5	5	3	3	3
(i) STRUCT	3	3	2	2	2	3	3
(j) M	5300	1800	4000	4000	5200	5300	5300
(k) K	0.439	0.126	0.345	0.345	0.398	0.439	0.439

(a) AVERAGE OF ALL SUB-BASINS
(b) RESULTS FROM THE "DRAINAGE MANAGEMENT PLAN", RTI, 1991
(c) FROM SOIL SURVEY PUBLICATION
(d) ASSUME 100 LBS/CU FT BULKED DRY UNIT WEIGHT OF SEDIMENT
(e) Rw = 3 * 95 * (V * qp)^ 0.56
(f) K BASED ON SOIL CONSERVATION SERVICE 10/13/92
(g) S AND L BASED ON LOT LENGTH OF 240 FT. IN NORTH ALB. ACRES
(h) LS= (L / 72.6)^m * (0.065 + 0.0454 *S + 0.0065 * S^2)
m= 0.3 IF S <= 3%
m= 0.4 IF S = 4%
m= 0.5 IF S >= 5%
(i) ASSUMED BASED ON LIMITED INFORMATION IN SOIL SURVEY PUBLICATION
(j) M = %SILT (0.1 TO 0.002 mm) * (100 - % CLAY)
(k) K = 2.1 * M^1.14 * (10^-4) * (12 - % ORG) + 3.25 * (STRUCT - 2) + 2.5 * (PERM - 3)
(l) C WAS DETERMINED FROM 3 EXTERNAL GRAPHS
(m) TONS = (1 - (%LT B + % LT D) / 100) * Rw * K * LS * C * P
ASSUME LAND TREATMENT TYPES B AND D DO NOT CONTRIBUTE SEDIMENT
(n) Cs = 10^6 * (x TONS / y RUNOFF VOLUME AC-FT) *
(2000 LBS/TON / (43560 CU FT/AC-FT * 62.4 LBS/CU FT))

filename = DBMUSCL1.wq1
DATE - 11/25/92

filename = DBMUSCL1.wk1

TABLE 3-9.a
MUSLE EQUATION DATA AND RESULTS
FUTURE DEVELOPED CONDITION WATERSHED DRAINING TO THE
PROPOSED DAM EXCLUDING THE AREA DRAINING TO THE
EXISTING NORTH DOMINGO BACA DAM

MUSLE EQUATION FACTORS								RESULTS											
Rw (e)	K (f)	S % (q)	a	L FT (g)	LS (h)	C (i)	P	TONS (d,a)	Cs PPM (n)	TONS / SQ MI	TONS / ACRE	AC-FT (d)	AC-FT / SQ MI	CU FT (d)	DRAINAGE AREA TOTAL SQ MI	TONS TOTAL	Cs PPM (n)	AC-FT TOTAL	CU FT TOTAL
3,152	0.15	5	0.5	240	0.83	0.24	1	15.0	6344	282.0	0.44	0.00689	0.12948	300	1.33	375.1	158604	0.17221	7,501
4,637	0.15	5	0.5	240	0.83	0.24	1	22.1	6246	414.9	0.65	0.01013	0.19048	441	1.33	551.8	156147	0.25333	11,035
5,596	0.15	5	0.5	240	0.83	0.24	1	26.6	6254	500.7	0.78	0.01223	0.22989	533	1.33	665.9	156345	0.30575	13,319
7,998	0.15	5	0.5	240	0.83	0.24	1	38.1	6832	715.5	1.12	0.01748	0.32853	761	1.33	951.7	170790	0.43695	19,034
9,780	0.15	5	0.5	240	0.83	0.24	1	46.6	7136	875.0	1.37	0.02137	0.40175	931	1.33	1,163.8	178394	0.53433	23,275
11,951	0.15	5	0.5	240	0.83	0.24	1	56.9	7474	1,069.2	1.67	0.02612	0.49093	1138	1.33	1,422.1	186851	0.65293	28,442

NOTE – SEE TABLE 3-9.1 FOR FOOTNOTES

TABLE 3-10

SUMMARY OF AVERAGE VELOCITY, HYDRAULIC DEPTH AND TOP WIDTH FOR SUBREACHES 1 AND 2 LOCATED BETWEEN WYOMING BLVD. AND PROPOSED DAM (NORTH DOMINGO BACA ARROYO) - VARIOUS RETURN PERIODS FOR FUTURE CONDITIONS

RETURN PERIOD	SUBREACH *	PEAK DISCHARGE (cfs)	VELOCITY (ft/sec)	HYDRAULIC DEPTH (ft)	TOP WIDTH (ft)
(a)	1	100	3.74	0.35	102
(1/2)2		390	4.77	0.46	188
2		781	6.12	0.65	202
5		1100	6.91	0.77	213
10		1241	7.16	0.81	222
25		1800	8.30	0.98	230
50		2100	8.68	1.11	232
100		2626	9.47	1.26	248
(a)	2	100	4.89	0.39	54
(1/2)2		390	6.15	0.55	119
2		781	7.49	0.78	137
5		1100	8.23	0.93	147
10		1241	8.52	0.99	152
25		1800	9.62	1.19	160
50		2100	10.34	1.29	162
100		2626	11.20	1.44	167

(a) Assumed 100 cfs for hydraulic analysis, not associated with a return period.

* See Figure 3-11 for subreach locations.

TABLE 3-11

COMPARISON OF

SIX UNIT SEDIMENT TRANSPORT EQUATIONS

Equation No.	Source	D50 (mm)	G	a	b	c	qs (cfs/ft) (e)	Notes
			$qs = a\ Y^b\ V^c$					
1.	Simons, Li & Assoc. April, 1983	0.4	1.8	1.7×10^{-5}	-0.225	4.638	0.734	
2.	Simons, Li & Assoc. 1982	1.0	3.0	9.14×10^{-6}	0.18	3.76	0.057	
3.	Resource Consultants & Engineers, Inc., July, 1992	1.9	3.08	4.3×10^{-5}	-0.22	4.01	0.435	LaCueva Arroyo
4.	Simons, Li & Assoc. June, 1981*	1.1	2.80	4.6×10^{-5}	0.10	3.95	0.436	(f)
5.	Resource Technology, Inc., Dec., 1992	1.1	2.80	6.5×10^{-5}	-0.1	3.9	0.524	(g)
6.	Zeller & Fullerton Equation (1983) obtained from Resource Consultants & Engineers, Inc., March, 1992	$qs = \frac{.0064\ n^{1.77}\ V^{4.32}\ G^{0.45}}{Y^{0.30}\ D50^{0.61}}$						
		assume n = 0.03,				qs = 0.39374		

(e) Y = 1.26 ft, V = 10.1 ft/sec (Average Subreach 2 HEC-2 results).
(f) a,b and c interpolated from Figures 3-18, 3-19, 3-20.
(g) See text and Table 3-12 for description of computation.

* The values of a, b and c are interpolated between data for integer values of D_{50} and G.

TABLE 3-12

NORTH DOMINGO BACA ARROYO UNIT

SEDIMENT TRANSPORT EQUATION COMPUTATION

	(1) North Domingo Baca Arroyo	(2) LaCueva Arroyo Trib. Modified	(3) Difference of (1) and (2)	(4) RCE July, 1992 LaCueva Arroyo Trib.	(5) RTI Dec., 1992 North Domingo Baca Arroyo
	D50 = 1.1mm G = 2.80	D50 = 1.9mm G = 3.08		D50 = 1.9mm G = 3.08	D50 = 1.1mm G = 2.80
*	(d)	(d)			(e)
a	4.6×10^{-5}	2.4×10^{-5}	2.2×10^{-5}	4.3×10^{-5}	6.5×10^{-5}
b	0.10	-0.02	0.12	-0.22	-0.1
c	3.95	4.06	0.11	4.01	3.90

(d) Interpolated from Figures 3-18, 3-19 and 3-20.

(e) Computed as the positive difference between columns 1 and 2, and applied to column 4 (either added or subtracted) in the same trend direction as observed between columns 1 and 2 (from larger sediment (column 2) to smaller sediment (column 1). The equivalent graphical solution is shown on Figures 3-18, 3-19 and 3-20 for a, b and c, respectively.

* $qs = a\,Y^{b}\,V^{c}$

TABLE 3-13

COLBY'S ADJUSTMENT FACTORS
FUTURE CONDITIONS

SUBREACH. 1	Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Y (ft)	0.65	0.77	0.81	0.98	1.11	1.26
CsPPM(b)	158,604	156,147	156,345	170,790	178,394	186,851
K_1(a)	1.0	1.0	1.0	1.0	1.0	1.0
K_2	7.7	7.6	8	10.2	10.5	10.9
K_3	0.055	0.055	0.055	0.055	0.055	0.055
Factor	1.37	1.36	1.39	1.51	1.52	1.54

SUBREACH 2	Return Period 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Y (ft)	0.78	0.93	0.99	1.19	1.29	1.44
CsPPM(b)	158,604	156,147	156,345	170,790	178,394	186,851
K_1(a)	1.0	1.0	1.0	1.0	1.0	1.0
K_2	8	9	9.1	10.3	10.6	11
K_3	0.055	0.055	0.055	0.055	0.055	0.055
Factor	1.39	1.44	1.45	1.51	1.53	1.55

a) Assume 60°F
b) Cs for total basin not contributing to existing North Domingo Baca Dam
c) D_{50} = 1.1 mm

TABLE 3-14

NORTH DOMINGO BACA ARROYO (MAIN ARROYO)
BED MATERIAL SEDIMENT TRANSPORT CAPACITIES
AND
AGGRADATION/DEGRADATION VOLUMES
FUTURE CONDITIONS

SEDIMENT TRANSPORT CAPACITIES PER RETURN PERIOD (a)
(cu ft)

SUB-REACH	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
1	46,860	77,807	91,565	145,535	179,205	242,329
1(b)	64,198	105,818	127,275	219,758	272,392	373,187
2	72,527	118,196	137,968	215,187	262,227	349,284
2(b)	100,813	171,384	200,054	324,932	401,207	541,390

SEDIMENT AGGRADATION VOLUMES IN RESERVOIR
(cu ft)

SUB-REACH	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
1			Supply-Sub Reach			
1(b)			Supply-Sub Reach			
2	25,667	40,389	46,403	69,652	83,022	106,955
2(b)	36,615	65,567	72,778	105,175	128,816	168,204
2(c)	61,025	109,278	121,297	175,292	214,693	280,340

(a) Unit sediment transport equation

$$= 6.5 \times 10^{-5} Y^{-.1} V^{3.9}$$

(b) Includes Colby's adjustment factor.

(c) Increased to account for porosity of 0.6 of sediment after deposition.

TABLE 3-15

SUMMARY OF THE SEDIMENT YIELD
AND
SEDIMENT TRANSPORT ANALYSIS*

TOTAL SEDIMENT VOLUME (EXCLUDING TRIBUTARY ARROYOS)

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
	(cu ft)					
Yield	7,501	11,035	13,319	19,034	23,275	28,442
Transport	61,025	109,278	121,297	175,292	214,693	280,340
Total	68,526	120,313	134,616	194,326	237,968	308,782

	Rep. Annual	4 x Rep. Annual Volume	100-Yr Volume	Total Design Volume
Total (cu ft)	78,217	312,866	308,784	621,650
Total (ac-ft)	1.80	7.18	7.09	14.27

TOTAL SEDIMENT VOLUME (INCLUDING TRIBUTARY ARROYOS)

Total design sediment volume excluding tributary arroyos = 14.27 ac-ft + total design sediment volume from two tributary arroyos = 0.392 ac-ft. = 14.7 ac-ft.

* The sediment yield is the washload determined with the MUSLE for the drainage area to the proposed dam excluding the drainage area contributing to the existing North Domingo Baca Dam.

The sediment transport analysis is for the main North Domingo Baca Arroyo for the reach between Wyoming Blvd. to where the arroyo intersects Anaheim Ave.

TABLE 3-16

SUMMARY OF TOTAL SEDIMENT LOAD

FOR EXISTING CONDITIONS

Existing Tributary Location	Analysis Point	Drain. Area (sq.mi)	100-yr Qp (cfs)	100-yr Vol. (ac-ft)	Four Times the Representative Annual Plus 100-yr Total Sed. Load (Estimated) (ac-ft) (a)
Wilshire @ Louisiana	933.99	0.1455	118	7.66	0.34
Between Wilshire and Corona @ Louisiana	934.99	0.2355	247	15.09	0.68
Main N. Domingo Baca Arroyo @ Louisiana	935.99	2.698	535	159.99	7.22
Arroyo N. of Holly @ Louisiana	937.99	0.1598	110	8.03	0.36
				Sum =	8.6

a) The total sediment load from a tributary arroyo was computed assuming that the ratio of its total sediment load to its 100-yr runoff volume is proportional to the total sediment load of the main North Domingo Baca Arroyo to its 100-yr runoff volume (the North Domingo Baca Arroyo sediment load and runoff volume are future condition). The equation is:

$$\frac{14.27}{316} * \text{Trib. Run. Vol.} = \text{Trib. Total Sed. Load (4 x rep. annual plus the 100-yr.)}$$

APPENDIX A

of Appendix A

HYDRAULIC INFORMATION

THIS RUN EXECUTED 27AUG92 15:59:26
SHEET 1 OF 8

```
**************************************
 HEC-2 WATER SURFACE PROFILES
:? YR 0 = 100 SUPER CRITICAL
 Version   4.6.2:  May 1991
**************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DOMINGO BACA PHASE IIB

SUMMARY-PRINTOUT

HYDRAULIC DEPTH

		SECNO	XLCH	ELMIN	K*CHSL	CWSEL	CRIWS	EG	HV	Q	DEPTH	VCH	AREA	TOPWID	
	*	2166.000	0.00	5392.40	0.00	5393.16	5393.16	5393.43	0.27	100.00	0.76	4.16	24.01	47.96	
	*	2164.000	210.00	5385.50	-32.66	5386.33	5387.04	5393.43	7.10	100.00	0.83	21.39	4.68	11.47	
	*	2163.700	20.00	5386.90	70.00	5387.29	5387.39	5387.61	0.31	100.00	0.40	4.48	22.31	83.91	
SUB-	*	2163.500	25.00	5388.30	56.00	5388.80	5388.80	5388.90	0.11	100.00	0.50	2.61	38.26	189.88	
REACH	*	2163.200	25.00	5382.50	-231.99	5383.01	5383.66	5388.08	5.07	100.00	0.51	18.07	5.53	17.90	
	*	2162.000	165.00	5379.20	-20.00	5380.79	5380.79	5381.09	0.30	100.00	1.59	4.39	22.79	38.32	0.5
1	*	2160.000	210.00	5374.80	-20.95	5375.15	5375.23	5375.39	0.23	100.00	0.35	3.87	25.87	138.13	0.1
	*	2158.000	205.00	5368.30	-31.71	5368.81	5368.81	5368.95	0.14	100.00	0.51	2.95	33.84	129.21	6.2
	*	2156.000	205.00	5361.70	-32.19	5362.23	5362.37	5362.68	0.45	100.00	0.53	5.37	18.61	53.09	6.3
2	*	2154.000	215.00	5355.10	-30.70	5356.33	5356.33	5356.55	0.22	100.00	1.23	3.74	26.75	67.79	0.3
		2152.000	200.00	5350.00	-25.50	5350.73	5350.85	5351.21	0.48	100.00	0.73	5.56	17.99	41.33	0.4
		2150.000	250.00	5341.80	-32.80	5342.65	5342.73	5342.99	0.34	100.00	0.85	4.70	21.28	50.61	
		2148.000	200.00	5336.10	-28.50	5336.82	5336.89	5337.15	0.33	100.00	0.72	4.64	21.56	53.85	
		2144.000	400.00	5323.50	-31.50	5324.38	5324.53	5324.92	0.54	100.00	0.88	5.91	16.92	30.55	
		2140.000	400.00	5313.30	-25.50	5314.73	5314.74	5315.04	0.31	100.00	1.43	4.48	22.34	43.31	
	*	2138.000	200.00	5307.70	-28.00	5308.39	5308.54	5308.85	0.45	100.00	0.69	5.40	18.51	57.72	
	*	2137.800	70.00	5307.40	-4.29	5308.20	5308.20	5308.38	0.18	100.00	0.80	3.37	29.70	83.21	

MANNING'S "n"

OVERBANKS = 0.035
Channel = 0.030

AVERAGES

SUB-REACH	VCH	TW	HD
1	3.74	102	0.35
2	4.89	54	0.39

THIS RUN EXECUTED 27AUG92 15:57:39

SHEET 2 OF 8

```
*************************************
 HEC-2 WATER SURFACE PROFILES
1/2 2 YR Q = 390   SUPER CRITICAL
 Version   4.6.2:  May 1991
*************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DOMINGO BACA PHASE IIB

SUMMARY PRINTOUT

HYDRAULIC DEPTH

		SECNO	XLCH	ELMIN	K*CHSL	CWSEL	CRIWS	EG	HV	Q	DEPTH	VCH	AREA	TOPWID	
	*	2166.000	0.00	5392.40	0.00	5393.82	5393.82	5394.09	0.27	390.00	1.42	4.16	93.82	188.00	
	*	2164.000	210.00	5385.50	-32.86	5386.90	5387.79	5394.09	7.19	390.00	1.40	21.52	18.12	39.30	
	*	2163.700	20.00	5386.90	70.00	5387.69	5387.87	5388.22	0.53	390.00	0.79	5.83	66.86	147.15	
	*	2163.500	25.00	5388.30	56.00	5389.11	5389.11	5389.32	0.22	390.00	0.81	3.74	104.30	240.00	
SUB-REACH	*	2163.200	25.00	5382.50	-231.99	5383.69	5384.68	5388.78	5.09	390.00	1.19	18.11	21.54	30.30	
	*	2162.000	165.00	5379.20	-20.00	5381.68	5381.69	5381.99	0.30	390.00	2.48	4.41	88.45	155.83	0.57
1	*	2160.000	210.00	5374.80	-20.95	5375.37	5375.53	5375.87	0.50	390.00	0.57	5.68	68.60	217.30	0.32
	*	2158.000	205.00	5366.30	-31.71	5369.17	5369.19	5369.45	0.28	390.00	0.87	4.22	92.43	190.04	0.49
	*	2156.000	205.00	5361.70	-32.19	5362.72	5362.97	5363.49	0.77	390.00	1.02	7.05	55.32	108.81	0.51
2	*	2154.000	215.00	5355.10	-30.70	5356.89	5356.93	5357.32	0.43	390.00	1.79	5.26	74.10	107.50	0.67
	*	2152.000	200.00	5350.00	-25.50	5351.24	5351.40	5351.83	0.59	390.00	1.24	6.15	63.40	140.29	0.45
		2150.000	250.00	5341.80	-32.80	5343.29	5343.41	5343.78	0.49	390.00	1.49	5.60	69.62	112.85	
		2148.000	200.00	5336.10	-28.50	5337.31	5337.57	5338.19	0.88	390.00	1.21	7.54	51.71	66.36	
		2144.000	400.00	5323.50	-31.50	5325.18	5325.44	5326.05	0.87	390.00	1.68	7.50	52.02	61.02	
		2140.000	400.00	5313.30	-25.50	5315.35	5315.42	5315.87	0.52	390.00	2.05	5.78	67.51	99.25	
		2138.000	200.00	5307.70	-28.00	5308.91	5309.12	5309.65	0.74	390.00	1.21	6.92	56.34	104.49	
	*	2137.800	70.00	5307.40	-4.29	5308.70	5308.70	5309.08	0.38	390.00	1.30	4.97	78.42	105.82	

AVERAGES

SUB-REACH	VCH	TW	HD
1	4.77	188	0.46
2	6.15	119	0.55

THIS RUN EXECUTED 27AUG92 15:53:53

SHEET 3 OF 8

```
*************************************
 HEC-2 WATER SURFACE PROFILES
2 YR Q = 781   SUPER CRITICAL
 Version  4.6.2:  May 1991
*************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DOMINGO BACA PHASE IIB

SUMMARY PRINTOUT

SUB-REACH		SECNO	XLCH	ELMIN	K*CHSL	CWSEL	CRIWS	EG	HV	Q	DEPTH	VCH	AREA	TOPWID	HYDRAULIC DEPTH
	*	2166.000	0.00	5392.40	0.00	5394.14	5394.14	5394.50	0.36	781.00	1.74	4.80	162.82	233.13	
	*	2164.000	210.00	5385.50	-32.86	5387.28	5388.09	5394.50	7.22	781.00	1.78	21.56	36.23	55.92	
	*	2163.700	20.00	5386.90	70.00	5387.45	5388.15	5394.50	7.05	781.00	0.55	21.30	36.66	104.83	
	*	2163.500	25.00	5388.30	56.00	5388.95	5389.35	5391.01	2.06	781.00	0.65	11.53	67.76	209.56	
		2163.200	25.00	5382.50	-231.99	5384.40	5385.71	5388.47	4.07	781.00	1.90	16.19	48.25	44.02	
	*	2162.000	165.00	5379.20	-20.00	5381.96	5382.03	5382.49	0.54	781.00	2.76	5.88	132.87	165.47	0.8
1	*	2160.000	210.00	5374.80	-20.95	5375.56	5375.81	5376.31	0.75	781.00	0.76	6.95	112.42	232.56	0.48
	*	2158.000	205.00	5368.30	-31.71	5369.41	5369.50	5369.88	0.47	781.00	1.11	5.53	141.22	208.42	0.68
		2156.000	205.00	5361.70	-32.19	5363.07	5363.38	5364.05	0.99	781.00	1.37	7.95	98.21	138.50	0.71
2		2154.000	215.00	5355.10	-30.70	5357.23	5357.38	5357.99	0.76	781.00	2.13	6.98	111.83	114.78	0.97
		2152.000	200.00	5350.00	-25.50	5351.50	5351.76	5352.38	0.88	781.00	1.50	7.54	103.59	156.46	0.66
		2150.000	250.00	5341.80	-32.80	5343.65	5343.85	5344.33	0.68	781.00	1.85	6.63	117.88	157.52	
		2148.000	200.00	5336.10	-28.50	5338.04	5338.20	5338.66	0.62	781.00	1.94	6.33	123.42	197.60	
		2144.000	400.00	5323.50	-31.50	5325.70	5326.05	5326.83	1.13	781.00	2.20	8.53	91.58	88.66	
		2140.000	400.00	5313.30	-25.50	5315.69	5315.88	5316.59	0.90	781.00	2.39	7.62	102.50	100.00	
		2138.000	200.00	5307.70	-29.00	5309.20	5309.56	5310.39	1.19	781.00	1.50	8.74	89.35	115.58	
	*	2137.800	70.00	5307.40	-4.29	5309.16	5309.16	5309.72	0.56	781.00	1.76	6.01	129.92	118.36	

AVERAGES

SUB-REACH	VCH	TW	HD
1	6.12	202	0.65
2	7.49	137	0.78

THIS RUN EXECUTED 27AUG92 15:47:29

SHEET 4 OF 8

```
*************************************
 HEC-2 WATER SURFACE PROFILES
5 YR Q = 1100   SUPER CRITICAL
 Version   4.6.2:  May 1991
*************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DOMINGO BACA PHASE IIB

SUMMARY PRINTOUT

		SECNO	XLCH	ELMIN	K*CHSL	CWSEL	CRIWS	EG	HV	Q	DEPTH	VCH	AREA	TOPWID	HYDRAULIC DEPTH
	*	2166.000	0.00	5392.40	0.00	5394.32	5394.32	5394.77	0.45	1100.00	1.92	5.38	204.36	238.14	
	*	2164.000	210.00	5385.50	-32.86	5387.47	5388.29	5394.77	7.30	1100.00	1.97	21.68	50.75	102.52	
	*	2163.700	20.00	5386.90	70.00	5387.58	5388.32	5394.77	7.18	1100.00	0.68	21.51	51.14	119.66	
	*	2163.500	25.00	5388.30	56.00	5389.05	5389.53	5391.22	2.16	1100.00	0.75	11.81	93.16	240.00	
SUB-REACH		2163.200	25.00	5382.50	-231.99	5384.78	5386.00	5389.09	4.31	1100.00	2.28	16.66	66.02	51.15	
	*	2162.000	165.00	5379.20	-20.00	5382.11	5382.24	5382.95	0.75	1100.00	2.91	6.93	158.67	171.39	0.9
1	*	2160.000	210.00	5374.80	-20.95	5375.72	5375.98	5376.57	0.85	1100.00	0.92	7.40	148.66	245.38	0.6
		2158.000	205.00	5368.30	-31.71	5369.56	5369.70	5370.19	0.63	1100.00	1.26	6.39	172.27	222.22	0.7
		2156.000	205.00	5361.70	-32.19	5363.31	5363.61	5364.36	1.05	1100.00	1.61	8.24	133.55	160.41	0.8
2		2154.000	215.00	5355.10	-30.70	5357.44	5357.67	5358.45	1.01	1100.00	2.34	8.06	136.56	118.60	1.1
		2152.000	200.00	5350.00	-25.50	5351.67	5352.01	5352.76	1.09	1100.00	1.67	8.38	131.34	163.11	0.8
		2150.000	250.00	5341.80	-32.80	5343.85	5344.10	5344.65	0.80	1100.00	2.05	7.19	152.89	188.26	
		2148.000	200.00	5336.10	-28.50	5338.22	5338.43	5338.95	0.73	1100.00	2.12	6.86	160.31	219.31	
		2144.000	400.00	5323.50	-31.50	5325.99	5326.41	5327.32	1.32	1100.00	2.49	9.23	119.14	103.38	
		2140.000	400.00	5313.30	-25.50	5315.93	5316.20	5317.11	1.17	1100.00	2.63	8.67	126.52	100.00	
	*	2138.000	200.00	5307.70	-28.00	5309.40	5309.85	5310.88	1.49	1100.00	1.70	9.79	112.35	125.41	
	*	2137.800	70.00	5307.40	-4.29	5309.46	5309.46	5310.13	0.67	1100.00	2.06	6.58	167.19	127.54	

AVERAGE

SUB-REACH	VCH	TW	HD
1	6.91	213	0.77
2	8.23	147	0.93

THIS RUN EXECUTED 27AUG92 15:51:18

SHEET 5 OF 8

```
*************************************
 HEC-2 WATER SURFACE PROFILES
10 YR Q = 1241   SUPER CRITICAL
 Version   4.6.2:  May 1991
*************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DOMINGO BACA PHASE IIB

SUMMARY PRINTOUT

SUB-REACH		SECNO	XLCH	ELMIN	K*CHSL	CWSEL	CRIWS	EG	HV	Q	DEPTH	VCH	AREA	TOPWID	HYDRAULIC DEPTH
	*	2166.000	0.00	5392.40	0.00	5394.39	5394.39	5394.87	0.48	1241.00	1.99	5.56	223.17	240.37	
	*	2164.000	210.00	5385.50	-32.86	5387.52	5388.37	5394.87	7.35	1241.00	2.02	21.76	57.04	108.86	
	*	2163.700	20.00	5386.90	70.00	5387.62	5388.39	5394.87	7.25	1241.00	0.72	21.62	57.41	129.24	
	*	2163.500	25.00	5388.30	56.00	5389.08	5389.60	5391.43	2.35	1241.00	0.78	12.30	100.90	240.00	
SUB-REACH		2163.200	25.00	5382.50	-231.99	5384.92	5386.08	5389.38	4.46	1241.00	2.42	16.94	73.24	53.78	
	*	2162.000	165.00	5379.20	-20.00	5382.16	5382.33	5383.01	0.85	1241.00	2.96	7.38	168.13	171.76	0.9
1		2160.000	210.00	5374.80	-20.95	5375.79	5376.05	5376.65	0.86	1241.00	0.99	7.42	167.16	266.47	0.6
		2158.000	205.00	5368.30	-31.71	5369.61	5369.78	5370.31	0.69	1241.00	1.31	6.67	186.03	227.81	0.8
		2156.000	205.00	5361.70	-32.19	5363.40	5363.71	5364.49	1.10	1241.00	1.70	8.40	147.69	168.55	0.8
2		2154.000	215.00	5355.10	-30.70	5357.53	5357.80	5358.63	1.10	1241.00	2.43	8.42	147.34	120.23	1.2
		2152.000	200.00	5350.00	-25.50	5351.74	5352.21	5352.92	1.18	1241.00	1.74	8.73	142.10	165.84	0.8
		2150.000	250.00	5341.80	-32.80	5343.93	5344.18	5344.77	0.84	1241.00	2.13	7.37	168.29	201.22	
		2146.000	200.00	5336.10	-28.50	5338.29	5338.51	5339.07	0.78	1241.00	2.19	7.08	175.35	227.33	
		2144.000	400.00	5323.50	-31.50	5326.11	5326.52	5327.49	1.38	1241.00	2.61	9.43	131.63	110.66	
		2140.000	400.00	5313.30	-25.50	5316.04	5316.32	5317.32	1.29	1241.00	2.74	9.10	136.33	100.00	
	*	2138.000	200.00	5307.70	-28.00	5309.46	5309.96	5311.10	1.64	1241.00	1.76	10.26	120.92	126.83	
	*	2137.800	70.00	5307.40	-4.29	5309.58	5309.58	5310.30	0.72	1241.00	2.18	6.80	182.44	130.49	

AVERAGES

SUB-REACH	VCH	TW	HL
1	7.16	222	0.8
2	8.52	152	0.9

THIS RUN EXECUTED 27AUG92 16:01:10

SHEET 6 OF 8

```
****************************************
 HEC-2 WATER SURFACE PROFILES
25 YR Q = 1800   SUPER CRITICAL
 Version   4.6.2:  May 1991
****************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DOMINGO BACA PHASE IIB

SUMMARY PRINTOUT

HYDRAULIC DEPTH

		SECNO	XLCH	ELMIN	K*CHSL	CWSEL	CRIWS	EG	HV	Q	DEPTH	VCH	AREA	TOPWID	
	*	2166.000	0.00	5392.40	0.00	5394.66	5394.66	5395.27	0.61	1800.00	2.26	6.27	287.04	244.69	
	*	2164.000	210.00	5385.50	-32.86	5387.72	5388.61	5395.27	7.54	1800.00	2.22	22.04	81.66	131.31	
	*	2163.700	20.00	5386.90	70.00	5387.78	5388.64	5395.27	7.48	1800.00	0.88	21.96	81.99	189.62	
	*	2163.500	25.00	5388.30	56.00	5389.21	5389.87	5392.09	2.87	1800.00	0.91	13.60	132.30	240.00	
SUB-REACH		2163.200	25.00	5382.50	-231.99	5385.39	5396.47	5390.30	4.91	1800.00	2.89	17.78	101.26	62.94	
	*	2162.000	165.00	5379.20	-20.00	5382.35	5382.69	5383.60	1.25	1800.00	3.15	8.97	200.71	172.00	1.17
1		2160.000	210.00	5374.80	-20.95	5375.99	5376.29	5377.02	1.03	1800.00	1.19	8.14	221.26	280.81	0.79
		2158.000	205.00	5368.30	-31.71	5369.82	5370.06	5370.76	0.94	1800.00	1.52	7.78	231.31	237.51	0.97
		2156.000	205.00	5361.70	-32.19	5363.66	5364.06	5364.99	1.34	1800.00	1.96	9.27	194.12	176.92	1.10
2		2154.000	215.00	5355.10	-30.70	5357.85	5358.22	5359.31	1.46	1800.00	2.75	9.68	185.86	125.88	1.44
		2152.000	200.00	5350.00	-25.50	5351.98	5352.25	5353.50	1.52	1800.00	1.98	9.90	181.86	175.54	1.04
		2150.000	250.00	5341.80	-32.80	5344.18	5344.47	5345.20	1.02	1800.00	2.38	8.10	222.28	237.50	
		2148.000	200.00	5336.10	-28.50	5338.51	5338.80	5339.46	0.95	1800.00	2.41	7.83	229.93	251.05	
		2144.000	400.00	5323.50	-31.50	5326.49	5326.98	5328.01	1.53	1800.00	2.99	9.92	181.51	142.06	
		2140.000	400.00	5313.30	-25.50	5316.39	5316.80	5318.07	1.68	1800.00	3.09	10.42	172.81	100.00	
	*	2138.000	200.00	5307.70	-28.00	5309.71	5310.33	5311.90	2.20	1800.00	2.00	11.90	151.23	131.48	
	*	2137.800	70.00	5307.40	-4.29	5309.85	5309.99	5310.91	1.07	1800.00	2.45	8.29	217.23	136.00	

AVERAGES

SUB-REACH	VCH	TW	HD
1	8.30	230	0.98
2	9.62	160	1.19

THIS RUN EXECUTED 27AUG92 16:03:01

SHEET 7 OF 8

```
****************************************
 HEC-2 WATER SURFACE PROFILES
50 YR Q = 1800   SUPER CRITICAL
 Version   4.6.2:  May 1991
****************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DOMINGO BACA PHASE IIB

SUMMARY PRINTOUT

SUB-REACH		SECNO	XLCH	ELMIN	K*CHSL	CWSEL	CRIWS	EG	HV	Q	DEPTH	VCH	AREA	TOPWID	HYDRAULIC DEPTH
	*	2166.000	0.00	5392.40	0.00	5394.79	5394.79	5395.46	0.67	2100.00	2.39	6.58	319.26	245.80	
	*	2164.000	210.00	5385.50	-32.86	5387.82	5388.73	5395.46	7.64	2100.00	2.32	22.19	94.65	188.48	
	*	2163.700	20.00	5386.90	70.00	5387.84	5388.76	5395.46	7.62	2100.00	0.94	22.15	94.80	208.60	
	*	2163.500	25.00	5388.30	56.00	5389.29	5389.99	5392.44	3.15	2100.00	0.99	14.24	147.42	240.00	
		2163.200	25.00	5382.50	-231.99	5385.65	5386.62	5390.10	4.45	2100.00	3.15	16.93	124.02	134.32	
1	*	2162.000	165.00	5379.20	-20.00	5382.63	5382.76	5383.75	1.12	2100.00	3.43	8.48	247.58	172.00	1.4
	*	2160.000	210.00	5374.80	-20.95	5375.96	5376.41	5377.49	1.53	2100.00	1.16	9.93	211.57	278.52	0.7
	*	2158.000	205.00	5368.30	-31.71	5369.99	5370.18	5370.90	0.91	2100.00	1.69	7.64	274.97	244.88	1.1
		2156.000	205.00	5361.70	-32.19	5363.71	5364.23	5365.38	1.67	2100.00	2.01	10.37	202.45	178.72	1.1
2		2154.000	215.00	5355.10	-30.70	5358.06	5358.42	5359.57	1.51	2100.00	2.96	9.85	213.20	129.90	1.6
	*	2152.000	200.00	5350.00	-25.50	5352.05	5352.22	5353.86	1.81	2100.00	2.05	10.80	194.39	178.49	1.0
		2150.000	250.00	5341.80	-32.20	5344.31	5344.60	5345.37	1.07	2100.00	2.51	8.29	253.45	251.60	
		2148.000	200.00	5336.10	-28.50	5338.60	5338.96	5339.67	1.08	2100.00	2.50	8.32	252.34	259.11	
		2144.000	400.00	5323.50	-31.50	5326.65	5327.13	5328.29	1.65	2100.00	3.15	10.31	203.78	144.77	
		2140.000	400.00	5313.30	-25.50	5316.54	5317.03	5318.48	1.93	2100.00	3.24	11.15	188.29	100.00	
	*	2138.000	200.00	5307.70	-28.00	5309.82	5310.52	5312.25	2.43	2100.00	2.12	12.51	167.84	134.26	
	*	2137.800	70.00	5307.40	-4.29	5309.96	5310.18	5311.22	1.25	2100.00	2.56	8.98	233.83	136.00	

AVERAGES

SUB REACH	VCH	TW	HD
1	8.68	232	1.11
2	10.34	162	1.29

THIS RUN EXECUTED 27AUG92 16:04:39

SHEET 8 OF 8

```
************************************
 HEC-2 WATER SURFACE PROFILES
100 YR Q = 2626   SUPER CRITICAL
 Version   4.6.2:  May 1991
************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DOMINGO BACA PHASE IIB

SUMMARY PRINTOUT

		SECNO	XLCH	ELMIN	K*CHSL	CWSEL	CRIWS	EG	HV	Q	DEPTH	VCH	AREA	HYDRAULIC DEPTH TOPWID	
	*	2166.000	0.00	5392.40	0.00	5395.02	5395.02	5395.78	0.76	2626.00	2.62	6.99	375.77	247.73	
	*	2164.000	210.00	5385.50	-32.86	5387.91	5389.03	5395.78	7.86	2626.00	2.41	22.50	116.70	233.58	
	*	2163.700	20.00	5386.90	70.00	5387.95	5388.96	5395.78	7.83	2626.00	1.05	22.45	116.95	232.31	
	*	2163.500	25.00	5386.30	56.00	5389.39	5390.21	5393.00	3.61	2626.00	1.09	15.24	172.27	240.00	
SUB REACH	*	2163.200	25.00	5382.50	-231.99	5385.80	5386.95	5390.75	4.96	2626.00	3.30	17.87	146.99	147.04	
	*	2162.000	165.00	5379.20	-20.00	5382.81	5383.11	5384.19	1.37	2626.00	3.61	9.41	279.16	172.00	1.
1	*	2160.000	210.00	5374.80	-20.95	5376.09	5376.59	5377.83	1.74	2626.00	1.29	10.59	247.88	287.00	0.
	*	2158.000	205.00	5368.30	-31.71	5370.15	5370.40	5371.25	1.10	2626.00	1.85	8.41	312.41	245.00	1.
		2156.000	205.00	5361.70	-32.19	5363.90	5364.48	5365.78	1.88	2626.00	2.20	10.99	238.91	186.39	1.
2		2154.000	215.00	5355.10	-30.70	5358.30	5358.74	5360.08	1.78	2626.00	3.20	10.70	245.48	132.51	1.
	*	2152.000	200.00	5350.00	-25.50	5352.19	5352.21	5354.39	2.21	2626.00	2.19	11.92	220.26	184.43	1.
		2150.000	250.00	5341.80	-32.80	5344.47	5344.78	5345.68	1.21	2626.00	2.67	8.83	297.25	265.70	
		2148.000	200.00	5336.10	-28.50	5338.77	5339.16	5339.99	1.22	2626.00	2.67	8.86	296.38	279.18	
		2144.000	400.00	5323.50	-31.50	5326.93	5327.57	5328.67	1.73	2626.00	3.43	10.57	248.55	167.57	
		2140.000	400.00	5313.30	-25.50	5316.84	5317.43	5319.10	2.27	2626.00	3.54	12.08	217.34	100.00	
	*	2138.000	200.00	5307.70	-28.00	5309.99	5310.85	5312.92	2.93	2626.00	2.29	13.73	191.21	136.00	
	*	2137.800	70.00	5307.40	-4.29	5310.12	5310.50	5311.76	1.64	2626.00	2.72	10.27	255.68	136.00	

AVERAGES

SUBREACH	VCH	TW	
1	9.47	248	1.
2	11.20	167	1.

filename = BONREGRS.W01

NORTH BORINGO BACA MAIN ARROYO
SUBREACHES 1 AND 2 WEST OF WYOMING BLVD.
REGRESSIONS OF VELOCITY AND HYDRAULIC DEPTH VS. Qp AND TOP WIDTH

RETURN PERIOD	DISCHARGE	LOG	SUBREACH	VELOCITY	LOG	DEPTH	LOG	TOP WIDTH	LOG
7	100	2.00	1	3.74	0.57	0.35	-0.46	102	2.01
(1/2) 2	390	2.59	1	4.77	0.68	0.46	-0.34	190	2.27
2	781	2.89	1	6.12	0.79	0.65	-0.19	202	2.31
5	1100	3.04	1	6.91	0.84	0.77	-0.11	213	2.33
10	1241	3.09	1	7.16	0.85	0.81	-0.09	222	2.35
25	1800	3.26	1	8.3	0.92	0.98	-0.01	230	2.36
50	2100	3.32	1	8.68	0.94	1.11	0.05	232	2.37
100	2626	3.42	1	9.47	0.98	1.256	0.10	248	2.39

EQUATIONS:

V = a * Q ^ I
y = a * Q ^ I
TW = a * Q ^ I

Regression Output:

Constant	-0.04005	-1.30781	1.552001
Std Err of Y Est	0.023106	0.04335	0.03843
R Squared	0.97575	0.955265	0.915176
No. of Observations	8	8	8
Degrees of Freedom	6	6	6
X Coefficient(s)	0.291625	0.39958	0.252464
Std Err of Coef.	0.018769	0.035213	0.031378
a Anti-Log	0.911898	0.049226	35.71009

RETURN PERIOD	DISCHARGE	LOG	SUBREACH	VELOCITY	LOG	DEPTH	LOG	TOP WIDTH	LOG
7	100	2.00	2	4.89	0.69	0.39	-0.41	54	1.73
(1/2) 2	390	2.59	2	6.15	0.79	0.55	-0.26	119	2.08
2	781	2.89	2	7.49	0.87	0.78	-0.11	137	2.14
5	1100	3.04	2	8.23	0.92	0.93	-0.03	147	2.17
10	1241	3.09	2	8.52	0.93	0.99	-0.00	152	2.18
25	1800	3.26	2	9.62	0.98	1.19	0.08	160	2.20
50	2100	3.32	2	10.34	1.01	1.29	0.11	162	2.21
100	2626	3.42	2	11.2	1.05	1.44	0.16	167	2.22

EQUATIONS:

V = a * Q ^ I
y = a * Q ^ I
TW = a * Q ^ I

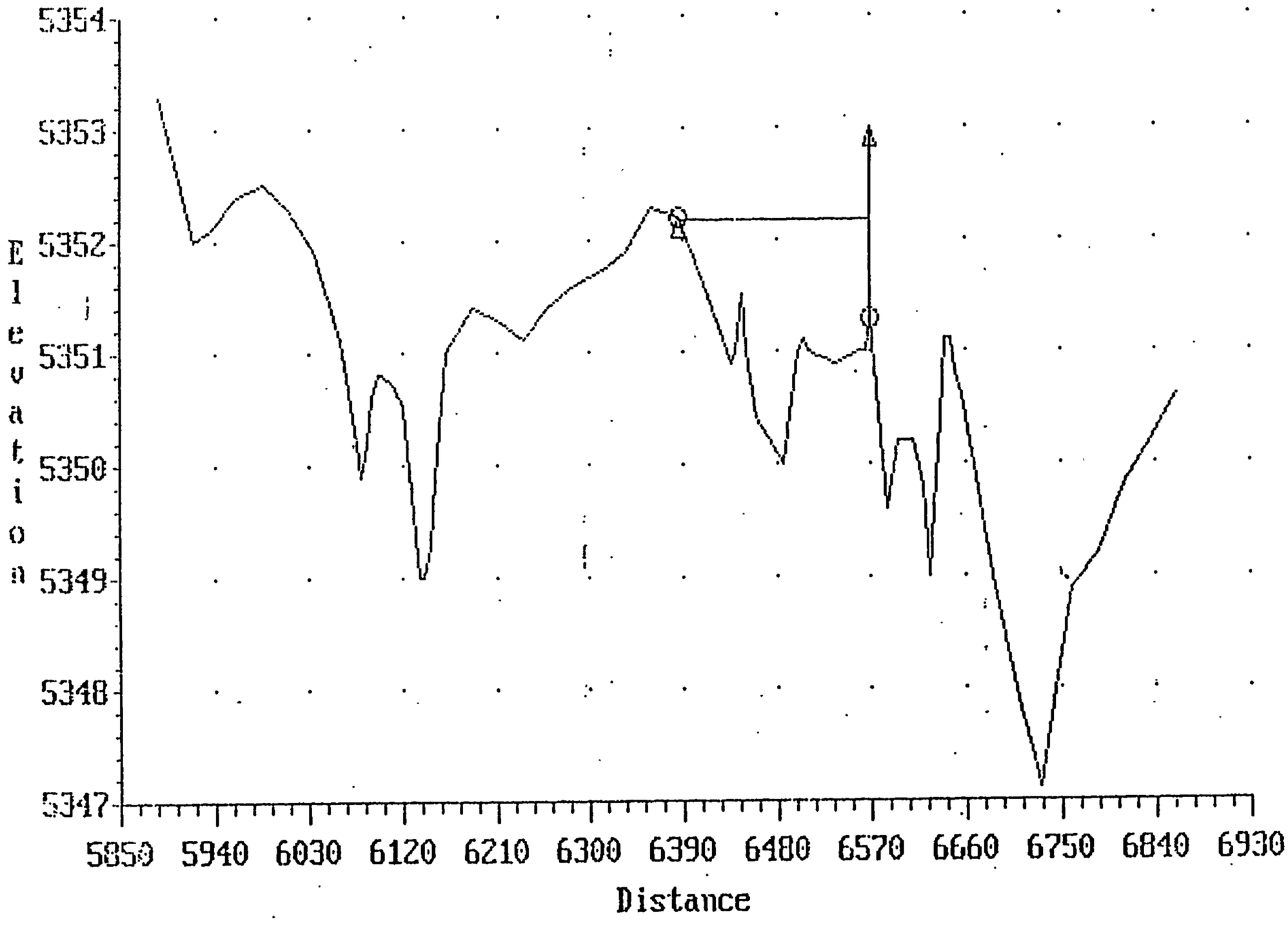
Regression Output:

Constant	0.155322	-1.27352	1.135202
Std Err of Y Est	0.021096	0.0321	0.052732
R Squared	0.973456	0.976488	0.909369
No. of Observations	8	8	8
Degrees of Freedom	6	6	6
X Coefficient(s)	0.254189	0.411643	0.332345
Std Err of Coef.	0.017136	0.026074	0.042833
a Anti-Log	1.429955	0.05327	13.65217

DOMINGO BACA PHASE IIB

FUTURE CONDITION 100 YR Q

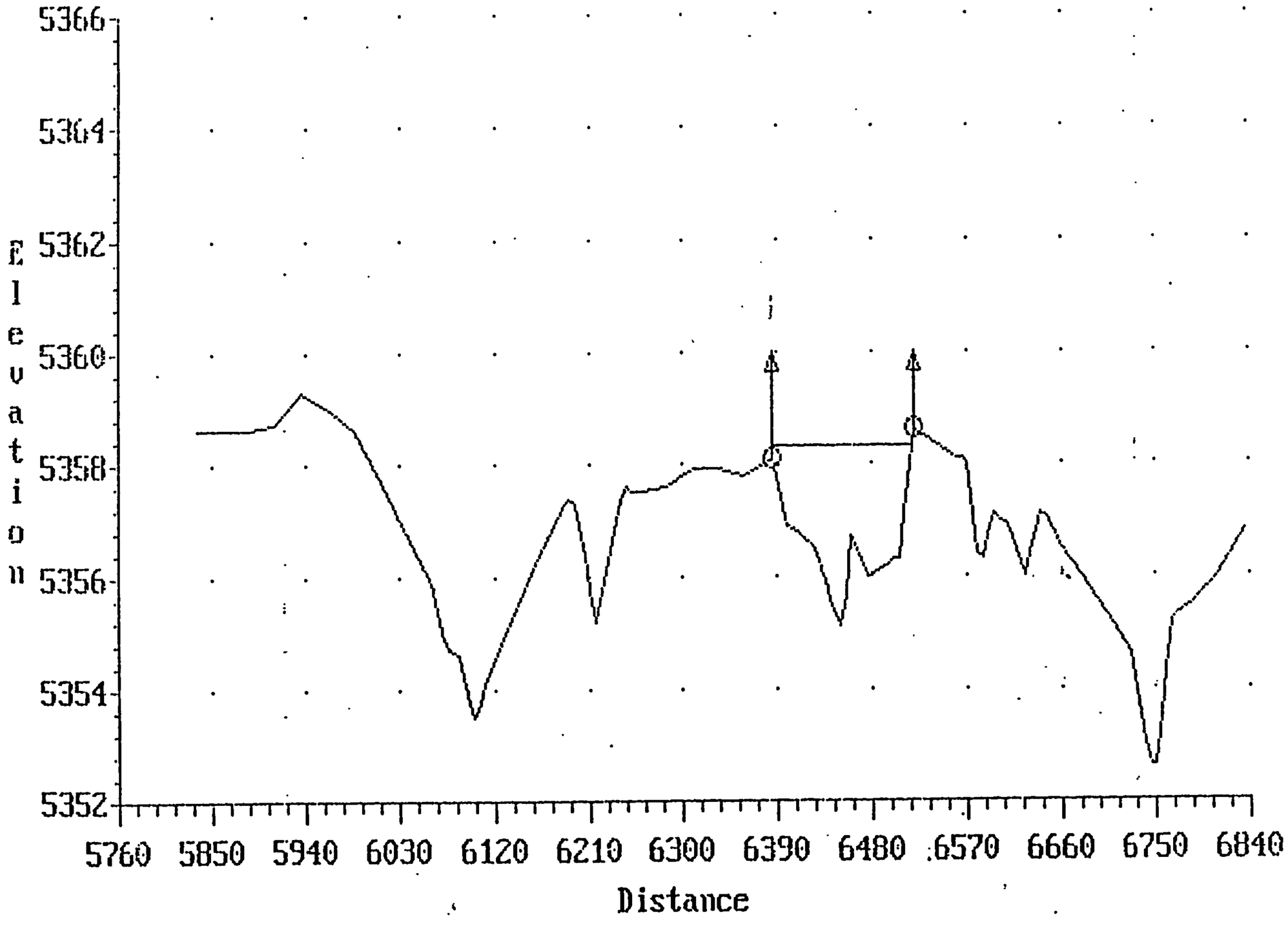
Cross section 2152



DOMINGO BACA PHASE IIB

FUTURE CONDITION 100 YR Q

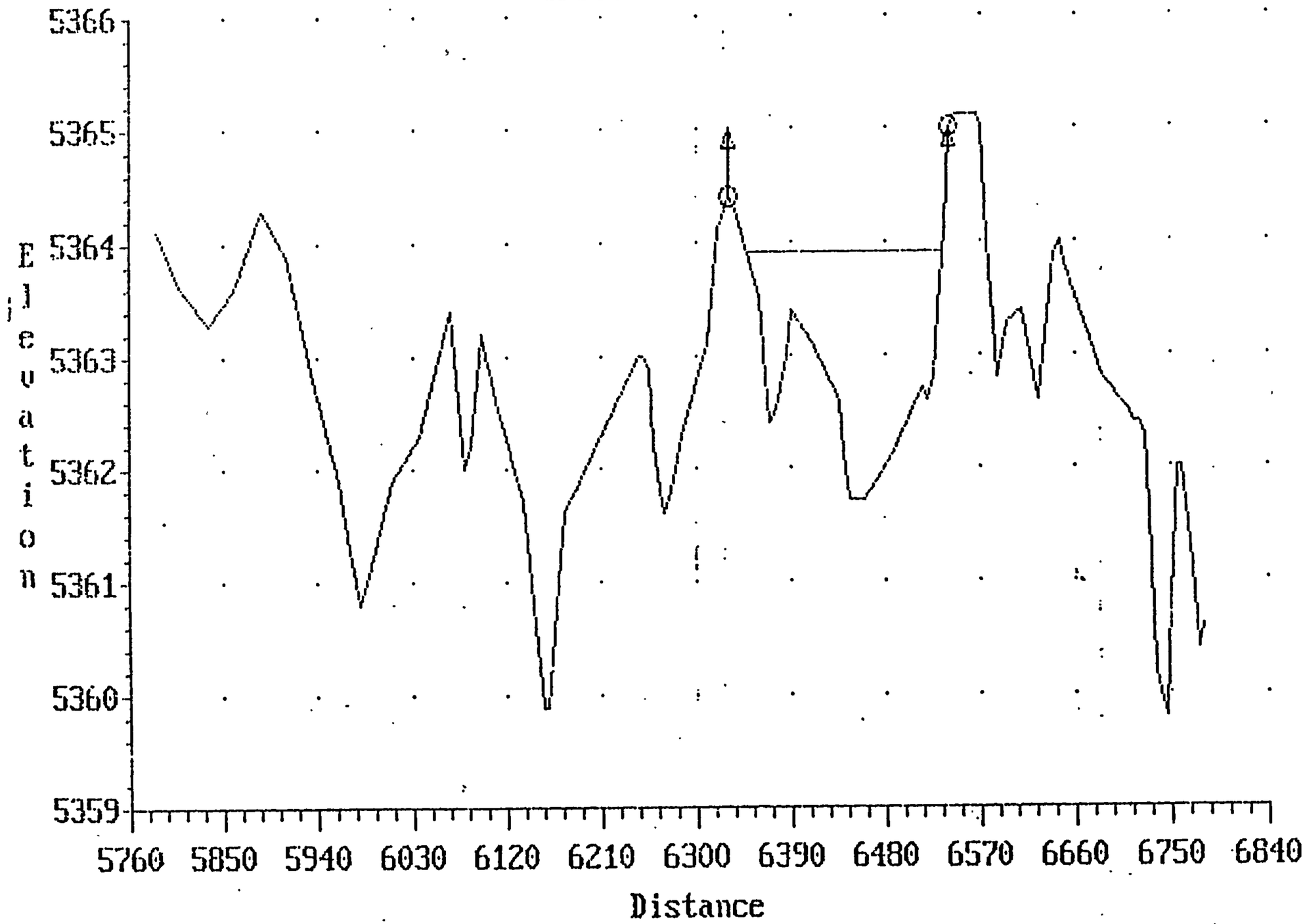
Cross section 2154



DOMINGO BACA PHASE IIB

FUTURE CONDITION 100 YR Q

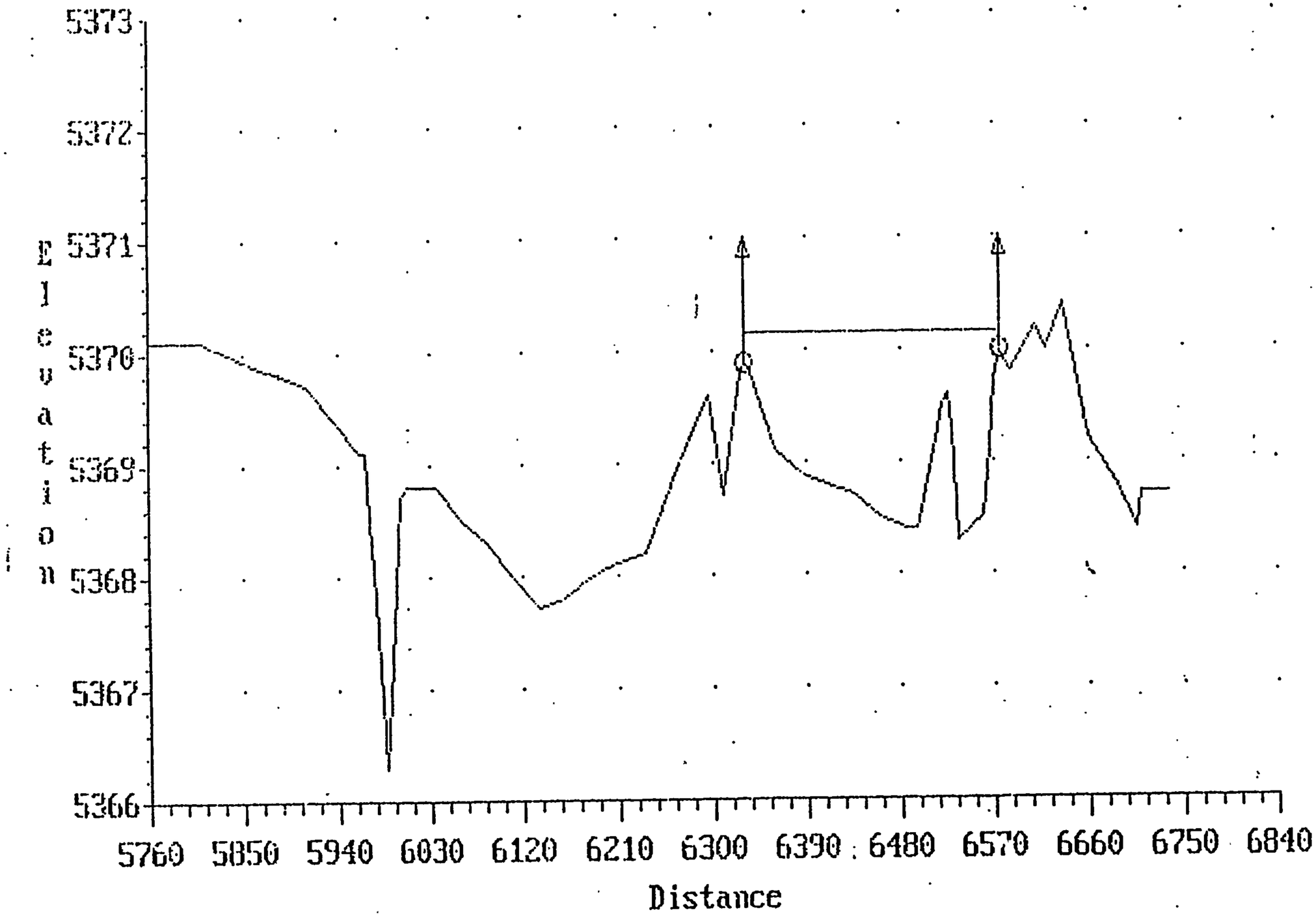
Cross section 2156



DOMINGO BACA PHASE IIB

FUTURE CONDITION 100 YR Q

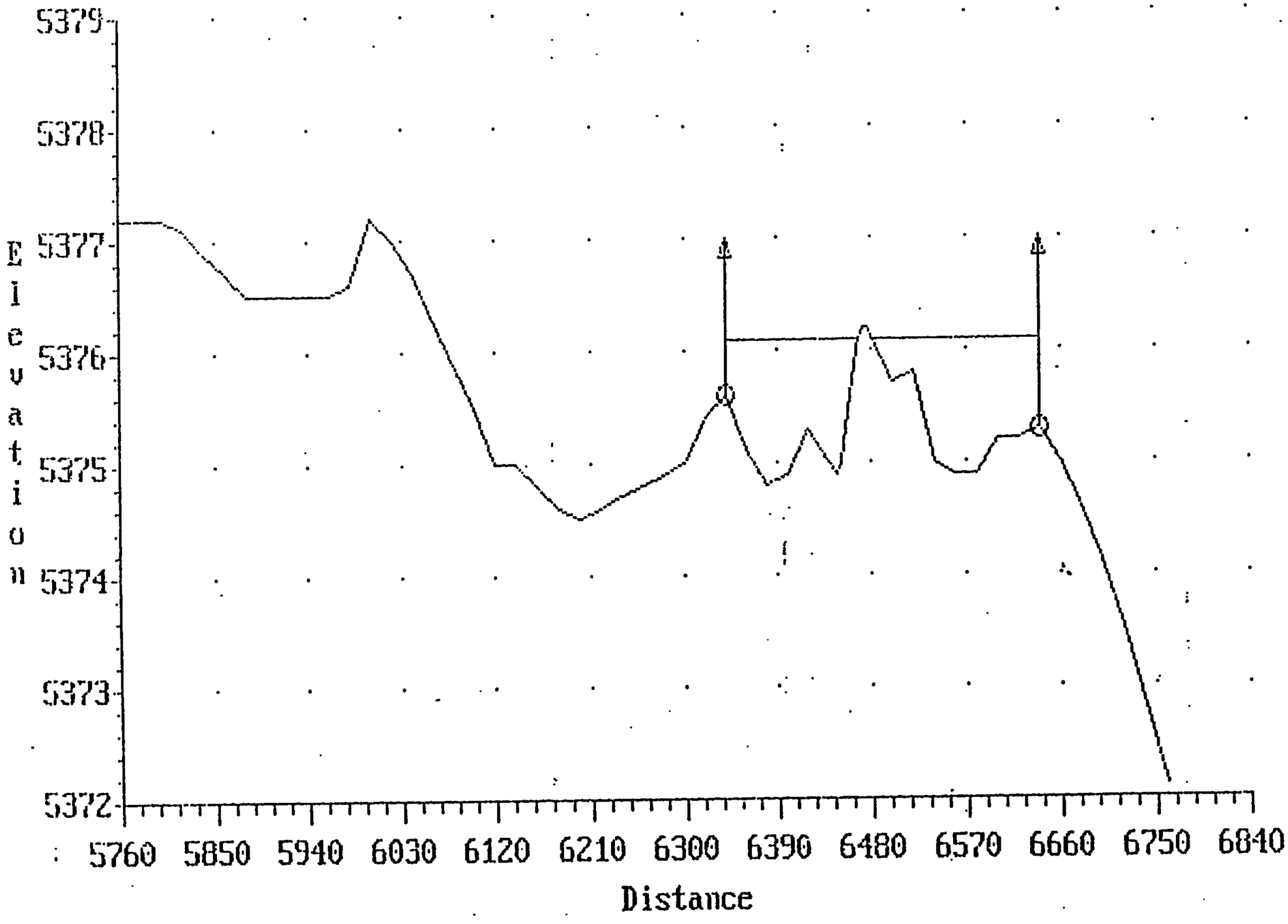
Cross section 2158



DOMINGO BACA PHASE IIB

FUTURE CONDITION 100 YR Q

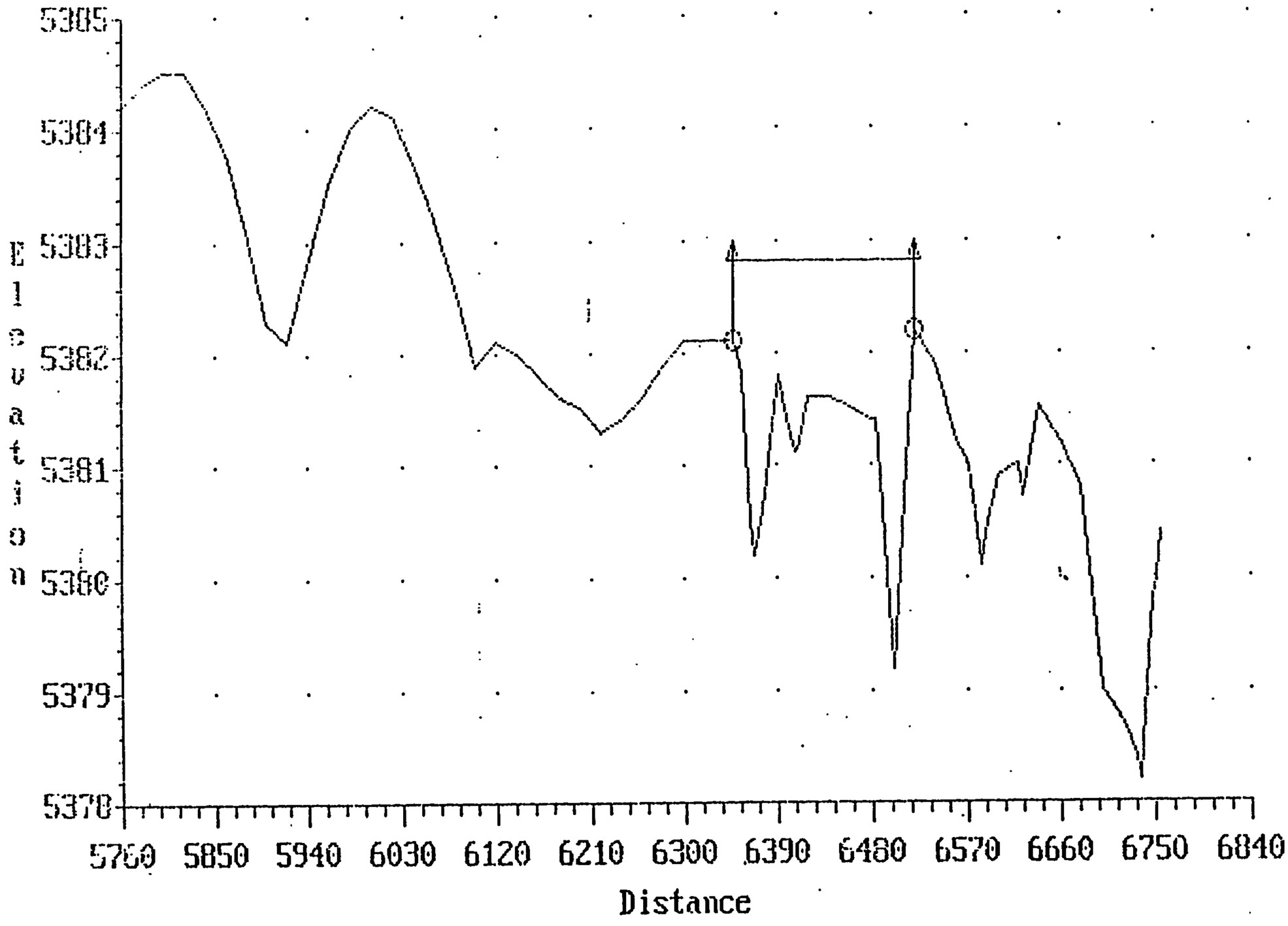
Cross section 2160



DOMINGO BACA PHASE IIB

FUTURE CONDITION 100 YR Q

Cross section 2162



Resource Technology, Inc.

PROJECT NAME D. BACA II B SHEET ____ OF ____

PROJECT NO. ____ BY PS DATE 8-31-

SUBJECT ____ CH'D ____ DATE ____

"n" Value

REFERENCE = "Draft Sediment and Erosion Design Guide", Resource Consultants, Inc, March 1982

USE 2 APPROACHES

1ST Obtain a value from Table 3.1

$D_{50} = 1.1$ mm $\boxed{\therefore \text{Base "n" value} = 0.026} = n_b$

2ND Use equation 3.9

$$n = (n_b + n_1 + n_2 + n_3 + n_4)\, m$$

TABLE 3.2

$n_b = 0.026$

n_1 = Cross-section Irregularity = minor = $\boxed{0.002 = n_1}$

n_2 = Variation in cross-section shape and size alternating occasionally = $\boxed{.001 = n_2}$

n_3 = Obstructions - Negligible = $\boxed{0.001 = n_3}$

n_4 = Vegetation " " medium = $\boxed{.025 = n_4}$

m = Sinuosity = minor = $\boxed{1.0 = m}$

$$n = (0.026 + 0.002 + 0.001 + 0.001 + 0.025)\, 1.0$$

$$n = 0.055$$

TRY STRICKLER EQUATION

$$n = 0.04\, D_{50}^{1/6} = 0.04\,(0.0433)^{1/6} = \boxed{0.024 = n}$$

$D_{50} = 1.1$ mm =

$$\frac{1\text{ in}}{25.4\text{ mm}}(1.1\text{ mm}) = 0.0433$$

Row 2 COL. PAS

APPENDIX B
of
Appendix A

SEDIMENT TRANSPORT CALCULATIONS

Round 2 COL. PAS

APPENDIX B

SEDIMENT TRANSPORT CALCULATIONS

DOMINGO BACA PHASE IIB
HYDROGRAPHS AND SEDIMENT TRANSPORT SPREADSHEET PS & BGG 8/31/92
FILE NAME : DOMBHYD.WO1 12-2-92
12-18-92

NORTH DOMINGO BACA ARROYO
FULL DEVELOPMENT CONDITION HYDROGRAPHS
AT LOUISIANA BLVD.
AHYMO UNBULKED HYDROGRAPHS

TIME	2 YR FLOW	5 YR FLOW	10 YR FLOW	25 YR FLOW	50 YR FLOW	100 YR FLOW
(hrs)			(cfs)			
.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	0.0	0.0	0.0	0.0	0.0	0.0
0.2	0.0	0.0	0.0	0.0	0.0	0.0
0.3	0.0	0.0	0.0	0.0	0.0	0.0
0.4	0.0	0.0	0.0	0.0	0.0	0.0
0.5	0.0	0.0	0.0	0.0	0.0	0.0
0.6	0.0	0.0	0.0	0.0	0.0	0.0
0.7	0.0	0.0	0.0	0.0	0.0	0.0
0.8	0.0	0.0	0.0	0.0	0.0	0.0
0.9	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.1	0.1	0.1
1.1	0.0	0.7	0.8	1.7	2.0	2.5
1.2	0.3	3.5	4.0	13.7	16.0	20.0
1.3	18.5	31.9	36.0	82.4	96.1	120.2
1.4	133.4	349.8	394.6	459.0	535.6	669.7
1.5	498.7	885.7	999.2	1485.0	1732.5	2166.4
1.6	781.5	1099.6	1240.6	1786.6	2084.4	2606.5
1.7	635.3	832.4	939.1	1380.2	1610.3	2013.6
1.8	475.6	611.7	690.1	1043.3	1217.2	1522.1
1.9	383.8	486.6	549.0	821.7	958.7	1198.8
2	331.5	406.2	458.3	656.5	765.9	957.8
2.1	287.0	343.8	387.9	533.1	621.9	777.7
2.2	231.6	273.4	308.5	402.5	469.6	587.2
2.3	183.4	217.3	245.2	292.1	340.8	426.1
2.4	150.7	182.2	205.6	234.5	273.6	342.1
2.5	130.4	160.3	180.9	206.4	240.8	301.1
2.6	117.6	146.6	165.4	184.9	215.8	269.8
2.7	108.2	137.5	155.1	169.2	197.4	246.8
2.8	101.2	130.9	147.7	157.2	183.5	229.4
2.9	96.1	126.0	142.1	147.9	172.6	215.8
3	92.1	122.1	137.7	140.7	164.2	205.3
3.1	88.8	119.0	134.3	135.2	157.7	197.2
3.2	86.1	116.6	131.5	130.8	152.6	190.8
3.3	83.9	114.6	129.3	127.2	148.3	185.5
3.4	82.0	112.9	127.4	124.2	144.9	181.2
3.5	80.4	111.5	125.8	121.9	142.2	177.8
3.6	79.0	110.3	124.4	120.0	139.9	175.0
3.7	77.8	109.1	123.1	118.4	138.1	172.7
3.8	76.7	108.1	122.0	117.1	136.6	170.8
3.9	75.7	107.2	120.9	116.0	135.3	169.2
4	74.9	106.4	120.0	115.0	134.2	167.8
4.1	74.1	105.6	119.1	114.2	133.2	166.6
4.2	73.4	104.9	118.4	113.5	132.4	165.6
4.3	72.7	104.2	117.6	112.9	131.7	164.7

2 OF 6

4.4	72.1	103.8	116.7	112.4	131.1	164.0
4.5	71.4	103.0	116.2	111.9	130.6	163.3
4.6	70.8	102.5	115.6	111.6	130.2	162.8
4.7	70.0	102.0	115.1	111.2	129.8	162.3
4.8	69.4	101.5	114.5	110.9	129.4	161.8
4.9	68.7	101.0	113.9	110.7	129.2	161.5
5	68.1	100.5	113.4	110.5	128.9	161.2
5.1	67.6	100.0	112.8	110.3	128.7	160.9
5.2	67.0	99.5	112.2	110.2	128.5	160.7
5.3	66.4	99.0	111.7	110.0	128.4	160.5
5.4	65.9	98.6	111.2	109.9	128.2	160.3
5.5	65.5	98.1	110.7	109.8	128.1	160.2
5.6	65.0	97.7	110.2	109.7	128.0	160.1
5.7	64.5	97.3	109.8	109.7	128.0	160.0
5.8	64.1	96.9	109.3	109.6	127.9	159.9
5.9	63.8	96.5	108.9	109.6	127.9	159.9
6	63.4	96.2	108.5	109.5	127.8	159.8
6.1	63.0	95.6	107.8	109.5	127.7	159.7
6.2	62.2	93.6	105.6	109.1	127.3	159.2
6.3	61.1	91.0	102.7	108.6	126.7	158.4
6.4	59.9	88.6	100.0	108.2	126.2	157.8
6.5	58.8	86.8	97.9	107.8	125.7	157.2
6.6	57.7	85.3	96.2	107.5	125.4	156.8
6.7	56.7	84.0	94.8	107.2	125.1	156.4
6.8	55.7	82.9	93.5	106.9	124.8	156.0
6.9	54.7	81.9	92.4	106.7	124.4	155.6
7	53.7	80.9	91.3	106.5	124.2	155.3
7.1	52.7	80.0	90.3	106.2	123.9	154.9
7.2	51.9	79.2	89.3	105.9	123.6	154.5
7.3	51.0	78.3	88.3	105.7	123.3	154.2
7.4	50.1	77.5	87.4	105.5	123.1	153.9
7.5	49.3	76.6	86.4	105.3	122.8	153.6
7.6	48.4	75.9	85.6	105.0	122.5	153.2
7.7	47.6	75.0	84.6	104.8	122.3	152.9
7.8	46.9	74.2	83.7	104.5	122.0	152.5
7.9	46.1	73.5	82.9	104.3	121.7	152.2
8	45.4	72.7	82.0	104.1	121.5	151.9
8.1	44.6	71.9	81.1	103.8	121.2	151.5
8.2	43.9	71.2	80.3	103.6	120.9	151.2
8.3	43.2	70.5	79.5	103.4	120.6	150.8
8.4	42.5	69.8	78.7	103.0	120.2	150.3
8.5	41.8	69.0	77.8	102.7	119.8	149.8
8.6	41.1	68.2	76.9	102.3	119.4	149.3
8.7	40.5	67.4	76.0	102.0	119.0	148.8
8.8	39.8	66.5	75.0	101.7	118.6	148.3
8.9	39.2	65.6	74.0	101.2	118.1	147.7
9	38.6	64.8	73.1	100.9	117.7	147.2
9.1	38.0	63.9	72.1	100.6	117.4	146.8
9.2	37.3	63.1	71.2	100.2	116.9	146.2
9.3	36.8	62.2	70.2	99.9	116.5	145.7
9.4	36.2	61.4	69.3	99.5	116.1	145.2
9.5	35.6	60.6	68.4	99.2	115.7	144.7
9.6	35.1	59.9	67.6	98.9	115.4	144.3
9.7	34.5	59.1	66.7	98.5	114.9	143.7
9.8	33.9	58.3	65.8	98.2	114.5	143.2
9.9	33.3	57.6	65.0	97.8	114.1	142.7
10	32.5	56.9	64.2	97.5	113.7	142.2
10.1	31.6	56.2	63.4	97.1	113.2	141.6
10.2	30.8	55.5	62.6	96.7	112.8	141.1
10.3	30.0	54.8	61.8	96.4	112.4	140.6
10.4	29.2	54.0	60.9	96.0	112.0	140.1
10.5	28.5	53.3	60.1	95.7	111.6	139.6
10.6	27.8	52.5	59.2	95.3	111.2	139.1
10.7	27.2	51.6	58.2	95.0	110.8	138.6
10.8	26.6	50.8	57.3	94.7	110.4	138.1
10.9	25.9	50.0	56.4	94.3	110.0	137.6
11	25.2	49.1	55.4	94.0	109.6	137.1

3 of 6

11	25.5	49.1	55.4	94.0	109.8	137.1
11.1	24.8	48.3	54.5	93.6	109.2	136.6
11.2	24.2	47.5	53.6	93.2	108.8	136.0
11.3	23.7	46.8	52.8	92.8	108.3	135.4
11.4	23.1	46.0	51.9	92.3	107.6	134.6
11.5	22.6	45.2	51.0	91.7	107.0	133.8
11.6	22.2	44.5	50.2	91.2	106.4	133.0
11.7	21.7	43.8	49.4	90.5	105.6	132.1
11.8	21.3	43.2	48.7	90.0	105.0	131.3
11.9	20.8	42.5	47.9	89.5	104.4	130.5
12	20.3	41.7	47.1	88.9	103.7	129.7
12.1	19.9	41.1	46.4	88.4	103.2	129.0
12.2	19.5	40.5	45.7	87.9	102.5	128.2
12.3	19.1	39.9	45.0	87.3	101.9	127.4
12.4	18.7	39.3	44.3	86.8	101.2	126.6
12.5	18.4	38.7	43.7	86.3	100.7	125.9
12.6	18.1	38.1	43.0	85.8	100.1	125.2
12.7	17.7	37.6	42.4	85.2	99.4	124.3
12.8	17.4	37.0	41.7	84.6	98.7	123.4
12.9	17.1	36.4	41.1	83.8	97.8	122.3
13	16.8	35.9	40.5	83.1	97.0	121.3
13.1	16.5	35.4	39.9	82.4	96.1	120.2
13.2	16.2	34.8	39.3	81.6	95.2	119.1
13.3	15.9	34.3	38.7	80.9	94.4	118.0
13.4	15.6	33.9	38.2	80.1	93.5	116.9
13.5	15.4	33.3	37.6	79.4	92.7	115.9
13.6	15.1	32.9	37.1	78.7	91.8	114.8
13.7	14.8	32.4	36.5	78.0	91.0	113.8
13.8	14.6	31.9	36.0	77.3	90.1	112.7
13.9	14.4	31.5	35.5	76.6	89.3	111.7
14	14.1	30.9	34.9	75.9	88.6	110.8
14.1	13.9	30.3	34.2	75.3	87.8	109.8
14.2	13.7	29.6	33.4	74.6	87.0	108.8
14.3	13.5	28.9	32.6	73.8	86.1	107.7
14.4	13.4	28.2	31.8	73.1	85.3	106.7
14.5	13.1	27.6	31.1	72.4	84.4	105.6
14.6	13.0	26.9	30.4	71.7	83.6	104.6
14.7	12.8	26.4	29.8	71.0	82.8	103.6
14.8	12.6	25.8	29.1	70.3	82.0	102.6
14.9	12.5	25.3	28.5	69.6	81.2	101.6
15	12.3	24.7	27.9	69.0	80.4	100.6
15.1	12.2	24.2	27.3	68.3	79.7	99.7
15.2	12.0	23.8	26.8	67.7	78.9	98.7
15.3	11.9	23.2	26.2	67.0	78.2	97.8
15.4	11.7	22.8	25.7	66.4	77.4	96.8
15.5	11.6	22.3	25.2	65.7	76.7	95.9
15.6	11.4	21.9	24.7	65.1	76.0	95.0
15.7	11.3	21.5	24.3	64.4	75.2	94.0
15.8	11.2	21.1	23.8	63.7	74.4	93.0
15.9	11.1	20.7	23.4	63.1	73.6	92.0
16	10.9	20.3	22.9	62.4	72.9	91.1
16.1	10.8	19.9	22.5	61.8	72.1	90.1
16.2	10.7	19.6	22.1	61.1	71.3	89.2
16.3	10.6	19.2	21.7	60.5	70.6	88.3
16.4	10.5	18.9	21.3	59.9	69.9	87.4
16.5	10.4	18.6	21.0	59.2	69.1	86.4
16.6	10.3	18.3	20.6	58.6	68.4	85.5
16.7	10.2	18.0	20.3	58.1	67.7	84.7
16.8	10.0	17.7	20.0	57.4	67.0	83.8
16.9	10.0	17.5	19.7	56.8	66.3	82.9
17	9.9	17.1	19.3	56.2	65.6	82.0
17.1	9.8	16.8	19.0	55.7	64.9	81.2
17.2	9.7	16.7	18.8	55.1	64.3	80.4
17.3	9.6	16.4	18.5	54.5	63.6	79.5
17.4	9.6	16.1	18.2	53.9	62.9	78.7
17.5	9.5	16.0	18.0	53.4	62.3	77.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

17.6	9.4	15.7	17.7	52.8	61.7	77.1
17.7	9.3	15.5	17.5	52.2	60.9	76.2
17.8	9.3	15.2	17.2	51.5	60.1	75.2
17.9	9.2	15.1	17.0	50.9	59.4	74.3
18	9.1	14.9	16.8	50.2	58.6	73.3
18.1	9.0	14.7	16.6	49.6	57.8	72.3
18.2	9.0	14.5	16.4	48.9	57.1	71.4
18.3	8.9	14.4	16.2	48.3	56.4	70.5
18.4	8.9	14.2	16.0	47.7	55.7	69.6
18.5	8.8	14.0	15.8	47.1	54.9	68.7
18.6	8.7	13.7	15.5	46.5	54.2	67.8
18.7	8.7	13.7	15.4	45.9	53.6	67.0
18.8	8.6	13.5	15.2	45.3	52.9	66.1
18.9	8.5	13.3	15.0	44.8	52.2	65.3
19	8.5	13.2	14.9	44.2	51.6	64.5
19.1	8.4	13.0	14.7	43.7	50.9	63.7
19.2	8.4	12.9	14.6	43.1	50.3	62.9
19.3	8.3	12.8	14.4	42.6	49.7	62.1
19.4	8.3	12.7	14.3	42.1	49.1	61.4
19.5	8.2	12.5	14.1	41.5	48.4	60.5
19.6	8.2	12.4	14.0	40.9	47.7	59.7
19.7	8.1	12.3	13.9	40.3	47.0	58.8
19.8	8.1	12.1	13.7	39.6	46.2	57.8
19.9	8.1	12.1	13.6	39.0	45.5	56.9
20	8.0	12.0	13.5	38.4	44.8	56.0
20.1	8.0	11.9	13.4	37.8	44.1	55.1
20.2	7.9	11.8	13.3	37.2	43.3	54.2
20.3	7.9	11.6	13.1	36.5	42.6	53.3
20.4	7.8	11.6	13.1	35.9	41.9	52.4
20.5	7.8	11.4	12.9	35.4	41.3	51.6
20.6	7.7	11.3	12.8	34.8	40.6	50.8
20.7	7.7	11.3	12.7	34.3	40.0	50.0
20.8	7.7	11.2	12.6	33.8	39.4	49.3
20.9	7.6	11.2	12.6	33.2	38.8	48.5
21	7.6	11.1	12.5	32.8	38.2	47.8
21.1	7.6	11.0	12.4	32.3	37.7	47.1
21.2	7.5	10.9	12.3	31.8	37.1	46.4
21.3	7.5	10.8	12.2	31.3	36.5	45.7
21.4	7.4	10.7	12.1	30.8	36.0	45.0
21.5	7.4	10.6	12.0	30.4	35.5	44.4
21.6	7.4	10.5	11.9	30.0	34.9	43.7
21.7	7.4	10.5	11.9	29.5	34.5	43.1
21.8	7.3	10.5	11.8	29.1	33.9	42.4
21.9	7.3	10.4	11.7	28.7	33.5	41.9
22	7.2	10.3	11.6	28.3	33.0	41.3
22.1	7.2	10.2	11.5	27.9	32.5	40.7
22.2	7.2	10.2	11.5	27.5	32.1	40.1
22.3	7.2	10.1	11.4	27.1	31.7	39.6
22.4	7.1	10.0	11.3	26.7	31.2	39.0
22.5	7.1	10.0	11.3	26.3	30.7	38.4
22.6	7.0	9.9	11.2	26.0	30.3	37.9
22.7	7.0	9.9	11.2	25.6	29.9	37.4
22.8	7.0	9.8	11.1	25.3	29.5	36.9
22.9	7.0	9.8	11.0	25.0	29.1	36.4
23	6.9	9.7	10.9	24.6	28.7	35.9
23.1	6.9	9.7	10.9	24.2	28.2	35.3
23.2	6.9	9.6	10.8	23.7	27.7	34.6
23.3	6.9	9.6	10.8	23.2	27.0	33.8
23.4	6.9	9.6	10.8	22.7	26.5	33.1
23.5	6.8	9.5	10.7	22.1	25.8	32.3
23.6	6.8	9.4	10.6	21.7	25.3	31.6

5 of 6

23.7	6.7	9.4	10.6	21.2	24.8	31.0
23.8	6.7	9.3	10.5	20.8	24.2	30.3
23.9	6.7	9.3	10.5	20.4	23.8	29.7
24	6.7	9.2	10.4	19.9	23.3	29.1
24.1	6.6	9.1	10.3	19.5	22.7	28.4
24.2	6.1	8.5	9.6	18.4	21.4	26.8
24.3	5.5	7.6	8.6	17.0	19.8	24.8
24.4	4.9	6.7	7.6	15.7	18.3	22.9
24.5	4.4	6.1	6.9	14.6	17.0	21.3
24.6	4.1	5.6	6.3	13.8	16.1	20.1
24.7	3.8	5.2	5.9	13.0	15.2	19.0
24.8	3.6	4.9	5.5	12.5	14.6	18.2
24.9	3.4	4.7	5.3	11.9	13.9	17.4
25	3.2	4.4	5.0	11.4	13.4	16.7
25.1	3.1	4.3	4.8	11.0	12.8	16.0
25.2	3.0	4.1	4.6	10.6	12.3	15.4
25.3	2.9	4.0	4.5	10.1	11.8	14.8
25.4	2.8	3.8	4.3	9.7	11.4	14.2
25.5	2.7	3.7	4.2	9.4	11.0	13.7
25.6	2.6	3.5	4.0	9.0	10.6	13.2
25.7	2.5	3.5	3.9	8.7	10.2	12.7
25.8	2.4	3.3	3.7	8.4	9.8	12.2
25.9	2.3	3.2	3.6	8.0	9.4	11.7
26	2.2	3.1	3.5	7.7	9.0	11.2
26.1	2.2	2.9	3.3	7.4	8.6	10.8
26.2	2.1	2.8	3.2	7.1	8.3	10.4
26.3	2.0	2.7	3.1	6.9	8.0	10.0
26.4	1.9	2.7	3.0	6.6	7.8	9.7
26.5	1.9	2.6	2.9	6.4	7.4	9.3
26.6	1.8	2.5	2.8	6.2	7.2	9.0
26.7	1.7	2.4	2.7	6.0	7.0	8.7
26.8	1.7	2.3	2.6	5.8	6.7	8.4
26.9	1.6	2.2	2.5	5.6	6.5	8.1
27	1.6	2.1	2.4	5.3	6.2	7.8
27.1	1.5	2.0	2.3	5.1	6.0	7.5
27.2	1.4	2.0	2.2	4.9	5.8	7.2
27.3	1.4	2.0	2.2	4.7	5.5	6.9
27.4	1.3	1.9	2.1	4.6	5.4	6.7
27.5	1.3	1.8	2.0	4.4	5.1	6.4
27.6	1.2	1.7	1.9	4.2	4.9	6.1
27.7	1.2	1.7	1.9	4.0	4.7	5.9
27.8	1.2	1.6	1.8	3.9	4.6	5.7
27.9	1.1	1.5	1.7	3.8	4.4	5.5
28	1.1	1.5	1.7	3.6	4.2	5.3
28.1	1.0	1.4	1.6	3.5	4.1	5.1
28.2	1.0	1.3	1.5	3.4	3.9	4.9
28.3	1.0	1.3	1.5	3.3	3.8	4.8
28.4	0.9	1.2	1.4	3.2	3.7	4.6
28.5	0.9	1.2	1.4	3.0	3.5	4.4
28.6	0.8	1.2	1.3	2.9	3.4	4.3
28.7	0.8	1.2	1.3	2.8	3.3	4.1
28.8	0.8	1.1	1.2	2.7	3.2	4.0
28.9	0.8	1.1	1.2	2.6	3.0	3.8
29	0.7	1.0	1.1	2.5	3.0	3.7
29.1	0.7	1.0	1.1	2.4	2.8	3.5
29.2	0.7	1.0	1.1	2.3	2.7	3.4
29.3	0.6	0.9	1.0	2.3	2.6	3.3
29.4	0.6	0.9	1.0	2.2	2.6	3.2
29.5	0.6	0.8	0.9	2.1	2.5	3.1
29.6	0.6	0.8	0.9	2.0	2.3	2.9
29.7	0.6	0.8	0.9	1.9	2.2	2.8
29.8	0.5	0.7	0.8	1.9	2.2	2.7
29.9	0.5	0.7	0.8	1.8	2.1	2.6

* 5-YR.ORDINATES SYNTHESIZED BASED ON FACTOR DETERMINED AS RATIOS OF THE 5-YR Qo TO THE 10-YR Qo = (1100/1241)= 0.886382

26.2	2.1	2.8	3.2	7.1	8.3	10.4
26.3	2.0	2.7	3.1	6.9	8.0	10.0
26.4	1.9	2.7	3.0	6.6	7.8	9.7
26.5	1.9	2.6	2.9	6.4	7.4	9.3
26.6	1.8	2.5	2.8	6.2	7.2	9.0
26.7	1.7	2.4	2.7	6.0	7.0	8.7
26.8	1.7	2.3	2.6	5.8	6.7	8.4
26.9	1.6	2.2	2.5	5.6	6.5	8.1
27	1.6	2.1	2.4	5.3	6.2	7.8
27.1	1.5	2.0	2.3	5.1	6.0	7.5
27.2	1.4	2.0	2.2	4.9	5.8	7.2
27.3	1.4	2.0	2.2	4.7	5.5	6.9
27.4	1.3	1.9	2.1	4.6	5.4	6.7
27.5	1.3	1.8	2.0	4.4	5.1	6.4
27.6	1.2	1.7	1.9	4.2	4.9	6.1
27.7	1.2	1.7	1.9	4.0	4.7	5.9
27.8	1.2	1.6	1.8	3.9	4.6	5.7
27.9	1.1	1.5	1.7	3.8	4.4	5.5
28	1.1	1.5	1.7	3.6	4.2	5.3
28.1	1.0	1.4	1.6	3.5	4.1	5.1
28.2	1.0	1.3	1.5	3.4	3.9	4.9
28.3	1.0	1.3	1.5	3.3	3.8	4.8
28.4	0.9	1.2	1.4	3.2	3.7	4.6
28.5	0.9	1.2	1.4	3.0	3.5	4.4
28.6	0.8	1.2	1.3	2.9	3.4	4.3
28.7	0.8	1.2	1.3	2.8	3.3	4.1
28.8	0.8	1.1	1.2	2.7	3.2	4.0
28.9	0.8	1.1	1.2	2.6	3.0	3.8
29	0.7	1.0	1.1	2.5	3.0	3.7
29.1	0.7	1.0	1.1	2.4	2.8	3.5
29.2	0.7	1.0	1.1	2.3	2.7	3.4
29.3	0.6	0.9	1.0	2.3	2.6	3.3
29.4	0.6	0.9	1.0	2.2	2.6	3.2
29.5	0.6	0.8	0.9	2.1	2.5	3.1
29.6	0.6	0.8	0.9	2.0	2.3	2.9
29.7	0.6	0.8	0.9	1.9	2.2	2.8
29.8	0.5	0.7	0.8	1.9	2.2	2.7
29.9	0.5	0.7	0.8	1.8	2.1	2.6

* 5-YR.ORDINATES SYNTHESIZED BASED ON FACTOR DETERMINED AS RATIOS OF
THE 5-YR Q_D TO THE 10-YR Q_D = (1100/1241)= 0.886382
ALL 5-YR ORDINATES COMPUTED AS (10-YR*0.886382)

* 25-YR.ORDINATES SYNTHESIZED BASED ON FACTOR DETERMINED AS RATIOS OF
THE 25-YR Q_D TO THE 100-YR Q_D = (1800/2626)= 0.685453
ALL 25-YR ORDINATES COMPUTED AS (100YR*0.685453)

*50-YR.ORDINATES SYNTHESIZED BASED ON FACTOR DETERMINED AS RATIOS OF
THE 50-YR Q_D TO THE 100-YR Q_D = (2100/2626)= 0.799695
ALL 50-YR ORDINATES COMPUTED AS (100-YR*0.799695)

1 of 6
SUBREACH 1

DOMINGO BACA PHASE IIB
HYDROGRAPHS AND SEDIMENT TRANSPORT SPREADSHEET PS & BGG 8/31/92 12/2/92 12/18/92
FILE NAME : DOMBHYD.WQ1

SUBREACH 1 IS IMMEDIATELY WEST OF WYOMING BLVD.
MAIN NORTH DOMINGO BACA ARROYO
SUBREACH 1
SEDIMENT DISCHARGE (MPM-EINSTEIN METHOD) (a)

2 YR FLOW qs (cfs/ft)	2 YR FLOW Qs (cu ft)	5 YR FLOW qs (cfs/ft)	5 YR FLOW Qs (cu ft)	10 YR FLOW qs (cfs/ft)	10 YR FLOW Qs (cu ft)	25 YR FLOW qs (cfs/ft)	25 YR FLOW Qs (cu ft)	50 YR FLOW qs (cfs/ft)	50 YR FLOW Qs (cu ft)	100 YR FLOW qs (cfs/ft)	100 YR FLOW Qs (cu ft)
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	3.24E-06	0.02114	3.83E-06	0.026031	4.9E-06	0.0352
0	0	4.2E-05	0.495497	4.8E-05	0.583116	0.000111	1.630745	0.000131	2.008014	0.000168	2.715331
1.64E-05	0.155124	0.000246	4.351904	0.000281	5.121453	0.001085	27.01435	0.001285	33.26406	0.001642	44.98123
0.001508	40.48753	0.002743	84.51733	0.003131	99.46257	0.007768	304.1634	0.0092	374.531	0.011758	506.4584
0.013183	582.955	0.037973	2141.865	0.043348	2520.612	0.051177	3091.754	0.060612	3807.025	0.077465	5148.038
0.056049	3457.652	0.105279	7508.054	0.12018	8835.706	0.185647	15084.63	0.21987	18574.42	0.281005	25117.21
0.091769	6341.036	0.133504	10055.49	0.152399	11833.61	0.227428	19362.82	0.269354	23842.37	0.344247	32240.78
0.073109	4794.285	0.09835	6904.885	0.11227	8125.879	0.171326	13666.27	0.202909	16827.93	0.259328	22755.52
0.053206	3243.2	0.070132	4555.345	0.080059	5360.868	0.126018	9366.545	0.149249	11533.48	0.190748	15596.11
0.042047	2427.924	0.054561	3345.096	0.062284	3936.611	0.096966	6785.549	0.114841	8355.371	0.146773	11298.53
0.035802	1992.249	0.044752	2621.41	0.051086	3084.956	0.075794	5011.802	0.089767	6171.272	0.114726	8345.085
0.030563	1639.943	0.037266	2092.914	0.042541	2463.005	0.060304	3783.254	0.071421	4658.502	0.091279	6299.446
0.024153	1227.67	0.028983	1536.279	0.033085	1807.94	0.044301	2588.96	0.052468	3187.911	0.067056	4310.843
0.018696	895.9203	0.022526	1126.741	0.025714	1325.983	0.031156	1679.187	0.0369	2067.663	0.04716	2795.992
0.015071	687.2737	0.018566	888.2795	0.021194	1045.354	0.024484	1248.421	0.028998	1537.241	0.037061	2079.73
0.012858	565.326	0.016133	747.3228	0.018416	879.4722	0.021283	1050.78	0.025206	1293.376	0.032215	1749.64
0.011479	491.725	0.014622	662.1974	0.016692	779.2941	0.018867	906.06	0.022346	1115.675	0.028559	1508.668
0.010476	439.4179	0.013626	607.1407	0.015554	714.5017	0.01711	803.3683	0.020264	989.2259	0.025898	1337.678
0.009735	401.4795	0.012914	568.3636	0.014742	668.8675	0.01579	727.8612	0.018701	896.2503	0.023901	1211.952
0.009198	374.4082	0.012377	539.4657	0.014129	634.8597	0.014766	670.2175	0.017488	825.271	0.02235	1115.97
0.008778	353.5237	0.011957	517.0376	0.01365	608.4656	0.013979	626.5714	0.016556	771.5274	0.02116	1043.296
0.008434	336.5309	0.011634	499.8774	0.01328	588.2709	0.013375	593.4294	0.015841	730.7181	0.020245	988.1114
0.008153	322.7908	0.011368	485.859	0.012977	571.7737	0.012899	567.5772	0.015277	698.885	0.019525	945.0653
0.007924	311.7059	0.011159	474.9175	0.012739	558.8974	0.012507	546.3965	0.014812	672.8042	0.018931	909.7976
0.007726	302.2141	0.010979	465.5203	0.012533	547.8385	0.012189	529.3669	0.014436	651.8349	0.01845	881.4418
0.007562	294.3804	0.010828	457.6448	0.012361	538.5704	0.011938	516.0013	0.014139	635.3771	0.01807	859.1869
0.007418	287.3335	0.010696	450.7825	0.01221	530.4945	0.011732	505.0612	0.013895	621.906	0.017758	840.9706
0.007294	281.5059	0.010573	444.4344	0.01207	523.0239	0.011565	495.1203	0.013694	610.8968	0.017502	826.0934
0.007181	276.1459	0.01047	439.0813	0.011952	516.7242	0.011423	486.7658	0.013529	601.8407	0.017291	813.8374
0.007078	271.2964	0.010366	433.745	0.011833	510.4443	0.011306	482.5946	0.01339	594.2419	0.017113	803.5619
0.006996	267.4329	0.010281	429.3916	0.011737	505.3211	0.011203	477.2116	0.013268	587.6135	0.016955	794.5987
0.006914	263.5839	0.010197	425.0496	0.01164	500.2113	0.011115	472.6191	0.013164	581.9475	0.016825	786.9368
0.006843	260.2278	0.010131	421.6804	0.011565	496.2463	0.011042	468.7843	0.013078	577.2366	0.016714	780.5665
0.006771	256.883	0.010056	417.8384	0.011479	491.725	0.010976	465.348	0.013	573.0054	0.016614	774.9449

2 of 6
SUBREACH 1

0.00671	254.0241	0.00999	414.4842	0.011404	487.7776	0.010925	462.6799	0.012939	569.72	0.016537	770.4022
0.006638	250.701	0.009925	411.137	0.011329	483.8385	0.010874	460.0158	0.012878	566.4395	0.016459	765.9662
0.006577	247.861	0.009868	408.2736	0.011265	480.4688	0.010837	458.1153	0.012835	564.0993	0.016404	762.6016
0.006435	244.0875	0.009822	405.8914	0.011212	477.6653	0.010801	456.2168	0.012792	561.7616	0.016349	759.6405
0.006435	241.2672	0.009765	403.0375	0.011148	474.3068	0.010764	454.3204	0.012749	559.4265	0.016293	756.4828
0.006363	237.9876	0.009709	400.1888	0.011084	470.9544	0.010742	453.1835	0.012723	558.0266	0.01626	754.5898
0.006302	235.1859	0.009663	397.819	0.01103	468.1655	0.01072	452.0474	0.012697	556.6276	0.016227	752.6981
0.006252	232.8577	0.009606	394.9799	0.010966	464.8244	0.010698	450.912	0.012671	555.2295	0.016194	750.8076
0.006191	230.0718	0.00955	392.1462	0.010902	461.4896	0.010684	450.1555	0.012653	554.298	0.016172	749.5479
0.00613	227.2946	0.009504	389.7888	0.010849	458.7153	0.010669	449.3993	0.012636	553.3669	0.01615	748.2888
0.006079	224.987	0.009457	387.4351	0.010795	455.9454	0.010655	448.6434	0.012619	552.4362	0.016128	747.0302
0.006039	223.1453	0.00941	385.0851	0.010742	453.1799	0.010647	448.2656	0.01261	551.9709	0.016117	746.4011
0.005928	220.8487	0.009364	382.7388	0.010689	450.4187	0.01064	447.8879	0.012602	551.5058	0.016105	745.7722
0.005938	218.5583	0.009326	380.8644	0.010646	448.2129	0.010633	447.5103	0.012593	551.0408	0.016094	745.1434
0.005897	216.7304	0.00928	378.5249	0.010593	445.4596	0.010626	447.1327	0.012584	550.5759	0.016083	744.5147
0.005867	215.3622	0.009242	376.6559	0.010551	443.2601	0.010626	447.1327	0.012584	550.5759	0.016083	744.5147
0.005827	213.5413	0.009205	374.7893	0.010508	441.0635	0.010618	446.7552	0.012576	550.1111	0.016072	743.8862
0.005786	211.7245	0.00914	371.5286	0.010434	437.2262	0.010611	446.3778	0.012567	549.6464	0.016061	743.2578
0.005706	208.1029	0.008936	361.329	0.0102	425.223	0.010574	444.4921	0.012524	547.3245	0.016006	740.1179
0.005595	203.1498	0.008667	347.9975	0.009893	409.5341	0.010516	441.4793	0.012455	543.6146	0.015918	735.1013
0.005475	197.7819	0.008417	335.7033	0.009608	395.0659	0.010472	439.2231	0.012403	540.8365	0.015852	731.3446
0.005364	192.8743	0.008223	326.221	0.009387	383.9068	0.010429	436.97	0.012351	538.0621	0.015786	727.593
0.005254	188.0386	0.008066	318.5967	0.009208	374.9343	0.0104	435.4696	0.012317	536.2146	0.015741	725.0946
0.005154	183.6524	0.007938	312.3532	0.009061	367.5867	0.010371	433.9705	0.012282	534.3687	0.015697	722.5985
0.005055	179.2931	0.007818	306.5844	0.008925	360.7979	0.010341	432.4728	0.012248	532.5245	0.015653	720.1047
0.004955	174.9612	0.007717	301.725	0.00881	355.0792	0.010312	430.9764	0.012213	530.6819	0.015609	717.613
0.004856	170.6568	0.007617	296.8859	0.008695	349.3843	0.010291	429.855	0.012188	529.301	0.015576	715.7458
0.004757	166.3805	0.007525	292.5043	0.00859	344.228	0.010261	428.3609	0.012153	527.4614	0.015532	713.2581
0.004677	162.9798	0.007434	288.1397	0.008486	339.0915	0.010232	426.8682	0.012119	525.6233	0.015488	710.7726
0.004589	159.1759	0.007342	283.7921	0.008382	333.9752	0.010211	425.7496	0.012093	524.2459	0.015455	708.91
0.0045	155.3954	0.00726	279.894	0.008288	329.3878	0.010189	424.6317	0.012067	522.8694	0.015422	707.0487
0.004421	152.0548	0.007169	275.5793	0.008184	324.3101	0.010167	423.5146	0.012041	521.4939	0.015389	705.1886
0.004332	148.3194	0.007096	272.14	0.008101	320.2627	0.010138	422.0264	0.012007	519.6613	0.015345	702.7105
0.004254	145.0193	0.007005	267.8568	0.007997	315.222	0.010116	420.911	0.011981	518.2879	0.015312	700.8534
0.004185	142.1475	0.006924	264.0169	0.007904	310.7032	0.010087	419.4251	0.011947	516.4583	0.015268	698.3792
0.004107	138.8839	0.006851	260.6159	0.007821	306.7007	0.010065	418.3116	0.011921	515.0871	0.015235	696.5251
0.004039	136.0445	0.006769	256.8034	0.007728	302.2141	0.010043	417.1988	0.011895	513.7169	0.015202	694.6722
0.003961	132.8181	0.006688	253.0055	0.007635	297.7446	0.010014	415.7163	0.011861	511.8915	0.015158	692.2038
0.003892	130.0116	0.006616	249.642	0.007552	293.7863	0.009993	414.6054	0.011835	510.5235	0.015125	690.3539
0.003824	127.2207	0.006543	246.2902	0.007469	289.8418	0.009964	413.1253	0.0118	508.701	0.015082	687.8894
0.003756	124.4455	0.006471	242.9502	0.007387	285.9112	0.009927	411.2771	0.011758	506.4252	0.015027	684.812
0.003687	121.6864	0.00639	239.2068	0.007294	281.5059	0.009891	409.4311	0.011715	504.1521	0.014972	681.7382
0.003621	118.9433	0.006309	235.4786	0.007202	277.1184	0.009855	407.5872	0.011672	501.8816	0.014917	678.668
0.003563	116.6051	0.006228	231.7657	0.007109	272.7489	0.009819	405.7455	0.011629	499.6139	0.014862	675.6014
0.003495	113.8925	0.006138	227.6581	0.007007	267.915	0.009783	403.9059	0.011586	497.3487	0.014807	672.5384
0.003437	111.5807	0.006048	223.5698	0.006904	263.1037	0.009739	401.7013	0.011534	494.6341	0.014742	668.8675
0.00338	109.2812	0.005967	219.9067	0.006812	258.7929	0.009703	399.8666	0.011492	492.3749	0.014687	665.6125
0.003322	106.9942	0.005878	215.8551	0.00671	254.0249	0.009674	398.4003	0.011457	490.5694	0.014643	663.371
0.003255	104.3419	0.005797	212.2255	0.006618	249.7534	0.009631	396.2036	0.011406	487.8644	0.014577	659.7133
0.003207	102.4581	0.005708	208.2114	0.006516	245.0295	0.009594	394.3753	0.011363	485.6133	0.014523	656.6691
0.00315	100.2093	0.005628	204.6157	0.006424	240.798	0.009558	392.5493	0.01132	483.3648	0.014468	653.6286
0.003093	97.9735	0.005548	201.0363	0.006333	236.5857	0.009522	390.7255	0.011278	481.119	0.014413	650.5918
0.003045	96.12038	0.005476	197.8685	0.006252	232.8577	0.009493	389.268	0.011243	479.3244	0.01437	648.165
0.002988	93.90881	0.005397	194.3203	0.00616	228.6821	0.00945	387.0845	0.011192	476.6357	0.014304	644.5292
0.002931	91.71066	0.005317	190.7889	0.006069	224.5262	0.009414	385.2673	0.011149	474.3981	0.014249	641.5034
0.002874	89.52609	0.005246	187.664	0.005988	220.8487	0.009378	383.4523	0.011107	472.1632	0.014195	638.4813
0.002798	86.63473	0.005175	184.5525	0.005907	217.187	0.009342	381.6395	0.011064	469.9311	0.01414	635.4629
0.002713	83.41162	0.005104	181.4546	0.005827	213.5413	0.009299	379.4672	0.011013	467.2561	0.014075	631.8458
0.002638	80.57346	0.005034	178.3703	0.005746	209.9116	0.009263	377.6594	0.01097	465.0301	0.01402	628.8356
0.002563	77.76099	0.004963	175.2998	0.005665	206.2982	0.009226	375.8538	0.010927	462.8068	0.013965	625.8291
0.002488	74.97465	0.004884	171.8621	0.005575	202.2526	0.00919	374.0504	0.010885	460.5862	0.013911	622.8264
0.002423	72.5584	0.004813	168.8212	0.005495	198.674	0.009154	372.2493	0.010842	458.3684	0.013857	619.8274
0.002357	70.16284	0.004734	165.4172	0.005404	194.668	0.009119	370.4505	0.010799	456.1534	0.013802	616.8322
0.002302	68.12623	0.004647	161.6561	0.005304	190.2418	0.009083	368.6539	0.010757	453.9412	0.013748	613.8407
0.002246	66.10525	0.004565	158.2903	0.005214	186.2809	0.009047	366.8596	0.010714	451.7318	0.013693	610.853
0.002181	63.76761	0.004489	154.9431	0.005124	182.3417	0.009011	365.0675	0.010672	449.5252	0.013639	607.8691

3 OF 6

SUBREACH 1

0.002126	61.7614	0.004402	151.2458	0.005025	177.9906	0.008975	363.2778	0.010629	447.3213	0.013525	604.869
0.00208	60.13876	0.004323	147.9381	0.004935	174.0981	0.008939	361.4903	0.010587	445.1203	0.01353	601.9127
0.002025	58.18265	0.004245	144.6495	0.004846	170.2279	0.008896	359.3483	0.010536	442.4828	0.013465	598.3462
0.001979	56.56583	0.004176	141.7425	0.004767	166.8069	0.008853	357.2097	0.010485	439.8494	0.0134	594.7851
0.001924	54.64112	0.004098	138.4905	0.004677	162.9798	0.008795	354.3633	0.010417	436.3446	0.013313	590.0457
0.001878	53.05049	0.00402	135.2581	0.004589	159.1759	0.008738	351.5229	0.010349	432.847	0.013226	585.3161
0.001842	51.78682	0.00395	132.4016	0.00451	155.8143	0.008681	348.6884	0.010281	429.3567	0.013139	580.5963
0.001796	50.21841	0.003881	129.561	0.004431	152.4714	0.008616	345.5066	0.010204	425.4389	0.013042	575.2985
0.00176	48.97274	0.003821	127.0887	0.004362	149.5619	0.008559	342.6848	0.010137	421.9643	0.012955	570.6
0.001715	47.42715	0.003752	124.2783	0.004283	146.2545	0.008502	339.869	0.010069	418.497	0.012869	565.9114
0.001669	45.89451	0.003684	121.4844	0.004205	142.9665	0.008444	337.0592	0.010001	415.0372	0.012782	561.2329
0.001633	44.67786	0.003623	119.0532	0.004136	140.1055	0.008394	334.6057	0.009942	412.016	0.012706	557.1474
0.001597	43.46975	0.003564	116.6349	0.004068	137.2595	0.008337	331.8073	0.009874	408.5702	0.01262	552.4879
0.001561	42.27027	0.003504	114.2295	0.004	134.4288	0.00828	329.015	0.009807	405.1319	0.012533	547.8385
0.001526	41.07956	0.003444	111.8372	0.003931	131.6134	0.008223	326.2288	0.009739	401.7012	0.012447	543.1993
0.001499	40.19235	0.003393	109.7971	0.003873	129.2126	0.008173	323.796	0.00968	398.7055	0.012372	539.1484
0.001472	39.31019	0.003333	107.4294	0.003805	126.4261	0.008123	321.3679	0.009621	395.7157	0.012296	535.1054
0.001436	38.14192	0.003282	105.4106	0.003747	124.0504	0.008059	318.253	0.009545	391.8802	0.012199	529.9189
0.00141	37.27176	0.003223	103.068	0.003679	121.2935	0.007995	315.146	0.009469	388.0544	0.012102	524.7455
0.001383	36.40682	0.003172	101.0709	0.003621	118.9433	0.007917	311.3594	0.009377	383.3917	0.011984	518.4404
0.001356	35.54719	0.003121	99.08406	0.003563	116.6051	0.007846	307.9273	0.009293	379.1656	0.011876	512.7256
0.00133	34.69291	0.00307	97.10747	0.003505	114.279	0.007768	304.1634	0.0092	374.531	0.011758	506.4584
0.001303	33.84405	0.00302	95.14127	0.003447	111.9651	0.00769	300.4116	0.009108	369.9112	0.01164	500.2113
0.001277	33.00068	0.002969	93.18554	0.003389	109.6636	0.007612	296.6718	0.009015	365.3062	0.011522	493.9843
0.00125	32.16286	0.002927	91.56384	0.003341	107.7551	0.007534	292.9443	0.008923	360.7163	0.011404	487.7776
0.001233	31.60743	0.002877	89.6276	0.003284	105.4765	0.007464	289.5662	0.008839	356.5568	0.011297	482.1529
0.001206	30.77902	0.002835	88.0223	0.003236	103.5873	0.007386	285.8621	0.008747	351.9958	0.01118	475.9853
0.00119	29.95634	0.002784	86.10592	0.003178	101.3321	0.007315	282.5056	0.008664	347.8626	0.011073	470.3963
0.001163	29.41112	0.002743	84.51733	0.003131	99.46257	0.007238	278.8252	0.008572	343.3309	0.010955	464.2682
0.001145	28.86851	0.002701	82.93645	0.003083	97.60214	0.007167	275.4904	0.008489	339.2245	0.010849	458.7153
0.001119	28.05953	0.002651	81.04766	0.003026	95.38171	0.007104	272.4979	0.008413	335.5397	0.010753	453.7326
0.001102	27.52354	0.002592	78.86272	0.002959	92.80805	0.007034	269.1829	0.00833	331.4578	0.010646	448.2129
0.001084	26.99025	0.002526	76.38249	0.002883	89.88924	0.006963	265.8785	0.008247	327.3889	0.01054	442.7107
0.001067	26.45957	0.00246	73.92297	0.002808	86.9948	0.006886	262.2558	0.008155	322.9282	0.010423	436.6787
0.001058	26.19541	0.002393	71.48449	0.002732	84.12512	0.006816	258.9738	0.008072	318.8868	0.010317	431.2138
0.001032	25.40678	0.002336	69.36835	0.002666	81.63478	0.006739	255.3759	0.007981	314.4566	0.0102	425.223
0.001024	25.14529	0.002278	67.26881	0.0026	79.16398	0.006669	252.1165	0.007898	310.4431	0.010094	419.7958
0.001006	24.62444	0.002229	65.48261	0.002544	77.06193	0.006599	248.8679	0.007815	306.443	0.009988	414.3867
0.000989	24.10643	0.002171	63.41459	0.002479	74.62822	0.006529	245.6304	0.007733	302.4564	0.009883	408.9958
0.00098	23.8485	0.002122	61.65578	0.002423	72.5584	0.006459	242.4038	0.00765	298.4834	0.009777	403.6234
0.000963	23.3348	0.002073	59.90989	0.002367	70.50379	0.006389	239.1884	0.007567	294.5241	0.009671	398.2693
0.000955	23.07904	0.002024	58.1771	0.002311	68.46458	0.006327	236.304	0.007493	290.9724	0.009576	393.4666
0.000937	22.56973	0.001984	56.74324	0.002264	66.77717	0.006257	233.1098	0.007411	287.0393	0.009471	388.1481
0.000929	22.31619	0.001935	55.03494	0.002209	64.76679	0.006195	230.2447	0.007336	283.5114	0.009376	383.3774
0.000912	21.81133	0.001895	53.62177	0.002163	63.10373	0.006125	227.0721	0.007254	279.6048	0.009271	378.0948
0.000903	21.56003	0.001854	52.21819	0.002117	61.45195	0.006063	224.2265	0.00718	276.1009	0.009177	373.3566
0.000886	21.05971	0.001814	50.82432	0.002071	59.81161	0.006	221.3903	0.007106	272.6085	0.009082	368.6341
0.000878	20.81067	0.001782	49.71631	0.002034	58.50767	0.005931	218.2499	0.007024	268.7416	0.008977	363.4051
0.000869	20.56245	0.001741	48.34026	0.001988	56.88828	0.005862	215.1213	0.006942	264.8891	0.008872	358.1956
0.000861	20.31498	0.001709	47.24666	0.001951	55.60131	0.005792	212.0043	0.00686	261.0511	0.008768	353.0056
0.000844	19.82238	0.001669	45.88886	0.001905	54.00341	0.00573	209.2092	0.006767	257.6093	0.008674	348.3515
0.000835	19.57726	0.001637	44.81005	0.001869	52.73383	0.005661	206.1148	0.006705	253.7991	0.008569	343.1991
0.000827	19.33294	0.001605	43.73794	0.001833	51.47214	0.005599	203.3402	0.006632	250.3825	0.008475	338.579
0.000818	19.08941	0.001573	42.67259	0.001796	50.21841	0.005537	200.5753	0.006558	246.9779	0.008382	333.9752
0.00081	18.84668	0.001542	41.6141	0.00176	48.97274	0.005475	197.8202	0.006485	243.5855	0.008288	329.3878
0.000801	18.60477	0.001518	40.82478	0.001733	48.04385	0.005407	194.7707	0.006403	239.8305	0.008184	324.3101
0.000793	18.36366	0.001486	39.77848	0.001697	46.81253	0.005345	192.0366	0.00633	236.4639	0.00809	319.7577
0.000784	18.12333	0.001462	38.99841	0.001669	45.89451	0.00529	189.6148	0.006265	233.4818	0.008007	315.7251
0.000767	17.64528	0.001437	38.22236	0.001642	44.98123	0.005228	186.8998	0.006192	230.1387	0.007914	311.2044
0.000757	17.64523	0.001415	37.45037	0.001615	44.07273	0.005167	184.195	0.006119	226.8082	0.007821	306.7067
0.000759	17.40746	0.001384	36.42744	0.001579	42.86892	0.005105	181.5005	0.006046	223.4903	0.007728	302.2141
0.000751	17.17052	0.00136	35.6651	0.001552	41.97177	0.005051	179.114	0.005922	220.5517	0.007645	298.2404
0.000742	16.9344	0.001344	35.1592	0.001535	41.37641	0.004996	176.7358	0.005917	217.6232	0.007562	294.2804
0.000734	16.69913	0.001321	34.40383	0.001508	40.48753	0.004935	174.0701	0.005844	214.3409	0.007467	289.8416
0.000734	16.69913	0.001297	33.65283	0.001481	39.60368	0.00488	171.7095	0.00578	211.4341	0.007367	285.9112
0.000725	16.46472	0.001282	33.15454	0.001463	39.01727	0.004826	169.3572	0.005715	208.5377	0.007305	281.9945

4 OF 6

SUBREACH 1

0.000717	16.23118	0.001258	32.41072	0.001436	38.14192	0.004771	167.0134	0.005651	205.6517	0.007222	278.0919
0.000709	15.9985	0.001243	31.91728	0.001418	37.56123	0.00471	164.3868	0.005579	202.4174	0.00713	273.7183
0.000709	15.9985	0.001219	31.18083	0.001392	36.69455	0.004642	161.4811	0.005498	198.8394	0.007027	268.88
0.0007	15.76667	0.001204	30.69235	0.001374	36.11969	0.004582	158.8774	0.005426	195.6334	0.006935	264.5447
0.000692	15.53577	0.001188	30.20587	0.001356	35.54719	0.004514	155.9974	0.005346	192.0871	0.006832	259.7473
0.000684	15.30573	0.001173	29.72142	0.001339	34.97707	0.004446	153.1312	0.005266	188.5577	0.00673	254.9767
0.000684	15.30573	0.001157	29.23901	0.001321	34.40935	0.004386	150.5633	0.005194	185.3959	0.006638	250.701
0.000675	15.07658	0.001142	28.75865	0.001303	33.84405	0.004325	148.0068	0.005122	182.2479	0.006547	246.4442
0.000675	15.07658	0.001126	28.28036	0.001286	33.28119	0.004264	145.4617	0.005051	179.114	0.006455	242.2063
0.000667	14.84834	0.001111	27.80416	0.001268	32.72079	0.004204	142.9281	0.004979	175.9942	0.006363	237.9876
0.000659	14.621	0.001088	27.09382	0.001242	31.88483	0.004144	140.406	0.004907	172.8887	0.006272	233.7882
0.000659	14.621	0.00108	26.8581	0.001233	31.60743	0.00409	138.1741	0.004844	170.1403	0.006191	230.0718
0.00065	14.39457	0.001065	26.38827	0.001215	31.05452	0.00403	135.6742	0.004773	167.0621	0.0061	225.9093
0.000642	14.16906	0.001049	25.9206	0.001198	30.50415	0.003976	133.4621	0.004709	164.3382	0.006019	222.2259
0.000642	14.16906	0.001041	25.68758	0.001189	30.22992	0.003923	131.2594	0.004646	161.626	0.005938	218.5583
0.000634	13.94448	0.001026	25.22318	0.001171	29.68341	0.003869	129.0663	0.004583	158.9255	0.005857	214.9066
0.000634	13.94448	0.001019	24.99181	0.001163	29.41112	0.003816	126.8828	0.00452	156.2369	0.005776	211.2709
0.000626	13.72084	0.001003	24.53073	0.001145	28.86851	0.003763	124.709	0.004456	153.5602	0.005696	207.6513
0.000626	13.72084	0.000996	24.30103	0.001136	28.59819	0.003716	122.815	0.004401	151.2279	0.005625	204.4976
0.000617	13.49813	0.00098	23.84331	0.001119	28.05953	0.003657	120.3908	0.004331	148.243	0.005535	200.4612
0.000617	13.49813	0.000973	23.6153	0.00111	27.7912	0.003604	118.2466	0.004268	145.6028	0.005454	196.8909
0.000609	13.27638	0.000965	23.38786	0.001102	27.52354	0.003544	115.8464	0.004197	142.6472	0.005364	192.8943
0.000609	13.27638	0.00095	22.9347	0.001084	26.99025	0.003478	113.1945	0.004119	139.3819	0.005264	188.4787
0.000609	13.27638	0.000942	22.70898	0.001076	26.72462	0.003418	110.8215	0.004049	136.4599	0.005174	184.5275
0.000601	13.05558	0.000935	22.48384	0.001067	26.45967	0.003359	108.4616	0.003978	133.554	0.005085	180.598
0.000601	13.05558	0.000927	22.25929	0.001058	26.19541	0.0033	106.115	0.003908	130.6645	0.004995	176.6906
0.000593	12.83574	0.000919	22.03532	0.00105	25.93184	0.003241	103.7817	0.003838	127.7914	0.004905	172.8055
0.000593	12.83574	0.000904	21.58916	0.001032	25.40678	0.003182	101.4619	0.003768	124.935	0.004816	168.9429
0.000584	12.61687	0.000904	21.58916	0.001032	25.40678	0.003123	99.15586	0.003699	122.0954	0.004727	165.1031
0.000584	12.61687	0.000889	21.14537	0.001015	24.88451	0.003071	97.11761	0.003637	119.5856	0.004648	161.7092
0.000576	12.39899	0.000882	20.92437	0.001006	24.62444	0.003018	95.09038	0.003575	117.0893	0.004569	158.3337
0.000576	12.39899	0.000874	20.70398	0.000998	24.36508	0.002966	93.07431	0.003513	114.6069	0.00449	154.9768
0.000576	12.39899	0.000866	20.4842	0.000989	24.10643	0.002921	91.31947	0.003459	112.446	0.004421	152.0548
0.000568	12.18209	0.000866	20.4842	0.000989	24.10643	0.002869	89.32461	0.003398	109.9897	0.004342	148.7332
0.000568	12.18209	0.000859	20.26502	0.00098	23.8485	0.002823	87.58852	0.003344	107.8519	0.004274	145.8425
0.000568	12.18209	0.000851	20.04646	0.000972	23.59129	0.002778	85.8613	0.00329	105.7251	0.004205	142.9665
0.00056	11.9662	0.000844	19.82852	0.000963	23.3348	0.002733	84.14305	0.003236	103.6094	0.004136	140.1055
0.00056	11.9662	0.000836	19.61119	0.000955	23.07904	0.002687	82.43385	0.003183	101.5047	0.004068	137.2595
0.000551	11.7513	0.000829	19.39449	0.000946	22.82402	0.002642	80.73379	0.003129	99.41138	0.004	134.4288
0.000551	11.7513	0.000821	19.17841	0.000937	22.56973	0.002604	79.28394	0.003084	97.62611	0.003941	132.0146
0.000551	11.7513	0.000814	18.96296	0.000929	22.31619	0.002559	77.60109	0.00303	95.55395	0.003873	129.2126
0.000551	11.7513	0.000814	18.96296	0.000929	22.31619	0.00252	76.16615	0.002985	93.78703	0.003815	126.8232
0.000543	11.53742	0.000806	18.74814	0.00092	22.06339	0.002475	74.50086	0.002932	91.73648	0.003747	124.0504
0.000543	11.53742	0.000799	18.53396	0.000912	21.81133	0.002443	73.31724	0.002894	90.27903	0.003698	122.0796
0.000535	11.32456	0.000791	18.32042	0.000903	21.56003	0.002405	71.90341	0.002848	88.53811	0.00364	119.7254
0.000535	11.32456	0.000784	18.10753	0.000895	21.30949	0.002367	70.49675	0.002803	86.80603	0.003582	117.3832
0.000535	11.32456	0.000784	18.10753	0.000895	21.30949	0.002328	69.09733	0.002757	85.08286	0.003524	115.053
0.000535	11.32456	0.000776	17.89528	0.000886	21.05971	0.002296	67.93673	0.00272	83.65376	0.003476	113.1206
0.000527	11.11274	0.000769	17.68369	0.000878	20.81069	0.002258	66.55077	0.002675	81.94716	0.003416	110.8128
0.000527	11.11274	0.000769	17.68368	0.000878	20.81069	0.00222	65.17226	0.002629	80.24972	0.003361	108.5175
0.000519	10.90196	0.000761	17.47274	0.000869	20.56245	0.002188	64.02923	0.002592	78.84227	0.003313	106.6142
0.000519	10.90196	0.000761	17.47274	0.000869	20.56245	0.002157	62.89148	0.002554	77.44129	0.003265	104.7198
0.000519	10.90196	0.000754	17.26245	0.000861	20.31498	0.002125	61.75903	0.002517	76.04686	0.003217	102.8341
0.000519	10.90196	0.000746	17.05283	0.000852	20.06829	0.002094	60.63195	0.00248	74.65902	0.003169	100.9575
0.000511	10.69223	0.000739	16.84387	0.000844	19.82238	0.002062	59.51027	0.002442	73.27785	0.003121	99.08976
0.000511	10.69223	0.000739	16.84387	0.000844	19.82238	0.002024	58.17146	0.002397	71.62931	0.003064	96.86052
0.000511	10.69223	0.000732	16.63558	0.000835	19.57726	0.00198	56.61956	0.002345	69.71838	0.002997	94.27648
0.000511	10.69223	0.000732	16.63558	0.000835	19.57726	0.00193	54.85938	0.002286	67.55096	0.002921	91.34562
0.000511	10.69223	0.000732	16.63558	0.000835	19.57726	0.001886	53.33113	0.002234	65.66917	0.002855	88.80095
0.000503	10.48356	0.000724	16.42797	0.000827	19.33294	0.001836	51.59836	0.002175	63.53554	0.002779	85.91575
0.000503	10.48356	0.000717	16.22104	0.000818	19.08941	0.001793	50.09446	0.002123	61.68371	0.002717	83.41162
0.000494	10.27596	0.000717	16.22104	0.000818	19.08941	0.001755	48.81464	0.002079	60.10781	0.002657	81.28061
0.000494	10.27596	0.000709	16.01478	0.00081	18.84668	0.001712	47.33244	0.002027	58.28271	0.002591	78.81262
0.000494	10.27596	0.000709	16.01478	0.00081	18.84668	0.001675	46.07149	0.001983	56.73003	0.002535	76.71302
0.000494	10.27596	0.000702	15.80922	0.000801	18.60477	0.001638	44.81942	0.001939	55.1883	0.002479	74.62822
0.000426	10.06944	0.000694	15.60434	0.000793	18.36366	0.001594	43.37006	0.001888	53.40363	0.002413	72.21491
0.000446	9.853468	0.000643	14.18992	0.000734	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

5 OF 6

SUBREACH 1

0.000446	9.053468	0.000643	14.18992	0.000734	16.69913	0.001496	40.10432	0.001772	49.38237	0.002264	65.77717
0.000398	7.872406	0.00057	12.23164	0.00065	14.39457	0.001374	36.11749	0.001627	44.4732	0.00208	60.13876
0.000351	6.735665	0.000497	10.35161	0.000568	12.18209	0.001259	32.43279	0.001491	39.93605	0.001905	54.00341
0.000312	5.824719	0.000447	9.085614	0.000511	10.69223	0.001163	29.41153	0.001377	36.21582	0.00176	48.97274
0.000288	5.295059	0.000405	8.03556	0.000462	9.456491	0.001091	27.19686	0.001292	33.4888	0.001651	45.28513
0.000265	4.778803	0.000377	7.354539	0.00043	8.655045	0.001026	25.20696	0.001215	31.03854	0.001552	41.97177
0.00025	4.442411	0.000349	6.689499	0.000398	7.872406	0.000978	23.78476	0.001159	29.28731	0.001481	39.60368
0.000235	4.112499	0.000335	6.363202	0.000382	7.48841	0.000931	22.38427	0.001103	27.56283	0.00141	37.27176
0.00022	3.789315	0.000314	5.881821	0.000359	6.921906	0.00089	21.17717	0.001054	26.07647	0.001347	35.26183
0.000212	3.630329	0.0003	5.566436	0.000343	6.550751	0.000849	19.98766	0.001006	24.61177	0.001286	33.28119
0.000205	3.473128	0.000287	5.255619	0.000327	6.184972	0.000814	18.98245	0.000965	23.374	0.001233	31.60743
0.000197	3.317751	0.00028	5.101963	0.000319	6.004145	0.00078	17.99086	0.000923	22.15301	0.00118	29.95634
0.00019	3.164238	0.000266	4.79824	0.000304	5.646715	0.000745	17.01325	0.000882	20.94922	0.001128	28.32853
0.000182	3.012633	0.000259	4.64821	0.000296	5.470155	0.000716	16.20951	0.000848	19.95955	0.001084	26.99025
0.000175	2.862981	0.000246	4.351904	0.000281	5.121453	0.000688	15.41599	0.000814	18.98245	0.001041	25.66896
0.000168	2.715331	0.000239	4.205669	0.000273	4.949359	0.000659	14.63292	0.000781	18.01821	0.000998	24.36508
0.00016	2.569735	0.000226	3.917141	0.000258	4.609811	0.000631	13.86057	0.000747	17.06718	0.000955	23.07904
0.000153	2.426246	0.000219	3.774894	0.00025	4.442411	0.000602	13.09922	0.000713	16.12969	0.000912	21.81133
0.000146	2.284926	0.000212	3.634024	0.000242	4.27663	0.000574	12.34918	0.00068	15.20613	0.000869	20.56245
0.000146	2.284926	0.000199	3.356516	0.000227	3.95005	0.000552	11.7575	0.000653	14.47758	0.000835	19.57726
0.000138	2.145837	0.000193	3.219933	0.00022	3.789315	0.000529	11.17345	0.000627	13.75841	0.000801	18.60477
0.000131	2.009048	0.000186	3.084836	0.000212	3.630329	0.000507	10.59721	0.000601	13.04886	0.000767	17.64528
0.000124	1.874633	0.000179	2.951256	0.000205	3.473128	0.00049	10.17028	0.000581	12.52315	0.000742	16.9344
0.000124	1.874633	0.000173	2.819226	0.000197	3.317751	0.000468	9.608207	0.000555	11.83105	0.000709	15.9985
0.000117	1.742673	0.000166	2.68878	0.00019	3.164238	0.000452	9.192151	0.000535	11.31674	0.000684	15.30573
0.00011	1.613255	0.00016	2.559955	0.000182	3.012633	0.000435	8.780923	0.000515	10.81237	0.000659	14.621
0.00011	1.613255	0.000153	2.43279	0.000175	2.862981	0.000419	8.374629	0.000496	10.31208	0.000634	13.94448
0.000103	1.486476	0.000147	2.307326	0.000168	2.715331	0.000402	7.973384	0.000477	9.81801	0.000609	13.27638
0.000103	1.486476	0.00014	2.183606	0.00016	2.569735	0.000386	7.577308	0.000457	9.330303	0.000584	12.61687
9.57E-05	1.362442	0.000134	2.061679	0.000153	2.426246	0.00037	7.18653	0.000438	8.849119	0.00056	11.9662
8.87E-05	1.24127	0.000128	1.941593	0.000146	2.284926	0.000354	6.801186	0.000419	8.374627	0.000535	11.32456
8.87E-05	1.24127	0.000128	1.941593	0.000146	2.284926	0.000337	6.421424	0.0004	7.907007	0.000511	10.69223
8.18E-05	1.123093	0.000121	1.823404	0.000138	2.145837	0.000327	6.171426	0.000387	7.599172	0.000494	10.27596
8.18E-05	1.123093	0.000115	1.707169	0.000131	2.009048	0.000311	5.801318	0.000368	7.143441	0.00047	9.659697
7.49E-05	1.008058	0.000109	1.592951	0.000124	1.874633	0.000295	5.437235	0.000349	6.695128	0.000446	9.053468
7.49E-05	1.008058	0.000109	1.592951	0.000124	1.874633	0.000284	5.197954	0.000337	6.400491	0.00043	8.655045
7.49E-05	1.008058	0.000102	1.480819	0.000117	1.742673	0.000274	4.961497	0.000324	6.109329	0.000414	8.261322
6.81E-05	0.896333	9.61E-05	1.370847	0.00011	1.613255	0.000263	4.727926	0.000312	5.821721	0.000398	7.872406
6.81E-05	0.896333	9.61E-05	1.370847	0.00011	1.613255	0.000253	4.497309	0.000299	5.537753	0.000382	7.48841
6.13E-05	0.788111	9E-05	1.263118	0.000103	1.486476	0.000242	4.26972	0.000287	5.257511	0.000367	7.109454
6.13E-05	0.788111	8.38E-05	1.157721	9.57E-05	1.362442	0.000232	4.045234	0.000274	4.981091	0.000351	6.735665
6.13E-05	0.788111	8.38E-05	1.157721	9.57E-05	1.362442	0.000227	3.93418	0.000268	4.844345	0.000343	6.550751
5.46E-05	0.683617	7.77E-05	1.054757	8.87E-05	1.24127	0.000216	3.714505	0.000256	4.573848	0.000327	6.184972
5.46E-05	0.683617	7.77E-05	1.054757	8.87E-05	1.24127	0.000206	3.498148	0.000244	4.307437	0.000312	5.824719
4.8E-05	0.583116	7.16E-05	0.954337	8.18E-05	1.123093	0.000201	3.391244	0.000238	4.175801	0.000304	5.646715
4.8E-05	0.583116	7.16E-05	0.954337	8.18E-05	1.123093	0.000191	3.18005	0.000226	3.915748	0.000288	5.295059
4.8E-05	0.583116	6.56E-05	0.856587	7.49E-05	1.008058	0.000185	3.075767	0.00022	3.787365	0.000281	5.121453
4.8E-05	0.583116	6.56E-05	0.856587	7.49E-05	1.008058	0.000175	2.870002	0.000208	3.533972	0.000265	4.778803
4.14E-05	0.486927	5.96E-05	0.76165	6.81E-05	0.896333	0.00017	2.768511	0.000202	3.409	0.000258	4.609811
4.14E-05	0.486927	5.96E-05	0.76165	6.81E-05	0.896333	0.00016	2.568413	0.00019	3.16261	0.000242	4.27663
4.14E-05	0.486927	5.96E-05	0.76165	6.81E-05	0.896333	0.000155	2.469841	0.000184	3.041233	0.000235	4.112499
3.5E-05	0.395442	5.37E-05	0.66969	6.13E-05	0.788111	0.00015	2.372279	0.000178	2.921101	0.000227	3.95005
3.5E-05	0.395442	5.37E-05	0.66969	6.13E-05	0.788111	0.000145	2.275746	0.000172	2.802235	0.00022	3.789315
3.5E-05	0.395442	4.78E-05	0.580897	5.46E-05	0.683617	0.00014	2.180264	0.000166	2.684664	0.000212	3.630329
3.5E-05	0.395442	4.78E-05	0.580897	5.46E-05	0.683617	0.00013	1.992539	0.000154	2.453509	0.000197	3.317751
3.5E-05	0.395442	4.78E-05	0.580897	5.46E-05	0.683617	0.000125	1.900344	0.000149	2.339985	0.00019	3.164238
2.96E-05	0.309161	4.2E-05	0.495497	4.8E-05	0.583116	0.00012	1.809295	0.000143	2.227872	0.000182	3.012633
2.86E-05	0.309161	4.2E-05	0.495497	4.8E-05	0.583116	0.000116	1.719419	0.000137	2.117205	0.000175	2.862981
	(2-YR)		(5-YR)		(10-YR)		(25-YR)		(50-YR)		(100-YR)
	46860		77807		91565		145535		179205		242329

SUBREACH 1
TOTAL Qs (cu ft)

(a) BASED ON THE LA CUEVA ARROYO UNIT SEDIMENT TRANSPORT EQUATION - MODIFIED (RTI, 1992) COEFF. & EXPONETS

6 OF 6

SUBREACH 1

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.00019	3.164238	0.000258	4.79524	0.000304	5.[illegible]715	[illegible]	17.[illegible]323	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.000182	3.012633	0.000259	4.64921	0.000296	5.470155	0.000716	16.20951	0.000848	19.95755	0.001034	26.99025	
0.000175	2.862981	0.000246	4.331904	0.000261	5.121453	0.000688	15.41559	0.000814	18.98245	0.001041	25.[illegible]	
0.000168	2.715331	0.000239	4.205669	0.000273	4.949359	0.000659	14.63292	0.000781	18.01821	0.000995	24.[illegible]	
0.00016	2.569735	0.000226	3.917141	0.000258	4.609811	0.000631	13.86057	0.000747	17.06715	0.000955	23.07904	
0.000153	2.426246	0.000219	3.774874	0.00025	4.442411	0.000602	13.07922	0.000713	16.12967	0.000912	21.81133	
0.000146	2.284926	0.000212	3.634024	0.000242	4.27663	0.000574	12.34918	0.00068	15.20613	0.000869	20.36245	
0.000146	2.284926	0.000199	3.356516	0.000227	3.95005	0.000552	11.7575	0.000653	14.47758	0.000835	19.5772[illegible]	
0.000138	2.145837	0.000193	3.219933	0.00022	3.789315	-0.000529	11.17345	0.000627	13.75541	0.000801	18.60477	
0.000131	2.009048	0.000186	3.084836	0.000212	3.630329	0.000507	10.59721	0.000601	13.04866	0.000767	17.64528	
0.000124	1.874633	0.000179	2.951256	0.000205	3.473128	0.00049	10.17028	0.000581	12.52315	0.000742	16.9344	
0.000124	1.874633	0.000173	2.819226	0.000197	3.317751	0.000468	9.608207	0.000555	11.83105	0.000709	15.9985	
0.000117	1.742673	0.000166	2.68878	0.00019	3.164238	0.000452	9.172151	0.000535	11.31674	0.000684	15.30573	
0.00011	1.613255	0.00015	2.559955	0.000182	3.012633	0.000435	8.780923	0.000515	10.81237	0.000659	14.621	
0.00011	1.613255	0.000153	2.43279	0.000175	2.862981	0.000419	8.374629	0.000496	10.31208	0.000634	13.94448	
0.000103	1.486476	0.000147	2.307326	0.000168	2.715331	0.000402	7.973384	0.000477	9.81801	0.000607	13.27638	
0.000103	1.486476	0.00014	2.183606	0.00016	2.569735	0.000386	7.577308	0.000457	9.330303	0.000584	12.61687	
9.57E-05	1.362442	0.000134	2.061679	0.000153	2.426246	0.00037	7.18653	0.000438	8.849119	0.00056	11.9662	
8.87E-05	1.24127	0.000128	1.941593	0.000146	2.284926	0.000354	6.801186	0.000419	8.374627	0.000535	11.32456	
8.87E-05	1.24127	0.000128	1.941593	0.000146	2.284926	0.000337	6.421424	0.0004	7.907007	0.000511	10.69223	
8.18E-05	1.123093	0.000121	1.823404	0.000138	2.145837	0.000327	6.171426	0.000387	7.599172	0.000494	10.27596	
8.18E-05	1.123093	0.000115	1.707169	0.000131	2.009048	0.000311	5.801318	0.000368	7.143441	0.00047	9.659697	
7.49E-05	1.008058	0.000109	1.592951	0.000124	1.874633	0.000295	5.437235	0.000349	6.695128	0.000446	9.053468	
7.49E-05	1.008058	0.000109	1.592951	0.000124	1.874633	0.000284	5.197954	0.000337	6.400491	0.00043	8.655045	
7.49E-05	1.008058	0.000102	1.480819	0.000117	1.742673	0.000274	4.961497	0.000324	6.109329	0.000414	8.261322	
6.81E-05	0.896333	9.61E-05	1.370847	0.00011	1.613255	0.000263	4.727926	0.000312	5.821721	0.000398	7.872406	
6.81E-05	0.896333	9.61E-05	1.370847	0.00011	1.613255	0.000253	4.497309	0.000299	5.537753	0.000382	7.48841	
6.13E-05	0.788111	9E-05	1.263118	0.000103	1.486476	0.000242	4.26972	0.000287	5.257511	0.000367	7.109454	
6.13E-05	0.788111	8.38E-05	1.157721	9.57E-05	1.362442	0.000232	4.045234	0.000274	4.981091	0.000351	6.735665	
6.13E-05	0.788111	8.38E-05	1.157721	9.57E-05	1.362442	0.000227	3.93418	0.000268	4.844345	0.000343	6.550751	
5.46E-05	0.683617	7.77E-05	1.054757	8.87E-05	1.24127	0.000216	3.714505	0.000256	4.573848	0.000327	6.184972	
5.46E-05	0.683617	7.77E-05	1.054757	8.87E-05	1.24127	0.000206	3.498148	0.000244	4.307437	0.000312	5.824719	
4.8E-05	0.583116	7.16E-05	0.954337	8.18E-05	1.123093	0.000201	3.391244	0.000238	4.175801	0.000304	5.646715	
4.8E-05	0.583116	7.16E-05	0.954337	8.18E-05	1.123093	0.000191	3.18005	0.000226	3.915748	0.000288	5.295059	
4.8E-05	0.583116	6.56E-05	0.856587	7.49E-05	1.008058	0.000185	3.075767	0.00022	3.787365	0.000281	5.121453	
4.8E-05	0.583116	6.56E-05	0.856587	7.49E-05	1.008058	0.000175	2.870002	0.000208	3.533972	0.000265	4.778803	
4.14E-05	0.486927	5.96E-05	0.76165	6.81E-05	0.896333	0.00017	2.768511	0.000202	3.409	0.000258	4.609811	
4.14E-05	0.486927	5.96E-05	0.76165	6.81E-05	0.896333	0.00016	2.568413	0.00019	3.16261	0.000242	4.27663	
4.14E-05	0.486927	5.96E-05	0.76165	6.81E-05	0.896333	0.000155	2.469841	0.000184	3.041233	0.000235	4.112499	
3.5E-05	0.395442	5.37E-05	0.66969	6.13E-05	0.788111	0.00015	2.372279	0.000178	2.921101	0.000227	3.95005	
3.5E-05	0.395442	5.37E-05	0.66969	6.13E-05	0.788111	0.000145	2.275746	0.000172	2.802235	0.00022	3.789315	
3.5E-05	0.395442	4.78E-05	0.580897	5.46E-05	0.683617	0.00014	2.180264	0.000166	2.684664	0.000212	3.630329	
3.5E-05	0.395442	4.78E-05	0.580897	5.46E-05	0.683617	0.00013	1.992539	0.000154	2.453509	0.000197	3.317751	
3.5E-05	0.395442	4.78E-05	0.580897	5.46E-05	0.683617	0.000125	1.900344	0.000149	2.339985	0.00019	3.164238	
2.86E-05	0.309161	4.2E-05	0.495497	4.8E-05	0.583116	0.00012	1.809295	0.000143	2.227872	0.000182	3.012633	
2.86E-05	0.309161	4.2E-05	0.495497	4.8E-05	0.583116	0.000116	1.719419	0.000137	2.117203	0.000175	2.862981	
	(2-YR)		(5-YR)		(10-YR)		(25-YR)		(50-YR)		(100-YR)	
	46860		77807		91565		145535		179205		242329	

SUBREACH 1

TOTAL Qs (cu ft)

(a) BASED ON THE LA CUEVA ARROYO UNIT SEDIMENT TRANSPORT EQUATION - MODIFIED (RTI, 1992) COEFF. & EXPONETS USING PREDICTED VELOCITY AND HYDRAULIC DEPTH FROM REGRESSION EQUATIONS OF EACH BASED ON HEC-2 RESULTS OF THE 6 RETURN PERIODS Qp's FOR THE NORTH DOMINGO BACA ARROYO

qs=a*(Y^b)*(V^c)

SPREADSHEET FORMULAS FOR SUBREACH 1

	a	Y	^b	V	^c
qs =	((6.5*10^-5)*((0.0492261*D327^0.39858)^-0.1)*((0.911898*D327^0.29165)^3.9))				

(MODIFIED a, b & c - LA CUEVA EQUATION , RTI, DECEMBER, 1992)

USED THIS EQ.

Qs = (1329*360*(35.710891*C329^0.252464))

1 OF 6

SUBREACH 1

DOMINGO BACA PHASE IIB
HYDROGRAPHS AND SEDIMENT TRANSPORT SPREADSHEET PS & BGG 8/31/92
FILE NAME : DOMBHYD.WD1 12-2-1992
12-18-92

SUBREACH 2 IS WEST SUBREACH 1 AND IS WEST OF WYOMING BLVD.
MAIN NORTH DOMINGO BACA ARROYO
SUBREACH 2
SEDIMENT DISCHARGE (MPM-EINSTEIN METHOD) (a)

2 YR FLOW qs (cfs/ft)	2 YR FLOW Qs (cu ft)	5 YR FLOW qs (cfs/ft)	5 YR FLOW Qs (cu ft)	10 YR FLOW qs (cfs/ft)	10 YR FLOW Qs (cu ft)	25 YR FLOW qs (cfs/ft)	25 YR FLOW Qs (cu ft)	50 YR FLOW qs (cfs/ft)	50 YR FLOW Qs (cu ft)	100 YR FLOW qs (cfs/ft)	100 YR FLOW Qs (cu ft)
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	2.75E-05	0.055545	3.19E-05	0.067687	3.94E-05	0.090158
0	0	0.000254	1.111885	0.000284	1.297888	0.000587	3.447713	0.000679	4.201377	0.00084	5.5962
0.000112	0.368912	0.00117	8.760004	0.001312	10.22543	0.00423	49.63221	0.004898	60.48174	0.006057	80.56119
0.005624	72.8957	0.009441	146.6699	0.010587	171.2058	0.023251	495.0934	0.026919	603.32	0.033289	803.6174
0.036753	918.5128	0.091846	3162.112	0.102998	3691.089	0.118921	4481.438	0.137679	5461.073	0.170258	7274.106
0.128661	4983.843	0.222051	10410.43	0.249013	12151.95	0.362839	20198.63	0.420073	24614.01	0.519474	32785.67
0.197159	8866.834	0.272741	13740.4	0.305858	16038.98	0.432545	25605.47	0.500774	31202.79	0.619272	41561.87
0.161938	6798.42	0.209341	9614.284	0.23476	11222.62	0.338478	18390.01	0.39187	22410.04	0.484597	29649.99
0.122992	4689.727	0.156214	6476.133	0.175182	7559.5	0.259451	12844.5	0.300377	15652.28	0.371455	20848.71
0.100318	3562.029	0.125699	4829.592	0.140961	5637.516	0.206788	9456.363	0.239407	11523.51	0.296057	15349.22
0.087283	2951.9	0.10588	3831.174	0.118737	4472.077	0.167075	7091.111	0.193429	8641.217	0.2392	11510.03
0.076111	2453.656	0.090364	3093.419	0.101336	3610.905	0.137074	5428.675	0.158696	6615.375	0.196248	8811.626
0.062079	1863.611	0.072692	2306.074	0.081518	2691.848	0.104956	3786.106	0.121512	4613.743	0.150265	6145.468
0.049734	1381.61	0.058441	1717.755	0.065537	2005.112	0.077388	2509.402	0.089595	3057.953	0.110796	4073.169
0.041268	1074	0.049435	1370.414	0.055437	1599.665	0.062815	1893.524	0.072724	2307.446	0.089932	3073.499
0.035967	892.1054	0.043774	1162.956	0.049089	1357.503	0.05564	1607.552	0.064416	1958.96	0.079659	2609.319
0.032604	781.3922	0.040203	1036.739	0.045084	1210.171	0.050129	1396.46	0.058037	1701.724	0.07177	2266.683
0.030123	702.2105	0.03782	934.6773	0.042412	1114.382	0.04606	1245.659	0.053325	1517.958	0.065944	2021.908
0.028268	644.4871	0.036103	896.6583	0.040487	1046.657	0.042969	1134.167	0.049747	1382.094	0.061518	1840.937
0.026913	603.1322	0.034801	853.2927	0.039027	996.0367	0.040545	1048.664	0.04694	1277.9	0.058048	1702.152
0.025847	571.1265	0.033777	819.556	0.037878	956.6563	0.038668	983.6794	0.044767	1198.71	0.055361	1596.672
0.024967	545.0152	0.032984	793.694	0.036989	926.4679	0.037217	934.1841	0.043087	1138.395	0.053283	1516.333
0.024245	523.854	0.03233	772.5342	0.036256	901.7684	0.036068	895.4798	0.041758	1091.23	0.051639	1453.51
0.023656	506.7493	0.031816	755.9975	0.035679	882.4653	0.035116	863.7038	0.040655	1052.508	0.050275	1401.932
0.023145	492.0786	0.031372	741.7796	0.035181	865.869	0.034342	838.1108	0.039759	1021.32	0.049167	1360.391
0.022717	479.7936	0.030997	729.853	0.034761	851.9473	0.033729	817.9954	0.03905	996.8078	0.04829	1327.74
0.022341	469.1097	0.030669	719.4523	0.034393	839.8067	0.033224	801.5111	0.038465	976.7201	0.047567	1300.983
0.022018	459.9907	0.030365	709.8241	0.034052	828.5678	0.032809	788.0259	0.037985	960.2872	0.046973	1279.095
0.021723	451.6663	0.030107	701.6995	0.033762	817.0841	0.032466	776.9243	0.037587	946.7536	0.046482	1261.075
0.021453	444.1278	0.029849	693.5956	0.033473	809.6245	0.032177	767.6025	0.037253	935.3991	0.046068	1245.944
0.021238	436.1172	0.029638	686.9806	0.033236	801.9029	0.031924	759.4663	0.03696	925.4844	0.045705	1232.738
0.021022	432.1247	0.029426	680.3796	0.032999	794.1977	0.031707	752.5077	0.036709	917.0047	0.045395	1221.443
0.020834	426.8763	0.029262	675.2553	0.032815	788.2161	0.031526	746.7196	0.036499	909.9514	0.045136	1212.048
0.020645	421.2819	0.029074	669.4093	0.032604	781.3922	0.031363	741.5188	0.036311	903.6137	0.044903	1203.606

2 OF 6

SUBREACH 2

0.020483	417.2237	0.02891	664.3033	0.03242	775.432	0.031237	737.4793	0.036164	898.6911	0.044721	1197.049
0.020294	412.0357	0.028745	659.2059	0.032235	769.4819	0.03111	733.4447	0.036017	893.7745	0.04454	1190.5
0.020132	407.6003	0.028604	654.8436	0.032077	764.3899	0.03102	730.5657	0.035913	890.2662	0.04441	1185.827
0.019916	401.7029	0.028486	651.2133	0.031945	760.1522	0.030929	727.6893	0.035808	886.7611	0.044291	1181.159
0.019753	397.2923	0.028345	646.8627	0.031787	755.0739	0.030838	724.8154	0.035703	883.2589	0.044151	1176.494
0.019564	392.1603	0.028204	642.5186	0.031629	750.003	0.030784	723.0923	0.03564	881.1591	0.044073	1173.697
0.019402	387.7731	0.028087	638.9035	0.031497	745.7831	0.03073	721.37	0.035577	879.0604	0.043996	1170.901
0.019266	384.1254	0.027945	634.5712	0.031339	740.7262	0.030675	719.6487	0.035514	876.9628	0.043918	1168.107
0.019104	379.7593	0.027804	630.2455	0.03118	735.6768	0.030639	718.5017	0.035472	875.565	0.043866	1166.245
0.018941	375.4022	0.027686	626.6457	0.031048	731.4748	0.030603	717.355	0.03543	874.1677	0.043814	1164.384
0.018806	371.7806	0.027569	623.0504	0.030916	727.2781	0.030567	716.2088	0.035388	872.7709	0.043762	1162.524
0.018697	368.8889	0.027451	619.4598	0.030784	723.0868	0.030549	715.6358	0.035367	872.0726	0.043736	1161.594
0.018561	365.2813	0.027333	615.8737	0.030652	718.9007	0.03053	715.0629	0.035346	871.3745	0.04371	1160.664
0.018426	361.6815	0.027239	613.0081	0.030546	715.5558	0.030512	714.4902	0.035325	870.6766	0.043684	1159.734
0.018317	358.8074	0.027121	609.4303	0.030414	711.3795	0.030494	713.9175	0.035304	869.9787	0.043658	1158.805
0.018236	356.6551	0.027026	606.5713	0.030308	708.0423	0.030494	713.9175	0.035304	869.9787	0.043658	1158.805
0.018127	353.7898	0.026932	603.7154	0.030202	704.7085	0.030476	713.3449	0.035283	869.281	0.043632	1157.875
0.018018	350.9296	0.026767	598.7246	0.030017	698.8829	0.030458	712.7725	0.035262	868.5834	0.043607	1156.946
0.017801	345.2246	0.026248	583.099	0.029435	680.6434	0.030367	709.9116	0.035158	865.0972	0.043477	1152.302
0.017502	337.4142	0.025562	562.642	0.028666	656.7642	0.030222	705.3396	0.03499	859.5258	0.043269	1144.881
0.017175	328.9388	0.024923	543.7419	0.02795	634.7024	0.030114	701.9149	0.034864	855.3524	0.043113	1139.322
0.016875	321.2118	0.024426	529.141	0.027392	617.6589	0.030005	698.4939	0.034738	851.1835	0.042958	1133.77
0.016575	313.5255	0.024023	517.3858	0.026939	603.9372	0.029932	696.2152	0.034654	848.4067	0.042854	1130.071
0.016302	306.5738	0.02369	507.7489	0.026567	592.6882	0.02986	693.9382	0.03457	845.632	0.04275	1126.375
0.016029	299.6566	0.023382	498.8363	0.026221	582.2847	0.029787	691.6628	0.034486	842.8592	0.042646	1122.682
0.015755	292.7744	0.02312	491.3222	0.025927	573.5135	0.029715	689.3891	0.034402	840.0884	0.042542	1118.991
0.015481	285.9277	0.022858	483.8333	0.025634	564.7718	0.02966	687.6849	0.034339	838.0117	0.042464	1116.225
0.015207	279.1169	0.02262	477.0472	0.025367	556.8506	0.029587	685.4141	0.034255	835.2445	0.04236	1112.539
0.014988	273.6945	0.022382	470.2824	0.0251	548.9541	0.029515	683.1449	0.034171	832.4793	0.042256	1108.856
0.014741	267.6224	0.022144	463.539	0.024833	541.0826	0.02946	681.4441	0.034108	830.4067	0.042178	1106.095
0.014493	261.5806	0.02193	457.4883	0.024592	534.0197	0.029406	679.7442	0.034044	828.3352	0.0421	1103.336
0.014273	256.2357	0.021691	450.7859	0.024325	526.1961	0.029352	678.0453	0.033981	826.2649	0.042022	1100.578
0.014026	250.2519	0.0215	445.4397	0.024111	519.9556	0.029279	675.7815	0.033897	823.5063	0.041918	1096.904
0.013805	244.9593	0.021262	438.7769	0.023843	512.1781	0.029224	674.0848	0.033834	821.4387	0.04184	1094.15
0.013612	240.3489	0.021047	432.7993	0.023602	505.2006	0.029152	671.824	0.03375	818.6836	0.041736	1090.48
0.013392	235.1036	0.020855	427.5011	0.023388	499.0161	0.029097	670.1294	0.033687	816.6186	0.041658	1087.729
0.013198	230.535	0.02064	421.5579	0.023146	492.0786	0.029043	668.4358	0.033624	814.5548	0.04158	1084.98
0.012977	225.338	0.020425	415.6331	0.022905	485.1627	0.02897	666.1792	0.03354	811.8049	0.041476	1081.318
0.012784	220.8122	0.020233	410.3821	0.02269	479.0333	0.028916	664.4878	0.033477	809.7438	0.041398	1078.572
0.01259	216.3068	0.020042	405.1459	0.022475	472.9212	0.028843	662.2341	0.033393	806.9974	0.041294	1074.914
0.012396	211.8219	0.01985	399.9246	0.02226	466.8264	0.028752	659.4193	0.033287	803.5673	0.041164	1070.345
0.012202	207.3578	0.019634	394.0685	0.022018	459.9907	0.028661	656.6072	0.033182	800.1405	0.041034	1065.781
0.012008	202.9149	0.019419	388.2316	0.021776	453.1773	0.02857	653.7977	0.033077	796.7169	0.040904	1061.22
0.011841	199.1236	0.019203	382.4139	0.021534	446.3864	0.028479	650.9909	0.032972	793.2965	0.040774	1056.665
0.011646	194.7204	0.018962	375.9726	0.021265	438.8675	0.028388	648.1868	0.032866	789.8794	0.040643	1052.113
0.01148	190.9636	0.018722	369.5555	0.020995	431.377	0.028279	644.8253	0.03274	785.7831	0.040487	1046.657
0.011313	187.2231	0.018506	363.801	0.020753	424.6598	0.028188	642.0271	0.032635	782.3732	0.040357	1042.115
0.011145	183.4989	0.018265	357.4306	0.020483	417.2237	0.028115	639.7904	0.03255	779.6476	0.040253	1038.484
0.01095	179.175	0.018048	351.7185	0.02024	410.5561	0.028006	636.4386	0.032424	775.5631	0.040096	1033.044
0.010811	176.1005	0.017807	345.3956	0.01997	403.1755	0.027915	633.6484	0.032319	772.163	0.039966	1028.515
0.010643	172.4266	0.01759	339.7267	0.019726	396.5583	0.027824	630.8609	0.032213	768.7661	0.039836	1023.99
0.010475	168.7699	0.017373	334.0786	0.019483	389.9653	0.027733	628.0762	0.032108	765.3726	0.039705	1019.47
0.010336	165.7359	0.01718	329.0757	0.019266	384.1254	0.02766	625.8503	0.032023	762.6602	0.039601	1015.257
0.010168	162.1112	0.016963	323.4673	0.019022	377.5789	0.027551	622.5148	0.031897	758.5955	0.039445	1010.443
0.01	158.5043	0.016745	317.8803	0.018778	371.0572	0.02746	619.7382	0.031791	755.2119	0.039314	1005.936
0.009831	154.9153	0.016552	312.9321	0.018561	365.2813	0.027369	616.9643	0.031686	751.8317	0.039184	1001.434
0.009607	150.1585	0.016358	308.0011	0.018344	359.5254	0.027278	614.1932	0.03153	748.4548	0.039053	996.9358
0.009354	144.8465	0.016164	303.0875	0.018127	353.7898	0.027168	610.8715	0.031454	744.407	0.038897	991.5441
0.009127	140.1604	0.01597	298.1913	0.01791	348.0745	0.027077	608.1064	0.031348	741.0375	0.038766	987.056
0.008903	135.5066	0.015776	293.3128	0.017692	342.3799	0.026986	605.3441	0.031243	737.6714	0.038636	982.5723
0.008678	130.8917	0.015558	287.8457	0.017447	335.9983	0.026895	602.5846	0.031137	734.3086	0.038505	978.0732
0.00848	126.8811	0.015364	283.0053	0.017229	330.3481	0.026804	599.8279	0.031032	730.9493	0.038374	973.6195
0.008262	122.8922	0.015145	277.5815	0.016984	324.017	0.026712	597.0739	0.030926	727.5933	0.038244	969.1484
0.008112	119.5067	0.014902	271.5823	0.016711	317.0142	0.026621	594.3228	0.03082	724.2407	0.038113	964.6828
0.007942	116.1364	0.014683	266.2078	0.016466	310.7407	0.02653	591.5744	0.030715	720.8916	0.037983	960.2218
0.007743	112.2314	0.014464	260.8572	0.01622	304.495	0.026439	588.8289	0.030609	717.5459	0.037852	955.7654

3 OF 6
SUBREACH 2

0.007572	108.9078	0.01422	254.9403	0.015946	297.5883	0.026347	586.0861	0.030503	714.2036	0.037721	951.3135
0.00743	106.1552	0.014	249.6408	0.0157	291.4022	0.026256	583.3462	0.030398	710.8648	0.03759	946.8662
0.007259	102.8726	0.013781	244.366	0.015454	285.245	0.026146	580.0621	0.030271	706.8627	0.037434	941.5355
0.007117	100.1547	0.013585	239.6982	0.015235	279.7964	0.026037	576.782	0.030144	702.8657	0.037277	936.2114
0.006945	96.91447	0.013365	234.4708	0.014988	273.6945	0.025891	572.415	0.029975	697.544	0.037067	929.123
0.006802	94.23237	0.013145	229.2689	0.014741	267.6224	0.025744	568.0553	0.029805	692.2313	0.036858	922.0465
0.006688	92.09871	0.012949	224.6668	0.014521	262.2504	0.025598	563.703	0.029636	686.9276	0.036649	914.982
0.006545	89.44689	0.012752	220.0853	0.014301	256.9025	0.025433	558.8155	0.029445	680.9716	0.036413	907.0487
0.00643	87.33781	0.012581	216.0936	0.014108	252.243	0.025287	554.4789	0.029276	675.6871	0.036203	900.0097
0.006287	84.71718	0.012384	211.5515	0.013888	246.9411	0.025141	550.1498	0.029106	670.4116	0.035994	892.9829
0.006143	82.11428	0.012188	207.0308	0.013667	241.6642	0.024994	545.8281	0.028937	665.1453	0.035784	885.9681
0.006028	80.04494	0.012015	203.093	0.013474	237.0676	0.024866	542.0529	0.028788	660.5447	0.0356	879.8403
0.005913	77.98733	0.011843	199.1718	0.013281	232.4905	0.024719	537.7454	0.028619	655.2956	0.035391	872.8485
0.005797	75.9416	0.011671	195.2677	0.013088	227.9332	0.024573	533.4454	0.028449	650.0558	0.035181	865.869
0.005682	73.90794	0.011498	191.3806	0.012894	223.3959	0.024426	529.1531	0.028279	644.8252	0.034971	858.9019
0.005595	72.39073	0.01135	188.0626	0.012728	219.5228	0.024298	525.4037	0.028131	640.2561	0.034787	852.8159
0.005509	70.88049	0.011177	184.2078	0.012534	215.0233	0.024169	521.6601	0.027982	635.6941	0.034603	846.7395
0.005393	68.87793	0.011029	180.9178	0.012368	211.1829	0.024004	516.8556	0.027791	629.8394	0.034367	838.941
0.005306	67.38418	0.010856	177.0961	0.012174	206.7218	0.023839	512.0609	0.0276	623.9966	0.03413	831.1584
0.005219	65.8978	0.010707	173.8347	0.012008	202.9149	0.023637	506.2141	0.027366	616.8717	0.033841	821.6682
0.005132	64.41876	0.010559	170.5868	0.011841	199.1236	0.023454	500.9118	0.027153	610.4103	0.033578	813.0616
0.005045	62.94717	0.01041	167.3524	0.011674	195.3481	0.023251	495.0934	0.026919	603.32	0.033289	803.6174
0.004958	61.48312	0.010261	164.1317	0.011507	191.5886	0.023049	489.2901	0.026685	596.2481	0.032999	794.1977
0.00487	60.02671	0.010113	160.9249	0.01134	187.8453	0.022847	483.5019	0.026451	589.1946	0.03271	784.8025
0.004783	58.57804	0.009988	158.2632	0.011201	184.7384	0.022644	477.7289	0.026216	582.1597	0.03242	775.432
0.004725	57.61661	0.009839	155.0822	0.011034	181.0253	0.02246	472.494	0.026003	575.7805	0.032156	766.9349
0.004637	56.18109	0.009715	152.4423	0.010894	177.9438	0.022258	466.7504	0.025769	568.7813	0.031856	757.6121
0.00455	54.7536	0.009565	149.2876	0.010727	174.2614	0.022073	461.5424	0.025555	562.4348	0.031602	749.1586
0.004491	53.80646	0.009441	146.6699	0.010587	171.2058	0.021871	455.8285	0.025321	555.4719	0.031312	739.8841
0.004433	52.86298	0.009316	144.0625	0.010448	168.1621	0.021686	450.6477	0.025107	549.1586	0.031048	731.4748
0.004345	51.4547	0.009167	140.9472	0.01028	164.5257	0.02152	445.9962	0.024915	543.4902	0.03081	723.9245
0.004286	50.52053	0.008992	137.3318	0.010084	160.3055	0.021336	440.8403	0.024701	537.2073	0.030546	715.5558
0.004228	49.59015	0.008792	133.2255	0.009859	155.5122	0.021151	435.6977	0.024487	530.9405	0.030282	707.2085
0.004169	48.6636	0.008592	129.1468	0.009635	150.7513	0.020948	430.0562	0.024252	524.0659	0.029991	698.0515
0.00414	48.20177	0.008391	125.0964	0.00941	146.0233	0.020763	424.9418	0.024038	517.8333	0.029726	689.7498
0.004052	46.82215	0.008216	121.5758	0.009213	141.9137	0.020559	419.3314	0.023802	510.9966	0.029435	680.6434
0.004022	46.36424	0.00804	118.0774	0.009016	137.8301	0.020374	414.2454	0.023588	504.7988	0.02917	672.388
0.003963	45.45142	0.007889	115.0969	0.008847	134.351	0.020189	409.1732	0.023374	498.6178	0.028905	664.1548
0.003905	44.54262	0.007713	111.641	0.008649	130.317	0.020004	404.1147	0.023159	492.4535	0.02864	655.9441
0.003875	44.08974	0.007562	108.6975	0.00848	126.8811	0.019819	399.0702	0.022945	486.3063	0.028374	647.756
0.003816	43.18705	0.00741	105.7714	0.00831	123.4654	0.019633	394.0396	0.02273	480.176	0.028107	639.5906
0.003787	42.73726	0.007259	102.863	0.00814	120.0705	0.019466	389.5242	0.022537	474.6736	0.02787	632.2613
0.003728	41.8408	0.007132	100.4531	0.007998	117.2575	0.019281	384.5205	0.022322	468.5761	0.027604	624.1396
0.003698	41.39415	0.006981	97.57792	0.007828	113.9013	0.019114	380.0295	0.022129	463.1033	0.027365	616.8499
0.003639	40.50402	0.006854	95.19611	0.007686	111.1211	0.018928	375.0531	0.021914	457.0391	0.027097	608.7724
0.003609	40.06057	0.006727	92.82735	0.007544	108.3561	0.018761	370.5868	0.02172	451.5964	0.02686	601.5228
0.00355	39.1769	0.0066	90.47184	0.007402	105.6065	0.018593	366.1322	0.021526	446.1681	0.02662	594.2924
0.003521	38.7367	0.006499	88.59709	0.007288	103.4182	0.018407	361.1967	0.021311	440.1538	0.026354	586.2813
0.003491	38.2976	0.006372	86.2659	0.007145	100.697	0.018221	356.276	0.021096	434.1574	0.026087	578.2942
0.003461	37.8596	0.00627	84.41088	0.007031	98.53164	0.018035	351.3703	0.02088	428.1793	0.025821	570.3313
0.003402	36.98696	0.006142	82.10467	0.006888	95.83964	0.017867	346.9679	0.020686	422.8146	0.025581	563.1856
0.003373	36.55233	0.00604	80.26991	0.006774	93.69795	0.017681	342.0909	0.02047	416.8714	0.025314	555.2693
0.003343	36.11883	0.005938	78.44434	0.006659	91.56699	0.017513	337.7145	0.020276	411.5384	0.025073	548.1658
0.003313	35.68647	0.005836	76.62808	0.006545	89.44689	0.017345	333.3507	0.020081	406.2206	0.024833	541.0826
0.003283	35.25527	0.005734	74.82126	0.00643	87.33781	0.017177	328.9994	0.019887	400.9181	0.024592	534.0197
0.003254	34.82523	0.005657	73.47241	0.006344	85.76332	0.01699	324.1794	0.01967	395.0445	0.024325	526.1561
0.003224	34.39635	0.005555	71.68241	0.006229	83.67387	0.016822	319.8549	0.019476	389.7746	0.024084	519.1767
0.003194	33.96865	0.005478	70.34632	0.006143	82.11428	0.016673	316.0216	0.019302	385.1035	0.02387	512.5547
0.003135	33.1162	0.005401	69.0158	0.006057	80.56119	0.016504	311.7215	0.019108	379.8633	0.023629	505.9749
0.003135	33.1162	0.005324	67.69091	0.00597	79.01466	0.016336	307.4343	0.018913	374.639	0.023388	499.0161
0.003105	32.69267	0.005221	65.93325	0.005855	76.96297	0.016167	303.1603	0.018717	369.4306	0.023146	492.0786
0.003075	32.26975	0.005144	64.62173	0.005769	75.43205	0.016017	299.3723	0.018544	364.8146	0.022932	485.35
0.003045	31.84805	0.005042	63.75062	0.005711	74.41521	0.015867	295.5948	0.01237	360.2113	0.022717	479.7935
0.003015	31.42757	0.005015	62.44887	0.005624	72.8937	0.015698	291.3578	0.018175	355.0481	0.022475	472.9212
0.003015	31.42757	0.004938	61.15307	0.005537	71.38312	0.015548	287.6027	0.018001	350.4724	0.02226	466.2268
0.002986	31.00833	0.004886	60.29254	0.00548	70.37864	0.015398	283.8588	0.017827	345.9099	0.022045	460.7492

4 OF 6

SUBREACH 2

0.002956	30.59033	0.004809	59.00681	0.005393	68.87783	0.015248	280.1255	0.017653	341.3605	0.02183	454.0895
0.002926	30.17359	0.004757	58.15307	0.005335	67.88126	0.015079	275.9387	0.017457	336.2584	0.021558	447.8935
0.002926	30.17359	0.00468	56.87762	0.005248	66.39245	0.014891	271.303	0.017239	330.6094	0.021319	440.3691
0.002896	29.75612	0.004628	56.0308	0.00519	65.40397	0.014721	267.1457	0.017043	325.5434	0.021076	433.6212
0.002866	29.34391	0.004576	55.18678	0.005132	64.41876	0.014533	262.5432	0.016825	319.9348	0.020607	426.1505
0.002836	28.93099	0.004525	54.34561	0.005074	63.43687	0.014344	257.9584	0.016607	314.3477	0.020537	418.7086
0.002836	28.93099	0.004473	53.50729	0.005016	62.45831	0.014175	253.8474	0.016411	309.338	0.020294	412.0357
0.002806	28.51937	0.004421	52.67185	0.004958	61.48312	0.014005	249.751	0.016214	304.3461	0.020051	405.3866
0.002806	28.51937	0.004369	51.83933	0.004899	60.51132	0.013835	245.6693	0.016017	299.3722	0.019807	398.7613
0.002776	28.10905	0.004317	51.00973	0.004841	59.54295	0.013665	241.6025	0.01582	294.4164	0.019564	392.1603
0.002746	27.70004	0.004239	49.77091	0.004754	58.09689	0.013495	237.5507	0.015623	289.4799	0.01932	385.5836
0.002746	27.70004	0.004213	49.35946	0.004725	57.61661	0.013343	233.9619	0.015448	285.1055	0.019104	379.7583
0.002716	27.29236	0.004161	48.53884	0.004666	56.65871	0.013173	229.9389	0.015251	280.2031	0.01886	373.2283
0.002686	26.88602	0.004109	47.72126	0.004608	55.70436	0.013021	226.3758	0.015076	275.8612	0.018643	367.4449
0.002686	26.88602	0.004083	47.31362	0.004579	55.22853	0.01287	222.8251	0.0149	271.5343	0.018426	361.6815
0.002656	26.48103	0.004031	46.50066	0.00452	54.27958	0.012718	219.2868	0.014724	267.2225	0.018208	355.9383
0.002656	26.48103	0.004005	46.09535	0.004491	53.80646	0.012566	215.761	0.014549	262.926	0.017991	350.2154
0.002626	26.0774	0.003953	45.28709	0.004433	52.86298	0.012414	212.2479	0.014373	258.6449	0.017774	344.513
0.002626	26.0774	0.003927	44.88414	0.004403	52.39263	0.012281	209.1844	0.014219	254.9117	0.017583	339.5404
0.002596	25.67513	0.003874	44.08063	0.004345	51.4547	0.01211	205.2601	0.014021	250.1296	0.017338	333.1706
0.002596	25.67513	0.003848	43.68008	0.004316	50.98715	0.011958	201.7856	0.013844	245.8956	0.01712	327.5309
0.002566	25.27425	0.003822	43.28034	0.004286	50.52053	0.011787	197.8925	0.013646	241.1515	0.016875	321.2118
0.002566	25.27425	0.00377	42.48329	0.004228	49.59015	0.011596	193.5866	0.013425	235.9043	0.016602	314.2226
0.002566	25.27425	0.003744	42.08599	0.004198	49.12639	0.011425	189.7292	0.013227	231.2036	0.016356	307.9614
0.002536	24.87477	0.003718	41.68952	0.004169	48.6636	0.011253	185.889	0.013028	226.524	0.016111	301.7281
0.002536	24.87477	0.003691	41.29388	0.00414	48.20177	0.011081	182.0661	0.012829	221.8655	0.015864	295.5231
0.002506	24.4767	0.003665	40.89907	0.00411	47.74092	0.010909	178.2609	0.01263	217.2285	0.015618	289.3466
0.002506	24.4767	0.003613	40.11197	0.004052	46.82215	0.010737	174.4736	0.01243	212.6132	0.015372	283.1991
0.002476	24.08005	0.003613	40.11197	0.004052	46.82215	0.010564	170.7042	0.012231	208.0199	0.015125	277.0808
0.002476	24.08005	0.00356	39.32826	0.003993	45.90733	0.010411	167.369	0.012053	203.9555	0.014905	271.6671
0.002445	23.68483	0.003534	38.93769	0.003963	45.45142	0.010258	164.0483	0.011876	199.909	0.014686	266.2772
0.002445	23.68483	0.003508	38.54797	0.003934	44.99651	0.010104	160.7424	0.011698	195.8804	0.014466	260.9111
0.002445	23.68483	0.003482	38.15913	0.003905	44.54262	0.00997	157.8619	0.011542	192.3703	0.014273	256.2357
0.002415	23.29105	0.003482	38.15913	0.003905	44.54262	0.009816	154.5841	0.011364	188.3759	0.014053	250.9152
0.002415	23.29105	0.003456	37.77115	0.003875	44.08974	0.009681	151.7285	0.011208	184.8961	0.01386	246.2802
0.002415	23.29105	0.003429	37.38405	0.003846	43.63788	0.009546	148.8847	0.011052	181.4307	0.013667	241.6642
0.002385	22.89874	0.003403	36.99783	0.003816	43.18705	0.009412	146.0528	0.010896	177.9797	0.013474	237.0676
0.002385	22.89874	0.003377	36.6125	0.003787	42.73726	0.009277	143.233	0.01074	174.5435	0.013281	232.4905
0.002355	22.50791	0.00335	36.22806	0.003757	42.28851	0.009141	140.4253	0.010583	171.1221	0.013088	227.9332
0.002355	22.50791	0.003324	35.84451	0.003728	41.8408	0.009026	138.0285	0.010449	168.2014	0.012922	224.0429
0.002355	22.50791	0.003298	35.46187	0.003698	41.39415	0.00889	135.2439	0.010293	164.8079	0.012728	219.5228
0.002355	22.50791	0.003298	35.46187	0.003698	41.39415	0.008774	132.867	0.010158	161.9115	0.012562	215.6648
0.002325	22.11856	0.003271	35.08014	0.003669	40.94855	0.008639	130.1058	0.010002	158.5467	0.012368	211.1827
0.002325	22.11856	0.003245	34.69931	0.003639	40.50402	0.008542	128.1413	0.009889	156.1528	0.01223	207.9943
0.002294	21.73072	0.003219	34.31941	0.003609	40.06057	0.008426	125.7927	0.009755	153.2908	0.012063	204.1621
0.002294	21.73072	0.003192	33.94043	0.00358	39.61819	0.008309	123.4537	0.00962	150.4405	0.011897	200.3856
0.002294	21.73072	0.003192	33.94043	0.00358	39.61819	0.008193	121.1245	0.009485	147.6021	0.01173	196.6048
0.002294	21.73072	0.003166	33.56238	0.00355	39.1769	0.008096	119.1909	0.009373	145.2459	0.011591	193.4663
0.002264	21.3444	0.00314	33.18526	0.003521	38.7367	0.007979	116.8798	0.009238	142.4295	0.011424	189.715
0.002264	21.3444	0.00314	33.18526	0.003521	38.7367	0.007863	114.5786	0.009103	139.6253	0.011257	185.9798
0.002234	20.95961	0.003113	32.80909	0.003491	38.2976	0.007765	112.6688	0.00899	137.298	0.011118	182.8798
0.002234	20.95961	0.003113	32.80909	0.003491	38.2976	0.007668	110.766	0.008877	134.9793	0.010978	179.7913
0.002234	20.95961	0.003087	32.43387	0.003461	37.8596	0.00757	108.8704	0.008765	132.6693	0.010839	176.7144
0.002234	20.95961	0.00306	32.0596	0.003432	37.42272	0.007473	106.982	0.008652	130.3681	0.010699	173.6493
0.002203	20.57637	0.003034	31.68628	0.003402	36.98696	0.007375	105.101	0.008539	128.0759	0.010559	170.5961
0.002203	20.57637	0.003034	31.68628	0.003402	36.98696	0.007258	102.8535	0.008403	125.3371	0.010392	166.948
0.002203	20.57637	0.003007	31.31394	0.003373	36.55233	0.007121	100.2451	0.008245	122.1585	0.010195	162.7141
0.002203	20.57637	0.003007	31.31394	0.003373	36.55233	0.006965	97.28219	0.008064	118.5479	0.009972	157.9049
0.002203	20.57637	0.003007	31.31394	0.003373	36.55233	0.006828	94.70536	0.007905	115.4084	0.009775	153.7231
0.002173	20.1947	0.002981	30.94257	0.003343	36.11883	0.006671	91.7803	0.007723	111.8433	0.009551	148.9744
0.002173	20.1947	0.002954	30.57218	0.003313	35.68647	0.006533	89.23715	0.007564	108.7442	0.009334	144.8465
0.002143	19.81461	0.002954	30.57218	0.003313	35.68647	0.006415	87.06993	0.007427	106.1033	0.009185	141.3287
0.002143	19.81461	0.002928	30.20277	0.003283	35.25527	0.006278	84.55546	0.007268	103.0404	0.008989	137.2489
0.002143	19.81461	0.002928	30.20277	0.003283	35.25527	0.00616	82.41506	0.007131	100.4309	0.008819	133.7731
0.002143	19.81461	0.002901	29.83435	0.003254	34.82523	0.006041	80.22585	0.006994	97.8362	0.008649	130.317
0.002112	19.43612	0.002875	29.46694	0.003224	34.39635	0.005903	77.81741	0.006834	94.82817	0.008451	126.3104

5 OF 6

SUBREACH 2

0.00196	17.56828	0.002689	26.92362	0.003015	31.42757	0.005587	72.2401	0.006468	88.03167	0.007998	117.2373
0.001776	15.38359	0.002422	23.38104	0.002716	27.29236	0.00519	65.40019	0.006008	79.69656	0.00743	106.1552
0.001592	13.26533	0.002154	19.95317	0.002415	23.29105	0.004811	59.04498	0.00557	71.95212	0.006888	95.83964
0.001437	11.55496	0.001965	17.62753	0.002203	20.57637	0.004491	53.80717	0.0052	65.56933	0.00643	87.33781
0.001344	10.55444	0.001802	15.68631	0.002021	18.31042	0.00425	49.95071	0.004921	60.86986	0.006035	81.07816
0.00125	9.574401	0.001693	14.42061	0.001899	16.83298	0.004029	46.47225	0.004665	56.63101	0.005749	75.43205
0.001187	8.932985	0.001584	13.17894	0.001776	15.38359	0.003868	43.97778	0.004478	53.59126	0.005537	71.38312
0.001125	8.301562	0.001529	12.5675	0.001715	14.66986	0.003706	41.51411	0.004291	50.58903	0.005306	67.38418
0.001062	7.680551	0.001447	11.66255	0.001622	13.61353	0.003564	39.38446	0.004126	47.99383	0.005103	63.9274
0.00103	7.374093	0.001392	11.06766	0.001561	12.91913	0.003422	37.27988	0.003962	45.4292	0.004899	60.51132
0.000999	7.070415	0.001337	10.47974	0.001499	12.23286	0.0033	35.4965	0.003821	43.25598	0.004725	57.61661
0.000967	6.769585	0.001309	10.18846	0.001468	11.89285	0.003178	33.73265	0.003679	41.10656	0.00455	54.7536
0.000935	6.471671	0.001254	9.611393	0.001406	11.21924	0.003055	31.9889	0.003537	38.98162	0.004374	51.9232
0.000903	6.176749	0.001226	9.32567	0.001375	10.88572	0.002953	30.55155	0.003419	37.23007	0.004228	49.59015
0.000872	5.884897	0.00117	8.760004	0.001312	10.22543	0.00285	29.12895	0.0033	35.49649	0.004081	47.28104
0.00084	5.5962	0.001143	8.480129	0.001281	9.898737	0.002748	27.7215	0.003181	33.78137	0.003934	44.99651
0.000808	5.310748	0.001087	7.926479	0.001219	9.252469	0.002645	26.32961	0.003062	32.08522	0.003787	42.73726
0.000776	5.028638	0.001059	7.652781	0.001187	8.932985	0.002542	24.95376	0.002943	30.40861	0.003639	40.50402
0.000744	4.749972	0.001031	7.381223	0.001156	8.615999	0.002438	23.59442	0.002823	28.75212	0.003491	38.2976
0.000744	4.749972	0.000975	6.844704	0.001093	7.989727	0.002356	22.51919	0.002727	27.44185	0.003373	36.55233
0.000712	4.474863	0.000947	6.579836	0.001062	7.680551	0.002273	21.45516	0.002631	26.14522	0.003254	34.82523
0.000679	4.203432	0.000919	6.317297	0.00103	7.374093	0.00219	20.40263	0.002535	24.86261	0.003135	33.1168
0.000647	3.93581	0.00089	6.05714	0.000999	7.070415	0.002127	19.62097	0.002463	23.91009	0.003045	31.84805
0.000647	3.93581	0.000862	5.799422	0.000967	6.769585	0.002044	18.58938	0.002366	22.65298	0.002926	30.17359
0.000615	3.672139	0.000834	5.544203	0.000935	6.471671	0.001981	17.82383	0.002293	21.7201	0.002836	28.93099
0.000582	3.412576	0.000806	5.291547	0.000903	6.176749	0.001918	17.06547	0.002221	20.79595	0.002746	27.70004
0.000582	3.412576	0.000777	5.041521	0.000872	5.884897	0.001855	16.31446	0.002148	19.88077	0.002656	26.48103
0.00055	3.157293	0.000749	4.794198	0.00084	5.5962	0.001792	15.57099	0.002075	18.97478	0.002566	25.27425
0.00055	3.157293	0.00072	4.549655	0.000808	5.310748	0.001729	14.83526	0.002002	18.07822	0.002476	24.08005
0.000517	2.90648	0.000692	4.307974	0.000776	5.028638	0.001666	14.10748	0.001929	17.19135	0.002385	22.89874
0.000484	2.660351	0.000663	4.069244	0.000744	4.749972	0.001602	13.38789	0.001855	16.31445	0.002294	21.73072
-0.000484	2.660351	0.000663	4.069244	0.000744	4.749972	0.001539	12.67671	0.001782	15.44782	0.002203	20.57637
0.000451	2.419142	0.000634	3.833562	0.000712	4.474863	0.001497	12.2074	0.001733	14.87592	0.002143	19.81461
0.000451	2.419142	0.000606	3.60103	0.000679	4.203432	0.001433	11.51086	0.001659	14.02711	0.002051	18.684
0.000418	2.183123	0.000577	3.371761	0.000647	3.93581	0.001369	10.82348	0.001585	13.18948	0.00196	17.56828
0.000418	2.183123	0.000577	3.371761	0.000647	3.93581	0.001326	10.37048	0.001535	12.63745	0.001899	16.83298
0.000418	2.183123	0.000548	3.145377	0.000615	3.672139	0.001283	9.921796	0.001486	12.09068	0.001833	16.10469
0.000385	1.952601	0.000519	2.923513	0.000582	3.412576	0.001241	9.47754	0.001436	11.54931	0.001776	15.38359
0.000385	1.952601	0.000519	2.923513	0.000582	3.412576	0.001198	9.037825	0.001387	11.01348	0.001715	14.66986
0.000352	1.727931	0.00049	2.704815	0.00055	3.157293	0.001155	8.602774	0.001337	10.48333	0.001653	13.96371
0.000352	1.727931	0.000461	2.489947	0.000517	2.90648	0.001112	8.172517	0.001287	9.959016	0.001592	13.26533
0.000352	1.727931	0.000461	2.489947	0.000517	2.90648	0.00109	7.95923	0.001262	9.699105	0.001561	12.91913
0.000318	1.509529	0.000432	2.279091	0.000484	2.660351	0.001047	7.53643	0.001212	9.183882	0.001499	12.23286
0.000318	1.509529	0.000432	2.279091	0.000484	2.660351	0.001004	7.118794	0.001162	8.674951	0.001437	11.55496
0.000284	1.297888	0.000402	2.07245	0.000451	2.419142	0.000982	6.911963	0.001137	8.422907	0.001406	11.21924
0.000284	1.297888	0.000402	2.07245	0.000451	2.419142	0.000938	6.502389	0.001087	7.923801	0.001344	10.55444
0.000284	1.297888	0.000373	1.870255	0.000418	2.183123	0.000917	6.299693	0.001061	7.676796	0.001312	10.22543
0.000284	1.297888	0.000373	1.870255	0.000418	2.183123	0.000873	5.898606	0.001011	7.188032	0.00125	9.574401
0.000251	1.093607	0.000343	1.67277	0.000385	1.952601	0.000851	5.70027	0.000986	6.94634	0.001219	9.252469
0.000251	1.093607	0.000343	1.67277	0.000385	1.952601	0.000807	5.308153	0.000935	6.468507	0.001156	8.615999
0.000251	1.093607	0.000343	1.67277	0.000385	1.952601	0.000786	5.114434	0.000909	6.232442	0.001125	8.301562
0.000216	0.89743	0.000314	1.480298	0.000352	1.727931	0.000764	4.922319	0.000884	5.99833	0.001093	7.989727
0.000216	0.89743	0.000314	1.480298	0.000352	1.727931	0.000742	4.731841	0.000859	5.766214	0.001062	7.680551
0.000216	0.89743	0.000284	1.293196	0.000318	1.509529	0.00072	4.543038	0.000833	5.536139	0.00103	7.374093
0.000216	0.89743	0.000284	1.293196	0.000318	1.509529	0.000675	4.170612	0.000782	5.082302	0.000967	6.769585
0.000216	0.89743	0.000284	1.293196	0.000318	1.509529	0.000653	3.987074	0.000756	4.858641	0.000935	6.471671
0.000182	0.710312	0.000254	1.111885	0.000284	1.297888	0.000631	3.805378	0.000731	4.637227	0.000903	6.176749
0.000182	0.710312	0.000254	1.111885	0.000284	1.297888	0.000609	3.625573	0.000705	4.418118	0.000872	5.884897
	(2-YR)		(5-YR)		(10-YR)		(25-YR)		(50-YR)		(100-YR)
	72527		118196		137968		215187		262227		349284

SUBREACH 2
TOTAL Qs (cu ft)

(a) BASED ON THE LA CUEVA ARROYO UNIT SEDIMENT TRANSPORT EQUATION MODIFIED (RTI, 1992) COEF. & EXPONETS

Qs=a*(Y^b)*(V^c)

6 of 6

SUBREACH 2

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.000744	4.749972	0.000631	7.381225	0.001156	8.615999	0.002438	23.57442	0.002823	28.75212	0.003491	32.2976	
0.000744	4.749972	0.000573	6.844704	0.001073	7.969727	0.002356	22.51919	0.002727	27.44185	0.003373	36.55233	
0.000712	4.474863	0.000547	6.577536	0.001062	7.680551	0.002273	21.45516	0.002631	26.14522	0.003254	34.82523	
0.000679	4.203432	0.000519	6.317297	0.00103	7.374093	0.00219	20.40263	0.002535	24.86261	0.003135	33.1166	
0.000647	3.93581	0.00049	6.05714	0.000999	7.070415	0.002127	19.42057	0.002463	23.91009	0.003045	31.84305	
0.000647	3.93581	0.000462	5.799422	0.000967	6.769585	0.002044	18.58939	0.002366	22.65298	0.002926	30.17359	
0.000615	3.672139	0.000434	5.544202	0.000935	6.471671	0.001981	17.82333	0.002293	21.7201	0.002836	28.93099	
0.000582	3.412576	0.000406	5.291247	0.000903	6.176749	0.001918	17.06547	0.002221	20.79595	0.002746	27.70004	
0.000582	3.412576	0.000377	5.041521	0.000872	5.884897	0.001855	16.31446	0.002148	19.88077	0.002656	26.48103	
0.00055	3.157293	0.000749	4.794198	0.00084	5.5962	0.001792	15.57099	0.002075	18.97478	0.002566	25.27425	
0.00055	3.157293	0.00072	4.549655	0.000808	5.310748	0.001729	14.83526	0.002002	18.07822	0.002476	24.08005	
0.000517	2.90648	0.000692	4.307974	0.000776	5.028632	0.001666	14.10748	0.001929	17.19135	0.002385	22.89874	
0.000484	2.660351	0.000663	4.069244	0.000744	4.749972	0.001602	13.38788	0.001855	16.31445	0.002294	21.73072	
0.000484	2.660351	0.000663	4.069244	0.000744	4.749972	0.001539	12.67671	0.001782	15.44782	0.002203	20.57637	
0.000451	2.419142	0.000634	3.833562	0.000712	4.474863	0.001497	12.2074	0.001733	14.87592	0.002143	19.81461	
0.000451	2.419142	0.000606	3.60103	0.000679	4.203432	0.001433	11.51026	0.001659	14.02711	0.002051	18.684	
0.000418	2.183123	0.000577	3.371761	0.000647	3.93581	0.001369	10.82348	0.001585	13.18948	0.00196	17.56828	
0.000418	2.183123	0.000577	3.371761	0.000647	3.93581	0.001326	10.37048	0.001535	12.63745	0.001899	16.83298	
0.000418	2.183123	0.000548	3.145877	0.000615	3.672139	0.001283	9.921796	0.001486	12.09068	0.001838	16.10469	
0.000385	1.952601	0.000519	2.923513	0.000582	3.412576	0.001241	9.47754	0.001436	11.54931	0.001776	15.38359	
0.000385	1.952601	0.000519	2.923513	0.000582	3.412576	0.001198	9.037825	0.001387	11.01348	0.001715	14.66986	
0.000352	1.727931	0.00049	2.704815	0.00055	3.157293	0.001155	8.602774	0.001337	10.48333	0.001653	13.96371	
0.000352	1.727931	0.000461	2.489947	0.000517	2.90648	0.001112	8.172517	0.001287	9.959016	0.001592	13.26533	
0.000352	1.727931	0.000461	2.489947	0.000517	2.90648	0.00109	7.95923	0.001262	9.699105	0.001561	12.91913	
0.000318	1.509529	0.000432	2.279091	0.000484	2.660351	0.001047	7.53643	0.001212	9.183882	0.001499	12.23286	
0.000318	1.509529	0.000432	2.279091	0.000484	2.660351	0.001004	7.118794	0.001162	8.674951	0.001437	11.55496	
0.000284	1.297888	0.000402	2.07245	0.000451	2.419142	0.000982	6.911963	0.001137	8.422907	0.001406	11.21924	
0.000284	1.297888	0.000402	2.07245	0.000451	2.419142	0.000938	6.502389	0.001087	7.923801	0.001344	10.55444	
0.000284	1.297888	0.000373	1.870255	0.000418	2.183123	0.000917	6.299693	0.001061	7.676796	0.001312	10.22543	
0.000284	1.297888	0.000373	1.870255	0.000418	2.183123	0.000873	5.898606	0.001011	7.188032	0.00125	9.574401	
0.000251	1.093607	0.000343	1.67277	0.000385	1.952601	0.000851	5.70027	0.000986	6.94634	0.001219	9.252469	
0.000251	1.093607	0.000343	1.67277	0.000385	1.952601	0.000807	5.308153	0.000935	6.468507	0.001156	8.615999	
0.000251	1.093607	0.000343	1.67277	0.000385	1.952601	0.000786	5.114434	0.000909	6.232442	0.001125	8.301562	
0.000216	0.89743	0.000314	1.480298	0.000352	1.727931	0.000764	4.922319	0.000884	5.99833	0.001093	7.989727	
0.000216	0.89743	0.000314	1.480298	0.000352	1.727931	0.000742	4.731841	0.000859	5.766214	0.001062	7.680551	
0.000216	0.89743	0.000284	1.293196	0.000318	1.509529	0.00072	4.543038	0.000833	5.536139	0.00103	7.374093	
0.000216	0.89743	0.000284	1.293196	0.000318	1.509529	0.000675	4.170612	0.000782	5.082302	0.000967	6.769585	
0.000216	0.89743	0.000284	1.293196	0.000318	1.509529	0.000653	3.987074	0.000756	4.858641	0.000935	6.471671	
0.000182	0.710312	0.000254	1.111885	0.000284	1.297888	0.000631	3.805378	0.000731	4.637227	0.000903	6.176749	
0.000182	0.710312	0.000254	1.111885	0.000284	1.297888	0.000609	3.625573	0.000705	4.418118	0.000872	5.884897	
	(2-YR)		(5-YR)		(10-YR)		(25-YR)		(50-YR)		(100-YR)	
	72527		118196		137968		215187		262227		349284	

SUBREACH 2
TOTAL Qs (cu ft)

(a) BASED ON THE LA CUEVA ARROYO UNIT SEDIMENT TRANSPORT EQUATION MODIFIED (RTI. 1992) COEF. & EXPONETS [redacted] OF THE 6 RETURN PERIODS Qs = FOR THE NORTH DONINGO BACA ARROYO

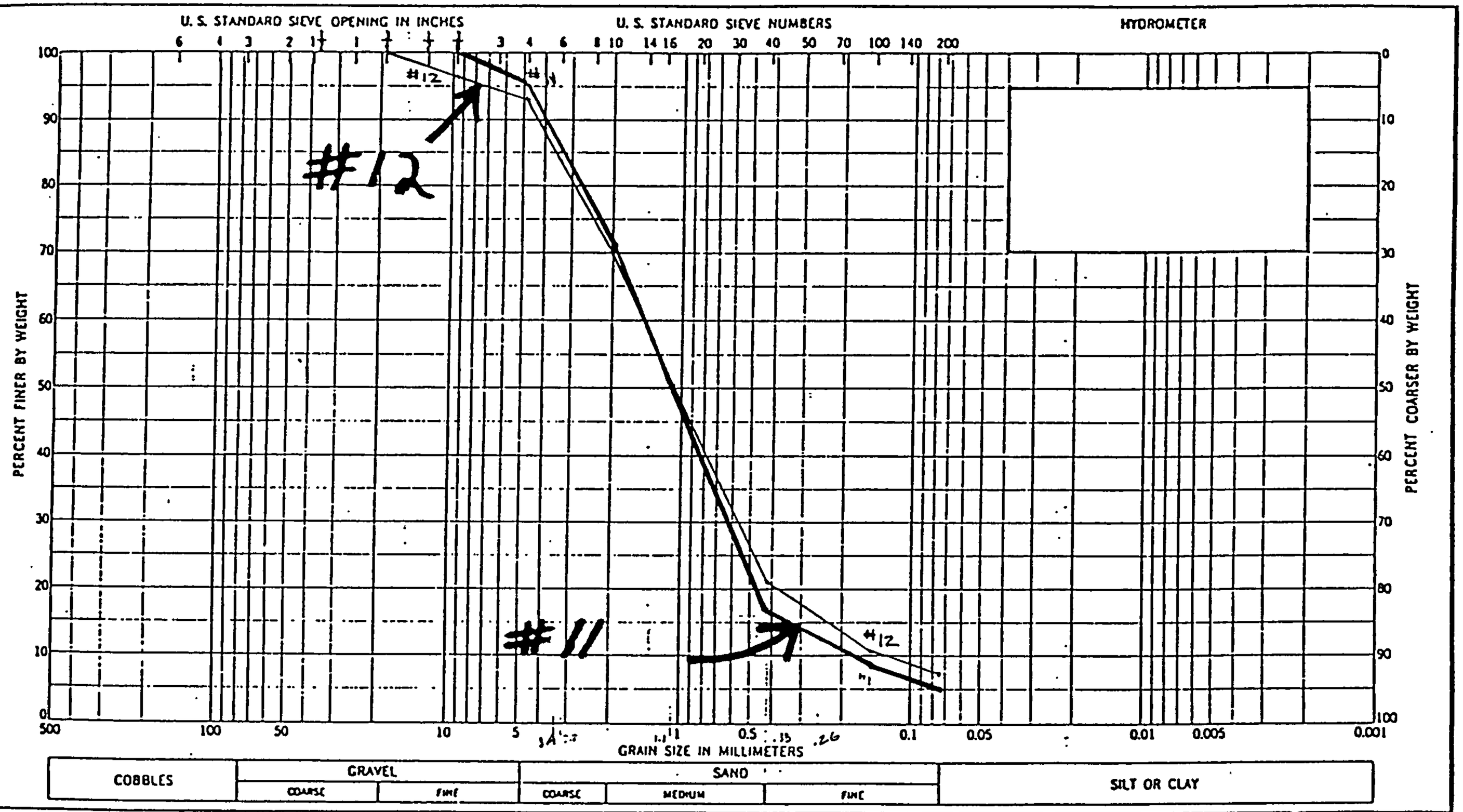
qs=a*(Y^b)*(V^c)

SPREADSHEET FORMULAS : FOR SUBREACH 2

	a	Y	^b	V	^c
qs =	((6.5*10^-5)*((0.053271*D329^0.411603)^-0.1)*((1.429955*D329^0.254189)^3.9))				

(MODIFIED a, b & c - LA CUEVA EQUATION , RTI, DECEMBER, 1992)
USED THIS EQ

Qs = (V331*360*(13.652171*C331^0.332345))



Sample No	Elev or Depth	Classification	Nat w %	LL	PL	PI
#11						
#12						

GRADATION CURVES

NORTH DOMINGO BACA ARROYO.
SERGENT, HAUSKINS & BECKWITH
JOB NO. CDI-5190
LAB NO. 3653

ENG FORM 1 MAY 63 2087

Resource Technology, Inc.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2120 OSUNA NE – SUITE 200 ALBUQUERQUE NEW MEXICO 87113

DRAFT

SEDIMENT AND EROSION DESIGN GUIDE

Prepared for

Albuquerque Metropolitan Arroyo
Flood Control Authority
(AMAFCA)

by

Resource Consultants, Inc.
P.O. Box Q
Fort Collins, Colorado 80522

Ref: 90-560

March, 1992

CONSTANTS AND CONVERSIONS

Unit Weight of Water (γ_w) = 62.4 lbs/ft^3

Density of Water (ρ_w) = 1.94 slugs/ft^3

Specific Gravity of Sediment ≈ 2.65 (Quartz)

Sediment Porosity (in-situ) (η) ≈ 0.4

Solid Unit Weight of Sediment (γ_s) = $S_G\gamma_s$ = $62.4S_G$ lbs/ft^3
≈ 165.4 lb/ft^3 (Quartz)

Bulked Unit Weight of Sediment (dry) = $(1-\eta)\gamma_s$
≈ 100 lb/ft^3 (η = 0.4)

Sediment Yield: 1 ac-ft/mi^2 (bulked) ≈ 3.4 tons/ac (η = 0.4)

Sediment Transport:

1 cfs = $43.2\gamma_s$ tons/day

Concentration by volume (C_V) = $10^{-6}V_S/V_W$

Concentration by weight (c_W) = $10^{-6}W_S/W_W$ (ppm) = S_gC_V (ppm)

$$C_V = \frac{C_W}{S_G - C_W(S_G - 1)}$$

Bulking Factor (BF) = V_t/V_W = $1/(1-C_V)$

The National Flood Insurance Program establishes the 100-year flood as t minimum level of risk that is acceptable when considering potential impacts due to floodir With reference to Figure 1.1, the use of the 100-year event as the level of acceptable ri implies an approximately 74% chance that the event will not occur in a 30-year peric Conversely, this implies a risk of about 26% that the event will occur within a 30-ye period.

While damages due to flooding are generally associated with a single, short-te event, the impacts of erosion can also be cumulative over the long term. Consequently, c must assess the erosion potential not only of a single event, such as a 100-year flood, l also the cumulative impact of a series of smaller flows. One approach to evaluating lo: term erosion impacts is to develop a representative annual storm and ex-apolate the eff of that storm through time. This concept is similar to the geomorpnic concept of dominant or channel forming discharge. For adjusted perennial streams the domin discharge is commonly assumed to be approximately the mean annual flood (Wolman a Miller, 1960). The dominant discharge for ephemeral streams such as those in Albuquerque area can be substantially larger. For purposes of analyzing the long-te erosion potential, the representative annual event can be more accurately defined considering individual storm events independently and weighting the effect of each ba on their probability of occurrence. This is accomplished by integrating the flow durat curve over discrete intervals resulting in the following equation;

$$Y_m = .015Y_{100} + .015Y_{50} + .04Y_{25} + .08_{10} + .2Y_5 + .4Y_2 \quad (1.$$

where Y_m is the magnitude of the average annual event (i.e. runoff volume, sediment yie and Y_i is the magnitude of the event for the 2-, 5-, 10-, 25-, 50- and 100-year return per flood. (This relationship is discussed in more detail in Chapter 4.0) The representat annual event, thus defined, is then used as the basis for estimating the long-term eros potential.

1.2.2 Arroyo Processes - A General Statement of the Problem. Arroyos (or gulli are ephemeral flow stream channels characterized by steeply sloping or vertical banks fine sedimentary material and flat, generally sandy beds (Fairbridge, 1968). The Ameri Geological Institute Glossary (1972) defines an arroyo as "a term applied in the arid a semiarid regions of southwestern U.S. to the deep, flat-floored channel or gully of ephemeral stream or of an intermittent stream usually with vertical or steeply cut bank unconsolidated material at least 60 centimeters high, that is usually dry, but may transformed into a temporary water course of short lived torrent after heavy rains." T definition contains most of the elements of the arroyo problem in the southwest;

1. Arroyos occur at many different scales and range in size from small, gully-l features to major channels such as the Rio Puerco (Schumm et al., 1984)

Table 3.5. Range of conditions for which Equation 3.27 is applicable.

Parameter	Range
Velocity	3-30 (feet/sec)
Manning's n	0.018-0.035
Bed Slope	0.001-0.040
Unit Discharge	10-200 (cfs/foot)
Particle Size	0.05 mm ≤ d_{50} ≤ 10 mm
Depth	1-20 feet
Gradation Coefficient	2-5

Colby's Approach

Colby (1964) developed the graphical procedure shown in Figures 3.7 and 3.8 for determining bed-material discharge (tons/day of dry sediment) in sand-bed channels. In developing his computational curves, Colby was guided by Einstein's bed-load function (Einstein, 1950) and an immense amount of data from streams and flumes (Simons and Richardson, 1966). However, it should be understood that all curves for the 100-foot depth, most curves of the 10-foot depth, and some of the curves of 1.0-foot and 0.1-foot depths (Figure 3.7) are not based entirely on data but are developed from limited data and theory.

In utilizing Figures 3.7 and 3.8 to compute the bed-material discharge, the following procedure is used:

1. Estimate the mean velocity (V), depth (Y_b), median size bed material (D_{50}), water temperature, and fine-sediment concentration;

2. The uncorrected sediment discharge (q_{si}) for the given V, Y_b and D_{50} are found from Figure 3.7 for the two depths that bracket the desired depth. A logarithmic scale of depth versus q_{si} is used to interpolate in order to determine the bed-material discharge per unit width.

3. Two correction factors, k_1 and k_2, shown in Figures 3.8a and 3.8b, respectively, account for the effect of water temperature and fine suspended sediment on the bed-material discharge. If the bed-material size falls outside the 0.2- to 0.3-mm range, factor k_3 from Figure 3.8 is applied to correct for the effect of sediment size. The sediment discharge (q_s), corrected for the effect of water temperature, presence of fine suspended sediment, and sediment size is then given by

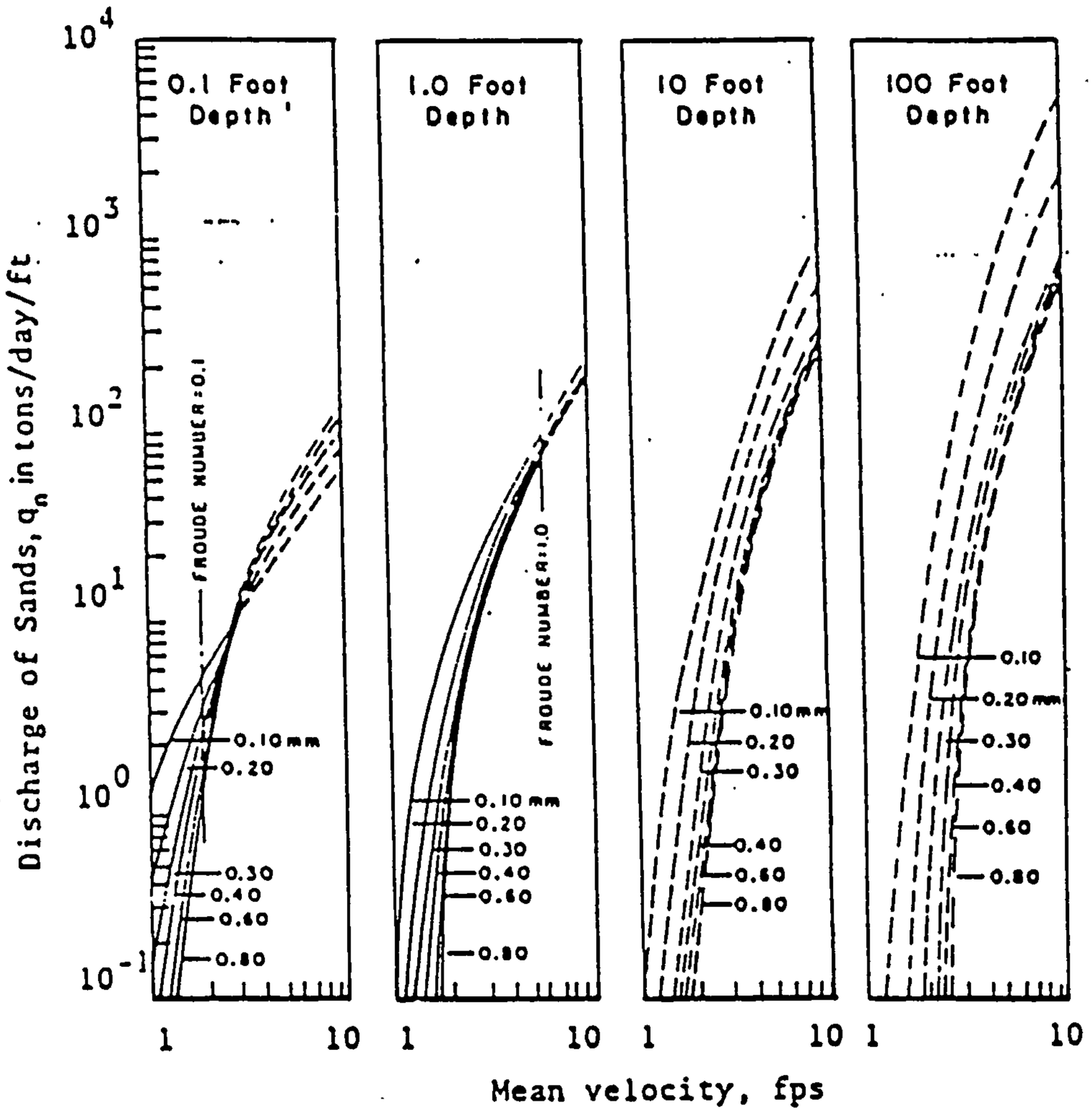


Figure 3.7. Colby's curves for discharge of source vs. mean velocity for various increments of flow depth (Colby, 1964).

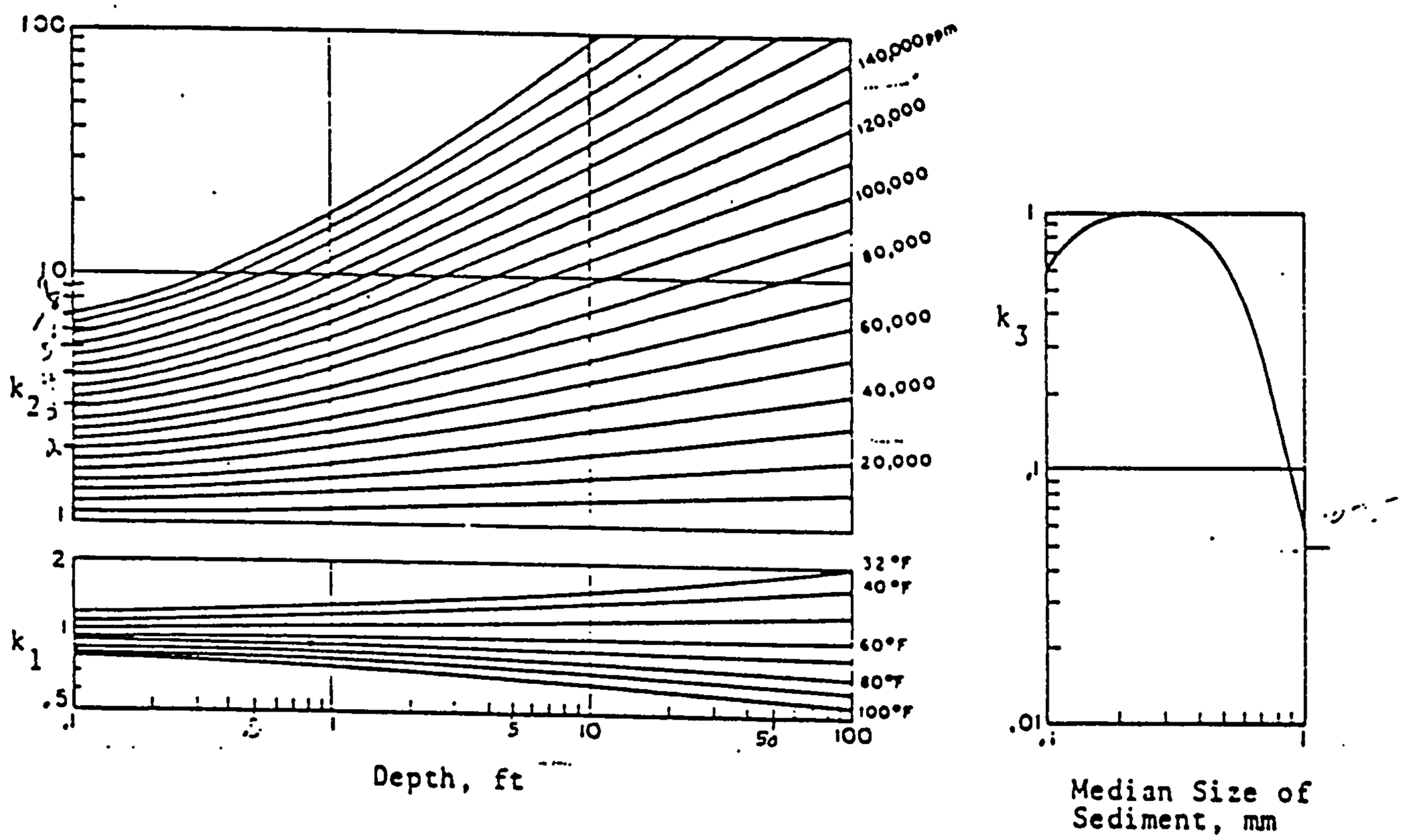


Figure 3.8. Colby's corrections factors (Colby, 1964).

$$q_s = [1 + (k_1 k_2 - 1) k_3] q_{s_t} \quad (3.28)$$

The fine sediment concentration refers to the concentration by weight of fine suspended sediment (washload) in the water/sediment mixture and can be derived from the watershed sediment yield analysis. As shown in Figure 3.8, k_1 = 1 when the temperature is 60. F, k_2 = 1 when the concentration of fine sediment is negligible, and k_3 = ~~100~~ 1.0 when D_{50} lies between 0.2 mm and 0.3 mm.

Effect of Suspended Sediment Concentration

Leopold and Miller, 1956 observed suspended sediment concentrations in arroyos in north central New Mexico approaching 200,000 ppm by weight (9% by volume). Nordin, 1963 reported concentrations in the Rio Puerco, Paria and Little Colorado Rivers as high as 650,000 ppm by weight (41% by volume), with sand concentrations up to nearly 450,000 ppm by weight (24% by volume). Others (Beverage and Culbertson, 1964 and Lane, 1940) have reported similar observations. Based on the watershed sediment yield discussions in Chapter 2.0, similar concentrations may occur in the arroyos in the Albuquerque area during large storm events.

The presence of high concentrations of fine suspended sediment enhances the capacity of the stream to transport coarser sediments (Vanoni, 1977). As a result, the bed material loads computed from the relationships discussed in the previous section should be adjusted accordingly. The following procedure is recommended:

1. Compute the bed material load (q_{si}) using an appropriate relationship:

2. Estimate the fine sediment concentration based on the watershed sediment yield relationships discussed in Chapter 2.0, or from field data;

3. Use Figure 3.8 and Equation 3.28 from Colby's procedure to correct the clear water estimate of bed material load for the presence of high suspended sediment concentrations.

The adjusted estimate will represent the bed material channel adjustment transport capacity in the presence of the high concentration of fine suspended sediment.

3.4 Evaluation of Channel Adjustments

3.4.1 Sediment Continuity. Vertical adjustment of stream channels results from removal of sediment from the surface of the channel bed (degradation or scour) or deposition of sediment on the channel bed (aggradation). Within a given reach of channel, the magnitude of vertical adjustment is a function of the difference between the amount of sediment that is carried into the reach by the flow (supply) and the amount that is carried

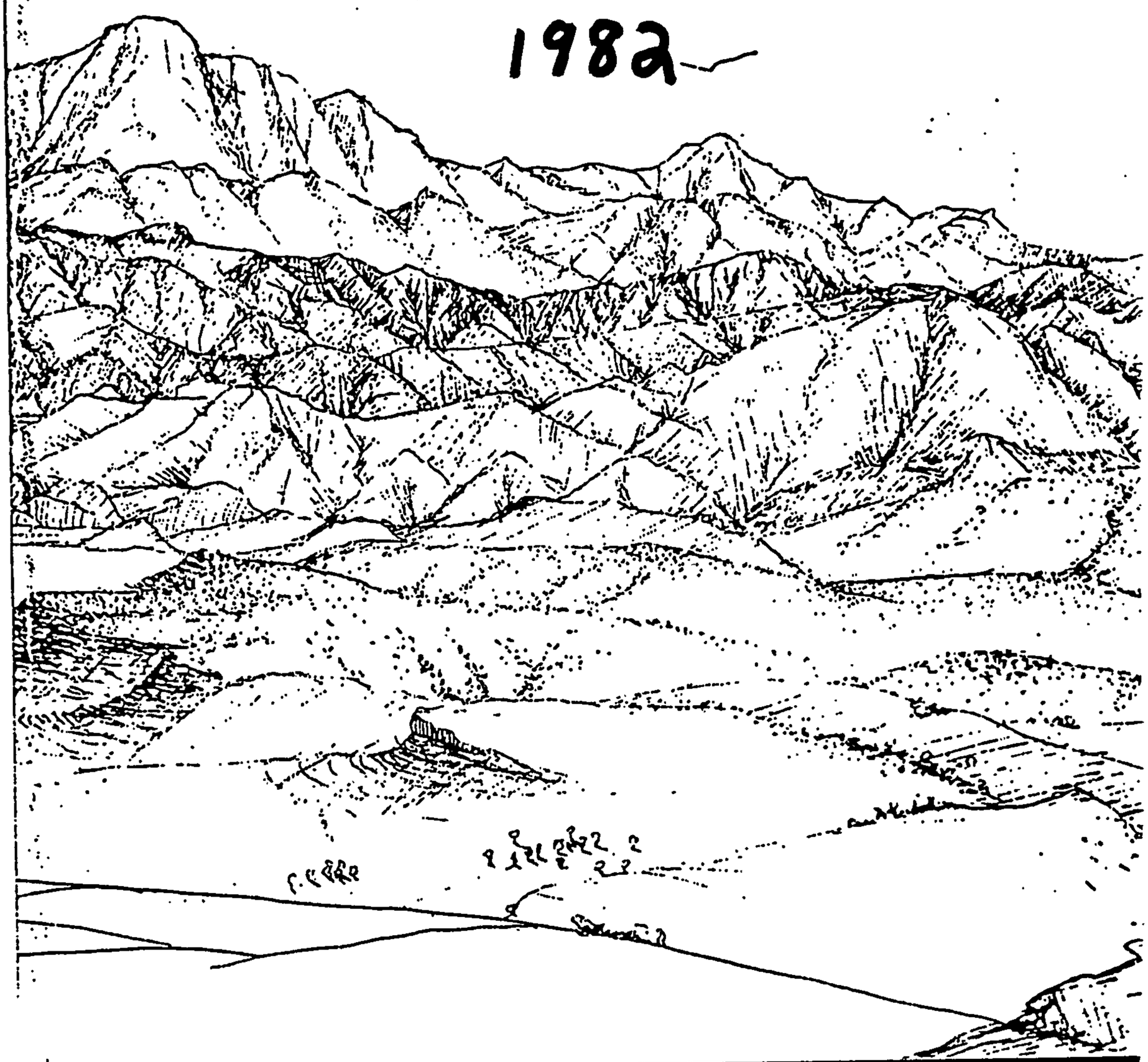
401.7
ENGINEERING ANALYSIS OF FLUVIAL S
SIMONS, LI & ASSOC
1982
0

ENGINEERING ANALYSIS OF FLUVIAL SYSTEMS

by

SIMONS, LI & ASSOCIATES

1982



factor k_3 from Figure 7.10c is applied to correct for sediment size effect. True sediment discharge q_T corrected for water temperature effect, presence of fine suspended sediment, and sediment size is given by

$$q_T = [1 + (k_1 k_2 - 1)\ 0.01\ k_3]\ q_{Ti} \qquad (7.38)$$

As Figure 7.10 shows, $k_1 = 1$ when the temperature is 60° F, $k_2 = 1$ when the concentration of fine sediment is negligible, and $k_3 = 1$ when D_{50} lies between 0.2 mm and 0.3 mm.

In spite of many inaccuracies in the available data and uncertainties in the graphs, Colby found

"...about 75 percent of the sand discharges that were used to define the relationships were less than twice or more than half of the discharges that were computed from the graphs of average relationship. The agreement of computed and observed discharges of sands for sediment stations whose records were not used to define the graphs seemed to be about as good as that for stations whose records were used."

Power Relationships

The following paragraphs describe an accurate and efficient method of evaluating sediment discharge. The method is based on easy-to-apply power relationships that estimate the sediment transport rate based on the velocity and depth of flow. The power relationships were developed from computer-generated data obtained from solution of the Meyer-Peter, Muller bed-load transport equation and Einstein's integration of the suspended bed-material discharge. A publication by Simons, Li and Fullerton (1981) details the development procedure.

The results of the sediment transport equation determination are presented in Table 7.3. These results show the high level of dependence that sediment transport rates have with respect to velocity. The dependence on depth is less important. Note that some sizes have a proportional dependence and others are inversely proportional. Some exhibited almost no dependence. The smaller sizes have the proportional dependence since the smaller material is more easily

Table 7.3. Results of Regression Analysis.

$$q_s = a_1 Y^{a_2} V^{a_3}$$

	d_{50}=0.1 mm	d_{50}=0.25 mm	d_{50}=0.5 mm	d_{50}=1.0 mm	d_{50}=2.0 mm	d_{50}=3.0 mm	d_{50}=4.0 mm	d_{50}=5.0 mm
G = 1.0								
a_1	3.30×10^{-5}	1.42×10^{-5}	7.6×10^{-6}	5.62×10^{-6}	5.64×10^{-6}	6.32×10^{-6}	7.10×10^{-6}	7.78×10
a_2	0.715	0.495	0.28	0.06	-0.14	-0.24	-0.30	-0.34
a_3	3.3	3.61	3.82	3.93	3.95	3.92	3.89	3.87
G = 2.0								
a_1		1.59×10^{-5}	9.8×10^{-6}	6.94×10^{-6}	6.32×10^{-6}	6.62×10^{-6}	6.94×10^{-6}	
a_2		0.51	0.33	0.12	-0.09	-0.196	-0.27	
a_3		3.55	3.73	3.86	3.91	3.91	3.9	
G = 3.0								
a_1			1.21×10^{-5}	9.14×10^{-6}	7.44×10^{-6}			
a_2			0.36	0.18	-0.02			
a_3			3.66	3.76	3.86			
G = 4.0								
a_1				1.05×10^{-5}				
a_2				0.21				
a_3				3.71				

q_s = sediment transport rate in ft^3/sec (unbulked) Y = velocity in ft/sec
Y = depth in feet G = gradation coefficient

SIMONS, LI

suspended and the resulting sediment concentration profiles are more uniform. Thus, the larger the depth, the more sediment which will be suspended for a given velocity. For the larger sizes of sediment, the sediment is more difficult to suspend and keep in suspension. As the depth increases for a given velocity, the intensity of the turbulent transfer properties decreases for these sizes. The increase in area available for suspended sediment with the increased depth does not totally counterbalance the reduced turbulent transfer characteristics. The result is an inverse dependence of transport rate on depth for these larger sizes. The sizes with almost no dependence on depth in their transport rate fall between these two extremes.

When applying the equations given in Table 7.3, care should be taken so that the range of parameters being used is not out of the range used to develop the equations. Table 7.4 lists the range of parameters used in the equation development. When using the equations to determine sediment transport rates, the conditions should be checked against Table 7.4. If conditions are within the ranges outlined in Table 7.4, the regression equations should provide results within ten percent of the theoretically computed values.

Table 7.4. Range of Parameters Examined.

Parameter	Value Range
Froude No.	1-4
Velocity	6.5-26 (ft/sec)
Manning's n	0.015 - 0.025
Bed Slope	0.005 - 0.040
Unit Discharge	10-200 (cfs/ft)
Particle Size	$d_5 \geq 0.062$ mm $d_{90} \leq 15$ mm

There are several other checks that should be made in order to insure the equations are applicable to a given problem. The equations are based on the

assumption that all the sediment sizes present can be moved by the flow. If this is not true, armoring will take place. The equations are not applicable when armoring occurs. This can be determined using Shields' critical shear stress criteria (see Section 7.4). The bed shear stress is given by

$$\tau_o = \gamma RS \tag{7.39}$$

in which γ is the unit weight of water, R is the hydraulic radius and S is the bed slope. The diameter of the largest particles moving is then

$$D = \tau_o/[(\gamma_s - \gamma)\ 0.047] \tag{7.40}$$

in which D is the diameter of the sediment, γ_s is the unit weight of sediment and 0.047 is the recommended value of Shields' parameter. (All units are in feet, pounds and seconds.) If no sediment of the computed size or larger is present in significant quantities, the equations are applicable.

The equations were developed for sand-bed channels. Therefore, they do not apply to conditions when the bed material has cohesion. The equations would overpredict transport rates in a cohesive channel.

7.5.3.4 Calculation of Sediment Discharge from Stream Measurements

Normal measurements made on many streams include discharge measurements as well as suspended-load measurements. Discharge measurements consist of determining depth and mean velocity at selected verticals from which the total discharge Q and the cross-sectional area A for the channel cross section may be calculated. Suspended-load samples give the mean measured sediment concentration C_s' at each or at least several of the verticals in which mean velocity is measured. Concentration C_s' includes sediment of all grain sizes, wash load, and bed-material load and is defined by

SIMONS, LI
1982

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

2600
PROSPECT
AVE.
N.E.

P. O. BOX 25851
ALBUQUERQUE, N. M. 8712

DESIGN GUIDELINES & CRITERIA

CHANNELS & HYDRAULIC STRUCTURES ON SANDY SOIL

SIMONS, LI
& ASSOCIATES

JUNE, 1981

DESIGN OF CHANNELS AND HYDRAULIC STRUCTURES

ON SANDY SOILS

A Short Course
Sponsored By

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

Taught By

SIMONS, LI and ASSOCIATES, INC.

Daryl B. Simons, PhD, Head Lecturer

TIME: December 2 and 3, 1981
8:30 A.M. - 5:00 P.M.

PLACE: Albuquerque Convention Center
Acoma-Zuni-Tesuque Rooms

COST: $50.00 each, to partially defray costs of the course

ABOUT THE COURSE: See description and content on reverse side

REGISTRATION: Limited to first come, first served. Make your reservations early by completing the lower portion of this announcement and returning it with your payment to:

AMAFCA
P.O. Box 25851
Albuquerque, N.M. 87125
Telephone, 884-2215 (Larry Blair)

A text will be given to each participant. In order to order sufficient texts, please respond no later than November 20, 1981. Bring your own calculator.

Table 5c. Results of Regression Analysis,

($S = 0.01\text{-}0.04$, $q_s = a_1 Y^{a_2} V^{a_3}$)

d_{50} =	0.1mm	0.25 mm	0.5 mm	1.0 mm	2.0 mm	3.0 mm	4.0 mm	5.0 mm
				G = 1.0				
a_1	9.48×10^{-4}	1.49×10^{-4}	3.32×10^{-5}	1.16×10^{-5}	7.15×10^{-6}	7.24×10^{-6}	8.05×10^{-6}	8.99×10^{-6}
a_2	0.557	0.305	0.0530	-0.198	-0.427	-0.532	-0.587	-0.615
a_3	3.22	-3.76	4.17	4.42	4.45	4.37	4.27	4.18
				G = 2.0				
a_1		2.53×10^{-4}	7.62×10^{-5}	2.32×10^{-5}	1.05×10^{-5}	8.39×10^{-6}	7.77×10^{-6}	
a_2		0.383	0.199	-0.0318	-0.264	-0.385	-0.459	
a_3		-3.56	3.88	4.18	4.33	4.34	4.31	
				G = 3.0				
a_1			1.48×10^{-4}	6.04×10^{-5}	2.16×10^{-5}			
a_2			0.310	0.161	-0.0502			
a_3			3.65	3.86	4.10			
				G = 4.0				
a_1				1.06×10^{-4}				
a_2				0.264				
a_3				3.67				

AHS 37/12/78

Cliff Anderson

PREDICTING RAINFALL EROSION LOSSES

A GUIDE TO CONSERVATION PLANNING

NOTE: THIS DOCUMENT CONTAINS USLE EQUATION AND FACTORS

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURE HANDBOOK NUMBER 537

PREPARED BY SCIENCE AND EDUCATION ADMINISTRATION

PREDICTING RAINFALL EROSION LOSSES

A GUIDE TO CONSERVATION PLANNING

Supersedes Agriculture Handbook No. 282,
"Predicting Rainfall-Erosion Losses From Cropland East of the Rocky Mountains"

Science and Education Administration
United States Department of Agriculture
in cooperation with
Purdue Agricultural Experiment Station

USDA policy does not permit discrimination because of age, race, color, national origin, sex, or religion. Any person who believes he or she has been discriminated against in any USDA-related activity should write immediately to the Secretary of Agriculture, Washington, D.C. 20250.

December 1978

tion and developmental areas can be obtained from table 5 if good judgment is exercised in comparing the surface conditions with those of agricultural conditions specified in lines of the table. Time intervals analogous to cropstage periods will be defined to begin and end with successive construction or management activities that appreciably change the surface conditions. The procedure is then similar to that described for cropland.

Establishing vegetation on the denuded areas as quickly as possible is highly important. A good sod has a C value of 0.01 or less (table 5-B), but such a low C value can be obtained quickly only by laying sod on the area, at a substantial cost. When grass or small grain is started from seed, the probable soil loss for the period while cover is developing can be computed by the procedure outlined for estimating cropstage-period soil losses. If the seeding is on topsoil, without a mulch, the soil loss ratios given in line 141 of table 5 are appropriate for cropstage C values. If the seeding is on a desurfaced area, where residual effects of prior vegetation are no longer significant, the ratios for periods SB, 1 and 2 are 1.0, 0.75 and 0.50, respectively, and line 141 applies for cropstage 3. When the seedbed is protected by a mulch, the pertinent mulch factor from the upper curve of figure 6 or table 9 is applicable until good canopy cover is attained. The combined effects of vegetative mulch and low-growing canopy are given in figure 7. When grass is established in small grain, it can usually be evaluated as established meadow about 2 mo after the grain is cut.

C Values for Pasture, Range, and Idle Land

Factor C for a specific combination of cover conditions on these types of land may be obtained from table 10 (*57*). The cover characteristics that must be appraised before consulting this table are defined in the table and its footnotes. Cropstage periods and EI monthly distribution data are generally not necessary where perennial vegetation has become established and there is no mechanical disturbance of the soil.

Available soil loss data from undisturbed land were not sufficient to derive table 10 by direct comparison of measured soil loss rates, as was done for development of table 5. However, analyses of the assembled erosion data showed that the research information on values of C can be extended to completely different situations by combining subfactors that evaluate three separate and distinct, but interrelated, zones of influence: (a) vegetative cover in direct contact with the soil surface, (b) canopy cover, and (c) residual and tillage effects.

Subfactors for various percentages of surface cover by mulch are given by the upper curve of

TABLE 10.—*Factor C for permanent pasture, range, and idle land*[1]

Vegetative canopy		Cover that contacts the soil surface						
			Percent ground cover					
Type and height[2]	Percent cover[3]	Type[4]	0	20	40	60	80	95+
No appreciable canopy		G	0.45	0.20	0.10	0.042	0.013	0.003
		W	.45	.24	.15	.091	.043	.011
Tall weeds or short brush with average drop fall height of 20 in	25	G	.36	.17	.09	.038	.013	.003
		W	.36	.20	.13	.083	.041	.011
	50	G	.26	.13	.07	.035	.012	.003
		W	.26	.16	.11	.076	.039	.011
	75	G	.17	.10	.06	.032	.011	.003
		W	.17	.12	.09	.068	.038	.011
Appreciable brush or bushes, with average drop fall height of 6½ ft	25	G	.40	.18	.09	.040	.013	.003
		W	.40	.22	.14	.087	.042	.011
	50	G	.34	.16	.08	.038	.012	.003
		W	.34	.19	.13	.082	.041	.011
	75	G	.28	.14	.08	.036	.012	.003
		W	.28	.17	.12	.078	.040	.011
Trees, but no appreciable low brush. Average drop fall height of 13 ft	25	G	.42	.19	.10	.041	.013	.003
		W	.42	.23	.14	.089	.042	.011
	50	G	.39	.18	.09	.040	.013	.003
		W	.39	.21	.14	.087	.042	.011
	75	G	.36	.17	.09	.039	.012	.003
		W	.36	.20	.13	.084	.041	.011

[1] The listed C values assume that the vegetation and mulch are randomly distributed over the entire area.

[2] Canopy height is measured as the average fall height of water drops falling from the canopy to the ground. Canopy effect is inversely proportional to drop fall height and is negligible if fall height exceeds 33 ft.

[3] Portion of total-area surface that would be hidden from view by canopy in a vertical projection (a bird's-eye view).

[4] G: cover at surface is grass, grasslike plants, decaying compacted duff, or litter at least 2 in deep.

W: cover at surface is mostly broadleaf herbaceous plants (as weeds with little lateral-root network near the surface) or undecayed residues or both.

PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

Survey Area- BERNALILLO COUNTY AND PARTS OF SANDOVAL AND V

Map Symbol	Soil Name	Depth (In)	Clay (pct)	Moist Blk Density (g/cm3)	Permeability (In/hr)	Available water cap (In/in)	Soil React (ph)	Salinity (mmhos/cm)	Shrink Swell Pot.	Erosion Factor K	Erosion Factor T	Wind Erod. Group	Organic Matter (pct)
		24-60	8-18	1.45-1.65	2.0- 6.0	0.-0.06	7.9-8.4	0- 2	VERY	.20			-
Br	BRAZITO	0- 5	5-15	1.45-1.55	2.0- 6.0	0.13-0.15	7.4-8.4	0- 4	LOW	.28	5	.3	.4- .6
		5-60	2-10	1.40-1.50	6.0- 20	0.05-0.07	7.4-8.4	0- 4	LOW	.17			-
Bs	BRAZITO	0-12	28-35	-	0.2- 0.6	0.19-0.21	7.4-7.8	0- 4	LOW	.37	5	7	.3- .5
		12-60	0-10	-	20- 20.0	0.04-0.06	7.4-7.8	0- 2	LOW	.15			-
Bt	BRAZITO	0-10	28-35	-	0.2- 0.6	0.19-0.21	7.4-7.8	0- 4	LOW	.37	5	7	.3- .5
		10-60	0-10	-	20- 20.0	0.04-0.06	7.4-7.8	0- 2	LOW	.15			-
	BRAZITO	0-10	20-30	-	0.6- 20	0.12-0.14	7.9-8.4	4- 8	MODER	.32	5	5	.3- .5
		10-60	0- 5	-	20- 20.0	0.03-0.06	7.9-8.4	4- 8	LOW	.10			-
CAF	CARLITO	0- 4	20-27	1.30-1.40	0.6- 2.0	0.12-0.14	7.4-7.8	-	LOW	.20	5	6	1.- 2.
		4- 8	45-55	1.30-1.40	0.06- 0.2	0.14-0.16	7.4-7.8	-	HIGH	.20			-
		8-60	45-55	1.30-1.40	0.06- 0.2	0.14-0.16	7.9-8.4	0- 2	HIGH	.24			-
	CARLITO	0- 4	20-27	1.30-1.40	0.6- 2.0	0.08-0.10	7.4-7.8	-	LOW	.05	5	8	1.- 2.
		4- 8	45-55	1.30-1.40	0.06- 0.2	0.14-0.16	7.4-7.8	-	HIGH	.20			-
		8-60	45-55	1.30-1.40	0.06- 0.2	0.14-0.16	7.9-8.4	0- 2	HIGH	.24			-
EnB	EMBUDO	0- 4	5-15	1.45-1.55	2.0- 6.0	0.09-0.11	7.9-8.4	0- 2	LOW	.15	5	5	.6- .9
		4-20	5-15	1.45-1.55	2.0- 6.0	0.03-0.10	7.9-8.4	0- 2	LOW	.15			-
		20-60	5-10	1.30-1.40	20- 20.0	0.03-0.05	7.9-8.4	0- 2	LOW	.05			-
EtC	EMBUDO	0- 4	5-15	1.45-1.55	2.0- 6.0	0.09-0.11	7.9-8.4	0- 2	LOW	.15	5	5	.6- .9
		4-20	5-15	1.45-1.55	2.0- 6.0	0.08-0.10	7.9-8.4	0- 2	LOW	.15			-
		20-60	5-10	1.30-1.40	20- 20.0	0.03-0.05	7.9-8.4	0- 2	LOW	.05			-
	TIJERAS	0- 4	10-15	1.45-1.55	2.0- 6.0	0.09-0.11	6.6-7.8	0- 2	LOW	.15	5	5	.5- .9
		4-14	20-30	1.40-1.50	0.6- 2.0	0.14-0.16	6.6-7.8	0- 2	LOW	.32			-
		14-19	10-15	1.45-1.55	2.0- 6.0	0.07-0.09	7.9-8.4	0- 2	LOW	.15			-
		19-60	5-10	1.40-1.50	6.0- 20	0.04-0.09	7.9-8.4	0- 2	LOW	.10			-
GA	GILA	0- 7	10-18	1.45-1.55	0.6- 2.0	0.13-0.15	7.9-8.4	0- 4	LOW	.24	5	3	.5- 1.
		7-60	10-18	1.35-1.45	0.6- 2.0	0.17-0.19	7.9-8.4	0- 4	LOW	.32			-
GF	GILA	0- 7	5-12	1.45-1.55	6.0- 20	0.09-0.10	7.4-8.4	4- 16	LOW	.20	5	2	.5- 1.
		7-60	10-20	1.35-1.45	0.2- 0.6	0.04-0.08	9.0-9.6	8- 16	LOW	.32			-
	GILA	0- 7	20-30	1.45-1.55	0.6- 2.0	0.04-0.10	7.9-9.0	4- 16	LOW	.32	5	5	.5- 1.
		7-60	10-20	1.35-1.45	0.2- 0.6	0.04-0.08	9.0-9.6	8- 16	LOW	.32			-
GH	GILA	0-10	27-30	1.40-1.50	0.2- 0.6	0.19-0.21	7.4-8.4	0- 4	LOW	.37	5	4L	.5- 1.
		10-60	10-20	1.30-1.60	0.2- 0.6	0.18-0.20	7.4-8.4	0- 4	LOW	.32			-
	HANTZ	0- 4	25-35	1.30-1.40	0.2- 2.0	0.19-0.21	7.9-9.0	2- 4	MODER	.37	5	4L	.5- 1.
		4-60	40-50	1.35-1.45	0.0- 0.06	0.14-0.16	7.9-9.0	2- 4	HIGH	.24			-
Gb	GILA	0- 7	10-18	1.45-1.55	0.6- 2.0	0.16-0.18	7.9-8.4	0- 4	LOW	.37	5	4L	.5- 1.
		7-60	10-18	1.35-1.45	0.6- 2.0	0.17-0.19	7.9-8.4	0- 4	LOW	.32			-
Gc	GILA	0- 7	10-18	1.45-1.55	0.6- 2.0	0.16-0.18	7.9-8.4	0- 4	LOW	.37	5	4L	.5- 1.
		7-60	10-18	1.35-1.45	0.6- 2.0	0.17-0.19	7.9-8.4	0- 4	LOW	.32			-
Gd	GILA	0- 7	20-30	1.45-1.55	0.6- 2.0	0.04-0.10	7.9-9.0	4- 16	LOW	.32	5	4L	.5- 1.
		7-60	10-20	1.35-1.45	0.2- 0.6	0.04-0.08	9.0-9.6	8- 16	LOW	.32			-
Ge	GILA	0- 7	28-35	1.45-1.55	2.0- 6.0	0.13-0.15	7.9-8.4	0- 4	MODER	.32	5	4L	.5- 1.
		7-60	10-18	1.35-1.45	0.6- 2.0	0.17-0.19	7.9-8.4	0- 4	LOW	.32			-
Gk	GLENDALE	0- 6	15-25	1.50-1.60	0.6- 2.0	0.13-0.15	7.9-8.4	2- 4	LOW	.32	5	4L	.5- 1.
		6-60	25-35	1.40-1.50	0.2- 0.6	0.16-0.21	7.9-8.4	2- 4	MODER	.37			-
Gm	GLENDALE	0- 7	25-35	1.40-1.50	0.2- 0.6	0.16-0.21	7.9-8.4	2- 4	MODER	.37	5	4L	.5- 1.
TgB	TIJERAS	0- 6	10-15	1.45-1.55	2.0- 6.0	0.09-0.11	6.6-7.8	0- 2	LOW	.15	5	5	.5- .9

* OBTAINED FROM CLIFF ANDERSON (11-1990

APPENDIX B

Revised Hydrology

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =05/02/1995
INPUT FILE = NDBCL100.EXT USER NO.= RSTECHNM.STE

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .0
RECALL HYD	914.99	-	2	2.74790	157.00	206.140	1.40657	3.450	.089	
ROUTE	914.68	2	3	2.74790	157.00	206.140	1.40657	3.500	.089	
RAINFALL TYPE= 2										RAIN24= 3.20
COMPUTE NM HYD	914.20	-	1	.03500	66.18	2.167	1.16090	1.500	2.955	PER IMP= 10.0
ROUTE	914.28	1	2	.03500	54.68	2.167	1.16091	1.600	2.441	
ADD HYD	914.78	2& 3	2	2.78290	157.31	208.307	1.40348	3.300	.088	
ROUTE	914.88	2	3	2.78290	157.31	208.307	1.40348	3.350	.088	
COMPUTE NM HYD	919.10	-	1	.07900	144.21	4.478	1.06285	1.500	2.852	PER IMP= 5.0
ADD HYD	919.19	1& 3	1	2.86190	216.29	212.785	1.39408	1.550	.118	
ROUTE	919.18	1	5	2.86190	193.60	212.785	1.39408	1.700	.106	
COMPUTE NM HYD	915.10	-	1	.00900	14.41	.476	.99145	1.500	2.502	PER IMP= 10.0
ROUTE	915.18	1	3	.00900	11.55	.476	.99150	1.600	2.005	
COMPUTE NM HYD	915.20	-	1	.02800	39.40	1.240	.83019	1.500	2.199	PER IMP= 5.0
ADD HYD	915.29	1& 3	2	.03700	48.42	1.716	.86940	1.500	2.045	
COMPUTE NM HYD	408.10	-	1	.01900	26.99	1.005	.99145	1.550	2.220	PER IMP= 10.0
ADD HYD	408.79	1& 2	1	.05600	75.32	2.720	.91080	1.500	2.102	
ROUTE	915.28	1	2	.05600	52.59	2.720	.91082	1.650	1.467	
COMPUTE NM HYD	919.20	-	1	.06100	102.14	3.173	.97531	1.500	2.616	PER IMP= 5.0
ADD HYD	919.29	2& 1	1	.11700	137.56	5.893	.94443	1.550	1.837	
ROUTE	919.28	1	2	.11700	76.75	5.893	.94444	1.750	1.025	
ADD HYD	919.38	2& 5	6	2.97890	268.10	218.678	1.37642	1.700	.141	
COMPUTE NM HYD	913.20	-	1	.01700	27.21	.899	.99145	1.500	2.501	PER IMP= 10.0
ROUTE	913.18	1	2	.01700	16.57	.899	.99148	1.650	1.523	
RAINFALL TYPE= 2										RAIN24= 3.20
COMPUTE NM HYD	918.00	-	1	.11400	111.95	6.028	.99145	1.650	1.534	PER IMP= 10.0
ADD HYD	918.99	1& 2	1	.13100	128.52	6.927	.99144	1.650	1.533	
ROUTE	918.88	1	2	.13100	107.12	6.927	.99145	1.750	1.278	
RAINFALL TYPE= 2										RAIN24= 3.05
COMPUTE NM HYD	921.10	-	1	.04600	65.80	2.280	.92943	1.500	2.235	PER IMP= 10.0
ADD HYD	921.19	1& 2	1	.17700	136.11	9.207	.97532	1.700	1.202	
ADD HYD	921.78	6& 1	1	3.15590	404.21	227.885	1.35392	1.700	.200	
ROUTE	921.88	1	2	3.15590	265.58	227.885	1.35392	2.150	.131	
RAINFALL TYPE= 2										RAIN24= 3.05
COMPUTE NM HYD	921.20	-	1	.08500	130.29	4.213	.92943	1.500	2.395	PER IMP= 10.0
ADD HYD	921.99	1& 2	6	3.24090	276.11	232.098	1.34279	2.100	.133	
RAINFALL TYPE= 2										RAIN24= 3.20
COMPUTE NM HYD	913.10	-	1	.04900	78.40	2.591	.99145	1.500	2.500	PER IMP= 10.0
ROUTE	913.88	1	2	.04900	51.01	2.591	.99146	1.650	1.626	
COMPUTE NM HYD	917.00	-	1	.05000	75.37	2.512	.94213	1.500	2.355	PER IMP= 10.0
ADD HYD	917.99	1& 2	1	.09900	114.80	5.103	.96654	1.550	1.812	
ROUTE	917.88	1	2	.09900	72.08	5.103	.96654	1.750	1.138	
RAINFALL TYPE= 2										RAIN24= 3.05
COMPUTE NM HYD	920.00	-	1	.10500	139.64	5.205	.92943	1.550	2.078	PER IMP= 10.0
ADD HYD	920.99	2& 1	1	.20400	187.40	10.308	.94743	1.550	1.435	
ADD HYD	920.99	1& 6	1	3.44490	379.82	242.406	1.31938	1.600	.172	
ROUTE	920.88	1	2	3.44490	350.11	242.406	1.31938	1.950	.159	
RAINFALL TYPE= 2										RAIN24= 3.05
COMPUTE NM HYD	926.00	-	1	.09800	180.18	5.987	1.14539	1.500	2.873	PER IMP= 15.0

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	926.79	1& 2	4	3.54290	400.23	248.393	1.31456	1.650	.177	
COMPUTE NM HYD	923.00	-	1	.01300	31.39	1.280	1.84560	1.500	3.797	PER IMP= 50.0
ROUTE	923.30	1	2	.01300	20.13	1.280	1.84564	1.600	2.419	
RAINFALL TYPE= 2										RAIN24= 3.05
COMPUTE NM HYD	925.00	-	1	.07700	153.09	7.579	1.84560	1.550	3.107	PER IMP= 50.0
ADD HYD	925.99	2& 1	1	.09000	171.81	8.859	1.84560	1.550	2.983	
ADD HYD	926.98	4& 1	5	3.63290	560.22	257.252	1.32772	1.600	.241	
RAINFALL TYPE= 2										RAIN24= 3.05
COMPUTE NM HYD	922.00	-	1	.02100	31.91	1.041	.92943	1.500	2.374	PER IMP= 10.0
ROUTE	922.80	1	2	.02100	21.08	1.041	.92945	1.650	1.568	
COMPUTE NM HYD	924.00	-	1	.06100	101.70	3.455	1.06205	1.500	2.605	PER IMP= 15.0
ADD HYD	924.99	1& 2	1	.08200	115.91	4.496	1.02808	1.500	2.209	
ROUTE	924.98	1	2	.08200	92.65	4.496	1.02809	1.600	1.765	
ADD HYD	926.99	5& 2	1	3.71490	652.87	261.748	1.32111	1.600	.275	
ROUTE	926.80	1	5	3.71490	577.23	261.748	1.32110	1.750	.243	
RAINFALL TYPE= 2										RAIN24= 2.95
COMPUTE NM HYD	930.00	-	1	.14800	305.43	10.974	1.39031	1.500	3.225	PER IMP= 30.0
ADD HYD	930.99	1& 5	1	3.86290	715.25	272.722	1.32376	1.650	.289	
ROUTE	930.80	1	12	3.86290	661.56	272.722	1.32376	1.800	.268	
RAINFALL TYPE= 2										RAIN24= 2.95
COMPUTE NM HYD	935.00	-	14	.09700	135.54	4.091	.79087	1.500	2.183	PER IMP= 5.0
RAINFALL TYPE= 2										RAIN24= 2.95
COMPUTE NM HYD	421.40	-	1	.01200	17.73	.573	.89462	1.500	2.309	PER IMP= 10.0
RECALL HYD	421.98	-	2	.10380	111.30	5.861	1.05864	1.700	1.675	
ADD HYD	421.49	1& 2	1	.11580	119.26	6.433	1.04164	1.700	1.609	
ROUTE	421.48	1	2	.11580	102.83	6.433	1.04165	1.750	1.387	
RAINFALL TYPE= 2										RAIN24= 2.95
COMPUTE NM HYD	937.00	-	1	.03350	44.23	1.598	.89462	1.550	2.063	PER IMP= 10.0
ADD HYD	937.99	1& 2	1	.14930	121.97	8.032	1.00865	1.750	1.276	
ADD HYD	935.30	1&14	14	.24630	218.03	12.123	.92288	1.550	1.383	
ADD HYD	930.85	14&12	13	4.10920	826.41	284.845	1.29973	1.750	.314	
RAINFALL TYPE= 2										RAIN24= 2.95
COMPUTE NM HYD	929.00	-	4	.02000	55.30	2.293	2.14971	1.500	4.321	PER IMP= 65.0
RAINFALL TYPE= 2										RAIN24= 2.95
COMPUTE NM HYD	931.00	-	1	.04000	63.81	3.704	1.73644	1.650	2.493	PER IMP= 45.0
ROUTE RESERVOIR	931.80	1	2	.04000	4.06	2.005	.93977	2.750	.159	AC-FT= 2.81
ADD HYD	931.99	4& 2	1	.06000	55.31	4.298	1.34308	1.500	1.440	
ROUTE	931.70	1	2	.06000	38.58	4.297	1.34268	1.600	1.005	
COMPUTE NM HYD	934.20	-	1	.03250	47.99	1.551	.89462	1.500	2.307	PER IMP= 10.0
DIVIDE HYD	934.20	1	1	.03250	55.19	1.783	1.02880	1.500	2.654	
	.00	AND	20	.03250	7.20	.233	.13419	1.500	.346	
ADD HYD	934.29	1& 2	5	.09250	88.01	6.080	1.23240	1.550	1.487	
COMPUTE NM HYD	932.00	-	4	.07800	192.28	7.279	1.74970	1.500	3.852	PER IMP= 40.0
ROUTE	932.81	4	2	.07800	151.47	7.279	1.74971	1.600	3.034	
COMPUTE NM HYD	934.10	-	1	.03250	47.99	1.551	.89462	1.500	2.307	PER IMP= 10.0
ADD HYD	934.99	1& 2	1	.11050	195.97	8.829	1.49820	1.550	2.771	
ADD HYD	930.86	1&13	11	4.21970	957.19	293.674	1.30492	1.700	[illegible]	
*S 100-yr. TOTAL DAM INFLOW HYDROGRAPH (AP 930.86)										
ROUTE RESERVOIR	930.87	11	12	4.21970	177.49	293.823	1.30559	4.350	.066	AC-FT= 60.45
*S DAM 1 - 100-yr. DAM OUTFLOW HYDROGRAPH (AP 930.87)										
*S FINISH (FOR LOWER NORTH DOMINGO BACA DETENTION DAM, SEDIMENT POND)										
RAINFALL TYPE= 2										RAIN24= 2.85

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	940.00	-	1	.07760	82.10	3.675	.88807	1.600	1.653	PER IMP= 10.0(
DIVIDE HYD	940.00	1	1	.07760	95.23	4.263	1.03015	1.600	1.918	
	.00	AND	20	.07760	13.14	.588	.14209	1.600	.264	
ROUTE	940.80	1	6	.07760	82.36	4.264	1.03016	1.700	1.658	
COMPUTE NM HYD	939.10	-	3	.02800	74.62	3.008	2.01454	1.500	4.164	PER IMP= 60.0(
DIVIDE HYD	939.10	3	3	.02800	81.33	3.279	2.19584	1.500	4.539	
	.00	AND	20	.02800	6.72	.271	.18131	1.500	.375	
DIVIDE HYD	939.13	3	2	.01400	40.67	1.640	2.19584	1.500	4.539	
	939.12	AND	9	.01400	40.67	1.640	2.19584	1.500	4.539	
RAINFALL TYPE= 2										RAIN24= 2.85(
COMPUTE NM HYD	943.10	-	1	.01200	32.26	1.322	2.06602	1.500	4.200	PER IMP= 65.0(
DIVIDE HYD	943.10	1	1	.01200	35.16	1.441	2.25194	1.500	4.578	
	.00	AND	20	.01200	2.90	.119	.18594	1.500	.378	
ADD HYD	943.16	1& 2	1	.02600	75.83	3.081	2.22172	1.500	4.557	
COMPUTE NM HYD	943.20	-	3	.01300	16.76	.475	.68508	1.500	2.014	PER IMP= .0(
DIVIDE HYD	943.20	3	3	.01300	19.61	.556	.80154	1.500	2.357	
	.00	AND	20	.01300	2.85	.081	.11646	1.500	.342	
ADD HYD	943.29	3& 6	6	.09060	93.37	4.819	.99735	1.650	1.610	
ADD HYD	943.18	1& 6	6	.11660	142.85	7.900	1.27037	1.550	1.914	
*S ROUTE OUTFLOW HYDROGRAPH FROM LOWER DAM (AP 930.87) TO UTE DR. (RP 930.88)										
ROUTE	930.88	12	15	4.21970	177.49	293.823	1.30559	4.400	.066	
*S ROUTE OUTFLOW HYDROGRAPH FROM UTE DR. (RP 930.88) TO I-25 (RP 930.89)										
ROUTE	930.89	15	12	4.21970	177.49	293.823	1.30559	4.400	.066	
ADD HYD	943.89	12& 6	2	4.33630	252.67	301.723	1.30464	1.650	.091	
*S @NB S ARROYO AT I-25										
ROUTE	943.81	2	1	4.33630	252.81	301.723	1.30464	1.650	.091	
*S @W I-25 NB S 4 4'x9'CBC (3 CULVERTS USED IN STORAGE RATING CURVE)(AP 943.81)										
ROUTE	943.88	1	2	4.33630	251.90	301.723	1.30464	1.700	.091	
RAINFALL TYPE= 2										RAIN24= 2.78(
COMPUTE NM HYD	945.00	-	1	.01500	40.71	1.667	2.08357	1.500	4.241	PER IMP= 70.0(
DIVIDE HYD	945.00	1	1	.01500	43.97	1.800	2.25024	1.500	4.580	
	.00	AND	20	.01500	3.26	.133	.16668	1.500	.339	
ADD HYD	945.99	1& 2	14	4.35130	274.20	303.523	1.30790	1.650	.098	
*SOUTH BRANCH OUTFALL CORONADO MOBILE HOME PARK (AP 945.99)										
RAINFALL TYPE= 2										RAIN24= 2.95(
COMPUTE NM HYD	933.00	-	1	.05300	72.93	2.236	.79087	1.500	2.150	PER IMP= 5.0(
DIVIDE HYD	933.00	1	1	.05300	84.60	2.593	.91740	1.500	2.494	
	.00	AND	20	.05300	11.67	.358	.12654	1.500	.344	
ROUTE	933.88	1	8	.05300	50.59	2.593	.91742	1.650	1.491	
RAINFALL TYPE= 2										RAIN24= 2.85(
COMPUTE NM HYD	938.00	-	1	.02000	24.02	.731	.68508	1.500	1.876	PER IMP= .0(
DIVIDE HYD	938.00	1	1	.02000	28.10	.855	.80154	1.500	2.195	
	.00	AND	20	.02000	4.08	.124	.11646	1.500	.319	
ADD HYD	938.99	8& 1	1	.07300	73.93	3.448	.88566	1.600	1.582	
ROUTE	938.88	1	2	.07300	65.68	3.448	.88567	1.700	1.406	
COMPUTE NM HYD	941.00	-	1	.00800	19.76	.753	1.76435	1.500	3.848	PER IMP= 45.0(
DIVIDE HYD	941.00	1	1	.00800	22.07	.843	1.97604	1.500	4.310	
	.00	AND	20	.00800	2.36	.090	.21172	1.500	.462	
ADD HYD	941.99	1& 2	7	.08100	75.67	4.291	.99336	1.650	1.498	
COMPUTE NM HYD	939.20	-	1	.05600	69.58	1.973	.66077	1.500	1.941	PER IMP= .0(
DIVIDE HYD	939.20	1	1	.05600	81.41	2.309	.77310	1.500	2.271	
	.00	AND	20	.05600	11.83	.335	.11233	1.500	.330	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ROUTE	934.88	5	2	.09250	63.22	6.078	1.23210	1.700	1.068	
ADD HYD	939.29	1& 2	1	.14850	126.89	8.387	1.05901	1.550	1.335	
ROUTE	939.28	1	4	.14850	112.67	8.387	1.05892	1.650	1.186	
COMPUTE NM HYD	942.00	-	1	.03000	62.44	2.548	1.59281	1.550	3.252	PER IMP= 30.0
DIVIDE HYD	942.00	1	1	.03000	69.93	2.854	1.78393	1.550	3.642	
	.00	AND	20	.03000	7.49	.306	.19114	1.550	.390	
ADD HYD	942.09	1& 4	1	.17850	169.55	11.241	1.18077	1.600	1.484	
ROUTE	939.14	9	2	.01400	32.96	1.640	2.19588	1.550	3.678	
ADD HYD	942.89	1& 2	2	.19250	201.83	12.880	1.25459	1.600	1.638	
ADD HYD	942.99	2& 7	2	.27350	277.11	17.172	1.17722	1.600	1.583	
*S BNB N ARROYO AT I-25 (AP 942.99)										
ROUTE	942.31	2	1	.27350	277.75	17.172	1.17721	1.600	1.587	
ROUTE	942.86	1	2	.27350	269.31	17.170	1.17710	1.650	1.539	
RAINFALL TYPE= 2										RAIN24= 2.78
COMPUTE NM HYD	944.00	-	1	.03600	96.88	3.906	2.03444	1.500	4.205	PER IMP= 65.0
DIVIDE HYD	944.00	1	1	.03600	105.60	4.258	2.21753	1.500	4.583	
	.00	AND	20	.03600	8.72	.352	.18310	1.500	.378	
ADD HYD	944.99	1& 2	8	.30950	325.63	21.428	1.29812	1.650	1.644	
ADD HYD	945.09	8&14	1	4.66080	599.83	324.950	1.30725	1.650	.201	
FINISH										

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =04/07/1995
INPUT FILE = NEWL100.FUT USER NO.= RSTECHNM.STE

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION	PAGE = 1
START										TIME=	.00
RECALL HYD	914.DT=	-	2	2.88490	155.60	252.703	1.64241	3.200	.084		
RAINFALL TYPE= 2										RAIN24=	3.200
COMPUTE NM HYD	914.20	-	1	.03500	68.95	2.390	1.28017	1.500	3.078	PER IMP=	17.00
ADD HYD	914.20	2& 1	2	2.91990	156.37	255.093	1.63807	2.650	.084		
ROUTE	914.98	2	3	2.91990	156.36	255.065	1.63789	2.700	.084		
RAINFALL TYPE= 2										RAIN24=	3.200
COMPUTE NM HYD	919.10	-	1	.07900	208.44	8.556	2.03073	1.500	4.123	PER IMP=	50.00
ADD HYD	919.19	1& 3	4	2.99890	338.39	263.622	1.64824	1.500	.176		
RAINFALL TYPE= 2										RAIN24=	3.200
COMPUTE NM HYD	919.20	-	1	.05100	134.32	5.524	2.03073	1.500	4.115	PER IMP=	50.00
ROUTE	919.28	1	3	.05100	131.06	5.524	2.03073	1.500	4.015		
ADD HYD	919.19	4& 3	6	3.04990	469.45	269.145	1.65463	1.500	.241		
RAINFALL TYPE= 2										RAIN24=	3.200
COMPUTE NM HYD	913.10	-	1	.04900	96.52	3.346	1.28017	1.500	3.078	PER IMP=	17.00
ROUTE	913.88	1	2	.04900	84.71	3.346	1.28018	1.550	2.701		
RAINFALL TYPE= 2										RAIN24=	3.200
COMPUTE NM HYD	917.00	-	1	.05000	131.69	5.415	2.03073	1.500	4.115	PER IMP=	50.00
ADD HYD	917.99	1& 2	1	.09900	205.71	8.761	1.65923	1.500	3.247		
ROUTE	917.88	1	7	.09900	204.34	8.761	1.65924	1.550	3.225		
RAINFALL TYPE= 2										RAIN24=	3.200
COMPUTE NM HYD	913.20	-	1	.01700	33.50	1.161	1.28017	1.500	3.079	PER IMP=	17.00
ROUTE	913.18	1	2	.01700	29.83	1.161	1.28019	1.550	2.742		
RAINFALL TYPE= 2										RAIN24=	3.200
COMPUTE NM HYD	918.00	-	1	.11400	204.78	12.347	2.03072	1.650	2.807	PER IMP=	50.00
ADD HYD	918.99	1& 2	1	.13100	230.82	13.507	1.93332	1.600	2.753		
ADD HYD	918.99	1& 7	1	.23000	415.12	22.268	1.81534	1.600	2.820		
ROUTE	918.88	1	3	.23000	414.95	22.268	1.81535	1.600	2.819		
ADD HYD	919.19	3& 6	1	3.27990	840.12	291.413	1.66590	1.550	.400		
ROUTE	921.18	1	3	3.27990	815.41	291.386	1.66575	1.600	.388		
RAINFALL TYPE= 2										RAIN24=	3.050
COMPUTE NM HYD	921.10	-	1	.04600	113.39	4.730	1.92802	1.500	3.851	PER IMP=	50.00
ADD HYD	921.18	1& 3	3	3.32590	899.94	296.116	1.66938	1.600	.423		
RAINFALL TYPE= 2										RAIN24=	3.050
COMPUTE NM HYD	921.20	-	1	.09900	254.09	10.180	1.92802	1.500	4.010	PER IMP=	50.00
ROUTE	921.28	1	4	.09900	252.17	10.180	1.92802	1.500	3.980		
ADD HYD	921.18	3& 4	3	3.42490	1117.44	306.296	1.67685	1.550	.510		
RAINFALL TYPE= 2										RAIN24=	3.050
COMPUTE NM HYD	922.00	-	1	.02100	53.72	2.159	1.92802	1.500	3.997	PER IMP=	50.00
RAINFALL TYPE= 2										RAIN24=	3.050
COMPUTE NM HYD	923.00	-	2	.01300	33.26	1.337	1.92802	1.500	3.998	PER IMP=	50.00
ADD HYD	923.00	1& 2	1	.03400	86.98	3.496	1.92800	1.500	3.997		
ROUTE	922.18	1	2	.03400	83.90	3.496	1.92802	1.500	3.856		
RAINFALL TYPE= 2										RAIN24=	3.050
COMPUTE NM HYD	920.00	-	1	.10500	237.92	10.797	1.92802	1.550	3.540	PER IMP=	50.00
ADD HYD	920.99	2& 1	1	.13900	320.13	14.293	1.92801	1.500	3.599		
ROUTE	920.98	1	2	.13900	325.18	14.293	1.92802	1.550	3.655		
ADD HYD	920.99	2& 3	1	3.56390	1442.62	320.589	1.68665	1.550	.632		
ROUTE	920.97	1	2	3.56390	1422.47	320.577	1.68659	1.600	.624		

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
RAINFALL TYPE= 2										RAIN24= 3.050
COMPUTE NM HYD	926.00	-	1	.11700	308.93	12.595	2.01845	1.500	4.126	PER IMP= 55.00
ADD HYD	920.97	1& 2	2	3.68090	1689.89	333.172	1.69713	1.550	.717	
RAINFALL TYPE= 2										RAIN24= 3.050
COMPUTE NM HYD	924.00	-	1	.06400	172.50	7.187	2.10543	1.500	4.212	PER IMP= 60.00
ROUTE	924.98	1	3	.06400	160.65	7.187	2.10543	1.550	3.922	
RAINFALL TYPE= 2										RAIN24= 3.050
COMPUTE NM HYD	925.00	-	1	.07700	173.58	8.807	2.14460	1.550	3.522	PER IMP= 63.00
ADD HYD	925.99	3& 1	1	.14100	334.23	15.994	2.12681	1.550	3.704	
ROUTE	925.98	1	3	.14100	333.07	15.994	2.12682	1.550	3.691	
ADD HYD	926.99	3& 2	1	3.82190	2022.96	349.166	1.71299	1.550	.827	
ROUTE	925.97	1	5	3.82190	2001.64	349.153	1.71292	1.600	.818	
RAINFALL TYPE= 2										RAIN24= 2.950
COMPUTE NM HYD	930.00	-	1	.13500	348.87	13.910	1.93190	1.500	4.038	PER IMP= 54.00
ADD HYD	930.99	1& 5	7	3.95690	2289.20	363.063	1.72040	1.550	.904	
RAINFALL TYPE= 2										RAIN24= 2.950
RAINFALL TYPE= 1										RAIN6= 2.550
COMPUTE NM HYD	929.00	-	4	.02400	66.36	2.419	1.88994	1.500	4.320	PER IMP= 65.00
RAINFALL TYPE= 2										RAIN24= 2.950
COMPUTE NM HYD	931.00	-	1	.04000	66.42	3.897	1.82668	1.650	2.595	PER IMP= 50.00
ADD HYD	931.99	4& 1	1	.06400	115.62	6.316	1.85039	1.550	2.823	
ROUTE	931.98	1	3	.06400	116.30	6.316	1.85040	1.550	2.839	
RAINFALL TYPE= 2										RAIN24= 2.950
COMPUTE NM HYD	932.00	-	1	.07800	217.59	9.171	2.20449	1.500	4.359	PER IMP= 70.00
ADD HYD	932.00	1& 3	17	.14200	324.22	15.487	2.04489	1.500	3.568	
ROUTE	932.80	17	3	.14200	320.32	15.487	2.04490	1.500	3.525	
ADD HYD	930.99	3& 7	4	4.09890	2602.17	378.550	1.73164	1.550	.992	
ROUTE	930.98	4	5	4.09890	2580.26	378.540	1.73159	1.550	.984	
RAINFALL TYPE= 2										RAIN24= 2.950
COMPUTE NM HYD	935.00	-	1	.09700	244.61	9.637	1.86290	1.500	3.940	PER IMP= 50.00
ADD HYD	935.00	1& 5	17	4.19590	2795.11	388.177	1.73463	1.550	1.041	
RAINFALL TYPE= 2										RAIN24= 2.950
COMPUTE NM HYD	933.00	-	9	.04100	103.08	4.074	1.86290	1.500	3.928	PER IMP= 50.00
RAINFALL TYPE= 2										RAIN24= 2.950
COMPUTE NM HYD	934.00	-	1	.06500	163.44	6.458	1.86290	1.500	3.929	PER IMP= 50.00
DIVIDE HYD	934.19	1	2	.04875	122.58	4.844	1.86290	1.500	3.929	
	934.29	AND	5	.01625	40.86	1.615	1.86290	1.500	3.929	
ADD HYD	934.59	2&17	19	4.24465	2902.84	393.020	1.73610	1.550	1.069	
RAINFALL TYPE= 2										RAIN24= 2.950
COMPUTE NM HYD	937.00	-	2	.01200	30.18	1.192	1.86290	1.500	3.930	PER IMP= 50.00
ROUTE	937.80	2	20	.01200	26.78	1.192	1.86294	1.550	3.488	
ADD HYD	935.99	20&19	13	4.25665	2929.62	394.213	1.73646	1.550	1.075	
ROUTE RESERVOIR	940.87	13	2	4.25665	198.27	391.083	1.72267	3.250	.073	AC-FT= 110.408
ROUTE RESERVOIR	940.87	13	12	4.25665	203.44	394.216	1.73647	3.150	.075	AC-FT= 108.144
FINISH										

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =04/07/1995
INPUT FILE = NEWL10.FUT USER NO.= RSTECHNM.STE

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RECALL HYD	914.DT=	-	2	2.89690	131.12	135.296	.87570	2.950	.071	
RAINFALL TYPE= 2										RAIN24= 2.130
COMPUTE NM HYD	914.20	-	1	.03500	35.21	1.164	.62364	1.500	1.572	PER IMP= 17.00
ADD HYD	914.20	2& 1	2	2.93190	131.47	136.460	.87269	2.900	.070	
ROUTE	914.98	2	3	2.93190	131.46	136.460	.87269	2.900	.070	
RAINFALL TYPE= 2										RAIN24= 2.130
COMPUTE NM HYD	919.10	-	1	.07900	127.21	4.996	1.18577	1.500	2.516	PER IMP= 50.00
ADD HYD	919.19	1& 3	4	3.01090	204.47	141.456	.88090	1.550	.106	
RAINFALL TYPE= 2										RAIN24= 2.130
COMPUTE NM HYD	919.20	-	1	.05100	82.28	3.225	1.18576	1.500	2.521	PER IMP= 50.00
ROUTE	919.28	1	3	.05100	79.54	3.225	1.18577	1.500	2.437	
ADD HYD	919.19	4& 3	6	3.06190	281.52	144.682	.88598	1.550	.144	
RAINFALL TYPE= 2										RAIN24= 2.130
COMPUTE NM HYD	913.10	-	1	.04900	49.29	1.630	.62364	1.500	1.572	PER IMP= 17.00
ROUTE	913.88	1	2	.04900	42.45	1.630	.62365	1.550	1.354	
RAINFALL TYPE= 2										RAIN24= 2.130
COMPUTE NM HYD	917.00	-	1	.05000	80.67	3.162	1.18577	1.500	2.521	PER IMP= 50.00
ADD HYD	917.99	1& 2	1	.09900	116.33	4.792	.90753	1.500	1.836	
ROUTE	917.88	1	7	.09900	116.71	4.792	.90754	1.550	1.842	
RAINFALL TYPE= 2										RAIN24= 2.130
COMPUTE NM HYD	913.20	-	1	.01700	17.11	.565	.62364	1.500	1.572	PER IMP= 17.00
ROUTE	913.18	1	2	.01700	14.98	.565	.62366	1.550	1.377	
RAINFALL TYPE= 2										RAIN24= 2.130
COMPUTE NM HYD	918.00	-	1	.11400	122.52	7.209	1.18576	1.650	1.679	PER IMP= 50.00
ADD HYD	918.99	1& 2	1	.13100	135.23	7.775	1.11281	1.600	1.613	
ADD HYD	918.99	1& 7	1	.23000	237.74	12.567	1.02445	1.550	1.615	
ROUTE	918.88	1	3	.23000	239.03	12.567	1.02446	1.600	1.624	
ADD HYD	919.19	3& 6	1	3.29190	503.60	157.248	.89565	1.550	.239	
ROUTE	921.18	1	3	3.29190	497.02	157.248	.89565	1.600	.236	
RAINFALL TYPE= 2										RAIN24= 2.030
COMPUTE NM HYD	921.10	-	1	.04600	68.81	2.747	1.11953	1.500	2.337	PER IMP= 50.00
ADD HYD	921.18	1& 3	3	3.33790	547.85	159.995	.89874	1.600	.256	
RAINFALL TYPE= 2										RAIN24= 2.030
COMPUTE NM HYD	921.20	-	1	.09900	153.47	5.911	1.11953	1.500	2.422	PER IMP= 50.00
ROUTE	921.28	1	4	.09900	151.40	5.911	1.11954	1.500	2.389	
ADD HYD	921.18	3& 4	3	3.43690	688.75	165.906	.90510	1.550	.313	
RAINFALL TYPE= 2										RAIN24= 2.030
COMPUTE NM HYD	922.00	-	1	.02100	32.71	1.254	1.11953	1.500	2.434	PER IMP= 50.00
RAINFALL TYPE= 2										RAIN24= 2.030
COMPUTE NM HYD	923.00	-	2	.01300	20.25	.776	1.11953	1.500	2.434	PER IMP= 50.00
ADD HYD	923.00	1& 2	1	.03400	52.96	2.030	1.11952	1.500	2.434	
ROUTE	922.18	1	2	.03400	50.60	2.030	1.11954	1.500	2.325	
RAINFALL TYPE= 2										RAIN24= 2.030
COMPUTE NM HYD	920.00	-	1	.10500	143.33	6.269	1.11953	1.550	2.133	PER IMP= 50.00
ADD HYD	920.99	2& 1	1	.13900	193.08	8.299	1.11953	1.550	2.170	
ROUTE	920.98	1	2	.13900	197.44	8.299	1.11953	1.550	2.219	
ADD HYD	920.99	2& 3	1	3.57590	886.19	174.205	.91343	1.550	.387	
ROUTE	920.97	1	2	3.57590	876.97	174.205	.91343	1.600	.383	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
RAINFALL TYPE= 2										RAIN24= 2.030
COMPUTE NM HYD	926.00	-	1	.11700	188.50	7.419	1.18892	1.500	2.517	PER IMP= 55.00
ADD HYD	920.97	1& 2	2	3.69290	1036.06	181.624	.92216	1.550	.438	
RAINFALL TYPE= 2										RAIN24= 2.030
COMPUTE NM HYD	921.00	-	1	.06400	107.70	4.287	1.25593	1.500	2.629	PER IMP= 60.00
ROUTE	924.98	1	3	.06400	100.16	4.287	1.25594	1.550	2.445	
RAINFALL TYPE= 2										RAIN24= 2.030
COMPUTE NM HYD	925.00	-	1	.07700	108.02	5.286	1.28730	1.550	2.192	PER IMP= 63.00
ADD HYD	925.99	3& 1	1	.14100	208.17	9.573	1.27305	1.550	2.307	
ROUTE	925.98	1	3	.14100	207.91	9.573	1.27306	1.550	2.304	
ADD HYD	926.99	3& 2	1	3.83390	1243.97	191.197	.93507	1.550	.507	
ROUTE	925.97	1	5	3.83390	1240.47	191.197	.93507	1.600	.506	
RAINFALL TYPE= 2										RAIN24= 1.970
COMPUTE NM HYD	930.00	-	1	.13500	212.32	8.183	1.13654	1.500	2.457	PER IMP= 54.00
ADD HYD	930.99	1& 5	7	3.96890	1385.82	199.381	.94192	1.600	.546	
RAINFALL TYPE= 1										RAIN6= 1.700
COMPUTE NM HYD	929.00	-	4	.02400	42.48	1.442	1.12660	1.500	2.766	PER IMP= 65.00
RAINFALL TYPE= 2										RAIN24= 1.970
COMPUTE NM HYD	931.00	-	1	.04000	39.84	2.260	1.05942	1.650	1.556	PER IMP= 50.00
ADD HYD	931.99	4& 1	1	.06400	71.19	3.702	1.08460	1.550	1.738	
ROUTE	931.98	1	3	.06400	71.68	3.702	1.08461	1.550	1.750	
RAINFALL TYPE= 2										RAIN24= 1.970
COMPUTE NM HYD	932.00	-	1	.07800	139.25	5.603	1.34678	1.500	2.789	PER IMP= 70.00
ADD HYD	932.00	1& 3	17	.14200	203.90	9.305	1.22861	1.500	2.244	
ROUTE	932.80	17	3	.14200	200.66	9.305	1.22861	1.500	2.208	
ADD HYD	930.99	3& 7	4	4.11090	1579.57	208.685	.95182	1.550	.600	
ROUTE	930.98	4	5	4.11090	1599.23	208.685	.95182	1.600	.608	
RAINFALL TYPE= 2										RAIN24= 1.970
COMPUTE NM HYD	935.00	-	1	.09700	148.39	5.605	1.08339	1.500	2.390	PER IMP= 50.00
ADD HYD	935.00	1& 5	17	4.20790	1700.63	214.290	.95486	1.600	.631	
RAINFALL TYPE= 2										RAIN24= 1.970
COMPUTE NM HYD	933.00	-	1	.04100	63.01	2.369	1.08339	1.500	2.401	PER IMP= 50.00
ADD HYD	933.00	17& 1	18	4.24890	1743.47	216.659	.95610	1.600	.641	
RAINFALL TYPE= 2										RAIN24= 1.970
COMPUTE NM HYD	934.00	-	1	.06500	99.85	3.756	1.08339	1.500	2.400	PER IMP= 50.00
DIVIDE HYD	934.19	1	2	.04875	74.89	2.817	1.08339	1.500	2.400	
	934.29	AND	5	.01625	24.96	.939	1.08339	1.500	2.400	
ADD HYD	934.59	2&17	19	4.25665	1751.57	217.107	.95633	1.600	.643	
RAINFALL TYPE= 2										RAIN24= 1.970
COMPUTE NM HYD	937.00	-	2	.01200	18.45	.693	1.08340	1.500	2.402	PER IMP= 50.00
ROUTE	937.80	2	20	.01200	16.24	.693	1.08344	1.550	2.115	
ADD HYD	935.99	20&19	13	4.26865	1766.61	217.800	.95668	1.600	.647	
ROUTE RESERVOIR	940.57	13	2	4.26865	167.85	217.800	.95668	2.900	.061	AC-FT= 61.015
FINISH										

RESOURCE TECHNOLOGY, INC.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

CHECKED _____ DATE _____ PROJECT NO. _____

APPROVED _____ DATE _____ SHEET _____ OF _____

TITLE Dam As-Built Curve BY _____ DATE 4/95

STAGE	STORAGE	STORAGE w/ Sed Allowance	Design
5298	0	0	0
5300	.94	0	0
5302	5.71	0	0
5304	11.50	0	0
5306	17.91	3.31	6.2
5308	24.92	10.32	12.9
5310	32.44	17.84	20.1
5312	40.49	28.89	27.8
5314	52.47	37.87	36.0
5316	67.61	53.01	50.3
5318	83.29	68.69	65.3
5320	99.80	85.20	81.1
5322	117.19	105.59	97.6
5323.3	131.12	116.52	110.6
			118.0
			133.1
			152.1
			172.0

100-YR
w/o Sed Storage

```
F E D   File:OUT                                   Line:2873 Col:85      INS


DISCHARGE =      198.270 CFS - PEAK OCCURS AT HOUR    3.25
MAXIMUM WATER SURFACE ELEVATION =     5321.219
MAXIMUM STORAGE =      110.4078 AC-FT      INCREMENTAL TIME=     .050000HRS

*
*    *    *    *    *    *    *    *    *    *    *    *    *
*@OUTF DAM HYD E. LOUI
PRINT HYD              ID=2   CODE=1

                                     HYDROGRAPH FROM AREA   940.87


   RUNOFF VOLUME =     1.72267 INCHES     =     391.0804 ACRE-FEET
   PEAK DISCHARGE RATE =     198.27 CFS  AT   3.250 HOURS   BASIN AREA =  4.256
```

100-yr
14.6 Ac-ft Sed Storage

F E D File:OUT Line:2972 Col:6 INS

```
PEAK DISCHARGE =      203.442 CFS - PEAK OCCURS AT HOUR    3.15
MAXIMUM WATER SURFACE ELEVATION =     5322.304
MAXIMUM STORAGE =      108.1437 AC-FT      INCREMENTAL TIME=     .050000HRS

*    *    *    *    *    *    *    *    *    *    *    *    *
*@OUTF DAM HYD E. LOUI
PRINT HYD              ID=12  CODE=1

                                    HYDROGRAPH FROM AREA   940.87

    RUNOFF VOLUME =     1.73647 INCHES     =     394.2139 ACRE-FEET
    PEAK DISCHARGE RATE =     203.44 CFS  AT   3.150 HOURS   BASIN AREA =  4.256


FINISH
```

10-YR
W/O Sed Storage

F E D File:OUT Line:3620 Col:86 INS

```
DISCHARGE =      167.847 CFS - PEAK OCCURS AT HOUR    2.90
MAXIMUM WATER SURFACE ELEVATION =      5315.128
MAXIMUM STORAGE =      61.0152 AC-FT      INCREMENTAL TIME=     .050000HRS


   RUNOFF VOLUME =      .95668 INCHES     =     217.7987 ACRE-FEET
   PEAK DISCHARGE RATE =     167.85 CFS  AT   2.900 HOURS   BASIN AREA =  4.2687
```

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =04/22/1994
INPUT FILE = ndblpmf.fut USER NO.= RSTECHNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
RECALL HYD	914.00	-	2	2.36130	23406.51	1419.782	11.27384	2.467	15.488	
RAINFALL TYPE= 3										RAIN6= 15.480
COMPUTE NM HYD	914.20	-	1	.03500	618.81	21.001	11.25054	2.267	27.625	PER IMP= 17.00
ADD HYD	914.20	2& 1	2	2.39630	23648.16	1440.783	11.27349	2.467	15.420	
ROUTE	914.98	2	3	2.39630	22302.07	1441.244	11.27710	2.550	14.542	
COMPUTE NM HYD	919.10	-	1	.07900	1450.32	54.848	13.01760	2.267	28.685	PER IMP= 50.00
ADD HYD	919.19	1& 3	4	2.47530	22708.79	1495.706	11.32973	2.533	14.335	
COMPUTE NM HYD	919.20	-	1	.05100	936.90	35.408	13.01761	2.267	28.704	PER IMP= 50.00
ROUTE	919.28	1	3	.05100	880.63	35.403	13.01583	2.300	26.980	
ADD HYD	919.19	4& 3	6	2.52630	23035.82	1531.123	11.36388	2.500	14.248	
COMPUTE NM HYD	913.10	-	1	.04900	866.28	29.401	11.25053	2.267	27.624	PER IMP= 17.00
ROUTE	913.88	1	2	.04900	837.75	29.397	11.24892	2.300	26.714	
COMPUTE NM HYD	917.00	-	1	.05000	918.53	34.714	13.01761	2.267	28.704	PER IMP= 50.00
ADD HYD	917.99	1& 2	1	.09900	1733.65	64.107	12.14139	2.267	27.362	
ROUTE	917.88	1	7	.09900	1662.78	64.094	12.13893	2.300	26.243	
COMPUTE NM HYD	913.20	-	1	.01700	300.62	10.200	11.25054	2.267	27.630	PER IMP= 17.00
ROUTE	913.18	1	2	.01700	276.29	10.199	11.24895	2.300	25.395	
COMPUTE NM HYD	918.00	-	1	.11400	1433.06	79.147	13.01761	2.400	19.642	PER IMP= 50.00
ADD HYD	918.99	1& 2	1	.13100	1637.33	89.346	12.78810	2.367	19.529	
ADD HYD	918.99	1& 7	1	.23000	3093.89	153.443	12.50897	2.333	21.018	
ROUTE	918.88	1	3	.23000	2917.56	153.452	12.50964	2.350	19.820	
ADD HYD	919.19	3& 6	1	2.75630	25360.11	1684.608	11.45971	2.500	14.376	
ROUTE	921.18	1	3	2.75630	24628.89	1684.632	11.45987	2.550	13.962	
COMPUTE NM HYD	921.10	-	1	.04600	824.74	31.937	13.01760	2.267	28.014	PER IMP= 50.00
ADD HYD	921.18	1& 3	3	2.80230	24692.48	1716.221	11.48312	2.567	13.768	
COMPUTE NM HYD	921.20	-	1	.09900	1816.10	68.733	13.01761	2.267	28.663	PER IMP= 50.00
ROUTE	921.28	1	4	.09900	1708.75	68.724	13.01583	2.300	26.969	
ADD HYD	921.18	3& 4	3	2.90130	25233.60	1784.968	11.53557	2.567	13.590	
COMPUTE NM HYD	922.00	-	1	.02100	385.84	14.580	13.01761	2.267	28.708	PER IMP= 50.00
COMPUTE NM HYD	923.00	-	2	.01300	238.89	9.026	13.01761	2.267	28.713	PER IMP= 50.00
ADD HYD	923.00	1& 2	1	.03400	624.73	23.605	13.01760	2.267	28.710	
ROUTE	922.18	1	2	.03400	575.48	23.602	13.01584	2.300	26.447	
COMPUTE NM HYD	920.00	-	1	.10500	1733.09	72.899	13.01760	2.300	25.790	PER IMP= 50.00
ADD HYD	920.99	2& 1	1	.13900	2308.54	96.503	13.01750	2.300	25.950	
ROUTE	920.98	1	2	.13900	2238.47	96.505	13.01771	2.300	25.163	
ADD HYD	920.99	2& 3	1	3.04030	26100.62	1881.457	11.60324	2.567	13.414	
ROUTE	920.97	1	2	3.04030	26092.20	1881.424	11.60303	2.550	13.410	
COMPUTE NM HYD	926.00	-	1	.11700	2153.34	82.633	13.24240	2.267	28.757	PER IMP= 55.00
ADD HYD	920.97	1& 2	2	3.15730	26554.57	1963.662	11.66144	2.567	13.141	
COMPUTE NM HYD	927.00	-	1	.01000	189.34	7.868	14.75185	2.267	29.584	PER IMP= 90.00
COMPUTE NM HYD	924.00	-	3	.06400	1184.82	45.940	13.45891	2.267	28.926	PER IMP= 60.00
ADD HYD	924.99	1& 3	1	.07400	1374.15	53.807	13.63364	2.267	29.015	
ROUTE	924.98	1	3	.07400	1273.54	53.800	13.63181	2.300	26.891	
COMPUTE NM HYD	925.00	-	1	.07700	1174.58	55.680	13.55841	2.300	23.835	PER IMP= 53.00
ADD HYD	925.99	3& 1	1	.15100	2448.08	109.481	13.59444	2.300	25.332	
ROUTE	925.98	1	3	.15100	2386.29	109.482	13.59457	2.300	24.693	
ADD HYD	926.99	3& 2	1	3.30830	27533.68	2073.145	11.74968	2.567	13.004	
ROUTE	925.97	1	5	3.30830	27489.37	2073.146	11.74969	2.550	12.983	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
COMPUTE NM HYD	930.00	-	1	.13500	2480.79	95.010	13.19579	2.267	28.713	PER IMP= 54.00
ADD HYD	930.99	1& 5	7	3.44330	28074.78	2167.752	11.80419	2.567	12.740	
COMPUTE NM HYD	928.00	-	1	.01100	136.97	7.637	13.01761	2.400	19.457	PER IMP= 50.00
ROUTE	924.88	1	2	.01100	134.66	7.637	13.01776	2.450	19.128	
COMPUTE NM HYD	929.00	-	1	.01900	357.31	14.533	14.34153	2.267	29.384	PER IMP= 80.00
ADD HYD	929.99	1& 2	4	.03000	400.84	22.170	13.85609	2.267	20.877	
COMPUTE NM HYD	931.00	-	1	.06000	753.26	41.382	12.93198	2.400	19.616	PER IMP= 50.00
ADD HYD	931.99	4& 1	1	.09000	1071.00	63.552	13.24002	2.367	18.594	
ROUTE	931.98	1	3	.09000	1067.57	63.550	13.23965	2.400	18.534	
COMPUTE NM HYD	932.00	-	1	.07800	1454.28	57.825	13.90023	2.267	29.132	PER IMP= 70.00
ADD HYD	932.00	1& 3	17	.16800	2217.16	121.383	13.54726	2.267	20.621	
ROUTE	932.80	17	3	.16800	2211.51	121.393	13.54827	2.300	20.568	
ADD HYD	930.99	3& 7	4	3.61130	29282.46	2289.117	11.88518	2.567	12.670	
ROUTE	930.98	4	5	3.61130	29163.90	2289.070	11.88493	2.550	12.618	
COMPUTE NM HYD	935.00	-	1	.09700	1779.54	67.344	13.01761	2.267	28.665	PER IMP= 50.00
ADD HYD	935.00	1& 5	17	3.70830	29578.68	2356.128	11.91311	2.567	12.463	
COMPUTE NM HYD	933.00	-	1	.04100	753.21	28.465	13.01761	2.267	28.705	PER IMP= 50.00
ADD HYD	933.00	17& 1	18	3.74930	29786.76	2384.594	11.92520	2.567	12.413	
COMPUTE NM HYD	934.00	-	1	.06500	1193.94	45.128	13.01761	2.267	28.700	PER IMP= 50.00
ADD HYD	934.00	1&18	19	3.81430	30116.66	2429.722	11.94381	2.567	12.337	
COMPUTE NM HYD	937.00	-	1	.01200	220.52	8.331	13.01761	2.267	28.714	PER IMP= 50.00
ROUTE	937.80	1	20	.01200	210.23	8.330	13.01590	2.300	27.373	
ADD HYD	935.99	20&19	13	3.82630	30184.44	2438.050	11.94717	2.567	12.326	
ROUTE RESERVOIR	940.57	13	2	3.82630	30019.29	2369.097	11.60928	2.600	12.259	AC-FT= 198.967
FINISH										

```
* THIS FILE WILL PRINT ALL HYD'S WITH A PRINT HYD
START                0.0 HRS
*
* FILE NAME NDBL100.EXT
*
* TITLE 1           NORTH DOMINGO BACA ARROYO  LA CUEVA DIVERSION
* TITLE 2           EXISTING CONDITIONS 100-YR. 24-HR. STORM
*
* EXISTING  COND HYD WO BULKING
RECALL HYD          ID= 2   HYD NO=  914.DT=  .050000 HRS   DA=   2.7479 SQ MI
                    PEAK=    157.004CFS  RO= 1.4066 INCHES  NO PTS=584
                    FLOW RATES
                        .000      .000      .000      .000      .000
                        .000      .000      .000      .000      .000
                        .000      .000      .001      .006      .025
                        .093      .280      .700     1.477     2.711
                       4.458     6.722     9.456    12.585    16.117
                      20.336    25.989    30.758    39.708    54.719
                      67.224    79.999    91.964   103.204   114.136
                     122.718   128.467   133.223   137.341   140.443
                     142.993   144.953   146.680   148.163   149.507
                     150.660   151.658   152.548   153.339   154.027
                     154.453   154.828   155.155   155.441   155.690
                     155.908   156.097   156.261   156.403   156.526
                     156.630   156.719   156.793   156.854   156.903
                     156.941   156.969   156.988   156.999   157.004
                     156.999   156.989   156.973   156.952   156.926
                     156.896   156.861   156.823   156.781   156.736
                     156.688   156.638   156.584   156.529   156.472
                     156.412   156.351   156.288   156.224   156.158
                     156.091   156.022   155.953   155.883   155.812
                     155.739   155.667   155.593   155.519   155.444
                     155.369   155.293   155.216   155.140   155.062
                     154.985   154.907   154.829   154.751   154.672
                     154.593   154.514   154.435   154.356   154.276
                     154.197   154.117   154.037   153.938   153.823
                     153.708   153.592   153.477   153.362   153.246
                     153.131   153.015   152.900   152.784   152.668
                     152.553   152.437   152.321   152.205   152.089
                     151.973   151.857   151.742   151.626   151.510
                     151.394   151.278   151.162   151.046   150.930
                     150.814   150.699   150.583   150.467   150.351
                     150.236   150.120   150.005   149.879   149.754
                     149.628   149.502   149.377   149.251   149.126
                     149.001   148.875   148.750   148.625   148.500
                     148.375   148.250   148.125   148.000   147.875
                     147.751   147.626   147.501   147.377   147.252
                     147.128   147.004   146.879   146.755   146.631
                     146.507   146.383   146.259   146.135   146.012
                     145.876   145.739   145.602   145.466   145.329
                     145.193   145.056   144.920   144.784   144.648
                     144.512   144.376   144.240   144.105   143.969
                     143.834   143.698   143.563   143.428   143.293
                     143.158   143.023   142.888   142.753   142.619
                     142.484   142.350   142.215   142.081   141.926
                     141.739   141.552   141.365   141.178   140.992
                     140.805   140.619   140.434   140.248   140.063
                     139.877   139.693   139.508   139.323   139.139
                     138.955   138.771   138.588   138.404   138.221
```

135.962	135.722	135.482	135.243	135.004
134.765	134.527	134.289	134.052	133.815
133.579	133.343	133.107	132.872	132.637
132.402	132.168	131.935	131.701	131.468
131.236	131.004	130.708	130.411	130.115
129.819	129.524	129.230	128.937	128.644
128.352	128.060	127.769	127.479	127.190
126.901	126.613	126.325	126.038	125.752
125.467	125.182	124.898	124.614	124.331
124.049	123.595	123.107	122.621	122.137
121.655	121.175	120.696	120.220	119.746
119.274	118.804	118.336	117.870	117.405
116.943	116.482	116.024	115.567	115.113
114.660	114.209	113.760	113.312	112.809
112.173	111.541	110.913	110.289	109.668
109.051	108.438	107.829	107.223	106.621
106.023	105.428	104.837	104.250	103.666
103.085	102.508	101.935	101.365	100.798
100.235	99.676	99.119	98.496	97.858
97.225	96.596	95.971	95.351	94.735
94.124	93.517	92.914	92.316	91.721
91.131	90.545	89.964	89.386	88.812
88.243	87.677	87.116	86.558	86.004
85.455	84.858	84.016	83.184	82.360
81.546	80.740	79.944	79.157	78.378
77.608	76.846	76.093	75.348	74.612
73.884	73.163	72.451	71.747	71.050
70.362	69.680	69.007	68.340	67.549
66.629	65.724	64.833	63.955	63.092
62.243	61.406	60.583	59.773	58.976
58.191	57.419	56.659	55.911	55.174
54.449	53.736	53.033	52.342	51.108
49.367	47.699	46.101	44.570	43.104
41.699	40.353	39.063	37.828	36.644
35.509	34.422	33.380	32.382	31.426
30.509	29.631	28.730	27.938	25.149
22.785	20.782	19.083	17.642	16.420
15.383	14.504	13.757	13.123	12.584
12.125	11.735	11.402	11.118	10.875
10.667	10.489	10.336	10.204	10.089
9.990	9.905	9.831	9.766	9.708
9.657	9.611	9.571	9.534	9.501
9.471	9.443	9.417	9.393	9.371
9.349	9.329	9.310	9.292	9.275
9.258	9.241	9.226	9.211	9.197
9.182	9.167	9.153	9.138	9.124
9.110	9.096	9.082	9.068	9.054
9.040	9.025	9.005	8.971	8.911
8.818	8.686	8.512	8.297	8.042
7.753	7.434	7.093	6.735	6.368
5.998	5.630	5.268	4.916	4.576
4.251	3.942	3.648	3.372	3.112
2.868	2.641	2.429	2.232	2.049
1.880	1.723	1.579	1.445	1.322
1.209	1.105	1.009	.921	.841
.767	.700	.638	.581	.529
.482	.439	.399	.363	.331
.301	.273	.249	.226	.205
.187	.169	.154	.139	.126
.115	.104	.094	.085	.077
.070	.064	.058	.052	.047
.043	.039	.035	.032	.029
.026	.023	.021	.019	.017
.016	.014	.013	.012	.011

```
                    .004      .003      .003      .003      .002
                    .002      .002      .001      .001

*
*@OUTFLOW HYD N DAM HAMILTON
*
*
*
*
*    ROUTE OUTFLOW HYD. FROM N. DAM THROUH BASIN 919.1 TO RP 914.68
*     *      *    *    *    *    *    *    *    *    *    *    *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 2 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 30 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=2   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.028  FP SLP= .028
                    N=.035 DIST=135 N=-.03 DIST=195 N=.035 DIST=330
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0   180    0
                    195     1   330    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3  REACH=1  NO VS=1
                    L=1500   SLP=.028
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. OUTFLOW HYD.  THROUGH REACH 1  TO RP 914.88
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*        BETWEEN HAMILTON AND HOLBROOK
ROUTE               ID=3  HYD=914.68  INFLOW HYD ID=2   DT=.05
*
PRINT HYD           ID=3    CODE=1
*
*  SUB-BASIN  914.2
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                    RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
*  SUB-BASIN  914.2
***************************
COMPUTE NM HYD      ID=1  HYD=914.2  DA=.035 SQ MI
                    PER A=50  B=0  C=40  D=10
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 914.2
*     *PRINT HYD. 914.2
**********************
PRINT HYD           ID=1   CODE=1
*
*    ROUTE 914.2 TO RP 914.28 BETWEEN HAMILTON AND HOLBROOK
*     *      *    *    *    *    *    *    *    *    *    *    *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 5 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 100 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=5   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.032  FP SLP= .032
                    N=.035 DIST=135 N=-.03 DIST=265 N=.035 DIST=400
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0   250    0
                    265     1   400    10
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
*    *    *    *    *    *    *    *    *    *    *    *    *
*
ROUTE                ID=2  HYD=914.28  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  RP 914.28    AND    RP 914.68   AT   RP 914.78
*    BETWEEN HAMILTON AND HOLBROOK
ADD HYD              ID=2  HYD=914.78   ID I=2      ID II=3
PRINT HYD            ID=2   CODE=1
*
*   ROUTE RP 914.78 TO RP 914.88 AT HOLBROOK
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=3   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.030  FP SLP=.030
                     N=.035 DIST=135 N=-.03 DIST=215 N=.035 DIST=350
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0    200    0
                     215     1   350    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3  REACH=1  NO VS=1
                     L=1300   SLP=.030
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3  HYD=914.88  INFLOW HYD ID=2   DT=.05
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN   919.1
**********************
*RAINFALL              TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
*                      RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   919.1
***************************
COMPUTE NM HYD       ID=1  HYD=919.1  DA=.079 SQ MI
                     PER A=50  B=5  C=40  D=5
                     TP=.13 HRS        RAIN=-1
*@ SUB-BASIN 919.1
*
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 919.1    AND  RP 914.88   AT   AP  919.19
*    AT HOLBROOK
ADD HYD              ID=1  HYD=919.19 ID I=1      ID II=3
*@DAM HYD @ HOLBROOK
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 919.19 TO CONFLUENCE WITH OTHER ARROYO  RP 919.18
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS HALF WAY TO VENTURA AT CONFLUENCE WITH OTHER ARROYO
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=3   NSEGS=3
```

```
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0   200    0
                    215     1   350    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=5  REACH=1  NO VS=1
                    L=1950   SLP=.033
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE               ID=5  HYD=919.18  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=5   CODE=1
*
********************
* SUB-BASIN   915.1
**********************
*RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
*                     RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN    915.1
***************************
COMPUTE NM HYD       ID=1  HYD=915.1  DA=0.009 SQ MI
                     PER A=80  B=0  C=10  D=10
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 915.1
PRINT HYD            ID=1   CODE=1
*
*   ROUTE 915.1 THROUGH BASIN 915.2 TO RP 915.18 AT HAMILTON
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 3 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.040  FP SLP=.040
                     N=.035 DIST=135 N=-.03 DIST=168 N=.035 DIST=303
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0   153    0
                     168     1   303    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3  REACH=1  NO VS=1
                     L=1450   SLP=.040
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3  HYD=915.18  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN     915.2
**********************
*RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
*                     RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN    915.2
***************************
COMPUTE NM HYD       ID=1  HYD=915.2  DA=0.028 SQ MI
                     PER A=95  B=0  C=0  D=5
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 915.2
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  915.2    AND RP 915.18  AT   AP 915.29
*
ADD HYD              ID=2  HYD=915.29  ID I=1      ID II=3
```

```
**
********************
* SUB-BASIN     408.1
**********************
*RAINFALL              TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
*                      RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************     *     *     *     *     *     *     *     *
* SUB-BASIN    408.1
***************************
COMPUTE NM HYD        ID=1  HYD=408.1  DA=0.019 SQ MI
                      PER A=80  B=0  C=10  D=10
                      TP=0.15 HRS        RAIN=-1
*@ SUB-BASIN 408.1
PRINT HYD             ID=1   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S  915.29    AND AP 408.1    AT    RP 408.99
*      JUST BELOW HAMILTON
ADD HYD               ID=1  HYD=408.99  ID I=1      ID II=2
*
PRINT HYD             ID=1   CODE=1
*
*   ROUTE AP 408.99 TO HOLBROOK ST. = RP 915.28
*     *       *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 3 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                      ELMIN=0  ELMAX=10  CH SLP=.037  FP SLP=.037
                      N=.035 DIST=135 N=-.03 DIST=168 N=.035 DIST=303
                      DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                        0    10   135     1   150    0    153    0
                      168     1   303    10
*     *       *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=2   VS NO=3   NSEGS=3
                      ELMIN=0  ELMAX=10  CH SLP=.029  FP SLP=.029
                      N=.035 DIST=135 N=-.03 DIST=215 N=.035 DIST=350
                      DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                        0    10   135     1   150    0    200    0
                      215     1   350    10
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME   ID=2  REACH=1  NO VS=2
                      L=2900   SLP=.033
*     *     *     *     *     *     *     *     *     *     *     *     *
ROUTE                 ID=2  HYD=915.28  INFLOW HYD ID=1   DT=.05
PRINT HYD             ID=2   CODE=1
*
********************
* SUB-BASIN   919.2
**********************
*RAINFALL              TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
*                      RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************     *     *     *     *     *     *     *     *
```

```
COMPUTE NM HYD        ID=1  HYD=919.2  DA=0.061 SQ MI
                      PER A=65  B=5  C=25  D=5
                      TP=.13 HRS        RAIN=-1
*@ SUB-BASIN 919.2
*
PRINT HYD             ID=1   CODE=1
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S  919.2   AND  RP 915.28   AT   AP 919.29
*       AT HOLBROOK
ADD HYD               ID=1  HYD=919.29  ID I=2      ID II=1
*
PRINT HYD             ID=1   CODE=1
*
*   ROUTE AP 919.29 TO RP 919.28 BETWEEN HOLBROOK AND VENTURA
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 7 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 200 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=7   NSEGS=3
                      ELMIN=0  ELMAX=10  CH SLP=.003  FP SLP=.003
                      N=.035 DIST=135 N=-.03 DIST=365 N=.035 DIST=500
                      DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                        0    10   135     1   150    0    350    0
                      365     1   500    10
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=2   VS NO=3   NSEGS=3
                      ELMIN=0  ELMAX=10  CH SLP=.029  FP SLP=.029
                      N=.035 DIST=135 N=-.03 DIST=215 N=.035 DIST=350
                      DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                        0    10   135     1   150    0    200    0
                      215     1   350    10
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME   ID=2  REACH=1  NO VS=2
                      L=3000    SLP=.016
*     *     *     *     *     *     *     *     *     *     *     *     *
ROUTE                 ID=2  HYD=919.28  INFLOW HYD ID=1   DT=.05
PRINT HYD             ID=2   CODE=1
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S   RP 919.28     AND  RP 919.18   AT   RP 919.38
*     BETWEEN HOLBROOK AND VENTURA
ADD HYD               ID=6  HYD=919.38  ID I=2      ID II=5
PRINT HYD             ID=6   CODE=1
*
********************
* SUB-BASIN  913.2
**********************
*RAINFALL               TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
*                       RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************     *     *     *     *     *     *     *     *
* SUB-BASIN   913.2
***************************
COMPUTE NM HYD        ID=1  HYD=913.2  DA=0.017 SQ MI
                      PER A=95  B=0  C=0  D=5
```

```
PRINT HYD            ID=1   CODE=1
*   ROUTE AP 913.19 TO RP 913.18
*    *     *     *     *     *     *     *     *     *     *     *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 3 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.034  FP SLP=.034
                     N=.035 DIST=135 N=-.03 DIST=168 N=.035 DIST=303
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0   153    0
                     168     1   303    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=2920   SLP=.034
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=913.18  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
********************
* SUB-BASIN   918
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                     RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   918
***************************
COMPUTE NM HYD       ID=1  HYD=918  DA=0.114 SQ MI
                     PER A=80  B=0  C=10 D=10
                     TP=0.26 HRS        RAIN=-1
*@ SUB-BASIN 918
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 918  AND  RP 913.18  AT   AP 918.99
ADD HYD              ID=1  HYD=918.99  ID I=1      ID II=2
*
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 918.99 TO  RP 918.88
*    *     *     *     *     *     *     *     *     *     *     *     *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 2 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H. BOT. WIDTH = 30 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.028  FP SLP=.028
                     N=.035 DIST=135 N=-.03 DIST=195 N=.035 DIST=330
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0   180    0
                     195     1   330    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=2300   SLP=.028
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
*
ROUTE                ID=2  HYD=918.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
********************
* SUB-BASIN   921.1
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
***************************     *     *     *     *     *     *     *     *
* SUB-BASIN   921.1
***************************
COMPUTE NM HYD       ID=1  HYD=921.1  DA=0.046 SQ MI
                     PER A=80  B=0  C=10 D=10
                     TP=0.14 HRS        RAIN=-1
*@ SUB-BASIN 921.1
PRINT HYD            ID=1   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S  AP 921.1  AND  RP 918.88  AT  RP 921.19
*
ADD HYD              ID=1  HYD=921.19  ID I=1      ID II=2
PRINT HYD            ID=1   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S  RP 921.19    AND  RP 919.38   AT   RP 921.78
*
ADD HYD              ID=1  HYD=921.78  ID I=6      ID II=1
PRINT HYD            ID=1   CODE=1
*
*  ROUTE RP  921.78 TO VENTUREA ST. = RP 921.88
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 7 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 200 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=7   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.027  FP SLP=.027
                     N=.035 DIST=135 N=-.03 DIST=365 N=.035 DIST=500
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0    350    0
                     365     1   500    10
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=8500   SLP=.027
*     *     *     *     *     *     *     *     *     *     *     *     *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=921.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
********************
* SUB-BASIN   921.2
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
***************************     *     *     *     *     *     *     *     *
* SUB-BASIN   921.2
***************************
COMPUTE NM HYD       ID=1  HYD=921.2  DA=0.085 SQ MI
```

```
*@ SUB-BASIN 921.2
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 921.2  AND  RP 921.88   AT   AP 921.99
*
ADD HYD              ID=6  HYD=921.99  ID I=1      ID II=2
*
*@DAM HYD AT VENTURA
PRINT HYD            ID=6   CODE=1
*
********************
* SUB-BASIN   913.1
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                     RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
* SUB-BASIN    913.1
***************************
COMPUTE NM HYD       ID=1  HYD=913.1  DA=0.049 SQ MI
                     PER A=95  B=0  C=0  D=5
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 913.1
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*  ROUTE AP 913.10 TO RP 913.88 AT HOLBROOK ST.
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 2 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 30 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=2   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.029  FP SLP=.029
                     N=.035 DIST=135 N=-.03 DIST=195 N=.035 DIST=330
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0    180    0
                     195     1   330    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=2900   SLP=.029
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=913.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
********************
* SUB-BASIN   917
*RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
*                     RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   917
***************************
*
COMPUTE NM HYD       ID=1  HYD=917  DA=0.050 SQ MI
                     PER A=90  B=0  C=0  D=10
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 917
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
ADD HYD              ID=1  HYD=917.99  ID I=1      ID II=2
*
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 917.99 TP RP 917.88
*     *      *    *    *    *    *    *    *    *    *    *    *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 4 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 75 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=4   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.018  FP SLP=.018
                     N=.035 DIST=135 N=-.03 DIST=240 N=.035 DIST=375
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0   225    0
                     240     1   375    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=3620   SLP=.018
*    *    *    *    *    *    *    *    *    *    *    *    *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=917.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
********************
* SUB-BASIN   920
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
* SUB-BASIN  920
***************************
COMPUTE NM HYD       ID=1  HYD=920  DA=0.105 SQ MI
                     PER A=85  B=0  C=10  D=5
                     TP=0.16 HRS        RAIN=-1
*@ SUB-BASIN 920
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*     COMBINE HYD.'S  AP 920  AND  RP 917.88   AT   AP  920.99
*
ADD HYD              ID=1  HYD=920.99  ID I=2      ID II=1
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*     COMBINE HYD.'S  AP 920.99    AND AP 921.99 AT   AP 920.99
*
ADD HYD              ID=1  HYD=920.99  ID I=1      ID II=6
*
PRINT HYD            ID=1   CODE=1
*
*    ROUTE AP 920.99 TO RP 920.88
*     *      *    *    *    *    *    *    *    *    *    *    *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 7 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 200 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=7   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.029  FP SLP=.029
```

```
                    ---  ---  ---  ---  ---  ---  ---  ---
                      0   10  135    1  150    0  350    0
                    365    1  500   10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                    L=2700   SLP=.029
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=2  HYD=920.88  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=2   CODE=1
*
********************
* SUB-BASIN   926
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                    RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
* SUB-BASIN   926
***************************
COMPUTE NM HYD      ID=1  HYD=926  DA=0.098 SQ MI
                    PER A=80  B=0  C=10  D=10
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 926
PRINT HYD           ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 926  AND  RP 920.88 AT   AP  926.79
*
ADD HYD             ID=4  HYD=926.79  ID I=1      ID II=2
*
*@DAM HYD AT BARSTOW
PRINT HYD           ID=4   CODE=1
*
********************
* SUB-BASIN   923
**********************
*RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
*                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   923
***************************
COMPUTE NM HYD      ID=1  HYD=923  DA=0.013 SQ MI
                    PER A=80  B=0  C=10  D=10
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 923
PRINT HYD           ID=1   CODE=1
*
*   ROUTE AP 923.9 TO RP 923.8
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 3 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.029  FP SLP=.029
                    N=.035 DIST=135 N=-.03 DIST=168 N=.035 DIST=303
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0   153    0
                    168     1   303    10
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
```

```
*        ASSUME STANDARD CROSS SECTION 2 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 30 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=2   VS NO=2   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.034  FP SLP=.034
                    N=.035 DIST=135 N=-.03 DIST=195 N=.035 DIST=330
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0    180    0
                    195     1   330    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=2
                    L=2830   SLP=.031
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=2  HYD=923.8   INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=2   CODE=1
*
********************
* SUB-BASIN  925
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                    RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
* SUB-BASIN  925
***************************
COMPUTE NM HYD      ID=1  HYD=925  DA=0.077 SQ MI
                    PER A=50  B=5  C=25  D=20
                    TP=0.19 HRS        RAIN=-1
*@ SUB-BASIN 925
*
PRINT HYD           ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 925.9     AND   RP 923.8   AT   AP 925.99
*
ADD HYD             ID=1  HYD=925.99  ID I=2      ID II=1
*
PRINT HYD           ID=1   CODE=1
* COMBINE HYD.'S 925.99 AND 926.79 AT 926.99
ADD HYD             ID=1  HYD=926.99  ID I = 4  ID II = 1
*@BARSTOW
PRINT HYD           ID=1   CODE=1
*   ROUTE AP 926.99  TO RP 926.8
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 6 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 150 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=6   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.028  FP SLP=.028
                    N=.035 DIST=135 N=-.03 DIST=315 N=.035 DIST=450
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0    300    0
                    315     1   450    10
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=2   VS NO=3   NSEGS=3
```

```
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0   200    0
                    215     1   350    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=5  REACH=1  NO VS=2
                    L=2800   SLP=.027
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=5  HYD=926.8   INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=5   CODE=1
*
********************
* SUB-BASIN   930
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
* SUB-BASIN   930
***************************
COMPUTE NM HYD      ID=1  HYD=930  DA=0.148 SQ MI
                    PER A=50  B=0  C=30  D=20
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 930
*
PRINT HYD           ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  RP 926.8    AND  AP 930    AT   AP  930.99
*
ADD HYD             ID=1  HYD=930.99  ID I=1      ID II=5
*
*@DAM HYD @ WYOMING
PRINT HYD           ID=1   CODE=1
*
*   ROUTE AP 930.99  TO RP 930.8
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 7 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 200 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=7   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.029  FP SLP=.029
                    N=.035 DIST=135 N=-.03 DIST=365 N=.035 DIST=500
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0   350    0
                    365     1   500    10
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=2   VS NO=3   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.030  FP SLP=.030
                    N=.035 DIST=135 N=-.03 DIST=215 N=.035 DIST=350
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0   200    0
                    215     1   350    10
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
*     *     *     *     *     *     *     *     *     *     *     *     *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=12  HYD=930.8   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=12   CODE=1
********************
* SUB-BASIN   935
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                     RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
*   SUB-BASIN  935.1
***************************
COMPUTE NM HYD       ID=14 HYD=935.1  DA=0.09700 SQ MI
                     PER A=85  B=0  C=10  D=5
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 935.1
*
PRINT HYD            ID=14  CODE=1

***************************     *     *     *     *     *     *     *     *
* SUB-BASIN   421.4
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                     RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
* SUB-BASIN  421.4
***************************
COMPUTE NM HYD       ID=1  HYD=421.4  DA=0.012 SQ MI
                     PER A=80  B=0  C=10 D=10
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 421.4
*
PRINT HYD            ID=1   CODE=1
*
*  this hyd is from the existing condition south domingo baca and paseo del
* norte file   and is the split flow at the wyoming intersection  -
*  assumed 30% of the flow will spill into the north domingo baca basin
RECALL HYD           ID= 2   HYD NO=421.98 DT=  .050000 HRS   DA=  .1038 SQ MI
                     PEAK=    111.302CFS  RO= 1.0586 INCHES  NO PTS=520
                     FLOW RATES
                          .000       .000       .000       .000       .000
                          .000       .000       .000       .000       .000
                          .000       .000       .000       .000       .000
                          .000       .000       .000       .000       .000
                          .004       .034       .095       .185       .401
                          .926      1.915      5.376     14.296     29.119
                        48.632     71.558     93.290    107.778    111.302
                       104.697     92.635     79.568     67.490     57.296
                        49.035     42.108     36.384     31.527     27.054
                        23.230     20.271     17.831     15.569     13.409
                        11.619     10.388      9.530      8.821      8.182
                         7.596      7.054      6.555      6.097      5.677
                         5.290      4.935      4.610      4.317      4.045
                         3.787      3.540      3.298      3.066      2.845
                         2.638      2.444      2.265      2.099      1.946
                         1.806      1.677      1.559      1.452      1.353
                         1.263      1.181      1.106      1.038       .976
                          .920       .869       .822       .780       .742
                          .706       .674       .645       .618       .593
                          .571       .551       .533       .516       .501
                          .487       .475       .465       .455       .447
                          .440       .433       .427       .423       .419
                          .415       .412       .410       .408       .407
                          .406       .405       .405       .405       .405
                          .405       .406       .404       .401       .398
                          .396       .393       .391       .389       .387
```

.364	.362	.360	.358	.356
.355	.353	.352	.350	.349
.347	.346	.344	.343	.342
.341	.340	.339	.338	.336
.335	.333	.332	.331	.330
.329	.328	.327	.327	.326
.324	.323	.322	.321	.320
.319	.318	.317	.316	.315
.314	.313	.312	.311	.310
.309	.308	.307	.306	.305
.305	.304	.303	.302	.301
.300	.299	.298	.297	.297
.296	.295	.294	.293	.292
.292	.291	.290	.289	.288
.288	.287	.286	.285	.284
.284	.282	.281	.281	.280
.280	.279	.278	.277	.277
.276	.275	.274	.273	.273
.272	.272	.271	.270	.269
.269	.268	.267	.266	.266
.265	.265	.264	.264	.263
.262	.261	.260	.259	.259
.259	.258	.257	.256	.256
.256	.255	.254	.253	.253
.252	.252	.251	.251	.250
.250	.249	.248	.248	.247
.246	.246	.245	.245	.244
.244	.243	.242	.242	.241
.240	.240	.240	.239	.239
.238	.238	.237	.237	.236
.235	.235	.235	.234	.233
.233	.232	.232	.231	.231
.230	.230	.230	.229	.228
.228	.227	.227	.227	.226
.226	.225	.224	.224	.224
.223	.223	.222	.221	.221
.221	.221	.220	.220	.219
.218	.218	.218	.217	.217
.216	.216	.215	.215	.214
.214	.214	.213	.213	.212
.212	.211	.211	.211	.210
.210	.210	.209	.209	.208
.208	.208	.207	.207	.206
.205	.205	.205	.205	.204
.204	.203	.203	.203	.202
.202	.201	.201	.201	.201
.200	.199	.199	.199	.199
.198	.198	.197	.197	.197
.196	.196	.196	.195	.195
.195	.195	.194	.194	.193
.193	.193	.192	.192	.192
.191	.191	.191	.191	.190
.189	.189	.189	.188	.188
.188	.188	.187	.187	.187
.186	.186	.186	.185	.185
.185	.184	.184	.184	.183
.183	.183	.183	.182	.182
.182	.181	.181	.181	.181
.180	.180	.180	.179	.179
.178	.178	.178	.178	.178
.177	.177	.176	.176	.176
.176	.176	.176	.175	.175
.174	.174	.174	.173	.173
.173	.173	.172	.171	.171

```
                    .169      .169      .169      .169      .168
                    .168      .168      .167      .167      .167
                    .166      .166      .161      .153      .145
                    .136      .128      .119      .111      .102
                    .094      .086      .079      .071      .064
                    .057      .051      .045      .039      .034
                    .030      .025      .022      .019      .016
                    .013      .011      .009      .008      .006
                    .005      .004      .004      .003      .003
                    .002      .002      .001      .001      .001
*@30%DIV FROM PDN 421.98
PRINT HYD             ID=2
*     COMBINE HYD.'S   AP 421.4      AND  421.98 from PDN   AT   AP  421.49
*
ADD HYD             ID=1  HYD=421.49  ID I=1      ID II=2
*
*@BAS421.4+30%PDN @ WYOMING
PRINT HYD           ID=1   CODE=1
*   ROUTE  AP 421.49   TO RP 421.48
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 2 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 30 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=2   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.029  FP SLP=.029
                    N=.035 DIST=135 N=-.03 DIST=195 N=.035 DIST=330
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0   180    0
                    195     1   330    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                    L=2750   SLP=.029
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=2  HYD=421.48  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=2   CODE=1
********************
* SUB-BASIN   937
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  937
***************************
COMPUTE NM HYD      ID=1  HYD=937  DA=0.044 SQ MI
                    PER A=95  B=0  C=0  D=5
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 937
*
PRINT HYD           ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 937      AND     421.48  AT   AP  937.99
*
ADD HYD             ID=1  HYD=937.99  ID I=1      ID II=2
*
*@937.99
PRINT HYD           ID=1   CODE=1
```

```
*     *      *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 5 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 100 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=5   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.030  FP SLP=.030
                     N=.035 DIST=135 N=-.03 DIST=265 N=.035 DIST=400
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0    250    0
                     265     1   400    10
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=1000   SLP=.030
*     *     *     *     *     *     *     *     *     *     *     *     *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=937.8   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
PUNCH HYD            ID=2  HYD=937.8
*
*  COMBINE 937.8 AND 935.2 AS 935.3  (DSD 1-27-93)
ADD HYD              ID=14 HYD=935.3   ID I=2  ID II=14
PRINT HYD            ID=14  CODE=1
*
*   COMBINE 930.8 AND 935.3 AS 930.85 (LOWER NDB DAM INFLOW DSD 1-27-93)
ADD HYD              ID=13 HYD=930.85 ID I=14  ID II=12
PRINT HYD            ID=13  CODE=1
*
*
********************
*  SUB-BASIN  922
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
*  SUB-BASIN  922
***************************
COMPUTE NM HYD       ID=1  HYD=922  DA=0.021 SQ MI
                     PER A=80  B=0  C=10  D=10
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 922
*
PRINT HYD            ID=1   CODE=1
*
*  ROUTE AP 922   TO RP 922.8
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 2 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 30 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=2   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.030  FP SLP=.030?
                     N=.035 DIST=135 N=-.03 DIST=195 N=.035 DIST=330
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0    180    0
                     195     1   330    10
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
```

```
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=922.8   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
********************
* SUB-BASIN  924
*RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
*                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
* SUB-BASIN  924
***************************
COMPUTE NM HYD       ID=1  HYD=924  DA=0.064 SQ MI
                     PER A=90  B=0  C=8  D=2
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 924
PRINT HYD            ID=1   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S   AP 924      AND  RP 922.8   AT   AP 924.99
*
ADD HYD              ID=1  HYD=924.99  ID I=1      ID II=2
*
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 924.99 TO RP 924.8
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 5 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 100 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=5   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.027  FP SLP=.027
                     N=.035 DIST=135 N=-.03 DIST=265 N=.035 DIST=400
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0   250    0
                     265     1   400    10
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME  ID=6  REACH=1  NO VS=1
                     L=1100   SLP=.027
*     *     *     *     *     *     *     *     *     *     *     *     *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=6  HYD=924.8   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=6   CODE=1
*
********************
* SUB-BASIN   927
*RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
*                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
* SUB-BASIN  927
***************************
COMPUTE NM HYD       ID=1  HYD=927  DA=0.010 SQ MI
                     PER A=80  B=0  C=10  D=10
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 927
PRINT HYD            ID=1   CODE=1
*
*  ROUTE AP 927    TO RP 927.8
*     *     *     *     *     *     *     *     *     *     *     *     *
```

```
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=3   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.020  FP SLP=.020
                     N=.035 DIST=135 N=-.03 DIST=215 N=.035 DIST=350
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0    200    0
                     215     1   350    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=1100   SLP=.020
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=927.8   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
********************
* SUB-BASIN  928
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                     RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  928
***************************
COMPUTE NM HYD       ID=1  HYD=928  DA=0.011 SQ MI
                     PER A=75  B=0  C=20  D=5
                     TP=0.266 HRS        RAIN=-1
*@ SUB-BASIN 928
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 928        AND  RP 927.8   AT   AP 928.99
*
ADD HYD              ID=1  HYD=928.99 ID I=1      ID II=2
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 928.99     AND  RP 924.8   AT   AP  924.81
*
ADD HYD              ID=1  HYD=924.81  ID I=1      ID II=6
*
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 924.81  TO RP 924.88
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=3   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.036  FP SLP=.036?
                     N=.035 DIST=135 N=-.03 DIST=215 N=.035 DIST=350
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0    200    0
                     215     1   350    10
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
                    L=1600   SLP=.036
*     *     *     *     *     *     *     *     *     *     *     *     *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=2  HYD=924.88  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=2   CODE=1
*
********************
* SUB-BASIN  929
RAINFALL            TYPE=1  RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
* SUB-BASIN  929
***************************
COMPUTE NM HYD      ID=1  HYD=929  DA=0.019 SQ MI
                    PER A=50  B=0  C=30  D=20
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 929
PRINT HYD           ID=1   CODE=1
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S  AP 929     AND RP 924.88 AT   AP 929.99
*
ADD HYD             ID=4  HYD=929.99  ID I=1      ID II=2
*
PRINT HYD           ID=4   CODE=1
*
********************
* SUB-BASIN  931
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************     *     *     *     *     *     *     *     *
* SUB-BASIN  931
***************************
COMPUTE NM HYD      ID=1  HYD=931  DA=0.060 SQ MI
                    PER A=0  B=50  C=5  D=45
                    TP=0.26 HRS        RAIN=-1
*@ SUB-BASIN 931
PRINT HYD           ID=1   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S   AP 931      AND  AP 929.99  AT   AP  931.99
*
ADD HYD             ID=1  HYD=931.99 ID I=4      ID II=1
*
*@@ WYOMING AND WILSHIRE
PRINT HYD           ID=1   CODE=1
*
*  DIVIDE FLOW AT INTERSECTION AT WYOMING AND WILSHIRE , PUT 50% TO BASIN 933
*  AND 50% FOR BASIN 934
DIVIDE HYD          ID=1 PER-50  ID I=8 HYD=931.91  ID II=9  HYD=931.92
*@DIV 931.99 50% - 931.91
PRINT HYD           ID=8  CODE=1
*@DIV 931.99 50% - 931.92
PRINT HYD           ID=9  CODE=1
*   ROUTE AP 931.19 TO RP 931.88
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
```

```
                    N=.035 DIST=135 N=-.03 DIST=215 N=.035 DIST=350
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0    200    0
                    215     1   350    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                    L=2640   SLP=.034
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP.? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=2  HYD=931.88  INFLOW HYD ID=8   DT=.05
PRINT HYD           ID=2   CODE=1
*
*   ROUTE AP AP 931.32 TO RP 931.81
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 50 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=3   NSEGS=3
                    ELMIN=0  ELMAX=10  CH SLP=.032  FP SLP=.032
                    N=.035 DIST=135 N=-.03 DIST=215 N=.035 DIST=350
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    10   135     1   150    0    200    0
                    215     1   350    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=4  REACH=1  NO VS=1
                    L=1700   SLP=.032
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=4  HYD=931.81  INFLOW HYD ID=9   DT=.05
PRINT HYD           ID=4   CODE=1
*
********************
* SUB-BASIN  933
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.35  DT=.05
* SUB-BASIN  933.2
***************************
COMPUTE NM HYD      ID=1  HYD=933.2  DA=0.03975 SQ MI
                    PER A=85  B=0  C=10  D=5
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 933.2
PRINT HYD           ID=1   CODE=1
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  933.1
***************************
COMPUTE NM HYD      ID=11  HYD=933.1  DA=0.01325 SQ MI
                    PER A=85  B=0  C=10  D=5
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 933.1
PRINT HYD           ID=11   CODE=1
*     (DSD  1-27-93)
*     COMBINE HYD.'S  AP 933.1      AND  RP 931.88   AT   AP 933.99
*
ADD HYD             ID=12  HYD=933.99  ID I=11      ID II=2
PRINT HYD           ID=12   CODE=1
```

```
*
*   ROUTE AP 933.99 TO RP 933.88
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*
*       ASSUME STANDARD CROSS SECTION 1 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 3 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.024  FP SLP=.024
                     N=.035 DIST=135 N=-.03 DIST=168 N=.035 DIST=303
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0   153    0
                     168     1   303    10
*    *      *    *    *    *    *    *    *    *    *    *    *
*
COMPUTE TRAVEL TIME  ID=8  REACH=1  NO VS=1
                     L=2900   SLP=.024
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=8 HYD=933.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=8  CODE=1
*
*
********************
* SUB-BASIN  932
*RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
*                     RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
* SUB-BASIN 932
***************************
COMPUTE NM HYD       ID=1  HYD=932  DA=0.078 SQ MI
                     PER A=10  B=5  C=45  D=40
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 932
*
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 932    TO RP 932.81
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 5 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H, BOT. WIDTH = 100 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=5   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.044  FP SLP=.044
                     N=.035 DIST=135 N=-.03 DIST=265 N=.035 DIST=400
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0   250    0
                     265     1   400    10
*    *    *    *    *    *    *    *    *    *    *    *    *
*
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=1100   SLP=.044
*
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
*
ROUTE                ID=2  HYD=932.81   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
* ADD RP 932.81 AND RP 931.81 AT 932.82
ADD HYD             ID=1 HYD=932.82  ID I=2 ID II=4
PRINT HYD            ID=1   CODE=1
*
* ROUTE RP 932.82 TO RP 932.83
*    *     *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 5 WHICH HAS THE FOLLOWING DIMENSIONS
*          TRAP. 1V:15H, BOT. WIDTH = 100 FT., DEPTH = 10 FT.
COMPUTE RATING CURVE RC=1   VS NO=5   NSEGS=3
                     ELMIN=0  ELMAX=10  CH SLP=.021  FP SLP=.021
                     N=.035 DIST=135 N=-.03 DIST=265 N=.035 DIST=400
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    10   135     1   150    0    250    0
                     265     1   400    10
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=1700   SLP=.021
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=932.83   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
********************
* SUB-BASIN  934
*RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
*                     RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
* SUB-BASIN  934
***************************
COMPUTE NM HYD       ID=1  HYD=934  DA=0.065 SQ MI
                     PER A=80  B=0  C=10  D=10
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 934
PRINT HYD            ID=1   CODE=1
*
* DIVIDE FLOW FOR BASIN 934 75% TO DAM 25% TO 939.2
DIVIDE HYD          ID=1 PER-75  ID I=4 HYD=934.19
                                 ID II=5  HYD=934.29
*@DIV 934.19 75%
PRINT HYD           ID=4  CODE=1
*@DIV 934.29
PRINT HYD           ID=5  CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 934.19   AND  RP 932.83 AT   AP 934.99
*
ADD HYD              ID=1  HYD=934.99  ID I=4      ID II=2
*
PRINT HYD            ID=1   CODE=1
*PUNCH HYD            ID=1
*
*
*    COMBINE 934.89 AND 930.85 AS 930.86 DAM INFLOW   (DSD 1-27-93)
```

```
PRINT HYD            ID=11  CODE=1
*
*
*
*S 100-yr. TOTAL DAM INFLOW HYDROGRAPH
*    *    *    *    *    *    *    *    *    *    *    *    *
* PROPOSED DOMINGO BACA ARROYO DAM ORIGINAL DAM OPTION   L
*   OPTION = DAM 1
*        LOW FLOW OUTLET (PRINCIPLE SPILLWAY)
*  THE FOLLOWING RATING CURVE IS FOR A 40-INCH ORIFICE PLATE
*        14.6 AC-FT REM FROM STORAGE FOR SEDIMENT
*        EMERGENCY SPILLWAY not used in this routing
*  LENGTH =          C (WEIR COEFF.)=
*
ROUTE RESERVOIR      ID=12 HYD NO=930.87      INFLOW ID=11     CODE=10
                     OUTFLOW (cfs)       STORAGE (ac-ft)     ELEV (ft)
                        0                    0                 5298
                       42.7                  0                 5300
                       65.2                  0                 5302
                       88.9                  0                 5304
                      107.5                  6.2               5306
                      123.3                 12.9               5308
                      137.3                 20.1               5310
                      150.0                 27.8               5312
                      161.7                 36.0               5314
                      172.6                 50.3               5316
                      182.9                 65.3               5318
                      192.6                 81.1               5320
                      201.9                 97.6               5322
                      208.5                110.6               5323.5
                      210.7                115.0               5324
                      219.2                133.1               5326
                      227.4                152.1               5328
                      235.3                172.0               5330
*    *    *    *    *    *    *    *    *    *    *    *    *
*S DAM 1 - 100-yr. DAM OUTFLOW HYDROGRAPH
PRINT HYD            ID=12  CODE=1
*
*PLOT HYD            ID=2   ID=13
*
*
*
FINISH
********************
*  SUB-BASIN  936
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                     RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
*  SUB-BASIN  936
**************************
COMPUTE NM HYD       ID=1  HYD=936  DA=0.018 SQ MI
                     PER A=75  B=0  C=17  D=8
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 936
PRINT HYD            ID=1   CODE=1
*
*   ROUTE  AP 936 TO RP 936.8
*    *     *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CROSS SECTION 2 WHICH HAS THE FOLLOWING DIMENSIONS
*         TRAP. 1V:15H. BOT. WIDTH = 30 FT., DEPTH = 10 FT.
```

```
START                    0.0 HRS
* THIS FILE WILL PRINT ALL HYD'S WITH A PRINT HYD
*
* FILE NAME NDBL100.fut
*
* TITLE 1                NORTH DOMINGO BACA ARROYO - LA CUEVA DIVERSION
* TITLE 2                FUTURE COND. 100-YR. 24-HR. STORM
*
*
*
*
*        NOTE 3-17-94
*      THIS FILE COMPUTES THE HYDROLOGY FROM THE EXIST NDB DAM TO LOWER NDB DAM
*      WITH A RECALL HYD FOR EXIST DAM DISCHARGE.  INCLUDES LA CUEVA DIVERSION.
*      BASED ON FILE OPTL100.FUT
*
*
*
RECALL HYD            ID= 2   HYD NO=  914.DT=  .050000 HRS   DA=   2.8849 SQ MI
                      PEAK=    155.604CFS  RO= 1.6424 INCHES  NO PTS=600
                      FLOW RATES
                            .000      .000      .000      .000      .000
                            .000      .000      .000      .000      .000
                            .000      .000      .001      .005      .020
                            .066      .189      .461      .971     1.799
                           2.999     4.587     6.539     8.813    11.461
                          14.807    19.809    29.336    49.622    63.758
                          74.033    84.732    95.605   104.232   111.869
                         121.523   128.557   133.830   137.677   139.728
                         141.954   144.707   146.930   148.676   150.163
                         151.174   152.051   152.805   153.454   154.010
                         154.301   154.549   154.759   154.936   155.083
                         155.205   155.305   155.387   155.452   155.503
                         155.542   155.571   155.590   155.601   155.604
                         155.601   155.591   155.577   155.558   155.534
                         155.507   155.477   155.444   155.408   155.369
                         155.329   155.286   155.242   155.195   155.148
                         155.099   155.049   154.998   154.945   154.892
                         154.838   154.783   154.728   154.671   154.615
                         154.557   154.500   154.441   154.383   154.324
                         154.265   154.205   154.145   154.085   154.025
                         153.940   153.839   153.738   153.636   153.534
                         153.433   153.331   153.229   153.126   153.024
                         152.922   152.820   152.717   152.615   152.513
                         152.411   152.308   152.206   152.104   152.002
                         151.900   151.799   151.697   151.595   151.493
                         151.392   151.290   151.188   151.086   150.983
                         150.881   150.778   150.676   150.573   150.471
                         150.368   150.265   150.163   150.060   149.943
                         149.806   149.669   149.532   149.395   149.258
                         149.121   148.985   148.848   148.711   148.575
                         148.438   148.301   148.165   148.029   147.892
                         147.756   147.620   147.483   147.347   147.211
                         147.075   146.939   146.803   146.668   146.532
                         146.396   146.261   146.125   145.987   145.818
                         145.649   145.480   145.311   145.142   144.973
                         144.805   144.637   144.469   144.301   144.133
                         143.965   143.798   143.630   143.463   143.296
                         143.129   142.962   142.795   142.628   142.462
```

140.784	140.685	140.586	140.487	140.389
140.290	140.191	140.092	139.994	139.895
139.796	139.698	139.599	139.500	139.402
139.303	139.205	139.107	139.008	138.910
138.812	138.714	138.615	138.517	138.419
138.321	138.223	138.125	138.027	137.929
137.831	137.733	137.636	137.538	137.440
137.342	137.245	137.147	137.050	136.904
136.710	136.515	136.321	136.127	135.933
135.739	135.546	135.353	135.160	134.968
134.775	134.583	134.391	134.200	134.008
133.817	133.627	133.436	133.246	133.055
132.866	132.676	132.487	132.297	132.109
131.920	131.732	131.543	131.356	131.168
130.977	130.759	130.541	130.323	130.106
129.889	129.672	129.456	129.240	129.024
128.809	128.594	128.380	128.166	127.952
127.738	127.525	127.312	127.100	126.887
126.676	126.464	126.253	126.042	125.831
125.621	125.412	125.202	124.993	124.784
124.576	124.368	124.160	123.925	123.600
123.275	122.952	122.629	122.308	121.987
121.667	121.348	121.029	120.712	120.395
120.080	119.765	119.451	119.138	118.826
118.514	118.204	117.894	117.585	117.277
116.970	116.664	116.358	116.054	115.750
115.447	115.144	114.843	114.542	114.243
113.944	113.646	113.348	113.052	112.814
112.588	112.364	112.139	111.915	111.691
111.468	111.246	111.023	110.802	110.580
110.359	110.139	109.919	109.700	109.480
109.262	109.044	108.826	108.608	108.392
108.175	107.959	107.744	107.528	107.314
107.099	106.886	106.672	106.459	106.247
106.035	105.823	105.612	105.401	105.191
104.981	104.771	104.562	104.353	104.145
103.937	103.730	103.523	103.316	103.110
102.904	102.699	102.494	102.290	102.086
101.882	101.679	101.476	101.274	101.072
100.870	100.669	100.468	100.268	100.068
99.869	99.670	99.471	99.273	99.075
98.795	98.468	98.141	97.815	97.491
97.168	96.846	96.525	96.205	95.886
95.569	95.253	94.938	94.623	94.311
93.999	93.688	93.379	93.070	92.763
92.457	92.151	91.847	91.544	91.242
90.942	90.642	90.343	90.046	89.749
89.454	89.159	88.866	88.574	88.282
87.992	87.703	87.415	87.128	86.842
86.557	86.273	85.990	85.708	85.427
85.147	84.840	84.503	84.167	83.833
83.500	83.169	82.839	82.510	82.183
81.858	81.534	81.211	80.890	80.570
80.251	79.934	79.619	79.304	78.992
78.680	78.370	78.061	77.754	77.448
77.143	76.840	76.538	76.237	75.938
75.640	75.343	75.047	74.750	74.453
74.154	73.853	73.549	73.242	72.933
72.621	72.306	71.990	71.672	71.352
71.032	70.711	70.390	70.069	69.748
69.428	69.108	68.790	68.472	68.155
67.548	66.667	65.796	64.937	64.088
63.250	62.422	61.605	60.798	60.002
59.215	58.439	57.673	56.917	56.170

41.667	39.915	38.236	36.628	35.088
33.612	32.199	30.844	29.547	28.304
27.114	25.973	24.881	23.834	22.832
21.871	20.951	20.070	19.226	18.417
17.642	16.900	16.189	15.508	14.856
14.231	13.632	13.059	12.509	11.983
11.479	10.996	10.533	10.090	9.666
9.259	8.869	8.496	8.139	7.796
7.468	7.154	6.853	6.565	6.289
6.024	5.771	5.528	5.295	5.073
4.859	4.655	4.459	4.271	4.092
3.919	3.755	3.597	3.445	3.300
3.161	3.028	2.901	2.779	2.662
2.550	2.443	2.340	2.242	2.147

```
*
*******************
* SUB-BASIN  914.2
*********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                    RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  914.2
***************************
COMPUTE NM HYD      ID=1  HYD=914.2  DA=.035 SQ MI
                    PER A=38  B=23  C=22  D=17
                    TP=0.13 HRS       RAIN=-1
*@ SUB-BASIN 914.2
*********************    *    *    *    *    *    *    *    *
*     *PRINT HYD. 914.2
*********************
PRINT HYD           ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  RP 914.99    AND    RP 914.2    AT   914.2
*    BETWEEN HAMILTON AND HOLBROOK
ADD HYD             ID=2  HYD=914.2   ID I=2      ID II=1
PRINT HYD           ID=2   CODE=1
*
*****************************************************************
* ROUTE HYD. 914.2        TO  RP 914.98
*
*****************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.03  DIA=4.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3     REACH=1  NO VS=1
                    L=2650      ft      SLP=.03       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE               ID=3     HYD=914.98  INFLOW HYD ID=2   DT=.05
PRINT HYD           ID=3   CODE=1
*
*******************
* SUB-BASIN   919.1
*********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                    RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   919.1
***************************
COMPUTE NM HYD      ID=1  HYD=919.1  DA=.079 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=.13 HRS       RAIN=-1
*@ SUB-BASIN 919.1
*
```

```
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 919.1    AND  RP 914.98   AT   AP  919.19
*    AT HOLBROOK
ADD HYD              ID=4  HYD=919.19 ID I=1      ID II=3
*@DAM HYD @ HOLBROOK
PRINT HYD            ID=4   CODE=1
*
********************
* SUB-BASIN   919.2
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                     RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   919.2
***************************
COMPUTE NM HYD       ID=1  HYD=919.2  DA=0.051 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=.13 HRS       RAIN=-1
*@ SUB-BASIN 919.2
*
PRINT HYD            ID=1   CODE=1
*
*************************************************************************
* ROUTE HYD. RP 919.2       TO  RP 919.28
*************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005  DIA=5.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=700       ft       SLP=.005        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=919.28  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   RP 919.28     AND  RP 919.19   AT   RP 919.19
ADD HYD              ID=6  HYD=919.19  ID I=4      ID II=3
PRINT HYD            ID=6   CODE=1
*
********************
* SUB-BASIN   913.1
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                     RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN    913.1
***************************
COMPUTE NM HYD       ID=1  HYD=913.1  DA=0.049 SQ MI
                     PER A=38 B=23  C=22  D=17
                     TP=0.13 HRS       RAIN=-1
*@ SUB-BASIN 913.1
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*
*  ROUTE AP 913.1 TO RP 913.88 AT HOLBROOK ST.
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CONCRETE CHANNEL SECTION
*         TRAP.-1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
```

```
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                     0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                    L=2900   SLP=.029
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=2  HYD=913.88  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=2   CODE=1
*
********************
* SUB-BASIN   917
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                    RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   917
***************************
*
COMPUTE NM HYD      ID=1  HYD=917  DA=0.050 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 917
PRINT HYD           ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 917  AND  RP 913.88 AT   AP  917.99
*
ADD HYD             ID=1  HYD=917.99  ID I=1      ID II=2
*
PRINT HYD           ID=1   CODE=1
*
*   ROUTE AP 917.99 TP RP 917.88
*****************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.027  DIA=3.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=7      REACH=1  NO VS=1
                    L=1050       ft       SLP=.027       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE               ID=7      HYD=917.88  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=7   CODE=1
*
********************
* SUB-BASIN  913.2
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                    RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   913.2
***************************
COMPUTE NM HYD      ID=1  HYD=913.2  DA=0.017 SQ MI
                    PER A=38 B=23  C=22  D=17
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 913.2
PRINT HYD           ID=1   CODE=1
*   ROUTE AP 913.19 TO RP 913.18
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
```

```
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                    ELMIN=0  ELMAX=15  CH SLP=.034  FP SLP=.034
                    N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    15    30    0    40    0    70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                    L=2920   SLP=.034
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE               ID=2  HYD=913.18  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=2   CODE=1
********************
* SUB-BASIN   918
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.23
                    RAIN SIX=2.70  RAIN DAY=3.20  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   918
***************************
COMPUTE NM HYD      ID=1  HYD=918  DA=0.114 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.26 HRS        RAIN=-1
*@ SUB-BASIN 918
*
PRINT HYD           ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 918  AND  RP 913.18  AT   AP 918.99
ADD HYD             ID=1  HYD=918.99  ID I=1      ID II=2
*
PRINT HYD           ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 918.99  AND  RP 917.88  AT   AP 918.99
ADD HYD             ID=1  HYD=918.99  ID I=1      ID II=7
*
PRINT HYD           ID=1   CODE=1
*
*   ROUTE AP 918.99 TO  RP 918.88
*************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.014  DIA=6.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                    L=1850       ft       SLP=.014        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE               ID=3      HYD=918.88  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=3   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 919.19  AND  RP 918.88  AT   AP 919.19
ADD HYD             ID=1  HYD=919.19  ID I=3      ID II=6
*
*@TOT @ HOLBROOK
PRINT HYD           ID=1   CODE=1
*
*************************************************************************
* ROUTE HYD. RP 919.19        TO  RP 921.18
*
*************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.032  DIA=5.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
```

```
ROUTE                ID=3     HYD=921.18  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN   921.1
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
****************************    *    *    *    *    *    *    *    *
* SUB-BASIN   921.1
***************************
COMPUTE NM HYD       ID=1  HYD=921.1  DA=0.046 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.14 HRS        RAIN=-1
*@ SUB-BASIN 921.1
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 921.1  AND  RP 921.18  AT  RP 921.18
*
ADD HYD              ID=3  HYD=921.18  ID I=1      ID II=3
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN   921.2
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
****************************    *    *    *    *    *    *    *    *
* SUB-BASIN   921.2
***************************
COMPUTE NM HYD       ID=1  HYD=921.2  DA=0.099 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 921.2
*
PRINT HYD            ID=1   CODE=1
*************************************************************************
* ROUTE HYD. 921.2        TO  RP 921.28
*
*************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.023  DIA=5.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=4      REACH=1  NO VS=1
                     L=1100       ft       SLP=.023        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=4      HYD=921.28  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=4   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 921.28  AND  RP 921.18   AT   AP 921.18
*
ADD HYD              ID=3  HYD=921.18  ID I=3      ID II=4
*
*@DAM HYD AT VENTURA
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN  922
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
****************************    *    *    *    *    *    *    *    *
* SUB-BASIN  922
```

```
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 922
*
PRINT HYD           ID=1   CODE=1
*
********************
* SUB-BASIN   923
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                    RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   923
***************************
COMPUTE NM HYD      ID=2  HYD=923  DA=0.013 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 923
PRINT HYD           ID=2 CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 922  AND 923   AT   AP 923
*
ADD HYD             ID=1  HYD=923  ID I=1      ID II=2
*
PRINT HYD           ID=1   CODE=1
*************************************************************************
*ROUTE 923 TO RP 922.18
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005  DIA=4.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2      REACH=1  NO VS=1
                    L=700       ft       SLP=.005        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE               ID=2      HYD=922.18  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=2   CODE=1
*
********************
* SUB-BASIN   920
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                    RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  920
***************************
COMPUTE NM HYD      ID=1  HYD=920  DA=0.105 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.16 HRS        RAIN=-1
*@ SUB-BASIN 920
PRINT HYD           ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 920  AND  RP 922.18   AT   AP  920.99
*
ADD HYD             ID=1  HYD=920.99  ID I=2      ID II=1
*
PRINT HYD           ID=1   CODE=1
*************************************************************************
* ROUTE HYD. RP 920.99        TO  RP 920.98
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.017  DIA=5.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2      REACH=1  NO VS=1
                    L=1100      ft       SLP=.017        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE               ID=2      HYD=920.98  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=2   CODE=1
*
```

```
*
ADD HYD              ID=1  HYD=920.99  ID I=2      ID II=3
*
*@CONC CHAN.@ VENTURA
PRINT HYD            ID=1   CODE=1
*
*    ROUTE AP 920.99 TO RP 920.97
*     *      *    *    *    *    *    *    *    *    *    *    *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CONCRETE CHANNEL SECTION
*          TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.029  FP SLP=.029
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=2650   SLP=.028
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=920.97  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
********************
* SUB-BASIN   926
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   926
***************************
COMPUTE NM HYD       ID=1  HYD=926  DA=0.117 SQ MI
                     PER A=0  B=30  C=15  D=55
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 926
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 926  AND  RP 920.97 AT   AP  920.97
*
ADD HYD              ID=2  HYD=920.97  ID I=1      ID II=2
*
PRINT HYD            ID=2   CODE=1
*
*
********************
* SUB-BASIN  924
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  924
***************************
COMPUTE NM HYD       ID=1  HYD=924  DA=0.064 SQ MI
                     PER A=0  B=27  C=13  D=60
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 924
PRINT HYD            ID=1   CODE=1
```

```
*
*   ROUTE AP 924.00 TO RP 924.98
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.013  DIA=3.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=1200       ft       SLP=.013        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=924.98  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN  925
********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.18
                     RAIN SIX=2.60  RAIN DAY=3.05  DT=.05
*************************    *    *    *    *    *    *    *    *
* SUB-BASIN  925
*************************
COMPUTE NM HYD       ID=1  HYD=925  DA=0.077 SQ MI
                     PER A=0  B=29  C=8  D=63
                     TP=0.19 HRS        RAIN=-1
*@ SUB-BASIN 925
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 925     AND   RP 924.98   AT   AP 925.99
*
ADD HYD              ID=1  HYD=925.99  ID I=3      ID II=1
*
PRINT HYD            ID=1   CODE=1
*************************************************************************
* ROUTE HYD. RP 925.99        TO  RP 925.98
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.008  DIA=4.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=420        ft       SLP=.008        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=925.98  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
* COMBINE HYD.'S 925.98 AND 920.97 AT 926.99
ADD HYD              ID=1  HYD=926.99  ID I = 3  ID II = 2
*@CONC CHAN @ BARSTOW
PRINT HYD            ID=1   CODE=1
*   ROUTE AP 926.99  TO RP 925.97
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CONCRETE CHANNEL SECTION
*         TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.03  FP SLP=.03
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=5  REACH=1  NO VS=1
                     L=2700   SLP=.03
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=5  HYD=925.97   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=5   CODE=1
```

```
* SUB-BASIN   930
**********************
RAINFALL              TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                      RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   930
***************************
COMPUTE NM HYD        ID=1  HYD=930  DA=0.135 SQ MI
                      PER A=0  B=31  C=15  D=54
                      TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 930
*
PRINT HYD             ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  RP 925.97    AND  AP 930     AT   AP  930.99
*
ADD HYD               ID=7  HYD=930.99  ID I=1      ID II=5
*
PRINT HYD             ID=7   CODE=1
*
********************
* SUB-BASIN  928
**********************
RAINFALL              TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                      RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
*
********************
* SUB-BASIN  929
**********************
RAINFALL              TYPE=1  RAIN QUARTER=0.0  RAIN ONE=2.15
                      RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  929
***************************
COMPUTE NM HYD        ID=4  HYD=929  DA=0.024 SQ MI
                      PER A=0  B=15  C=20 D=65
                      TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 929
PRINT HYD             ID=4   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*
********************
* SUB-BASIN  931
**********************
RAINFALL              TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                      RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  931
***************************
COMPUTE NM HYD        ID=1  HYD=931  DA=0.040 SQ MI
                      PER A=0  B=45  C=5  D=50
                      TP=0.26 HRS        RAIN=-1
*@ SUB-BASIN 931
PRINT HYD             ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 931      AND  AP 929.99  AT   AP  931.99
*
ADD HYD               ID=1  HYD=931.99 ID I=4      ID II=1
*
*@@ WYOMING AND WILSHIRE
PRINT HYD             ID=1   CODE=1
*
```

```
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.008  DIA=6.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=600       ft       SLP=.008       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=931.98  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN  932
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                     RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN 932
**************************
COMPUTE NM HYD       ID=1  HYD=932  DA=0.078 SQ MI
                     PER A=0  B=20  C=10  D=70
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 932
*
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 932      AND  RP 931.98   AT   AP  932
*
ADD HYD              ID=17  HYD=932  ID I=1      ID II=3
PRINT HYD            ID=17   CODE=1
*************************************************************************
* ROUTE HYD. 932        TO  RP 932.8
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.006  DIA=8.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=500       ft       SLP=.006       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=932.8  INFLOW HYD ID=17   DT=.05
PRINT HYD            ID=3   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 932.8      AND  RP 930.99   AT   AP  930.99
*
ADD HYD              ID=4  HYD=930.99  ID I=3      ID II=7
*@CONC CHAN @ WYOMING
PRINT HYD            ID=4   CODE=1
*   ROUTE AP 930.99  TO RP 930.98
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CONCRETE CHANNEL SECTION
*          TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.03  FP SLP=.03
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=5  REACH=1  NO VS=1
                     L=2100   SLP=.03
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=5  HYD=930.98   INFLOW HYD ID=4   DT=.05
PRINT HYD            ID=5   CODE=1
```

```
**********************
RAINFALL            TYPE=-2. RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
*  SUB-BASIN  935
***************************
COMPUTE NM HYD      ID=1  HYD=935  DA=0.097 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 935
*
PRINT HYD           ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 935     AND  RP 930.98  AT  AP  935
*
ADD HYD             ID=17  HYD=935  ID I=1      ID II=5
*
PRINT HYD           ID=17   CODE=1
********************
* SUB-BASIN  933
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  933
***************************
COMPUTE NM HYD      ID=9  HYD=933  DA=0.041 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 933
PRINT HYD           ID=9   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
********************
* SUB-BASIN  934
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  934
***************************
COMPUTE NM HYD      ID=1  HYD=934  DA=0.065 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 934
PRINT HYD           ID=1   CODE=1
*
DIVIDE HYD          ID=1  PER=-75   ID=2   HYD=934.19
                                    ID=5   HYD=934.29
PRINT HYD           ID=2   CODE=1
PRINT HYD           ID=5   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 931.29    AND 935 AT   AP 934.59
*
ADD HYD             ID=19  HYD=934.59  ID I=2      ID II=17
PRINT HYD           ID=19   CODE=1
*
********************
* SUB-BASIN   937
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.15
                    RAIN SIX=2.55  RAIN DAY=2.95  DT=.05
***************************    *    *    *    *    *    *    *    *
```

```
COMPUTE NM HYD        ID=2  HYD=937  DA=0.012 SQ MI
                      PER A=0  B=34  C=16  D=50
                      TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 937
*
PRINT HYD             ID=2   CODE=1
*
*
*  ROUTE  AP 937.1    TO RP 937.8
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME EARTH / RIP-RAP DIVERSION CHANNEL
*          TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                      ELMIN=0  ELMAX=15  CH SLP=.01  FP SLP=.01
                      N=.03 DIST=30 N=-.03 DIST=40 N=.03 DIST=70
                      DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                        0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=20  REACH=1  NO VS=1
                      L=800   SLP=.01
*    *    *    *    *    *    *    *    *    *    *    *    *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
*
ROUTE                 ID=20  HYD=937.8   INFLOW HYD ID=2   DT=.05
PRINT HYD             ID=20   CODE=1
*
*^^^
```

```
                    22756              181.4              5330
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*@OUTF DAM HYD E. LOUI
PRINT HYD            ID=2   CODE=1
*
*
*  THE FOLLOWING RATING CURVE IS FOR A 40-INCH ORIFICE PLATE
*        14.6 AC-FT REM FROM STORAGE FOR SEDIMENT
*        EMERGENCY SPILLWAY
*  LENGTH = 440        C (WEIR COEFF.)= 3.0
*  REVISED RESEVOIR 6-16-94
*
ROUTE RESERVOIR     ID=12 HYD NO=940.87      INFLOW ID=13     CODE=24
                    OUTFLOW (cfs)       STORAGE (ac-ft)     ELEV (ft)
                        0                    0                5298
                     42.7                    0                5300
                     65.2                    0                5302
                     88.9                    0                5304
                    107.5                 3.31                5306
                    123.3                10.32                5308
                    137.3                17.84                5310
                    150.0                28.89                5312
                    161.7                37.87                5314
                    172.6                53.01                5316
                    182.9                68.69                5318
                    192.6                85.20                5320
                    201.9               105.59                5322
                    208.5               116.52                5323.3
                    210.7                120.0                5324
                    219.2                135.1                5326
                    227.4                152.1                5328
                    235.3                168.0                5330
*    *    *    *    *    *    *    *    *    *    *    *    *
*@OUTF DAM HYD E. LOUI
PRINT HYD            ID=12  CODE=1
FINISH
*
*
*  ROUTE  AP 940.57 TO RP 940.7  AT SAN PEDRO
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.030  DIA=4.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                    L=4000       ft       SLP=.030       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=940.7  INFLOW HYD ID=2   DT=.05
PRINT HYD            ID=3   CODE=1
*
********************
*  SUB-BASIN  940
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.10
                     RAIN SIX=2.45  RAIN DAY=2.85  DT=.05
***************************    *    *    *    *    *    *    *    *
*  SUB-BASIN  940
***************************
COMPUTE NM HYD       ID=1  HYD=940  DA=0.085 SQ MI
                     PER A=0  B=20  C=10  D=70
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 940
*
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.028  DIA=4.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=4      REACH=1  NO VS=1
                     L=1450       ft       SLP=.028       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=4      HYD=940.8  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=4   CODE=1
*
********************
* SUB-BASIN  943
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.10
                     RAIN SIX=2.45  RAIN DAY=2.85  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  943
***************************
COMPUTE NM HYD       ID=2  HYD=943  DA=0.034 SQ MI
                     PER A=0  B=20  C=10  D=70
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 943
PRINT HYD            ID=2   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 943       AND  RP 940.8  AT   AP 943.99
*    THIS IS THE NORTH BACA ARROYO S. TRIB. AT I-25
ADD HYD              ID=1  HYD=943.99  ID I=2      ID II=4
*@ FLOW AT CBC NOT IN PIPE
ADD HYD              ID=2  HYD=943.99  ID I=1      ID II=3
*
*@TOTAD NB S ARROYO AT I-25
PRINT HYD            ID=2   CODE=1
*
* ROUTE    AP 943.99 TO AP 943.81
*      *      *      *      *      *      *      *
* THIS IS THE SOUTH ARROYO OF THE NORTH BACA ARROYO AT I-25
*   FOUR CONCRETE BOX CULVERTS PASS THE FLOW UNDER I-25
*      4 * (4'HIGH  X  9'WIDE)
STORE RATING CURVE   CID=1 VS NO=15
                     ELEV        AREA        FLOW
                     5193.02        0           0
                     5194.75       62         250
                     5195.79      100         500
                     5196.68      132         750
                     5197.58      144        1000
                     5198.60      144        1250
                     5199.82      144        1500
                     5200.64      226        1750
                     5200.97      259        2000
                     5201.36      298        2250
                     5201.72      334        2500
                     5201.73      335        2501
                     5201.74      336        2502
                     5201.75      337        2503
                     5201.75      338        2504
                     5201.76      339        2505
                     5201.77      340        2506
                     5201.78      341        2507
                     5201.79      342        2508
                     5201.80      343        2509
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=11  REACH=1  NO VS=1
                     L=300   SLP=.017
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=11  HYD=943.81   INFLOW HYD ID=2   DT=.05
*@W I-25 NB S 4 4'x9'CBC
```

```
*   ROUTE AP 933.    TO RP 938
*    *     *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CONCRETE CHANNEL SECTION
*         TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.03  FP SLP=.03
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3  REACH=1  NO VS=1
                     L=2100   SLP=.03
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3  HYD=933.99   INFLOW HYD ID=9   DT=.05
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN  938
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.10
                     RAIN SIX=2.45  RAIN DAY=2.85  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  938
***************************
COMPUTE NM HYD       ID=4  HYD=938  DA=0.036 SQ MI
                     PER A=0  B=20  C=10  D=70
                     TP=0.14 HRS        RAIN=-1
*@ SUB-BASIN 938
PRINT HYD            ID=4   CODE=1
*
ADD HYD              ID=4   HYD 938.99   ID I=4   ID II=3
PRINT HYD            ID=4   CODE=1
********************
* SUB-BASIN  939.2
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.10
                     RAIN SIX=2.45  RAIN DAY=2.85  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  939.2
***************************
COMPUTE NM HYD       ID=1  HYD=939.2  DA=0.056 SQ MI
                     PER A=0  B=30  C=0  D=70
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 939.2
PRINT HYD            ID=1   CODE=1
*
ADD HYD              ID=1   HYD=939.29   ID I=1   ID II=5
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*  ROUTE AP 939.29 TO RP 939.27
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.029  DIA=3.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=700       ft       SLP=.029       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=939.27  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 938      AND  RP 939.27 AT   AP 939.2
```

```
*
PRINT HYD            ID=7   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
* ROUTE AP 939.2 TO RP 939.28
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.025  DIA=4.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=10      REACH=1  NO VS=1
                     L=1350       ft       SLP=.025       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=10     HYD=939.28  INFLOW HYD ID=7   DT=.05
PRINT HYD            ID=10     CODE=1
********************
* SUB-BASIN  939.1
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.10
                     RAIN SIX=2.45  RAIN DAY=2.85  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  939.1
***************************
COMPUTE NM HYD       ID=1  HYD=939.1  DA=0.028 SQ MI
                     PER A=0  B=20  C=20  D=60
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 939.1
PRINT HYD            ID=1   CODE=1
*
* ROUTE AP 939.1   TO RP 939.18
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STREET SECTION
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=14  ELMAX=15  CH SLP=.026  FP SLP=.026
                     N=.02 DIST=1 N=-.02 DIST=33 N=.02 DIST=34
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    1     14    33    14    34    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=1400   SLP=.026
*
ROUTE                ID=2  HYD=939.18  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  RP 939.28 AND RP 939.18 AT RP 939.88
*
ADD HYD              ID=10  HYD=939.88  ID I=2      ID II=10
PRINT HYD            ID=10  CODE=1
*
********************
* SUB-BASIN  941
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.10
                     RAIN SIX=2.45  RAIN DAY=2.85  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  941
***************************
COMPUTE NM HYD       ID=1  HYD=941  DA=0.018 SQ MI
                     PER A=0  B=20  C=10  D=70
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 941
*
```

```
********************
* SUB-BASIN  942
**********************
RAINFALL              TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.10
                      RAIN SIX=2.45  RAIN DAY=2.85  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  942
***************************
COMPUTE NM HYD        ID=2  HYD=942  DA=0.030 SQ MI
                      PER A=0  B=20  C=10  D=70
                      TP=0.16 HRS        RAIN=-1
*@ SUB-BASIN 942
PRINT HYD             ID=2   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 942   AND 941 AT AP 942.09
*
ADD HYD               ID=1  HYD=942.09  ID I=1      ID II=2
*
PRINT HYD             ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 942.09 AND AP 939.88 AT  AP 942.99
*   AT  I-25 NORTH BACA NORTH ARROYO
*
ADD HYD               ID=1  HYD=942.99  ID I=1      ID II=10
*
*@NB N ARROYO AT I-25
PRINT HYD             ID=1   CODE=1
*
* ROUTE    AP 942.99 TO AP 942.81
*      *       *       *       *       *       *       *
* THIS IS THE NORTH ARROYO OF THE NORTH BACA ARROYO AT I-25
STORE RATING CURVE   CID=1 VS NO=15
                      ELEV        AREA        FLOW
                      5194.82        0           0
                      5196.46       39         120
                      5197.23       63         240
                      5197.92       84         360
                      5198.59       98         480
                      5199.31       98         600
                      5200.14       98         720
                      5200.38      122         840
                      5200.67      151         960
                      5200.91      175        1080
                      5201.12      196        1200
                      5201.13      197        1201
                      5201.14      198        1202
                      5201.15      199        1203
                      5201.16      200        1204
                      5201.17      201        1205
                      5201.18      202        1206
                      5201.19      203        1207
                      5201.20      204        1208
                      5201.21      205        1209
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                      L=300   SLP=.028
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                 ID=2  HYD=942.81   INFLOW HYD ID=1   DT=.05
*@NB N A OF 8 4' CMP'S
PRINT HYD             ID=2   CODE=1
*
* NOW ROUTE FROM OUTFALL OF CULVERTS ALONG WEST I-25 FRONTAGE ROAD TO COMBINE
* WITH THE OUTFALL FROM THE S BRANCH OF SAN ANTONIO ARROYO AT WEST I-25
```

```
*  ROUTE AP 942.81 TO AP 942.82
*    *      *    *    *    *    *    *    *    *    *    *    *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CONCRETE CHANNEL SECTION
*          TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.01  FP SLP=.01
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=10  REACH=1  NO VS=1
                     L=400   SLP=.01
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID10  HYD=942.82   INFLOW HYD ID=2   DT=.05
*@NB N A OPEN CHANNEL
PRINT HYD            ID=10   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*     COMBINE HYD.'S   AP 943.81 AND AP 942.82 AT  AP 943.82
*    AT  I-25 NORTH BACA NORTH ARROYO
*
ADD HYD              ID=1  HYD=943.82  ID I=11      ID II=10
*
*@TOT. WEST OF I-25
PRINT HYD            ID=1   CODE=1
*    THIS IS THE TOTAL N AND S BRANCHES WEST OF I-25
*  ROUTE AP 943.82 TO AP 943.83
*    *      *    *    *    *    *    *    *    *    *    *    *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*        ASSUME STANDARD CONCRETE CHANNEL SECTION
*          TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.024  FP SLP=.033
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=10  REACH=1  NO VS=1
                     L=2050   SLP=.024
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=10  HYD=943.83   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=10   CODE=1
*
*
********************
*  SUB-BASIN  945
**********************
RAINFALL             TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.08
                     RAIN SIX=2.45  RAIN DAY=2.78  DT=.05
***************************    *    *    *    *    *    *    *    *
*  SUB-BASIN  945
***************************
COMPUTE NM HYD       ID=1  HYD=945  DA=0.015 SQ MI
                     PER A=0  B=20  C=10  D=70
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 945
```

```
********************
* SUB-BASIN 944
**********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.08
                    RAIN SIX=2.45  RAIN DAY=2.78  DT=.05
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN 944
***************************
COMPUTE NM HYD      ID=2  HYD=944  DA=0.036 SQ MI
                    PER A=0  B=20  C=10  D=70
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 944
PRINT HYD           ID=2   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 944   AND RP 945  AT AP 944.99
*
ADD HYD             ID=8  HYD=944.99  ID I=1      ID II=2
*
PRINT HYD           ID=8   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 944.99      AND  RP 943.83  AT   AP  945.09
*
ADD HYD             ID=5  HYD=945.09  ID I=10      ID II=8
*      THIS IS HYD. FROM N. DOMINGO BACA (SOUTH ARROYO) AT
*      WEST OUTFALL OF CORONADO MOBILE HOME PARK.
*
* THIS IS TOTAL HYD FROM N BACA ARROYO AT CONFLUENCE WITH SOUTH
*@TOT. N B ARROYO
PRINT HYD            ID=5  CODE=1
*
* NOW USE PUNCH HYD COMMAND TO STORE THE OUTPUT FILE FOR LATER INSERTION INTO
* THE SOUTH DOMINGO BACA HYMO FILE AT THE CONFLUENCE OF THE NORTH AND SOUTH
* DOMINGO BACA ARROYOS    the PUNCHED HYD. IS STORED IN A FILE NAMED
*      AHYMO.PUN
PUNCH HYD           ID=5
*
FINISH
```

```
START                    0.0 HRS
* THIS FILE WILL PRINT ALL HYD'S WITH A PRINT HYD
*
* FILE NAME NDBLPMF.fut
*
* TITLE 1                NORTH DOMINGO BACA ARROYO - LOWER NDB DAM
* TITLE 2                FUTURE COND. PMF-YR. 24-HR. STORM
*
*
*
*
*        NOTE 3-17-94  THIS FILE BASED ON OPTLPMF.FUT  RECALL HYD FOR EXIST NDB
*      OUTFLOW FOR ROUTING TO LOWER NDB DAM    INCLUDES LA CUEVA DIVERSION
*************************
*
*
RECALL HYD            ID= 2   HYD NO=  914.DT=  .033333 HRS   DA=   2.3613 SQ MI
                      PEAK=  23406.510CFS  RO=11.2736 INCHES  NO PTS=600
                      FLOW RATES
```

.000	.000	.000	.000	.000
.000	.000	.000	.000	.000
.000	.000	.002	.034	.178
.532	1.221	2.342	3.926	6.017
8.640	11.772	15.386	19.449	23.924
28.113	28.879	29.755	30.737	31.823
33.010	34.296	35.677	37.152	38.716
40.368	42.105	43.925	45.826	47.806
49.864	51.999	53.270	54.592	55.964
57.385	58.856	60.377	61.946	63.565
65.233	66.952	68.256	68.904	69.573
70.265	70.977	71.712	72.468	73.247
74.048	74.940	76.312	79.042	85.458
96.781	109.443	129.072	142.627	155.140
3319.715	13092.280	19800.780	22740.200	23406.510
22990.120	21980.140	20651.930	19160.890	17698.990
16250.070	14822.790	13487.470	12335.500	11297.060
10313.040	9421.215	8614.381	7900.155	7367.538
6874.427	6429.793	6044.489	5719.525	5464.038
5274.905	5133.095	5020.572	4919.977	4820.988
4715.413	4598.532	4471.082	4332.347	4182.830
4025.027	3860.150	3700.905	3567.063	3418.467
3260.066	3095.145	2927.182	2759.546	2594.314
2433.593	2278.776	2130.097	1988.184	1853.686
1726.757	1609.224	1501.845	1402.904	1311.216
1225.763	1145.654	1071.075	1002.182	938.327
879.110	836.553	807.992	778.232	748.401
718.862	689.936	661.824	634.610	608.452
583.462	559.625	536.986	515.557	495.268
476.109	458.059	441.037	425.022	409.987
395.859	382.611	370.212	358.589	347.702
337.509	327.944	318.976	310.577	302.699
295.327	288.438	281.992	275.967	270.338
265.068	260.141	255.549	251.265	247.280
243.580	240.136	236.927	233.934	231.137
228.526	226.095	223.827	221.716	219.753
217.928	216.208	214.459	212.410	209.653
205.896	201.134	195.415	188.857	181.625
173.855	165.674	159.991	159.962	159.928
159.889	159.845	159.798	159.746	159.691

158.927	158.848	158.769	158.689	158.609
158.527	158.446	158.364	158.281	158.198
158.115	158.031	157.948	157.864	157.779
157.695	157.610	157.526	157.441	157.356
157.271	157.186	157.101	157.015	156.958
156.907	156.855	156.804	156.753	156.702
156.650	156.599	156.547	156.496	156.445
156.393	156.342	156.290	156.239	156.187
156.136	156.085	156.033	155.982	155.930
155.879	155.827	155.776	155.725	155.673
155.622	155.571	155.519	155.468	155.417
155.365	155.314	155.263	155.211	155.160
155.109	155.058	155.006	154.955	154.904
154.853	154.802	154.751	154.699	154.648
154.597	154.546	154.495	154.444	154.393
154.342	154.291	154.240	154.189	154.138
154.087	154.036	153.975	153.891	153.806
153.721	153.637	153.552	153.467	153.383
153.298	153.214	153.130	153.045	152.961
152.877	152.792	152.708	152.624	152.540
152.456	152.372	152.288	152.204	152.120
152.037	151.953	151.869	151.786	151.702
151.618	151.535	151.451	151.368	151.285
151.201	151.118	151.035	150.952	150.868
150.785	150.702	150.619	150.536	150.453
150.371	150.288	150.205	150.122	150.040
149.943	149.832	149.722	149.612	149.503
149.393	149.283	149.173	149.064	148.954
148.845	148.736	148.627	148.517	148.408
148.299	148.190	148.082	147.973	147.864
147.756	147.647	147.539	147.430	147.322
147.214	147.106	146.998	146.890	146.782
146.674	146.566	146.459	146.351	146.244
146.136	146.029	145.902	145.768	145.635
145.501	145.367	145.234	145.101	144.968
144.835	144.702	144.569	144.436	144.303
144.171	144.039	143.907	143.774	143.642
143.511	143.379	143.247	143.116	142.984
142.853	142.722	142.591	142.460	142.329
142.199	142.068	141.938	141.808	141.678
141.547	141.418	141.288	141.158	141.029
140.939	140.862	140.784	140.707	140.629
140.552	140.474	140.397	140.320	140.242
140.165	140.088	140.011	139.934	139.856
139.779	139.702	139.626	139.549	139.472
139.395	139.318	139.241	139.165	139.088
139.011	138.935	138.858	138.782	138.705
138.629	138.553	138.476	138.400	138.324
138.248	138.172	138.095	138.019	137.943
137.867	137.791	137.715	137.640	137.564
137.488	137.412	137.337	137.261	137.185
137.110	137.034	136.918	136.767	136.616
136.466	136.316	136.165	136.015	135.866
135.716	135.567	135.417	135.268	135.119
134.970	134.822	134.673	134.525	134.377
134.229	134.081	133.933	133.786	133.638
133.491	133.344	133.197	133.051	132.904
132.758	132.612	132.466	132.320	132.174
132.028	131.883	131.738	131.593	131.448
131.303	131.158	131.014	130.848	130.680
130.512	130.344	130.177	130.009	129.842
129.676	129.509	129.343	129.176	129.011
128.845	128.679	128.514	128.349	128.184
128.019	127.855	127.691	127.526	127.363

125.574	125.413	125.252	125.091	124.930
124.770	124.609	124.449	124.289	124.130
123.953	123.703	123.453	123.204	122.956
122.707	122.460	122.213	121.966	121.720
121.474	121.229	120.984	120.740	120.497
120.253	120.011	119.769	119.527	119.286
119.045	118.805	118.565	118.326	118.087
117.848	117.611	117.373	117.136	116.900
116.664	116.429	116.194	115.959	115.725
115.492	115.259	115.026	114.794	114.562
114.331	114.100	113.870	113.640	113.411
113.182	112.954	112.790	112.616	112.443

```
*
RAINFALL            TYPE=-3  RAIN QUARTER=7.04 RAIN ONE=10.94
                    RAIN SIX=15.48 DT=.05
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  914.2
***************************
COMPUTE NM HYD      ID=1  HYD=914.2  DA=.035 SQ MI
                    PER A=38  B=23  C=22  D=17
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 914.2
**********************    *    *    *    *    *    *    *    *
*     *PRINT HYD. 914.2
**********************
PRINT HYD           ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  RP 914.99    AND    RP 914.2    AT   914.2
*    BETWEEN HAMILTON AND HOLBROOK
ADD HYD             ID=2  HYD=914.2   ID I=2      ID II=1
PRINT HYD           ID=2   CODE=1
*
*******************************************************************
* ROUTE HYD. 914.2        TO  RP 914.98
*
*******************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.03  DIA=4.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                    L=2650       ft       SLP=.03        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE               ID=3      HYD=914.98  INFLOW HYD ID=2   DT=.05
PRINT HYD           ID=3   CODE=1
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   919.1
***************************
COMPUTE NM HYD      ID=1  HYD=919.1  DA=.079 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=.13 HRS        RAIN=-1
*@ SUB-BASIN 919.1
*
PRINT HYD           ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 919.1    AND  RP 914.98   AT   AP  919.13
*    AT HOLBROOK
ADD HYD             ID=4  HYD=919.13 ID I=1      ID II=3
*@DAM HYD @ HOLBROOK
PRINT HYD           ID=4   CODE=1
*
***************************    *    *    *    *    *    *    *    *
```

```
COMPUTE NM HYD        ID=1  HYD=919.2  DA=0.051 SQ MI
                      PER A=0  B=34  C=16  D=50
                      TP=.13 HRS        RAIN=-1
*@ SUB-BASIN 919.2
*
PRINT HYD             ID=1   CODE=1
*
*************************************************************************
* ROUTE HYD. RP 919.2       TO  RP 919.28
*************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005  DIA=5.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=700       ft       SLP=.005        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=919.28  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   RP 919.28     AND  RP 919.19   AT   RP 919.19
ADD HYD              ID=6  HYD=919.19  ID I=4      ID II=3
PRINT HYD            ID=6   CODE=1
*
****************************    *    *    *    *    *    *    *    *
* SUB-BASIN    913.1
****************************
COMPUTE NM HYD        ID=1  HYD=913.1  DA=0.049 SQ MI
                      PER A=38 B=23  C=22  D=17
                      TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 913.1
*
PRINT HYD             ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*
* ROUTE AP 913.1 TO RP 913.88 AT HOLBROOK ST.
*    *      *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CONCRETE CHANNEL SECTION
*         TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.029  FP SLP=.029
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40     0    70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=2900   SLP=.029
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=913.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
****************************    *    *    *    *    *    *    *    *
* SUB-BASIN   917
****************************
*
COMPUTE NM HYD        ID=1  HYD=917  DA=0.050 SQ MI
                      PER A=0  B=34  C=16  D=50
```

```
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 917  AND  RP 913.88 AT   AP  917.99
*
ADD HYD              ID=1  HYD=917.99  ID I=1      ID II=2
*
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 917.99 TP RP 917.88
*****************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.027  DIA=3.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=7      REACH=1  NO VS=1
                     L=1050       ft       SLP=.027       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=7      HYD=917.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=7   CODE=1
*
****************************     *    *    *    *    *    *    *    *
*  SUB-BASIN   913.2
****************************
COMPUTE NM HYD       ID=1  HYD=913.2  DA=0.017 SQ MI
                     PER A=38 B=23  C=22  D=17
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 913.2
PRINT HYD            ID=1   CODE=1
*   ROUTE AP 913.19 TO RP 913.18
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CONCRETE CHANNEL SECTION
*         TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.034  FP SLP=.034
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=2930   SLP=.034
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=913.18  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
****************************     *    *    *    *    *    *    *    *
*  SUB-BASIN   918
****************************
COMPUTE NM HYD       ID=1  HYD=918  DA=0.114 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.25 HRS        RAIN=-1
*@ SUB-BASIN 918
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 918  AND  RP 913.18  AT   AP 918.99
ADD HYD              ID=1  HYD=918.99  ID I=1      ID II=2
*
PRINT HYD            ID=1   CODE=1
```

```
*     COMBINE HYD.'S  AP 918.99  AND  RP 917.88  AT   AP 918.99
ADD HYD              ID=1  HYD=918.99  ID I=1      ID II=7
*
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 918.99 TO  RP 918.88
*************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.014  DIA=6.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=1850       ft       SLP=.014        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=918.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*     COMBINE HYD.'S  AP 919.19  AND  RP 918.88  AT   AP 919.19
ADD HYD              ID=1  HYD=919.19  ID I=3      ID II=6
*
*@TOT @ HOLBROOK
PRINT HYD            ID=1   CODE=1
*
*************************************************************************
* ROUTE HYD. RP 919.19        TO  RP 921.18          .
*
*************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.032  DIA=5.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=2650       ft       SLP=.032        ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=921.18  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   921.1
***************************
COMPUTE NM HYD       ID=1  HYD=921.1  DA=0.046 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.14 HRS        RAIN=-1
*@ SUB-BASIN 921.1
PRINT HYD            ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*     COMBINE HYD.'S  AP 921.1  AND  RP 921.18  AT  RP 921.18
*
ADD HYD              ID=3  HYD=921.18  ID I=1      ID II=3
PRINT HYD            ID=3   CODE=1
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   921.2
***************************
COMPUTE NM HYD       ID=1  HYD=921.2  DA=0.039 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 921.2
*
PRINT HYD            ID=1   CODE=1
*************************************************************************
* ROUTE HYD. 921.2        TO  RP 921.28          .
*
*************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.023  DIA=5.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=4     HYD=921.28  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=4   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 921.28  AND  RP 921.18   AT   AP 921.18
*
ADD HYD              ID=3  HYD=921.18  ID I=3     ID II=4
*
*@DAM HYD AT VENTURA
PRINT HYD            ID=3   CODE=1
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  922
***************************
COMPUTE NM HYD       ID=1  HYD=922  DA=0.021 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.13 HRS       RAIN=-1
*@ SUB-BASIN 922
*
PRINT HYD            ID=1   CODE=1
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   923
***************************
COMPUTE NM HYD       ID=2  HYD=923  DA=0.013 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.13 HRS       RAIN=-1
*@ SUB-BASIN 923
PRINT HYD            ID=2 CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 922  AND 923   AT   AP 923
*
ADD HYD              ID=1  HYD=923  ID I=1     ID II=2
*
PRINT HYD            ID=1   CODE=1
*************************************************************************
*ROUTE 923 TO RP 922.18
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.005  DIA=4.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2     REACH=1  NO VS=1
                     L=700      ft      SLP=.005       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=2     HYD=922.18  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  920
***************************
COMPUTE NM HYD       ID=1  HYD=920  DA=0.105 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.16 HRS       RAIN=-1
*@ SUB-BASIN 920
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 920  AND  RP 922.18   AT   AP  920.99
*
ADD HYD              ID=1  HYD=920.99  ID I=2     ID II=1
*
PRINT HYD            ID=1   CODE=1
*************************************************************************
* ROUTE HYD. RP 920.99        TO  RP 920.98
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.017  DIA=5.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
```

```
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=2     HYD=920.98  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 920.98    AND AP 921.18 AT   AP 920.99
*
ADD HYD              ID=1  HYD=920.99  ID I=2      ID II=3
*
*@CONC CHAN.@ VENTURA
PRINT HYD            ID=1   CODE=1
*
*    ROUTE AP 920.99 TO RP 920.97
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CONCRETE CHANNEL SECTION
*         TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.029  FP SLP=.029
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=2650   SLP=.028
*    *    *    *    *    *    *    *    *    *    *    *    *
*    ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*        THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=920.97  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN   926
***************************
COMPUTE NM HYD       ID=1  HYD=926  DA=0.117 SQ MI
                     PER A=0  B=30  C=15  D=55
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 926
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 926  AND  RP 920.97 AT   AP  920.97
*
ADD HYD              ID=2  HYD=920.97  ID I=1      ID II=2
*
PRINT HYD            ID=2   CODE=1
*
*
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  927
***************************
COMPUTE NM HYD       ID=1  HYD=927  DA=0.010 SQ MI
                     PER A=0  B=10  C=0  D=90
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 927
PRINT HYD            ID=1   CODE=1
***************************    *    *    *    *    *    *    *    *
* SUB-BASIN  924
***************************
COMPUTE NM HYD       ID=3  HYD=924  DA=0.064 SQ MI
```

```
*@ SUB-BASIN 324
PRINT HYD            ID=3   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 324      AND 327   AT   AP 324.99
*
ADD HYD              ID=1  HYD=924.99  ID I=1      ID II=3
*
PRINT HYD            ID=1   CODE=1
*
*  ROUTE AP 324.99 TO RP 324.98
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.013  DIA=3.0 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=1200       ft       SLP=.013       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=924.98  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
***************************    *    *    *    *    *    *    *    *
*  SUB-BASIN  325
***************************
COMPUTE NM HYD       ID=1  HYD=925  DA=0.077 SQ MI
                     PER A=0  B=29  C=8  D=63
                     TP=0.19 HRS        RAIN=-1
*@ SUB-BASIN 325
*
PRINT HYD            ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 325     AND   RP 924.98   AT   AP 925.99
*
ADD HYD              ID=1  HYD=925.99  ID I=3      ID II=1
*
PRINT HYD            ID=1   CODE=1
*****************************************************************************
* ROUTE HYD. RP 925.99        TO  RP 925.98
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.008  DIA=4.5 FT N=.015
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=420        ft       SLP=.008       ft/ft
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE                ID=3      HYD=925.98  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
* COMBINE HYD.'S 925.98 AND 920.97 AT 926.99
ADD HYD              ID=1  HYD=926.99  ID I = 3  ID II = 2
*@CONC CHAN @ BARSTOW
PRINT HYD            ID=1   CODE=1
*  ROUTE AP 926.99  TO RP 925.97
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*       REACH IS BETWEEN AP ???.?? AND IAP ???.??
*       REACH BETWEEN STREETS ? AND ?
*       EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*       ASSUME STANDARD CONCRETE CHANNEL SECTION
*         TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.03  FP SLP=.03
                     N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=5  REACH=1  NO VS=1
```

```
ROUTE                ID=5  HYD=925.97   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=5   CODE=1
*
********************
* SUB-BASIN   930
***************************
COMPUTE NM HYD       ID=1  HYD=930  DA=0.135 SQ MI
                     PER A=0  B=31  C=15  D=54
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 930
*
PRINT HYD            ID=1   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S  RP 925.97     AND  AP 930     AT   AP  930.99
*
ADD HYD              ID=7  HYD=930.99  ID I=1      ID II=5
*
PRINT HYD            ID=7   CODE=1
*
***************************     *     *     *     *     *     *     *     *
* SUB-BASIN  928
***************************
COMPUTE NM HYD       ID=1  HYD=928  DA=0.011 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.266 HRS        RAIN=-1
*@ SUB-BASIN 928
PRINT HYD            ID=1   CODE=1
*
*   ROUTE AP 928  TO RP 924.88
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
* actually a street so use n=.02
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=14  ELMAX=15  CH SLP=.036  FP SLP=.036
                     N=.02 DIST=1 N=-.02 DIST=33 N=.02 DIST=34
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    1     14    33    14    34    15
*     *     *     *     *     *     *     *     *     *     *     *     *
*
COMPUTE TRAVEL TIME  ID=2  REACH=1  NO VS=1
                     L=1600   SLP=.036
*     *     *     *     *     *     *     *     *     *     *     *     *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
ROUTE                ID=2  HYD=924.88  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=2   CODE=1
*
***************************     *     *     *     *     *     *     *     *
* SUB-BASIN  929
***************************
COMPUTE NM HYD       ID=1  HYD=929  DA=0.019 SQ MI
                     PER A=0  B=13  C=7  D=80
                     TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 929
PRINT HYD            ID=1   CODE=1
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S  AP 929     AND RP 924.88 AT   AP 929.99
*
ADD HYD              ID=4  HYD=929.99  ID I=1      ID II=2
*
PRINT HYD            ID=4   CODE=1
*
```

```
***************************
COMPUTE NM HYD        ID=1  HYD=931  DA=0.060 SQ MI
                      PER A=0  B=45  C=5  D=50
                      TP=0.26 HRS        RAIN=-1
*@ SUB-BASIN 931
PRINT HYD             ID=1   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S   AP 931      AND  AP 929.99  AT   AP  931.99
*
ADD HYD               ID=1  HYD=931.99 ID I=4      ID II=1
*
*@@ WYOMING AND WILSHIRE
PRINT HYD             ID=1   CODE=1
*
*   ROUTE AP 931.99 TO RP 931.98
*****************************************************************************
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.008  DIA=6.0 FT N=.015
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=600       ft       SLP=.008       ft/ft
*     *     *     *     *     *     *     *     *     *     *     *     *
ROUTE                ID=3      HYD=931.98  INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=3   CODE=1
*
********************
* SUB-BASIN  932
***************************
COMPUTE NM HYD        ID=1  HYD=932  DA=0.078 SQ MI
                      PER A=0  B=20  C=10  D=70
                      TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 932
*
PRINT HYD             ID=1   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S   AP 932      AND  RP 931.98   AT   AP  932
*
ADD HYD               ID=17  HYD=932  ID I=1      ID II=3
PRINT HYD             ID=17   CODE=1
*****************************************************************************
* ROUTE HYD. 932        TO  RP 932.8
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.006  DIA=8.0 FT N=.015
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME  ID=3      REACH=1  NO VS=1
                     L=500       ft       SLP=.006       ft/ft
*     *     *     *     *     *     *     *     *     *     *     *     *
ROUTE                ID=3      HYD=932.8  INFLOW HYD ID=17   DT=.05
PRINT HYD            ID=3   CODE=1
*
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMBINE HYD.'S   AP 932.8      AND  RP 930.99   AT   AP  930.99
*
ADD HYD               ID=4  HYD=930.99  ID I=3      ID II=7
*@CONC CHAN @ WYOMING
PRINT HYD             ID=4   CODE=1
*   ROUTE AP 930.99  TO RP 930.98
*     *     *     *     *     *     *     *     *     *     *     *     *
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME STANDARD CONCRETE CHANNEL SECTION
```

```
                    ELMIN=0  ELMAX=15  CH SLP=.03  FP SLP=.03
                    N=.015 DIST=30 N=-.015 DIST=40 N=.015 DIST=70
                    DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                      0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME ID=5  REACH=1  NO VS=1
                    L=2100   SLP=.03
*    *    *    *    *    *    *    *    *    *    *    *    *
ROUTE               ID=5  HYD=930.98   INFLOW HYD ID=4   DT=.05
PRINT HYD           ID=5   CODE=1
***************************    *    *    *    *    *    *    *    *
*  SUB-BASIN  935
***************************
COMPUTE NM HYD      ID=1  HYD=935  DA=0.097 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 935
*
PRINT HYD           ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 935      AND  RP 930.98   AT   AP  935
*
ADD HYD             ID=17  HYD=935  ID I=1      ID II=5
*
PRINT HYD           ID=17   CODE=1
********************
*  SUB-BASIN  933
**********************
COMPUTE NM HYD      ID=1  HYD=933  DA=0.041 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 933
PRINT HYD           ID=1   CODE=1
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S   AP 933      AND  AP 935  AT   AP  933
*
ADD HYD             ID=18  HYD=933 ID I=17      ID II=1
*
PRINT HYD           ID=18   CODE=1
PRINT HYD           ID=18  CODE=1
***************************    *    *    *    *    *    *    *    *
*  SUB-BASIN  934
***************************
COMPUTE NM HYD      ID=1  HYD=934  DA=0.065 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 934
PRINT HYD           ID=1   CODE=1
*
*    *    *    *    *    *    *    *    *    *    *    *    *
*    COMBINE HYD.'S  AP 934      AND 933 AT   AP 934
*
ADD HYD             ID=19  HYD=934  ID I=1      ID II=18
PRINT HYD           ID=19   CODE=1
*
***************************    *    *    *    *    *    *    *    *
*  SUB-BASIN  937
***************************
COMPUTE NM HYD      ID=1  HYD=937  DA=0.012 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*@ SUB-BASIN 937
*
--- -  -            --.    ----.
```

```
* ROUTE  AP 937    TO RP 937.8
*     COMPUTE RATING CURVES FOR  VALLEY SECTIONS IN REACH 1
*        REACH IS BETWEEN AP ???.?? AND IAP ???.??
*        REACH BETWEEN STREETS ? AND ?
*        EXISTING REACH HAS THE FOLLOWING CROSS SECTION CHARACTERISTICS
*
*        ASSUME EARTH / RIP-RAP DIVERSION CHANNEL
*          TRAP. 1V:2H, BOT. WIDTH = 10 FT., DEPTH = 15 FT.
COMPUTE RATING CURVE RC=1   VS NO=1   NSEGS=3
                     ELMIN=0  ELMAX=15  CH SLP=.01  FP SLP=.01
                     N=.03 DIST=30 N=-.03 DIST=40 N=.03 DIST=70
                     DIST  ELEV  DIST  ELEV  DIST  ELEV  DIST  ELEV
                       0    15    30     0    40    0     70    15
*    *    *    *    *    *    *    *    *    *    *    *    *
COMPUTE TRAVEL TIME  ID=20  REACH=1  NO VS=1
                     L=800   SLP=.01
*    *    *    *    *    *    *    *    *    *    *    *    *
*     ROUTE HYD. THROUGH REACH 1 FROM AP ? TO IAP ?
*         THE LOCATION OF THE ROUTED HYDROGRAPH IS
*
*
ROUTE                ID=20  HYD=937.8   INFLOW HYD ID=1   DT=.05
PRINT HYD            ID=20   CODE=1
*
*^^^
```

APPENDIX C

Miscellaneous Hydraulic Calculations

Holly/Carmel Sediment Pond

```
AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
     RUN DATE (MON/DAY/YR) = 04/24/1995
     START TIME (HR:MIN:SEC) = 07:14:20     USER NO.= RSTECHNM.STE
     INPUT FILE = POND1.EXT

START                0.0 HRS
*
* FILE NAME POND1.EXT
*
* TITLE 1             LNDB POND 1
* TITLE 2             EXISTING COND 100-YR. 24-HR. STORM  as built pond
*                     .36 AC-FT SED ALLOWANCE
*************************
*    SUB-BASIN 937.99
*************************
RECALL HYD           ID= 1 HYD=      937.99 DT=  .050000 HRS DA=    .1493 SQ MI
                     PEAK=    121.967CFS  RO= 1.0087 INCHES  NO PTS=523
                     FLOW RATES
```

.000	.000	.000	.000	.000
.000	.000	.000	.000	.000
.000	.000	.000	.000	.000
.000	.000	.000	.000	.000
.001	.012	.073	.225	.614
1.535	3.240	9.189	25.728	50.952
74.579	91.411	103.671	113.733	120.462
121.967	117.803	109.563	99.478	88.845
78.637	69.210	60.440	52.483	45.493
39.403	34.172	29.748	25.968	22.659
19.746	17.263	15.232	13.592	12.247
11.119	10.152	9.309	8.562	7.896
7.298	6.760	6.272	5.829	5.428
5.059	4.720	4.403	4.102	3.818
3.551	3.300	3.064	2.845	2.641
2.453	2.278	2.118	1.971	1.836
1.712	1.599	1.496	1.401	1.315
1.237	1.166	1.101	1.042	.987
.938	.893	.852	.815	.781
.752	.725	.701	.677	.657
.638	.622	.607	.595	.582
.569	.559	.550	.544	.539
.534	.530	.527	.524	.523
.521	.521	.520	.520	.520
.521	.521	.519	.515	.510
.506	.502	.499	.496	.493
.490	.487	.485	.482	.480
.477	.475	.472	.470	.468
.465	.462	.460	.457	.455
.453	.451	.450	.448	.446
.444	.442	.440	.438	.436
.435	.434	.433	.431	.429
.427	.426	.424	.422	.421
.420	.419	.418	.417	.416
.414	.412	.411	.409	.409
.407	.405	.404	.403	.402
.401	.400	.398	.397	.395
.394	.393	.392	.391	.390
.389	.388	.387	.385	.384
.383	.382	.381	.379	.378
.377	.377	.375	.374	.373

.366	.367	.365	.364	.363
.362	.360	.359	.358	.358
.357	.356	.355	.354	.353
.352	.351	.350	.349	.348
.347	.347	.346	.344	.343
.343	.342	.341	.340	.339
.338	.338	.337	.336	.335
.335	.334	.332	.330	.330
.330	.329	.328	.327	.326
.326	.325	.324	.323	.322
.321	.321	.320	.320	.319
.319	.318	.317	.316	.315
.314	.313	.313	.313	.312
.311	.310	.309	.308	.307
.307	.306	.305	.305	.304
.304	.303	.303	.302	.301
.300	.300	.299	.299	.298
.297	.296	.295	.295	.294
.294	.293	.293	.292	.291
.290	.290	.289	.289	.288
.288	.287	.286	.285	.285
.285	.284	.283	.282	.282
.282	.282	.281	.280	.279
.279	.278	.278	.277	.277
.276	.275	.274	.273	.273
.273	.273	.272	.271	.271
.270	.269	.269	.268	.268
.268	.267	.267	.266	.265
.266	.265	.265	.264	.263
.262	.261	.261	.261	.260
.260	.259	.259	.258	.258
.257	.256	.256	.256	.256
.255	.254	.254	.254	.254
.253	.252	.251	.251	.251
.250	.250	.249	.249	.249
.248	.248	.248	.247	.246
.245	.245	.245	.245	.245
.244	.243	.243	.243	.242
.242	.241	.241	.240	.240
.239	.239	.238	.238	.238
.238	.237	.237	.236	.236
.236	.235	.235	.234	.233
.233	.233	.233	.233	.232
.232	.231	.230	.230	.230
.230	.229	.229	.229	.228
.227	.227	.227	.227	.227
.226	.225	.225	.224	.225
.225	.224	.224	.223	.223
.222	.222	.222	.221	.221
.220	.220	.219	.218	.218
.218	.218	.218	.218	.218
.217	.216	.216	.217	.217
.216	.215	.215	.215	.214
.214	.214	.213	.213	.213
.212	.211	.203	.189	.176
.164	.154	.144	.135	.125
.116	.107	.098	.090	.081
.074	.067	.060	.054	.047
.042	.037	.032	.028	.024
.021	.018	.015	.013	.011
.009	.007	.006	.005	.004
.004	.003	.003	.002	.002
.001	.001	.001		

*

*42" OUTFALL

ROUTE RESERVOIR ID=2 HYD NO=937.99 INFLOW ID=1 CODE=24

OUTFLOW (cfs)	STORAGE (ac-ft)	ELEV (ft)
0	0	28
10	.01	29
21	.02	30
42	.33	31
66	.74	32
85	1.22	33
100	1.81	34

* * * * * * * * * * * * * * * * *

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	28.00	.000	.00
1.20	.61	28.05	.001	.50
2.40	25.97	31.45	.516	52.89
3.60	3.06	28.31	.003	3.12
4.80	.73	28.07	.001	.73
6.00	.52	28.05	.001	.52
7.20	.46	28.05	.000	.46
8.40	.42	28.04	.000	.42
9.60	.39	28.04	.000	.39
10.80	.36	28.04	.000	.36
12.00	.34	28.03	.000	.34
13.20	.32	28.03	.000	.32
14.40	.30	28.03	.000	.30
15.60	.29	28.03	.000	.29
16.80	.27	28.03	.000	.27
18.00	.26	28.03	.000	.26
19.20	.25	28.02	.000	.25
20.40	.24	28.02	.000	.24
21.60	.23	28.02	.000	.23
22.80	.22	28.02	.000	.22
24.00	.21	28.02	.000	.21
25.20	.02	28.00	.000	.02

PEAK DISCHARGE = 91.304 CFS - PEAK OCCURS AT HOUR 1.95
MAXIMUM WATER SURFACE ELEVATION = 33.420
MAXIMUM STORAGE = 1.4679 AC-FT INCREMENTAL TIME= .050000HRS

*
PRINT HYD ID=2 CODE=1

HYDROGRAPH FROM AREA 937.99

RUNOFF VOLUME = 1.00865 INCHES = 8.0315 ACRE-FEET
PEAK DISCHARGE RATE = 91.30 CFS AT 1.950 HOURS BASIN AREA = .1493 SQ. MI.

*
*PLOT HYD ID=1
*
****
*
FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 07:16:05

```
    AHYMO PROGRAM (AHYMO194) - AMAFCA Hydrologic Model - January, 1994
         RUN DATE (MON/DAY/YR) = 04/24/1995
         START TIME (HR:MIN:SEC) = 07:17:05     USER NO.= RSTECHNM.STE
         INPUT FILE = POND2.EXT

START                0.0 HRS
*
* FILE NAME POND2.EXT
*
* TITLE 1             LNDB POND 2   AS BUILT POND
* TITLE 2             EXISTING COND 100-YR. 24-HR. STORM NO SED IN POND
*************************
*    SUB-BASIN 937.99
*************************
RECALL HYD           ID= 1 HYD=      937.99 DT=  .050000 HRS DA=    .1493 SQ MI
                     PEAK=    121.967CFS  RO= 1.0087 INCHES  NO PTS=523
                     FLOW RATES
                          .000       .000       .000       .000       .000
                          .000       .000       .000       .000       .000
                          .000       .000       .000       .000       .000
                          .000       .000       .000       .000       .000
                          .001       .012       .073       .225       .614
                         1.535      3.240      9.189     25.728     50.952
                        74.579     91.411    103.671    113.733    120.462
                       121.967    117.803    109.563     99.478     88.845
                        78.637     69.210     60.440     52.483     45.493
                        39.403     34.172     29.748     25.968     22.659
                        19.746     17.263     15.232     13.592     12.247
                        11.119     10.152      9.309      8.562      7.896
                         7.298      6.760      6.272      5.829      5.428
                         5.059      4.720      4.403      4.102      3.818
                         3.551      3.300      3.064      2.845      2.641
                         2.453      2.278      2.118      1.971      1.836
                         1.712      1.599      1.496      1.401      1.315
                         1.237      1.166      1.101      1.042       .987
                          .938       .893       .852       .815       .781
                          .752       .725       .701       .677       .657
                          .638       .622       .607       .595       .582
                          .569       .559       .550       .544       .539
                          .534       .530       .527       .524       .523
                          .521       .521       .520       .520       .520
                          .521       .521       .519       .515       .510
                          .506       .502       .499       .496       .493
                          .490       .487       .485       .482       .480
                          .477       .475       .472       .470       .468
                          .465       .462       .460       .457       .455
                          .453       .451       .450       .448       .446
                          .444       .442       .440       .438       .436
                          .435       .434       .433       .431       .429
                          .427       .426       .424       .422       .421
                          .420       .419       .418       .417       .416
                          .414       .412       .411       .409       .409
                          .407       .405       .404       .403       .402
                          .401       .400       .398       .397       .395
                          .394       .393       .392       .391       .390
                          .389       .388       .387       .385       .384
                          .383       .382       .381       .379       .378
                          .377       .377       .375       .374       .373
                          .372       .371       .370       .368       .368
```

.362	.360	.359	.358	.358
.357	.356	.355	.354	.353
.352	.351	.350	.349	.348
.347	.347	.346	.344	.343
.343	.342	.341	.340	.339
.338	.338	.337	.336	.335
.335	.334	.332	.330	.330
.330	.329	.328	.327	.326
.326	.325	.324	.323	.322
.321	.321	.320	.320	.319
.319	.318	.317	.316	.315
.314	.313	.313	.313	.312
.311	.310	.309	.308	.307
.307	.306	.305	.305	.304
.304	.303	.303	.302	.301
.300	.300	.299	.299	.298
.297	.296	.295	.295	.294
.294	.293	.293	.292	.291
.290	.290	.289	.289	.288
.288	.287	.286	.285	.285
.285	.284	.283	.282	.282
.282	.282	.281	.280	.279
.279	.278	.278	.277	.277
.276	.275	.274	.273	.273
.273	.273	.272	.271	.271
.270	.269	.269	.268	.268
.268	.267	.267	.266	.265
.266	.265	.265	.264	.263
.262	.261	.261	.261	.260
.260	.259	.259	.258	.258
.257	.256	.256	.256	.256
.255	.254	.254	.254	.254
.253	.252	.251	.251	.251
.250	.250	.249	.249	.249
.248	.248	.248	.247	.246
.245	.245	.245	.245	.245
.244	.243	.243	.243	.242
.242	.241	.241	.240	.240
.239	.239	.238	.238	.238
.238	.237	.237	.236	.236
.236	.235	.235	.234	.233
.233	.233	.233	.233	.232
.232	.231	.230	.230	.230
.230	.229	.229	.229	.228
.227	.227	.227	.227	.227
.226	.225	.225	.224	.225
.225	.224	.224	.223	.223
.222	.222	.222	.221	.221
.220	.220	.219	.218	.218
.218	.218	.218	.218	.218
.217	.216	.216	.217	.217
.216	.215	.215	.215	.214
.214	.214	.213	.213	.213
.212	.211	.203	.189	.176
.164	.154	.144	.135	.125
.116	.107	.098	.090	.081
.074	.067	.060	.054	.047
.042	.037	.032	.028	.024
.021	.018	.015	.013	.011
.009	.007	.006	.005	.004
.004	.003	.003	.002	.002
.001	.001	.001		

*

*42" OUTFALL

*

OUTFLOW (CFS)	STORAGE (AC-FT)	ELEV (FT)
0	0	28
10	.10	29
21	.34	30
42	.69	31
66	1.10	32
85	1.58	33
100	2.17	34

* * * * * * * * * * * * * * * * *

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	28.00	.000	.00
1.20	.61	28.02	.002	.18
2.40	25.97	31.43	.865	52.23
3.60	3.06	28.38	.038	3.82
4.80	.73	28.08	.008	.81
6.00	.52	28.05	.005	.52
7.20	.46	28.05	.005	.46
8.40	.42	28.04	.004	.42
9.60	.39	28.04	.004	.39
10.80	.36	28.04	.004	.36
12.00	.34	28.03	.003	.34
13.20	.32	28.03	.003	.32
14.40	.30	28.03	.003	.30
15.60	.29	28.03	.003	.29
16.80	.27	28.03	.003	.27
18.00	.26	28.03	.003	.26
19.20	.25	28.02	.002	.25
20.40	.24	28.02	.002	.24
21.60	.23	28.02	.002	.23
22.80	.22	28.02	.002	.22
24.00	.21	28.02	.002	.21
25.20	.02	28.00	.000	.04

PEAK DISCHARGE = 90.162 CFS - PEAK OCCURS AT HOUR 1.95
MAXIMUM WATER SURFACE ELEVATION = 33.344
MAXIMUM STORAGE = 1.7830 AC-FT INCREMENTAL TIME= .050000HRS

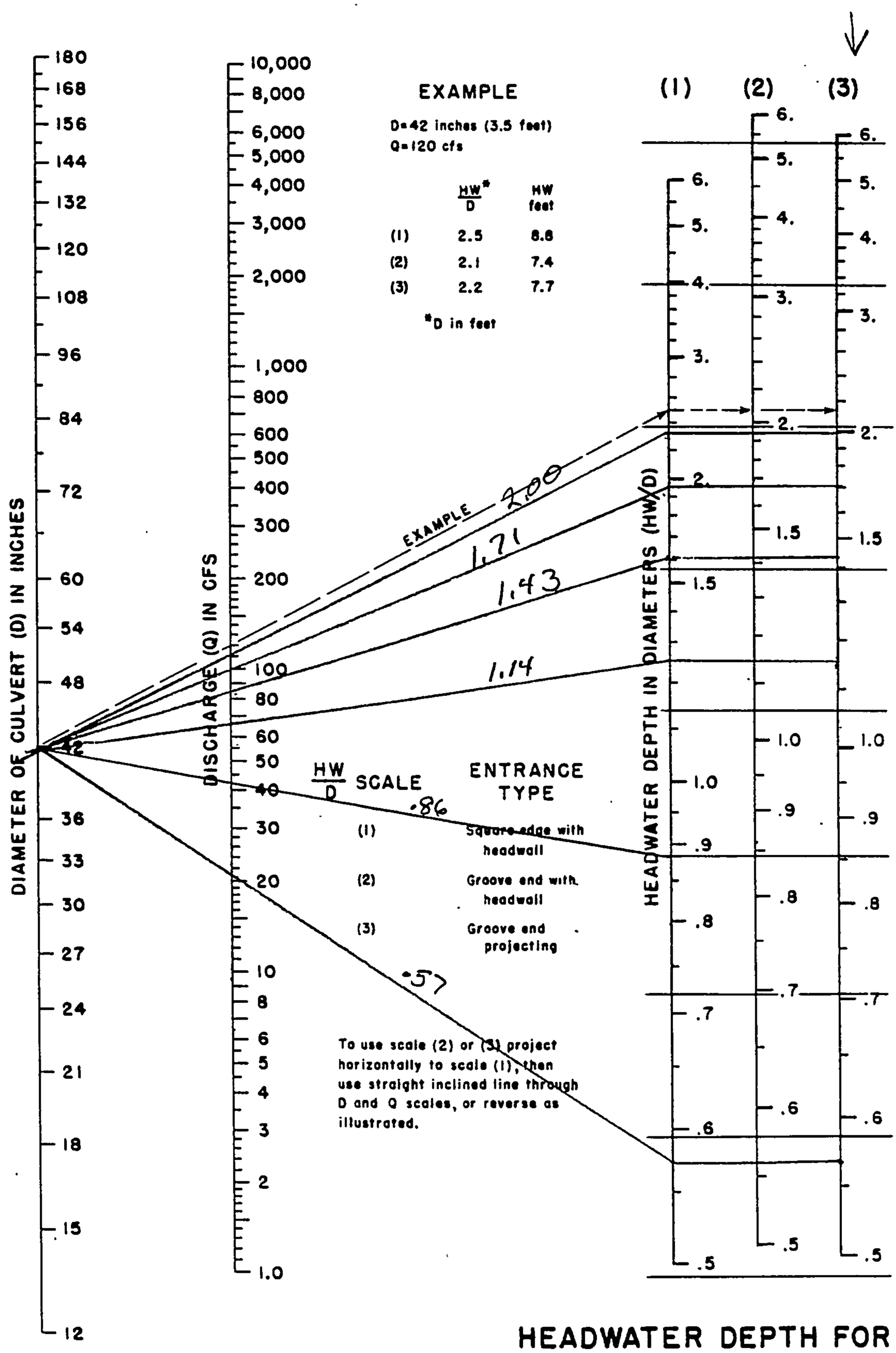
*
PRINT HYD ID=2 CODE=1

HYDROGRAPH FROM AREA 937.99

RUNOFF VOLUME = 1.00865 INCHES = 8.0315 ACRE-FEET
PEAK DISCHARGE RATE = 90.16 CFS AT 1.950 HOURS BASIN AREA = .1493 SQ. MI.

*
*
*
FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 07:18:49



FHWA

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

NOMOGRAPH 1

RESOURCE TECHNOLOGY, INC.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

CHECKED _____ DATE _____
APPROVED _____ DATE _____
TITLE As-Built Pond

PROJECT NO. _____
SHEET _____ OF _____
BY _____ DATE 5/3

Elev.	A	ΔV	V	S	S*
28	2064	0	0	0	0
29	7482	4492	4492	.10	0
30	13784	10474	14966	.34	0
31	16474	15109	30075	.69	.33
32	19201	17820	47895	1.10	.74
33	22371	20766	68661	1.58	1.22
34	29447	25828	94489	2.17	1.81

S* S -.36 Ac-ft)

Chute CALCS 3/24/94

CHANNEL LINING ANALYSIS

Channel Bottom Width (ft)	Side Slope Lt. (Horz. to 1)	Side Slope Rt. (Horz. to 1)	Channel Slope (ft/ft)
45.00	2.0	2.0	0.032

Lining	Permissible Shear (lb/sf)	Discharge (cfs)	Hydraulic Radius (ft)	Manning Coefficient
Concrete	99.00	%3100.0	2.33	0.020

Normal Depth (ft)	Area (sf)	Velocity (ft/sec)	Calculated Shear (lb/sf)	Remarks
2.63	%132.53	23.39	5.26	Stable

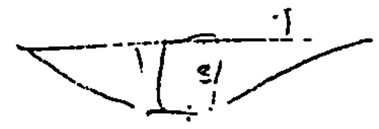
CHANNEL LINING ANALYSIS

Channel Bottom Width (ft)	Side Slope Lt. (Horz. to 1)	Side Slope Rt. (Horz. to 1)	Channel Slope (ft/ft)
35.00	2.0	2.0	0.032

Lining	Permissible Shear (lb/sf)	Discharge (cfs)	Hydraulic Radius (ft)	Manning Coefficient
Concrete	99.00	%3100.0	2.56	0.020

Normal Depth (ft)	Area (sf)	Velocity (ft/sec)	Calculated Shear (lb/sf)	Remarks
3.03	%124.48	24.90	6.05	Stable

Sediment Pond Calcs



CHANNEL LINING ANALYSIS			
Channel Bottom Width (ft)	Side Slope Lt. (Horz. to 1)	Side Slope Rt. (Horz. to 1)	Channel Slope (ft/ft)
25.00	3.0	3.0	0.005

Lining	Permissible Shear (lb/sf)	Discharge (cfs)	Hydraulic Radius (ft)	Manning Coefficient
Concrete	33.00	100.0	0.75	0.020

Normal Depth (ft)	Area (sf)	Velocity (ft/sec)	Calculated Shear (lb/sf)	Remarks
0.83	22.92	4.36	0.25	Stable

Assuming Backwater from 48" Outfall

MAX Q_{out} = 96 CFS

d_{mean} = 3.0'

$A = 75 + 27 = 102$

$Q = VA \quad V = \frac{Q}{A} = \frac{96}{102}$

$V \cong 1$ ft/s

CHANNEL LINING ANALYSIS			
Channel Bottom Width (ft)	Side Slope Lt. (Horz. to 1)	Side Slope Rt. (Horz. to 1)	Channel Slope (ft/ft)
25.00	3.0	3.0	0.020

Lining	Permissible Shear (lb/sf)	Discharge (cfs)	Hydraulic Radius (ft)	Manning Coefficient
Concrete	33.00	100.0	0.51	0.020

Normal Depth (ft)	Area (sf)	Velocity (ft/sec)	Calculated Shear (lb/sf)	Remarks
0.55	14.76	6.77	0.69	Stable

RESOURCE TECHNOLOGY, INC.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

CHECKED _____ DATE _____
APPROVED _____ DATE _____
TITLE 48" CCL PIPE

PROJECT NO. 92-277
SHEET _____ OF _____
BY 4/5 DATE Apl

$D = 48''$ (4')

$\frac{d}{D} = .81$ $\qquad n = .013$

$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$ $\qquad S = .0188$ $\qquad S^{1/2} = .1371$

$\frac{A}{D^2} = .6815$ $\qquad \frac{R}{D} = .3044$

$A = .6815(16) = 10.904$

$R = .3044(4) = 1.2176$ $\qquad R^{2/3} = 1.1403$

$Q = \frac{1.49}{.013}(10.904)(1.1403)(.1371) = 195.4 \text{ cfs}$

$n = .012$

$Q = 211.7$ cfs

RESOURCE TECHNOLOGY, INC.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

CHECKED _____ DATE _____
APPROVED _____ DATE _____
TITLE 40" Orifice Plate

PROJECT NO. 92-277
SHEET _____ OF _____
BY DSD DATE 1/20

C = .61 A = 8.727

$Q = CA\sqrt{2gh}$

Sharp : C = .61
Brubber King

Elev	d	h	Q
298	0	0	0
300	2	1	42.7
302	4	2.33	65.2
304	6	4.33	88.9
306	8	6.33	107.5
308	10	8.33	123.3
310	12	10.33	137.3
312	14	12.33	150.0
314	16	14.33	161.7
316	18	16.33	172.6
318	20	18.33	182.9
320	22	20.33	192.6
322	24	22.33	201.9
323.5	25.5	23.83	208.5
324	26	24.33	210.7
326	28	26.33	219.2
328	30	28.33	227.4
330	32	30.33	235.3

RESOURCE TECHNOLOGY, INC.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

CHECKED _____ DATE _____
APPROVED _____ DATE _____
TITLE Emergency Spillway

PROJECT NO. 92-277
SHEET _____ OF _____
BY DAJ DATE 3/7/92

$L_{Bottom} = 440'$ $C = 3$ $L = 2H + 440$

elev	H	L	Q_s	Q_p	Q_T
5324	.5	441	468	211	679
5326	2.5	445	5277	219	5496
5328	4.5	449	12858	227	13085
5330	6.5	453	22521	235	22756
5331.5	8.0	456	30954	240	31,194

$$Q = CLH^{3/2}$$

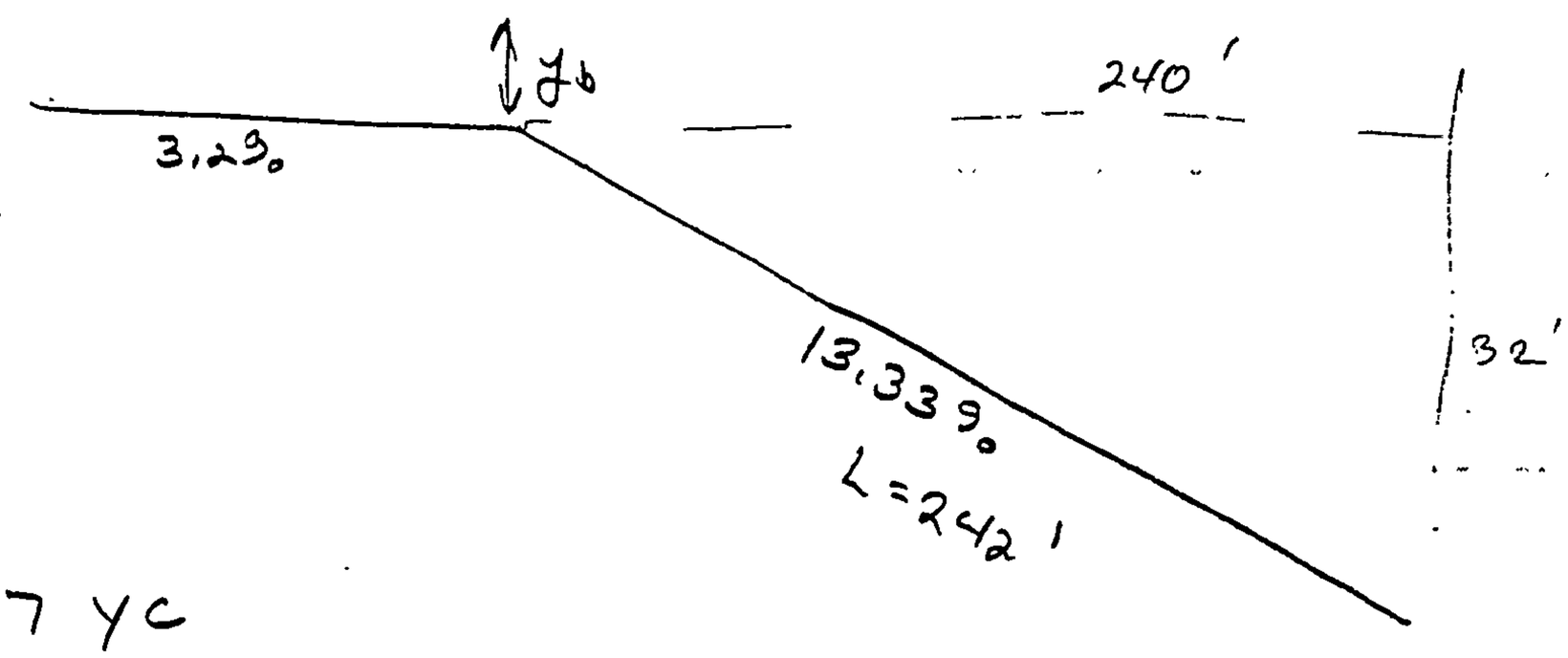
RESOURCE TECHNOLOGY, INC.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

CHECKED _____ DATE _____
APPROVED _____ DATE _____
TITLE chute calcs

PROJECT NO. _____
SHEET _____ OF _____
BY _____ DATE 3/2c

$\frac{2}{62.5} = 3.2\%$

$\frac{2}{15} = 13.33\%$



$y_0 = .7\, y_c$

$y_c = \left(\frac{q^2}{g}\right)^{1/3} =$ $\quad q = \frac{3100}{34} = 91.2$ $\quad y_c \cong 6.36'$

$y_0 = 4.45'$

$L = 242 \quad d = 2.1 \quad V = 43.2\ '/s$

if $y_n \sim 3.3'$, $L = 242$

$d = 2.05 \quad V \sim 43.4\ '/s$

RESOURCE TECHNOLOGY, INC.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

CHECKED _____ DATE _____
APPROVED _____ DATE _____
TITLE chute calcs

PROJECT NO. _____
SHEET _____ OF _____
BY _____ DATE 3/2/19

Design for .8 Qp

$Q_D = .8(3100) = 2480$

$y_c = \left(\frac{q^2}{g}\right)^{1/3}$ $q = 77.5$

$y_c = 5.70$ $y_b = .7\,y_c = 3.99'$

chute calcs

CHANNEL LINING ANALYSIS

Channel Bottom Width (ft)	Side Slope Lt. (Horz. to 1)	Side Slope Rt. (Horz. to 1)	Channel Slope (ft/ft)
30.00	2.0	2.0	0.032

Lining	Permissible Shear (lb/sf)	Discharge (cfs)	Hydraulic Radius (ft)	Manning Coefficient
Concrete	99.00	%3100.0	2.69	0.020

Normal Depth (ft)	Area (sf)	Velocity (ft/sec)	Calculated Shear (lb/sf)	Remarks
3.29	%120.45	25.73	6.57	Stable

-124/24

Y	A	P	R	V	EG	E	RBAR	VBAR	SO	SF	L	SUML
4.4	170.72	49.6774	3.436573	18.15839	5.119385	9.519385						
4.3	165.98	49.23018	3.371509	18.67695	5.41659	9.71659	3.404041	18.41767	0.1333	0.006659	1.55246	1.55246
4.2	161.28	48.78297	3.306072	19.22123	5.73689	9.93689	3.33879	18.94909	0.1333	0.007234	1.74749	3.29995
4.1	156.62	48.33576	3.240251	19.79313	6.083354	10.18335	3.273161	19.50718	0.1333	0.007873	1.965003	5.264953
4	152	47.88854	3.174037	20.39474	6.458778	10.45878	3.207144	20.09393	0.1333	0.008585	2.208427	7.47338
3.9	147.42	47.44133	3.107417	21.02835	6.866331	10.76633	3.140727	20.71155	0.1333	0.00938	2.48187	9.95525
3.8	142.88	46.99412	3.040381	21.69653	7.309617	11.10962	3.073899	21.36244	0.1333	0.010271	2.790288	12.74554
3.7	138.38	46.5469	2.972915	22.40208	7.792752	11.49275	3.006648	22.0493	0.1333	0.011271	3.139709	15.88525
3.6	133.92	46.09969	2.905009	23.14815	8.320447	11.92045	2.938962	22.77511	0.1333	0.012398	3.537529	19.42278
3.5	129.5	45.65248	2.836648	23.93822	8.898114	12.39811	2.870828	23.54319	0.1333	0.013671	3.99292	23.4157
3.4	125.12	45.20526	2.767819	24.77621	9.532	12.932	2.802234	24.35722	0.1333	0.015115	4.517377	27.93307
3.3	120.78	44.75805	2.698509	25.6665	10.22934	13.52934	2.733164	25.22136	0.1333	0.016758	5.12549	33.05856
3.2	116.48	44.31084	2.628702	26.61401	10.99853	14.19853	2.663606	26.14026	0.1333	0.018634	5.836043	38.89461
3.1	112.22	43.86362	2.558384	27.62431	11.84942	14.94942	2.593543	27.11916	0.1333	0.020785	6.673615	45.56822
3	108	43.41641	2.487539	28.7037	12.79352	15.79352	2.522962	28.16401	0.1333	0.023262	7.670969	53.23919
2.9	103.82	42.96919	2.41615	29.85937	13.84444	16.74444	2.451844	29.28154	0.1333	0.026126	8.872731	62.11192
2.8	99.68	42.52198	2.344199	31.09952	15.01832	17.81832	2.380174	30.47945	0.1333	0.029456	10.34126	72.45318
2.7	95.58	42.07477	2.27167	32.43356	16.33441	19.03441	2.307935	31.76654	0.1333	0.033345	12.16634	84.61952
2.6	91.52	41.62755	2.198544	33.87238	17.81581	20.41581	2.235107	33.15297	0.1333	0.037914	14.48211	99.10163
2.5	87.5	41.18034	2.1248	35.42857	19.49043	21.99043	2.161672	34.65047	0.1333	0.043312	17.49818	116.5998
2.4	83.52	40.73313	2.05042	37.11686	21.39225	23.79225	2.08761	36.27271	0.1333	0.049732	21.5613	138.1611
2.3	79.58	40.28591	1.97538	38.95451	23.56295	25.86295	2.0129	38.03568	0.1333	0.057421	27.28944	165.4505
2.2	75.68	39.8387	1.89966	40.96195	26.05405	28.25405	1.93752	39.95823	0.1333	0.066698	35.90133	201.3519
2.1	71.82	39.39149	1.823237	43.16346	28.92989	31.02989	1.861449	42.0627	0.1333	0.077984	50.18114	251.533
2	68	38.94427	1.746085	45.58824	32.27154	34.27154	1.784661	44.37585	0.1333	0.091837	78.18229	329.7153
1.9	64.22	38.49706	1.668179	48.27157	36.18236	38.08236	1.707132	46.9299	0.1333	0.109011	156.8966	486.6119
1.8	60.48	38.04984	1.589494	51.25661	40.79566	42.59566	1.628837	49.76409	0.1333	0.130535	1632.159	2118.771
1.7	56.78	37.60263	1.510001	54.59669	46.28569	47.98569	1.549747	52.92665	0.1333	0.157837	-219.668	1899.102
1.6	53.12	37.15542	1.42967	58.35843	52.88365	54.48365	1.469836	56.47756	0.1333	0.19294	-108.953	1790.149
1.5	49.5	36.7082	1.348472	62.62626	60.90138	62.40138	1.389071	60.49235	0.1333	0.238759	-75.0787	1715.07
1.4	45.92	36.26099	1.266375	67.50871	70.76749	72.16749	1.307424	65.06749	0.1333	0.299599	-58.7262	1656.344
1.3	42.38	35.81378	1.183344	73.14771	83.08366	84.38366	1.224859	70.32821	0.1333	0.381974	-49.1253	1607.219
1.2	38.88	35.36656	1.099343	79.73251	98.71542	99.91542	1.141343	76.44011	0.1333	0.496038	-42.8182	1564.401
1.1	35.42	34.91935	1.014337	87.52117	118.9434	120.0434	1.05684	83.62684	0.1333	0.658156	-38.3496	1526.051
1	32	34.47214	0.928286	96.875	145.7262	146.7262	0.971312	92.19809	0.1333	0.895763	-34.9955	1491.056
0.9	28.62	34.02492	0.841148	108.3159	182.179	183.079	0.884717	102.5954	0.1333	1.257037	-32.3499	1458.706
0.8	25.28	33.57771	0.75288	122.6266	233.4981	234.2981	0.797014	115.4712	0.1333	1.831441	-30.1619	1428.544
0.7	21.98	33.1305	0.663437	141.0373	308.8746	309.5746	0.708159	131.8319	0.1333	2.796895	-28.2612	1400.283
0.6	18.72	32.68328	0.57277	165.5983	425.8198	426.4198	0.618104	153.3178	0.1333	4.539135	-26.5206	1373.762

242

3/24/94

$Q = .8\,Q_p$

Y	A	P	R	V	EG	E	RBAR	VBAR	SO	SF	L	SUML
4	152	47.88854	3.174037	16.31579	4.133618	8.133618						
3.9	147.42	47.44133	3.107417	16.82268	4.394452	8.294452	3.140727	16.56924	0.1333	0.006003	1.263456	1.263456
3.8	142.88	46.99412	3.040381	17.35722	4.678155	8.478155	3.073899	17.08995	0.1333	0.006573	1.449604	2.713061
3.7	138.38	46.5469	2.972915	17.92166	4.987361	8.687361	3.006648	17.63944	0.1333	0.007214	1.65923	4.372291
3.6	133.92	46.09969	2.905009	18.51852	5.325086	8.925086	2.938962	18.22009	0.1333	0.007935	1.896254	6.268544
3.5	129.5	45.65248	2.836648	19.15058	5.694793	9.194793	2.870828	18.83455	0.1333	0.00875	2.165448	8.433993
3.4	125.12	45.20526	2.767819	19.82097	6.10048	9.50048	2.802234	19.48578	0.1333	0.009674	2.472668	10.90666
3.3	120.78	44.75805	2.698509	20.5332	6.546775	9.846775	2.733164	20.17709	0.1333	0.010725	2.825169	13.73183
3.2	116.48	44.31084	2.628702	21.29121	7.039062	10.23906	2.663606	20.9122	0.1333	0.011926	3.232034	16.96386
3.1	112.22	43.86362	2.558384	22.09945	7.583627	10.68363	2.593543	21.69533	0.1333	0.013302	3.704781	20.66864
3	108	43.41641	2.487539	22.96296	8.187852	11.18785	2.522962	22.53121	0.1333	0.014887	4.258203	24.92685
2.9	103.82	42.96919	2.41615	23.8875	8.860443	11.76044	2.451844	23.42523	0.1333	0.016721	4.911607	29.83846
2.8	99.68	42.52198	2.344199	24.87961	9.611727	12.41173	2.380174	24.38356	0.1333	0.018852	5.690635	35.52909
2.7	95.58	42.07477	2.27167	25.94685	10.45402	13.15402	2.307935	25.41323	0.1333	0.021341	6.630053	42.15914
2.6	91.52	41.62755	2.198544	27.0979	11.40212	14.00212	2.235107	26.52238	0.1333	0.024265	7.778157	49.9373
2.5	87.5	41.18034	2.1248	28.34286	12.47388	14.97388	2.161672	27.72038	0.1333	0.02772	9.203984	59.14128
2.4	83.52	40.73313	2.05042	29.69349	13.69104	16.09104	2.08761	29.01817	0.1333	0.031829	11.0097	70.15098
2.3	79.58	40.28591	1.97538	31.16361	15.08029	17.38029	2.0129	30.42855	0.1333	0.036749	13.35306	83.50404
2.2	75.68	39.8387	1.89966	32.76956	16.67459	18.87459	1.93752	31.96658	0.1333	0.042687	16.49101	99.99505
2.1	71.82	39.39149	1.823237	34.53077	18.51513	20.61513	1.861449	33.65016	0.1333	0.04991	20.87211	120.8672
2	68	38.94427	1.746085	36.47059	20.65379	22.65379	1.784661	35.50068	0.1333	0.058776	27.35567	148.2228
1.9	64.22	38.49706	1.668179	38.61725	23.15671	25.05671	1.707132	37.54392	0.1333	0.069767	37.82182	186.0447
1.8	60.48	38.04984	1.589494	41.00529	26.10922	27.90922	1.628837	39.81127	0.1333	0.083542	57.32796	243.3726
1.7	56.78	37.60263	1.510001	43.67735	29.62284	31.32284	1.549747	42.34132	0.1333	0.101016	105.7364	349.1091
1.6	53.12	37.15542	1.42967	46.68675	33.84553	35.44553	1.469836	45.18205	0.1333	0.123481	419.8878	768.9969
1.5	49.5	36.7082	1.348472	50.10101	38.97688	40.47688	1.389071	48.39388	0.1333	0.152806	-257.941	511.0561
1.4	45.92	36.26099	1.266375	54.00697	45.29119	46.69119	1.307424	52.05399	0.1333	0.191743	-106.331	404.7255
1.3	42.38	35.81378	1.183344	58.51817	53.17354	54.47354	1.224859	56.26257	0.1333	0.244463	-70.0083	334.7173
1.2	38.88	35.36656	1.099343	63.78601	63.17787	64.37787	1.141343	61.15209	0.1333	0.317464	-53.7799	280.9374
1.1	35.42	34.91935	1.014337	70.01694	76.12379	77.22379	1.05684	66.90147	0.1333	0.42122	-44.6163	236.3211
1	32	34.47214	0.928286	77.5	93.26475	94.26475	0.971312	73.75847	0.1333	0.573289	-38.7305	197.5906
0.9	28.62	34.02492	0.841148	86.65269	116.5945	117.4945	0.884717	82.07635	0.1333	0.804504	-34.6092	162.9814
0.8	25.28	33.57771	0.75288	98.10127	149.4388	150.2388	0.797014	92.37698	0.1333	1.172122	-31.5206	131.4609
0.7	21.98	33.1305	0.663437	112.8298	197.6797	198.3797	0.708159	105.4656	0.1333	1.790013	-29.0581	102.4028
0.6	18.72	32.68328	0.57277	132.4786	272.5247	273.1247	0.618104	122.6542	0.1333	2.905046	-26.9667	75.43606
0.5	15.5	32.23607	0.480828	160	397.5155	398.0155	0.526799	146.2393	0.1333	5.116043	-25.0647	50.37138
0.4	12.32	31.78885	0.387557	201.2987	629.2107	629.6107	0.434193	180.6494	0.1333	10.11552	-23.2008	27.17063
0.3	9.18	31.34164	0.292901	270.1525	1133.267	1133.567	0.340229	235.7256	0.1333	23.88084	-21.2214	5.949231
0.2	6.08	30.89443	0.196799	407.8947	2583.511	2583.711	0.24485	339.0236	0.1333	76.76149	-18.9244	-12.9752

APPENDIX D

Environmental Assessment

Resource Technology, Inc.

2129 OSUNA ROAD NE, SUITE 200
ALBUQUERQUE, NEW MEXICO 87113
(505) 345-3115
FAX (505) 345-4132

July 30, 1993

Mr. Larry Blair, P.E.
Executive Engineer
AMAFCA
2600 Prospect NE
Albuquerque, NM 87107

Re: Site Assessment of Alternate Lower North Domingo Baca Dam Location.
RTI File No: 92-270

Dear Larry:

RTI staff made a field reconnaissance inspection of what appeared to be a former dump site east of the proposed dam site on July 8, 1993. A brief report is attached and the area covered is shown on the attached drawing.

On July 14, 1993 a subsurface investigation was made with the assistance of Vinyard & Associates, Inc. This consisted of 17 backhoe pits randomly dug in the area in question. Vinyard's report is attached.

It is our conclusion from this investigation that the site was not used as a general landfill but rather it was (and still is) a site where construction debris, yard waste and general household trash has been illegally disposed of. At some point, approximately 3 years ago judging from the limited vegetation regrowth, an attempt was made to disguise the problem area by covering it with insitu material. There seems to be only a remote chance that any significant quantities of hazardous materials will be encountered. However, in areas that are to be affected by construction this material will have to be removed and disposed of due to its unsuitability for foundation or embankment material.

If you have any questions please contract me or Brad Sumrall at 345-3115.

RESOURCE TECHNOLOGY, INC.

Donald S. Dixon, P.E.

DSD/gg

RECONNAISSANCE REPORT OF CORONA AVE LOTS WEST OF WYOMING BLVD.
July 8, 1993

On the morning of July 8, 1993 members of the RTI staff, Elvidio Diniz, Don Dixon and Brad Sumrall, drove out east of the proposed Lower North Domingo Baca Detention Dam to inspect an area that had been utilized for dumping.

Upon inspection it was found that the northern half Lots 12, 13, 14, and 15, Block 7 Unit 3, Tract 2 south of Corona Avenue and west of Wyoming Blvd. has been subjected to dumping of what appeared to be primarily construction rubble. The area had been raised to about 5 feet above the adjacent property and it appeared that soil cover had been applied to most of the area. Where settling or inadequate soil cover was used large concrete slabs, rebar and other concrete rubble was visible.

Additionally, the southern half of lots 13, 14 and 15 directly south of the dumping area appeared to have been used as a soil storage area for the covering process. This was surmised based on the lack of established vegetation and flatness of the area.

Directly west of the dumping area on lot 11 was a large pit approximately 60 feet long, 30 feet wide and 20 feet deep that contained a random assortment of household waste and two car bodies. The entire area surrounding this pit was covered with randomly distributed mounds of landscape debris, old tires and old oil filters. It appears that this area is still being used for wildcat dumping of household wastes. No evidence of industrial wastes, hazardous or toxic materials was seen based on our visual inspection.

Based on review of aerial photography dated 10/8/80 for the FEMA Floodway mapping this disturbance had not yet occurred at that time. A later photo dated April, 1990 shows the subsequent dumping area in the condition that it exists today.

It is recommended that soil excavation pits be dug using a backhoe to determine the depth, type and nature of the debris that has been deposited in this area. This would ensure that no toxic or hazardous materials have been buried and covered over using the rubble material.

Vinyard & Associates, Inc.

4415-D Hawkins, NE
Albuquerque, New Mexico 87109
(505) 345-1937

Geotechnical Engineering • Materials Testing • Environmental Engineering

July 20, 1993

Resource Technology
2129 Osuna Road, NE
Albuquerque, New Mexico 87113

Attention: Mr. Don Dixon

Subject: Domingo Baca Detention Basin Buried Refuse Test Pits, Vinyard & Associates' Project No.: 93-1-30

Gentlemen:

This letter presents the results of a backhoe test pit study of a refuse dump area upstream from the proposed Domingo Baca Detention Dam. No testing of materials encountered was performed to determine any hazard associated with the refuse found.

The site is located in Northeast Albuquerque on three undeveloped lots on the south side of Corona Avenue, NE and west of Wyoming Boulevard, NE.

The area of specific concern was a ridge of apparent fill material approximately four feet higher than the surrounding ground which has construction and residential debris mixed with the surface soils.

A drainage channel crossing the site from east to west apparently was used as an illegal dump for residential trash and later for construction debris. Seventeen test pits were excavated to depths of seven to nine and one-half feet with a backhoe. Pit locations were selected by personnel from Resource Technology and located on a site plan by pacing from existing road alignments and two property line markers (see Figure 1).

Depths and descriptions of fill materials are presented in the attached table.

Soils encountered in the test pits below the trash and fill and the soils mixed with the trash and fill consisted of very silty fine to coarse-grained slightly gravelly granite sand. The soils were moist and brown in Test Pits 8, 15, 16 and 17. Soils in all other test pits were slightly moist to dry and light brown in color.

V
&
A

No quantative measurement of the trash and debris content of the materials was made. Visually the trash and debris content appeared to range from five to fifty percent in the depth of fill materials. In the pits with only a trace to slight amount of trash it appeared that a thin layer of scattered trash on the former ground surface was covered with three to four feet of relatively trash free soil. Test Pit 8 at the west edge of the area studied contained the most trash and debris to a depth lower than the surrounding drainage courses. No trash or fill was found in Test Pits 15, 16 and 17.

Should you have any questions regarding this letter or if we may be of further service, please do not hesitate to call.

Sincerely,
Vinyard & Associates, Inc.

Gordon T. Mossberg

Gordon T. Mossberg, PE

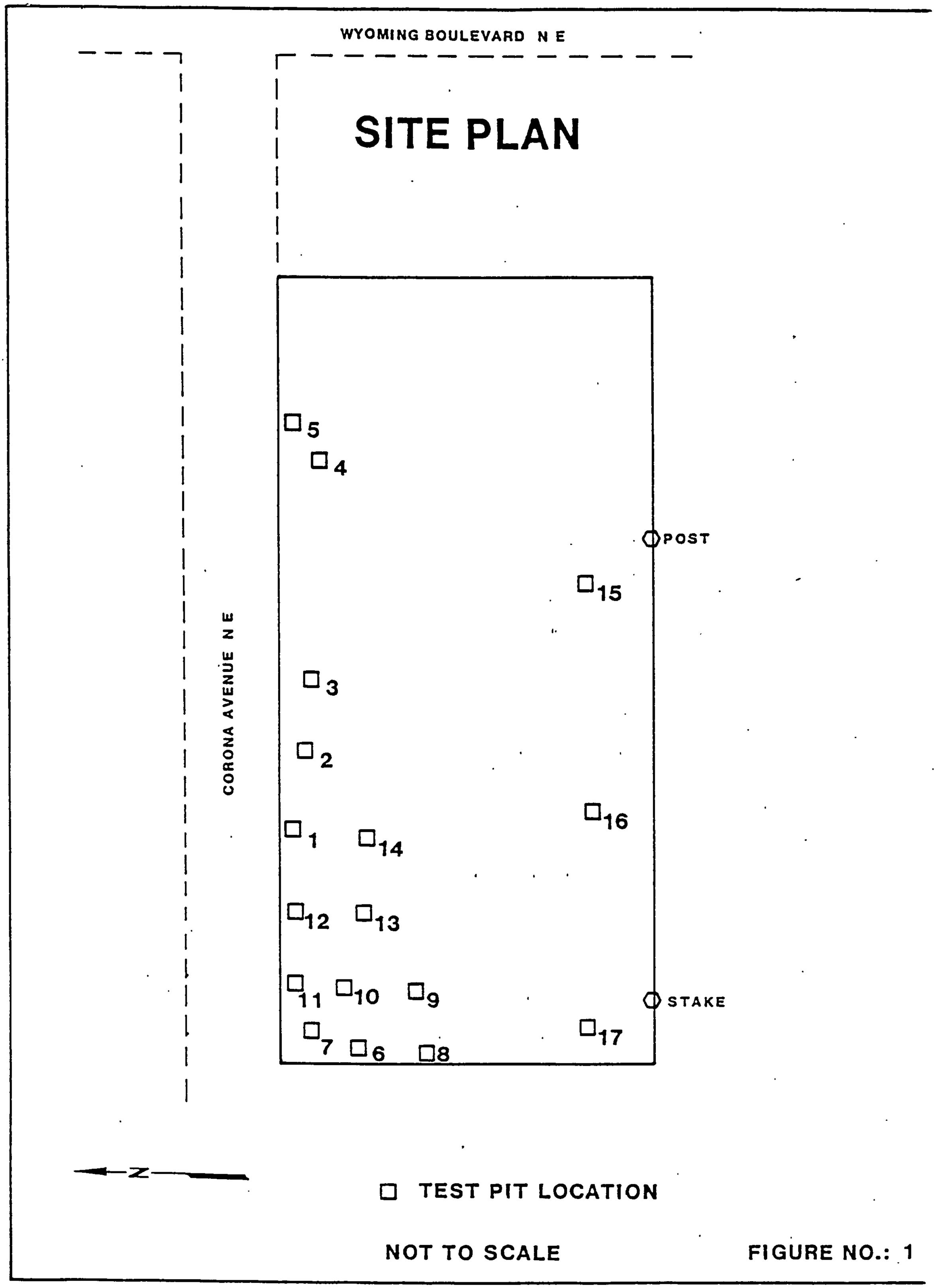
File: 93-1-30.lt2

V
&
A

Test Pit Number	Depth of Fill	Total Depth	Description of Fill
1	4′	9′	±6" concrete pieces near surface, slight household trash to bottom of fill
2	4′	9′	Two tires and slight household trash to bottom of fill
3	3′	9-1/2′	Trace of household trash in fill, some polyethylene sheeting
4	3-1/2′	9′	Trace of household trash in fill
5	3-1/2′	9-1/2′	Asphalt pieces, household trash, medicine bottle dated 1982
6	5′	8-1/2′	Household trash, concrete and asphalt pieces
7	3′	7′	Slight household trash, concrete pieces
8	8-1/2′	9-1/2′	Large concrete pieces, wood, asphalt, soil is moist
9	5′	8′	Slight household trash
10	5-1/2′	9′	Trace of household trash
11	3′	7′	Trace of trash, rags, 4" thick layer of landscaping debris at bottom of fill
12	2′	7′	Trace of household trash, pieces of carpet
13	3-1/2′	8′	Concrete and asphalt pieces near surface, trace of household trash in fill
14	4-1/2′	7′	Large piece of concrete ±7′ long near surface, layer of landscaping debris at bottom of fill

V
&
A

Test Pit Number	Depth of Fill	Total Depth	Description of Fill
15	-	8-1/2′	No trash, very silty moist brown sand, at 6-1/2′ soil was silty to slightly silty and medium moist
16	-	8′	No trash, very silty fine to coarse-grained moist brown sand at 7-1/2′ - slightly silty medium moist
17	-	8′	No trash, very silty, fine to coarse-grained moist brown sand, at 4-1/2′ to 5-1/2′ layer of hard dark brown organic soil


WYOMING BOULEVARD N E
SITE PLAN
CORONA AVENUE N E
5
4
POST
15
3
2
16
1
14
12
13
11
10
9
STAKE
7
6
8
17
N
TEST PIT LOCATION
NOT TO SCALE
FIGURE NO.: 1

A CULTURAL RESOURCES SURVEY OF 26 ACRES FOR A PROPOSED DETENTION DAM BERNALILLO COUNTY, NEW MEXICO

Prepared for

Resource Technology, Inc.
2129 Osuna Road NE, Suite 200
Albuquerque, New Mexico 87113

Prepared by

MARIAH ASSOCIATES, INC.
8417 Washington Place, NE, Suite A
Albuquerque, New Mexico 87113

John A. Evaskovich

Deni Seymour
Principal Investigator

MAI Project 773

June 1992

ABSTRACT

The following report summarizes the results of a cultural resources survey of 26 acres of private property for the proposed Lower North Domingo Baca Arroyo Dam and related facilities located in the Elena Gallegos Land Grant just north of Albuquerque, New Mexico. The survey was conducted on June 16, 1992 by Mr. John Evaskovich and Mr. Jonathan Ruhan, of Mariah Associates, Inc. (Mariah), at the request of Mr. Elvidio Diniz, of Resource Technology, Inc., on behalf of the Albuquerque Metropolitan Arroyo and Flood Control Authority (AMAFCA). Dr. Deni Seymour served as Principal Investigator. The survey was conducted under New Mexico State Permit #SP-90. Mariah's project number is MA 773.

Cultural remains observed in the project area consist of substantial amounts of modern trash. No cultural resources were observed which meet the minimum 50-year age eligibility requirements for the National Register of Historic Places (36 CFR 60.4).

Provided that the proposed undertaking is placed as depicted on project maps, archaeological clearance is recommended.

TABLE OF CONTENTS

Page

1.0 PROJECT DESCRIPTION 1
1.1 PROJECT BACKGROUND 1
1.2 PROJECT LOCATION 1
2.0 ENVIRONMENTAL SETTING 2
3.0 CULTURAL OVERVIEW 4
4.0 SURVEY METHODS 5
4.1 RECORDS CHECK 5
4.2 SURVEY METHODS 5
4.3 FIELD CONDITIONS 6
5.0 SURVEY RESULTS 6
6.0 RECOMMENDATIONS 6
7.0 REFERENCES 7

LIST OF TABLES

Table 1.1 Universal Transmercator Grid Coordinates of the Project Area. 2

LIST OF FIGURES

Figure 1.1 Project Area 3

1.0 PROJECT DESCRIPTION

1.1 PROJECT BACKGROUND

On June 15, 1992 Mariah Associates, Inc. (Mariah), conducted a Class I site files check. A Class III cultural resources survey of 26 acres of private property was then conducted on June 16, 1992. The private property is being considered for location of the proposed Lower North Domingo Baca Arroyo Dam and related facilities. This undertaking will provide for the detention of flood waters and will consist of an impoundment structure, sediment basins, and channels. The survey (Mariah project number MA773) was requested by Mr. Elvidio Diniz of Resource Technology, Inc. on behalf of AMAFCA. Fieldwork was performed by Mr. John Evaskovich and Mr. Jonathan Ruhan of Mariah. Dr. Deni Seymour served as Principal Investigator.

The survey adhered to all applicable federal and state legislation designed to identify and record nonrenewable cultural resources. Included in that body of legislation are the Antiquities Act of 1906 (PL 59-209), the Historic Preservation Act of 1966 (PL 89-665), the National Environmental Policy Act of 1969 (PL 91-852), the Archaeological Resources Protection Act of 1979 (PL 96-95), and Executive Order 11593.

1.2 PROJECT LOCATION

The proposed undertaking is located in the Elena Gallegos Land Grant just north of Albuquerque, Bernalillo County, New Mexico. This area is part of the Albuquerque Acres Subdivision and, as such, has undergone a certain amount of modification and development, including construction of a grid pattern of roads. Louisiana Boulevard, a paved thoroughfare located just west of the project area, runs north-south while the east-west streets of Wilshire, Anaheim, and Holly are improved and maintained dirt roads that cross and bound the project area. Corona Avenue is an unimproved, poorly defined, rutted road which crosses the middle of the proposed dam site. Other developments include a few houses to the north and south of the project area. Developed lots are located adjacent to planned sediment basins south of the dam site.

One portion of the survey area is located 450 ft (140 m) east of Louisiana Boulevard and between Anaheim and Wilshire Avenues. This square parcel is 1000 ft (305 m) per side. An additional portion to the south was surveyed for two proposed sediment basins. These occur in an area that is 170-ft (52-m) wide by 1000-ft (305-m) long and is located between Anaheim and Holly Avenues. The total area represented by the survey is about 26 acres. The Universal Transmercator Grid (UTM) coordinates for the corners of these two areas are provided in Table 1.

The corresponding U.S. Geological Survey (USGS) 7.5 minute quad map is Alameda, NM (photorevised 1972). Figure 1.1 presents the project area.

Table 1.1 Universal Transmercator Grid Coordinates of the Project Area.

All locations are in Zone 13.

Dam Location	
Northwest Corner:	E357340, N3894100
Northeast Corner:	E357645, N3894100
Southwest Corner:	E357340, N3893780
Southeast Corner:	E357645, N3893780
South Parcel Location	
Northwest Corner:	E357600, N3893780
Northeast Corner:	E357645, N3893780
Southwest Corner:	E357600, N3893460
Southeast Corner:	E357645, N3893460

2.0 ENVIRONMENTAL SETTING

The project area is situated on alluvial fans which extend from the west base of the Sandia Mountains. Elevations range from 5320 to 5350 ft amsl, and the ground surface generally slopes west at about 4 percent. The alluvial fans have been dissected by many weakly defined, intermittent, arroyos which transport runoff from melting snow and rains. The survey area is dissected by a more substantial arroyo--the object of the proposed impoundment structure. Cut banks were observed along this feature and are no more than two to 3 ft (0.6 to 0.9 m) high.

Soils in the project area are classified as belonging to the Hapargids- Camborthids- Torriorthents Associations characteristic of the light-colored soils of the warm desertic region (Maker et al. 1978: 30). These soils tend to be deep to moderately deep and consist of moderately coarse to fine-textured alluvium. The soils tend to be light brown to brown noncalcareous fine sandy loam with a gravelly to stony surface. Within the project area, the surface is littered with decomposing coarse granitic sand. The washes are filled with poorly consolidated coarse alluvium which is subjected to frequent transport during rainstorms.

Vegetation in the project area is dominated by short to mid-length grasses and forbes. Major plant species noted include Russian thistle (*Salsola kali*), Blue grama (*Bouteloua gracilis*), Black grama (*Bouteloua eriopoda*), Sand dropseed (*Sopobolus spp.*), Broom snakeweed (*Gutierrezia sarothrae*), and Sideoats grama (*Bouteloua curtipendula*). Other species occurring less often include Galleta (*Hilaria jamesii*), yucca (*Yucca spp.*), and Threeawn (*Aristida spp.*). Chamisa

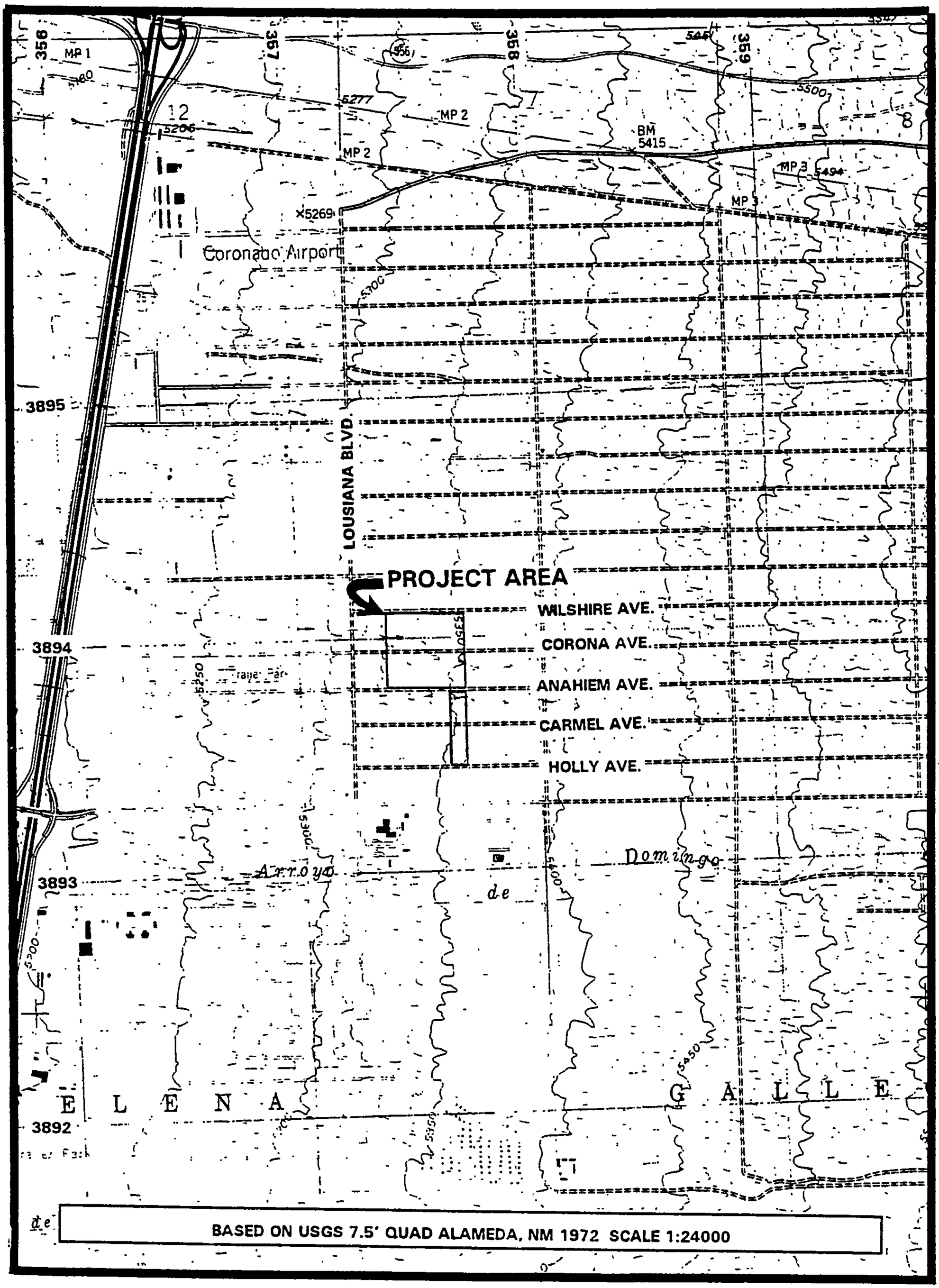


Figure 1.1 Project Area.

(*Chrysothamnus nauseosus*) and apache plume (*Fallugia paradoxa*) are growing in the relatively wetter soils of arroyos.

Wildlife observed during the survey included jack rabbits, cottontails, several varieties of lizard, bull snake, quail, and turkey vultures--species typically found at the margins of metropolitan areas.

3.0 CULTURAL OVERVIEW

Albuquerque lies in the Middle Rio Grande Archaeological Province of the Southwest (Peckham 1990), an area that has received considerable attention. As such, a chronological sequence of occupation can be inferred.

Evidence of Paleoindian occupations (ca. 10,000 - 5500 B.C.) have been located in the Middle Rio Grande Valley (Judge 1973). These sites are generally either isolated points found on the surface, or sparse lithic scatters found in subsurface contexts exposed by erosion. This period is characterized by a subsistence strategy focused on hunting now-extinct Pleistocene megafauna, including bison and mammoth. Paleo sites are recognized by the presence of large, stylized projectile points, most notably the fluted Clovis and Folsum lance points.

The Archaic Period (ca. 5500 B.C. - A.D. 400), characterized by the Oshara Tradition, has been well documented in the region by Irwin-Williams (1967). The Archaic is generally divided into three phases: Early, Middle, and Late. These are identified by differences in projectile point styles which reflect changes in subsistence strategies. As climate changes led to the extinction of Pleistocene megafauna, a generalized subsistence strategy was employed with a wider range of plant and animal resources being exploited. High mobility gave way to an increasingly less mobile lifestyle with the introduction of domesticated plants. In the Albuquerque area, Archaic sites are often found on the surface in areas that have been deflated by wind erosion (Cordell 1978).

The Albuquerque area is probably best known archaeologically for its Puebloan Period sites. Ceramic period phase designations can be correlated to both the Pecos Classification and the more recent Rio Grande Sequence.

A mixed subsistence pattern during the Early Developmental period (A.D. 600 - 900, Rio Grande Sequence) may have seen resource extraction from the pediment areas east of the river valley. The Period is characterized by the use of pithouses and the appearance of plainware ceramics. Sites dating to this time are generally ephemeral in nature.

The Late Developmental period (A.D. 900 -1175, Rio Grande Sequence), is characterized by small clusters of relatively deep pithouses. These vary in shape from round to rectangular, with associated surface work areas (Cordell, 1978).

The subsequent Coalition period (A.D. 1175 - 1325, Rio Grande Sequence) is characterized by an apparent population increase and a change in architectural preferences. Sites generally consist of linear or L-shaped roomblocks containing between two to over 200 rooms; although 13 to 30 rooms are the most common size (Stuart and Gauthier, 1981). Kivas are also present at some of the pueblos.

The Classic period (A.D. 1325 - 1500) is characterized by an inferred aggregation of the population into large, multi-storied sites, many of which contain over 100 rooms; a few are even larger, consisting of 300 to 500 rooms (Stuart and Gauthier, 1981). Circular subterranean kivas are composed of coursed adobe walls, and glazeware ceramics were developed at this time.

The Historic period (A.D. 1540 - Present) is characterized by major population centers focused on the Rio Grande and its major tributaries. Many of these large pueblos have been continuously occupied since before contact in A.D. 1540. Volume 9 of the *Handbook of North American Indians* (Ortiz 1979) presents overviews of these pueblos. Spanish occupation of the Albuquerque area began as an outpost on the El Camino Real and gradually was settled by Colonial period farmers who established small towns along the river. By the time the railroad arrived in 1880, Anglo settlement was well underway. The establishment of the University of New Mexico campus in 1889, well to the east of the cluster of development centered around Old Town and New Town, marked the expansion of the city on the East Mesa (Wilson 1986). Since then, commercial and residential developments have continued to expand to the east and north.

4.0 SURVEY METHODS

4.1 RECORDS CHECK

Prior to fieldwork, a Class I archaeological survey (site records check) was conducted using the Laboratory of Anthropology site files. These records show one previously recorded site located within one mile of the project area. LA 56119 is an historic site consisting of a late 1940s-early 1950s possible military storage facility (Lintz 1986). This site is located 2500 ft (762 m) from the proposed undertaking and will not be affected.

4.2 SURVEY METHODS

The project area was surveyed by two archaeologists walking parallel, nonoverlaping transects. The surveyors were spaced no more than 15 meters apart. Copies of the project maps, including an aerial photo and quad sheets, were carried for immediate reference to the exact location of the proposed dam and related facilities. The north and south boundaries of both portions of the project were defined by existing roads. Additionally, the corners of the project area had been staked with lath prior to the survey.

4.3 FIELD CONDITIONS

Light and weather conditions during the survey were excellent. Surface visibility was generally good, with some areas obscured by thick vegetation, accumulated tumbleweeds, and modern garbage, especially in the arroyos.

Considerable amounts of trash were observed throughout the project area especially along the central arroyo. Piles of building materials (bricks, boards, milled lumber, wall board, etc.); yard materials (grass clippings, dead trees, bushes); household furnishings (televisions, mattresses, bed springs, lawn chairs, etc.); clothing; at least one car body; and piles of household garbage are fairly ubiquitous throughout the project area and attest to the illegal dumping which has occurred in conjunction with land development.

5.0 SURVEY RESULTS

No cultural manifestations meeting the 50-year age eligibility requirements for the National Register of Historic Places (36 CFR 60.4) were observed in the project area. No isolated prehistoric or historic artifacts were found, nor where any cultural resource sites encountered. The absence of usable lithic, floral, and faunal resources in the project area may account for the lack of sustained or obvious human activities until recently.

6.0 RECOMMENDATIONS

Provided that the proposed detention dam and related facilities are placed as depicted on the project maps, archaeological clearance is recommended.

7.0 REFERENCES

Cordell, L. S.
1978 *Cultural Resources Overview: Middle Rio Grande Valley, New Mexico.* USDA Forest Service, Southwestern Region, Albuquerque, and USDI Bureau of Land Management, New Mexico State Office, Santa Fe.

Irwin-Williams, C.
1967 "PICOSA: The Elementary Southwestern Culture," *American Antiquity* 32(4): 441-456.

Judge, W.J.
1973 *The Paleo-Indian Occupation of the Central Rio Grande Valley, New Mexico.* University of New Mexico Press, Albuquerque

Lintz, Christopher
1986 *An Archaeological Survey Of The Presley Company Sector Development Plan Bernalillo County, New Mexico.* Mariah Associates, Albuquerque.

Maker, H.J., H.E. Dregne, V.G. Link, and J.U. Anderson
1978 Soils of New Mexico. *New Mexico State University, Agricultural Experimental Station, Research Report 285*, Las Cruces.

Ortiz, Alfonso (Editor)
1979 *Handbook of North American Indians*, Volume 9: The Southwest. Smithsonian Institution, Washington D.C.

Peckham, Stewart
1990 *From This Earth The Ancient Art of Pueblo Pottery* Museum of New Mexico Press. Santa Fe.

Stuart, D. E. and R. P. Gauthier
1981 *Prehistoric New Mexico.* Historic Preservation Bureau, Santa Fe.

Wilson, Chris
1986 *University Neighborhoods History Handbook* , University Heights Association, Albuquerque,

APPENDIX E

Geotechnical Report

Vinyard & Associates, Inc.

4415-D Hawkins, NE
Albuquerque, New Mexico 87109
(505) 345-1937

Geotechnical Engineering • Materials Testing • Environmental Engineering

FINAL

GEOTECHNICAL INVESTIGATION

DOMINGO BACA ARROYO

DETENTION DAM

Prepared for:

Resource Technology

Project No.: 93-1-30

August 9, 1994

V & A

TABLE OF CONTENTS

INTRODUCTION	Page	1
PROPOSED CONSTRUCTION		1
SITE DESCRIPTION		2
GEOLOGY		
REGIONAL GEOLOGY		3
LOCAL GEOLOGY		4
LOCAL STRUCTURE		5
SEISMICITY		5
SUBSURFACE CONDITIONS		6
LABORATORY TESTING		7
CONCLUSIONS AND RECOMMENDATIONS		
GENERAL		10
EMBANKMENT CONSTRUCTION		10
SLOPE STABILITY		11
SEEPAGE ANALYSIS		12
CUTOFF TRENCH		13
EXISTING UTILITIES		15
PRINCIPLE SPILLWAY		15
SETTLEMENT		16

V & A

TABLE OF CONTENTS

EMERGENCY SPILLWAY	Page	17
RETAINING WALLS		17
FAULTING AND LIQUEFACTION		18
EARTHWORK		
GENERAL		18
CLEARING AND GRUBBING		19
EXCAVATION		19
NATURAL GROUND PREPARATION		19
FILL PLACEMENT AND COMPACTION		20
OBSERVATION AND TESTING		21
EROSION		22
TRENCHES AND TEMPORARY EXCAVATIONS		22
CLOSURE		23
BIBLIOGRAPHY		25
SITE PLAN	Figure	1
LOGS OF TEST HOLES AND TEST PITS		2-12
NOTES - LOGS OF TEST HOLES		13
PROCTOR TEST RESULTS		14-15
DIRECT SHEAR TEST RESULTS		16-17
CONSOLIDATION TEST RESULTS		18-20
SIMPLIFIED BISHOP SLOPE STABILITY ANALYSIS		21-23

V&A

TABLE OF CONTENTS

SUMMARY OF LABORATORY TEST DATA	Table	1
PERMEABILITY TEST RESULTS		2

APPENDIX A

EARTHWORK PROCEDURES	Page	A-1

V
&
A

INTRODUCTION

This report presents the results of the final geotechnical investigation performed for the proposed Domingo Baca Detention Dam. The site is located east of Louisiana Boulevard between Corona Avenue and Carmel Avenue.

This investigation was performed to determine the following:

- General site suitability for development;
- Regional and local geology;
- Seismicity;
- Slope stability analysis;
- Seepage analysis;
- Settlement analysis;
- Suitability of on-site soils for use as structural fill; and
- Site grading and earthwork recommendations.

PROPOSED CONSTRUCTION

The proposed detention dam will be a homogeneous earth fill. Configuration of the structure is indicated on the Site Plan, Figure 1. Maximum height of the embankment will be thirty feet.

V&A

Crest elevation is anticipated to be at 5331.5′. Crest width will be twenty feet. Upstream and downstream slopes will be inclined at 3:1 (horizontal:vertical).

The principle spillway will be a four foot diameter concrete cylinder pipe. The emergency spillway will be a depressed section over the face of the embankment. The emergency spillway will be soil cement plated. Elevation of the emergency spillway will be 5323.5′.

SITE DESCRIPTION

The Domingo Baca Arroyo is located on the broad gently westward sloping alluvial fan derived from the Sandia Mountains to the east. The site is bounded by Louisiana Boulevard to the west, Carmel Avenue to the south and Corona Avenue to the north. The site is bounded to the east by undeveloped land, with Wyoming Boulevard beyond. Anaheim Avenue (unpaved) which runs east to west runs through the middle of the site. Anaheim Avenue will be abandoned.

The site is vegetated with a moderate growth of weeds, cactus, and shrubs.

V
&
A

GEOLOGY

Regional Geology

The study area is situated on the northeastern flank of the Albuquerque Basin. The Albuquerque Basin is one of a series of enechelon structural grabens that extend from Colorado through New Mexico.

This structural depression was formed by the relaxation of rotational compressive stresses when the Colorado plateau landmass retreated away from the southern extension of the Rocky Mountains. Timing for this regression and subsequent basin forming activity was during the Laramide orogeny and early in the Cenozoic era (approximately 62 million years ago).

The Albuquerque Basin is 102 miles long (north-south) and twenty-five to forty miles (east-west) wide (Kelley, 1977). The major drainage system in the Albuquerque Basin is the Rio Grande. The Domingo Baca Arroyo eventually discharges to the Rio Grande. The Sandia Mountains, an eastward-tilted north-south trending uplift forms the eastern flank of the Albuquerque Basin while the intensely faulted zone bordering the Rio Puerco is recognized as the western flank. The Rio Puerco fault belt is characterized by

V
&
A

the faulted outcroppings of Jurassic and Cretaceous formations. These geologic units represent the eastern edge of the Colorado Plateau landmass.

The Albuquerque Basin is filled with up to 12,000 feet of sandstones, mudstones, and gravels of the Miocene - Pliocene aged Santa Fe Formation and Quaternary alluvium.

Local Geology

Geologic units exposed or in the subsurface in the study area are in order of increasing age.

1. Quaternary, recent sediments deposited in arroyos as gravel, sand and silt, and redeposited aeolian (wind blown) sediments which form a mantle over older sedimentary units.

2. Quaternary gravel pediments consisting of interbedded gravel, sand, silt, and cobbles.

3. Santa Fe Formation (Ceja Member) underlies the site at considerable depth - in excess of 4000′. The Santa Fe typically consists of fine to coarse-grained sandstones

V & A

and conglomerates with varying weak cementation. These sediments were probably derived locally from Paleozoic and Mesozoic rocks that were eroded from the Sandia uplift to the east and the Nacimientos uplift to the northwest. Santa Fe units are eroded and unconformably overlain by Quaternary alluvial and fluvial deposits.

Local Structure

The study area is located west of the north-south trending fault zone that borders the western side of the Sandia Mountains and east of the Rio Grande River. No faults are mapped within the study area. The Rincon Fault is the nearest named mapped fault of those that are located along the west side of the Sandia Mountains. If projected from the last mapped location the projected Rincon Fault would be 2-1/2 miles east of the site. East of the site and the fault zone the north-south trending Sandia Mountains rise to an elevation of more than 10,000 feet.

Seismicity

Based upon a review of papers prepared by Johnpeer, ET. AL., 1986 and Algermissen, ET. AL., 1982, the site is located in an area with a peak bedrock acceleration of approximately 0.25g with a 90%

probability of not being exceeded in 250 years. The 0.25g acceleration represents one to three sharp spikes on the earthquake accelerogram. These spikes are of such short duration they do not significantly affect a massive structure such as an earth dam.

For Pseudo-static slope stability analysis a more rational procedure is to design for an "average" acceleration of approximately 65% of the peak acceleration, Seed and Idriss, 1971. This yields a pseudo-static design acceleration of approximately 0.15g.

SUBSURFACE CONDITIONS

To evaluate subsurface conditions within the study area, a total of nine test holes and two backhoe test pits were excavated at the approximate locations indicated on the attached Site Plan, Figure 1. Test holes were drilled with a truck mounted CME 55 drill rig equipped with seven inch outside diameter hollowstem auger. During drilling soil samples were taken at approximately five foot intervals using either a three inch outside diameter ring sampler or a standard penetration test sampler. Test holes were continuously logged in the field by a qualified geologist. Logs of the test holes are presented on Figures 2 through 9 and 12.

V
&
A

Test pits were excavated with a rubber tired backhoe equipped with a 24" bucket. Location of the test pits is indicated on the Site Plan, Figure 1. Logs of the Test Pits are presented on Figures 10 and 11.

The soils encountered in the test holes and test pits typically consisted of silty to very silty fine to coarse-grained sands with some gravel. The soils were loose at the ground surface and medium dense at greater depths. The site soils were slightly moist to moist. Occasional lenses of slightly silty sand and sandy clay were encountered.

Cobbles and boulders were not encountered in the test holes. However, cobbles and boulders are probably present.

Groundwater or bedrock were not encountered in the test holes to a depth of forty-one feet, the maximum depth explored.

LABORATORY TESTING

A laboratory testing program was performed on samples obtained during the field investigation which appeared representative of the site soils. The laboratory testing program was structured to determine the physical properties of the site soils necessary for

V&A

development of geotechnical recommendations.

The laboratory testing program included:

- Moisture Content;
- Dry Density;
- Sieve Analysis;
- Atterberg Limits;
- Consolidation/Collapse;
- Proctor (ASTM D-1557);
- Direct Shear; and
- Permeability.

Moisture Content and Dry Density tests were performed to evaluate the in-place soil density and moisture content. Test results help to evaluate settlement potential. Test results indicate the site soils are loose to medium dense with an average dry density of approximately 113 pcf. Natural moisture content averaged approximately three percent. Test results are presented on the Logs of Test Holes and Test Pits, Figures 2 through 12 and are summarized on Table 1.

Sieve Analyses and Atterberg Limits tests were performed to confirm field soil classifications and to provide information on

V&A

general physical soil properties. Test results are presented on Table 1.

Consolidation/Collapse tests were performed to evaluate structure settlement and to determine the effect of water on site soils. The tests indicate the site soils are slightly compressible under anticipated loads. Limited to moderate additional settlement occurs if the site soils are allowed to increase in moisture content. Test results are presented on Figures 18 through 20.

Proctor tests (ASTM D-1557) were performed on representative samples to determine the maximum compacted density and optimum moisture content of the soils. Test results were utilized to determine the appropriate density for Remolded Direct Shear and Permeability tests. Test results are presented on Figures 14 and 15.

Direct Shear tests were performed on both undisturbed and remolded samples. Remolded samples were compacted to 95% of maximum dry density as determined by ASTM D-1557. Following consolidation in the direct shear device, the samples were flooded with water and allowed to stabilize. The direct shear test was then performed. Test results are presented on Figures 16 and 17.

V
&
A

Test results were utilized to evaluate slope stability.

Falling Head Permeability tests were performed on both undisturbed and remolded samples. Remolded samples were compacted to 95% of maximum dry density as determined by ASTM D-1557. Test results are presented on Table 2.

CONCLUSIONS AND RECOMMENDATIONS

General

Our investigation indicates the site is suitable for the proposed construction. The on-site soils are suitable for use as embankment fill. Presented below are detailed geotechnical recommendations for design and construction.

Embankment Construction

The proposed embankment may be constructed as a homogeneous earth fill using the silty and slightly silty sands encountered. Use of an impermeable liner, clay liner or internal clay core does not appear necessary.

V&A

Slope Stability

Detailed slope stability analysis was performed using laboratory soil shear strength values. We have utilized a friction angle of 35 degrees for natural soils and 37 degrees for compacted fills.

Slope stability analysis was performed using our in-house computer program SB-SLOPE. This program utilizes the simplified Bishop Method of analysis. Example printouts are presented on Figures 21 through 23.

Three conditions were evaluated as follows:

1. Side slope, static loading, slope inclination 3:1 (horizontal:vertical).

   Our analysis indicates the embankment slops are stable at an inclination of 3:1 under static loading conditions. Factor of safety using design soil properties was 2.3, see Figure 21.

2. Side slope, pseudo-static loading, slope inclination 3:1 (horizontal:vertical).

V & A

Our analysis indicates the embankment slopes are stable at an inclination of 3:1 under a pseudo-static load of 0.15g. Factor of safety using design soil conditions was 1.5, see Figure 22.

3. Upstream slope, rapid draw down, static, inclination 3:1 (horizontal:vertical).

Our analysis indicates the upstream slope is grossly stable at an inclination of 3:1 under rapid draw down conditions. Minimum factor of safety using design soil conditions was 1.1, see Figure 23. No significant slump or failures are anticipated under rapid drawdown conditions.

Minimum crest width of the embankment should be no less than approximately twenty feet.

Seepage Analysis

A seepage analysis was performed to determine the need for a cutoff trench and to evaluate the potential for seepage on the down stream face during the design detention period.

V&A

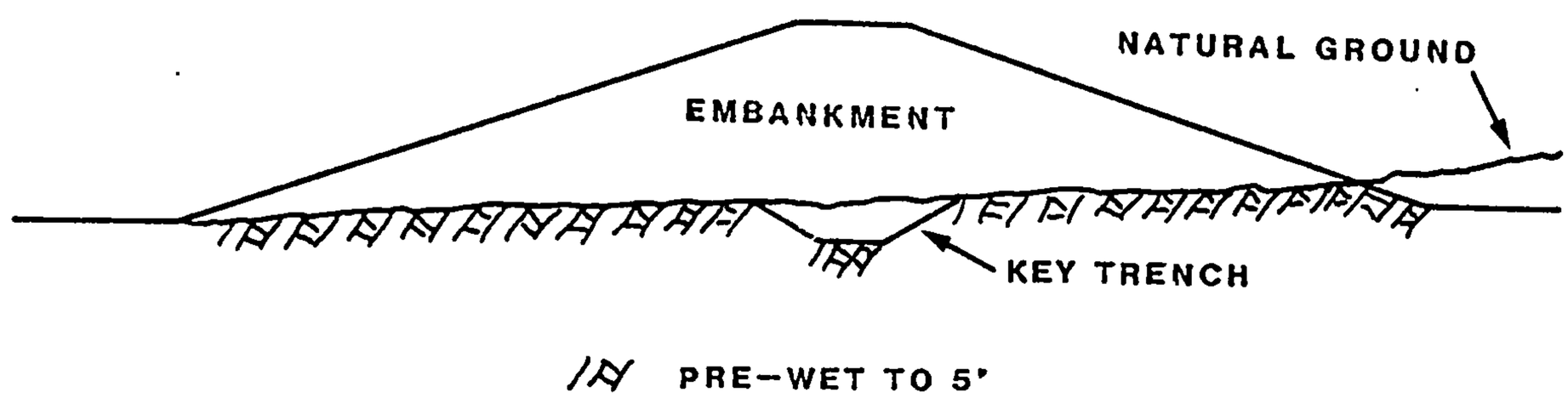
The design hydrograph indicates a significant quantity of water detained for a maximum period of twenty-four hours. During the design detention period moisture is not anticipated to penetrate more than thirty feet near the base of the embankment and no more than ten feet near the crest of the embankment. Time to develop steady state seepage through the embankment is estimated to be on the order of ninety-six hours.

During the design detention period moisture penetration through the foundation soils is not anticipated to exceed forty feet.

Seepage on the downstream face is not anticipated during the design detention period.

Cutoff Trench

A cutoff trench to control seepage and reduce settlement of the embankment will be required. Configuration of the cutoff trench is indicated on the following schematic drawing:



V
&
A

The cutoff trench should be located on the embankment center line. Minimum depth of cutoff trench is tabulated below. The longitudinal transition from one depth to another should be no steeper than 5:1 (horizontal:vertical).

Embankment Height	Cutoff Trench Depth
0′ - 3′	not required
3′ - 10′	5′
10′ or more	7′

The above embankment heights are measured from the crest to the downstream toe.

Minimum bottom width of the cutoff trench should be twelve feet. The side slopes of the cutoff trench excavation should be no steeper than 1.75:1 (horizontal:vertical). Soils at the base of the cutoff trench should be prewetted to a near optimum moisture content (-1 to +3%) to a minimum depth of five feet. The exposed soils should then be compacted with a minimum of twenty passes of a minimum twenty ton vibratory compactor to a minimum of 95% of maximum density as determined by ASTM D-1557. It is not necessary to prewet or perform twenty passes with the vibratory compactor on the side slopes of the cutoff trench. All fill in the cutoff trench should be placed and compacted as detailed in the attached

V
&
A

Appendix.

Existing Utilities

Any existing utilities below the proposed embankment or within twenty feet of the proposed embankment must be completely removed. The resulting excavations must be backfilled with engineered fill as detailed in the attached Appendix.

Principle Spillway

We anticipate the principle spillway will be a pipe through the base of the embankment. The natural soils below the spillway should be removed a minimum of five feet from the pipe in all directions. The soils at the base of the excavation should be scarified and moistened to a near optimum moisture content (-1 to +3%) to a minimum depth of five feet and compacted with a minimum of twenty passes of a minimum twenty ton vibratory compactor to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill in the excavation should be placed and compacted as detailed in the attached Appendix.

Seepage collars will be necessary at intervals around the principle spillway. A minimum of one seepage collar should be

V
&
A

located within the cutoff trench. A minimum of four additional seepage collars should be constructed..

Settlement

The site soils consist of granular materials. Therefore, settlement will occur very rapidly following load application. At maximum embankment height, we anticipate a maximum of two inches of settlement near the center of the embankment decreasing to approximately one inch at the toe of the embankment. The majority of this settlement should occur during construction. Maximum post construction settlement should not exceed one inch. It is not necessary to camber the embankment longitudinally to compensate for post construction settlement. Additionally, it is not necessary to camber the principle spillway pipe.

The site soils exhibit a limited to moderate collapse potential upon wetting. The magnitude of collapse is relatively small. However, the pool should be designed and constructed to drain completely. Long term ponding of water should not be permitted.

V & A

Emergency Spillway

The emergency spillway will be over a depressed portion of the embankment. The emergency spillway should be lined with either Portland Cement Concrete, gabions or soil cement.

Retaining Walls

Retaining walls constructed in conjunction with this project are not anticipated to exceed eight feet in height. Foundations for retaining walls may be designed for a maximum toe bearing pressure of 2000 pounds per square foot.

We recommend that the following equivalent fluid pressures be utilized for preliminary design of retaining walls:

Loading Condition	Equivalent Fluid Pressure*
Active Earth Pressure	32 pcf
Passive Earth Pressure	
Undisturbed Natural Soils	300 pcf
Structural Fill	400 pcf
Earth Pressure at Rest	60 pcf

* Does not include a factor of safety.

The above earth pressure do not include hydrostatic pressure. If retaining walls are restrained against rotation the earth pressure at rest should be utilized for design.

Lateral retaining wall loads will be resisted by passive earth pressure at the toe and friction along the base of the wall. A coefficient of friction between soil and concrete of 0.4 may be used for design.

Faulting and Liquefaction

The review of geologic literature performed in conjunction with this investigation did not reveal any mapped faults through or projecting through the site.

Liquefaction is not considered a significant risk due to the density of the site soils and depth to groundwater.

Earthwork

General

The recommendations presented in this report are based upon the assumption that site earthwork will be performed as recommended

V & A

in this report and the attached Appendix. Presented below is a summary of the site earthwork recommendations. Detailed earthwork procedures are presented in the attached Appendix.

Clearing and Grubbing

Prior to placing structural fill, all borrow and fill areas should be stripped of vegetation and deleterious materials. All strippings should be hauled offsite or utilized in landscaped areas.

Excavation

We anticipate that on site soils can be excavated with conventional earthwork equipment. Occasional cobbles or boulders may be encountered during excavation. Cobbles and boulders should be disposed of off-site or utilized for landscaping. Cobbles and boulders should not be placed within structural fills.

Natural Ground Preparation

Prior to placing structural fill the exposed soils should be scarified to a depth of eight inches and moisture conditioned to a near optimum (-1 to +3%) moisture content to a minimum depth of

five feet. Moisture conditioning may be performed by either ponding or sprinkling. The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557 with a minimum of twenty passes of a minimum twenty ton vibratory compactor. If vibratory compaction poses a threat to nearby structures, static compaction should be utilized.

Fill Placement and Compaction

The natural soils at the site may be utilized for embankment construction. Due to their higher permeability, very gravelly soils and clean to slightly silty sands should not be utilized as fill. Fill material should conform to the following gradation limits:

Sieve Size	Percent Passing
2"	100
No. 4	80 - 100
No. 200	15 - 45

Blending may be necessary to achieve the above gradation.

Structural fill should be placed in horizontal lifts a maximum of eight inches in loose thickness, moisture conditioned to a near

V & A

optimum moisture content and mechanically compacted. Use of a disc harrow is strongly recommended.

Embankment fill should be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill should be compacted with sheepsfoot type compactors. Absolutely no compaction with smooth drum, flat plate or rubber tired equipment should be permitted. To minimize differential settlement the embankment should be brought up relatively uniformly. Site earthwork should be performed as detailed in the attached Appendix.

All soils encountered may be excavated using conventional earthwork equipment. Some cobbles and possibly boulders may be encountered. Cobbles and boulders should not be placed as fill within the embankment.

Observation and Testing

Placement and compaction of structural fill should be observed and tested by a qualified Geotechnical Engineer or his representative. The purpose of the observation and testing is to confirm that the recommendations presented herein are followed and to provide supplemental recommendations if subsurface conditions differ from those anticipated.

V&A

Erosion

The majority of the soils encountered are slightly silty to silty fine sands. These materials are moderately to highly erodible by wind and water. Use of gravel plating, revegetation or artificial means may be necessary to control erosion.

Trenches and Temporary Excavations

All trenches greater than four feet in depth must be sloped, shored or braced or otherwise supported according to OSHA Construction and Safety Standards. Material excavated from the trench or spoil must be placed a minimum of two feet from the edge of the excavation. The spoil should be retained in an effective manner such that no loose material can fall into the excavation.

Temporary construction excavations should be sloped no steeper than 1-1/2:1 (horizontal:vertical). Limited raveling of slopes will occur particularly as the exposed soils dry out. Heavy equipment and material stockpiles should be located a minimum of five feet from the top of slope.

V
&
A

CLOSURE

The recommendations presented in this report are based upon the subsurface conditions disclosed by the test holes. Soil and groundwater conditions may vary between test holes and with time.

We strongly recommend that prior to bidding all contractors perform their own subsurface investigation to form their own opinion of the site soil, rock and groundwater conditions. Should contractors elect to use this report for construction, bidding or estimating purposes, they do so at their own risk.

If conditions are encountered during construction which differ from those presented herein, this office should be contacted for supplemental recommendations. The staff of **Vinyard & Associates, Inc.** is available for supplemental consultation as necessary.

This office would be pleased to review site grading and drainage plans to evaluate conformance with the recommendations presented herein. All site earthwork should be observed by a qualified geotechnical engineer or his representative. **Vinyard &**

V
&
A

Associates, Inc. would be pleased to provide these services.

Vinyard & Associates, Inc.

Martin D. Vinyard, P. E.

File: 93-1-30

V.
&
A

Bibliography

Algermissen, S.T., Perkins, D.M., Thenhaus, D.M., Hanson, S.L., and Bender, B.L., Probabilistic Estimates of Maximum Acceleration and Velocity in Rock in the Contiguous United States; United States Department of the Interior, Geologic Survey, Open-File Report 82-1033.

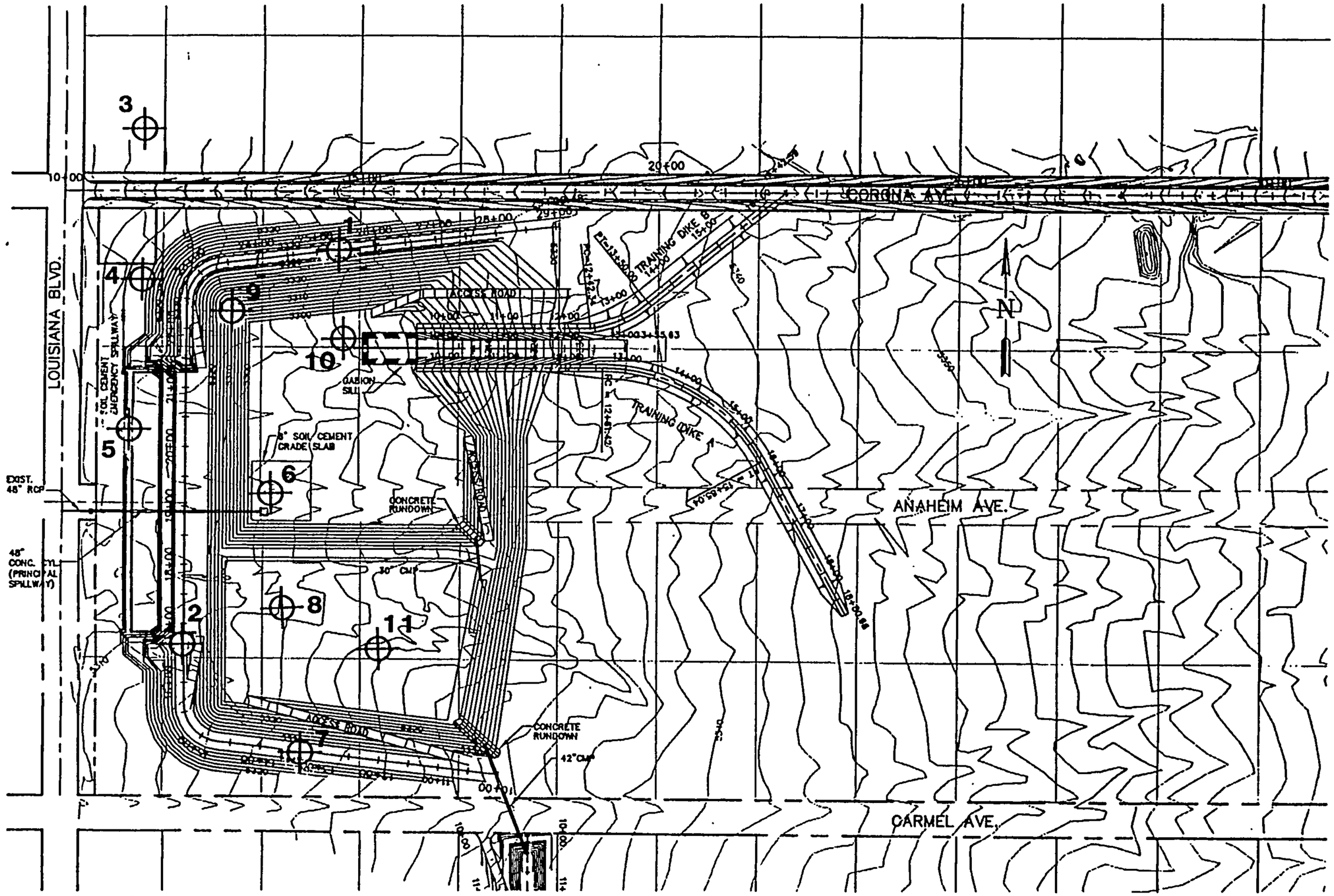
Johnpeer, Gary D., Love, David W., and Hemingway, Mark, 1986, Proceedings of the Third U.S. National Conference on Earthquake Engineering; "Assessment of Earthquake Hazards in New Mexico".

Kelley, Vincent C., 1977, Geology of Albuquerque Basin, New Mexico, New Mexico Bureau of Mines & Mineral Resources, Mem. 33 60 p, 9 Tables, 24 Figs., 2 Sheets (Geol. Map Scale 1:280,000).

Seed, H.B., Idriss, I.M., Simplified Procedure for Evaluating Soil Liquefaction Potential, ASCE Journal of the Soil Mechanics and Foundations Division, September, 1971.

Seed, H.B., Slope Stability During Earthquakes, ASCE Journal of the Soil Mechanics and Foundation Division, July, 1967.

SITE PLAN



PROJECT NO.: 93-1-30 NOT TO SCALE ⊕ TEST HOLE LOCATION FIGURE 1.

V & A

LOG OF TEST HOLE NO. 1

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 6/28/94

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, fine to coarse-grained, silty, slightly gravelly, medium dense, medium moist, brown
5	12	R	122	0.9	1,2,5	SP-SM	SAND, fine to coarse-grained, slightly silty, trace gravel, medium dense, slightly moist, brown
10	17	R	102	6.3	1	SM-SC	SAND, very silty to clayey, fine to coarse-grained, trace gravel, medium dense, moist, brown
15	39	S		6.4	1,2		
20	5	S		4.2	1,2		Fine to medium-grained, loose, slightly gravelly, medium moist
25	20	S		5.0			Medium dense
30							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Othe:

Figure 2

V & A

LOG OF TEST HOLE NO. 1 cont.

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 6/28/94

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
	29	S		1.2	1,2	SP-SM	SAND, slightly silty, fine to coarse-grained, gravelly, medium dense, slightly moist, brown
35	31	S		4.2		SM	SAND, silty, fine to medium-grained, trace gravel, dense, medium moist, brown
40	18	S		2.6	1,2		Medium dense, slightly moist
							Bottom of hole at 41-1/2'
45							
50							
55							
60							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Othe:

Figure 2 cont.

V & A

LOG OF TEST HOLE NO. 2

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 6/28/94

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, fine to coarse-grained, very silty, slightly gravelly, medium dense, medium moist, brown
5							
	14	R					
	NR						
	20	R	111	1.4	1,2		
							Slightly gravelly, silty, slightly moist
10							
	45	R					
	NR	B		2.3	1,2		
							Clayey/silty, trace gravel
15							
	67	S		4.2			
							Medium moist
						SM	SAND, fine to coarse-grained, slightly gravelly, very silty, medium dense, medium moist, brown
20							
	25	S		5.3	1,2		
							Water added to the hole
25							
	15	S		2.8			
							Slightly moist
30							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Other

Figure 3

V & A

LOG OF TEST HOLE NO. 2 cont.

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 6/28/94

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
	28	S		1.7	1,2	SP-SM	SAND, fine to coarse-grained, slightly silty, medium dense, slightly moist, brown
35	34	S		1.2			Clayey/silty
40	29	S		5.0	1,2		Very clayey/silty
							Bottom of hole at 41-1/2'
45							
50							
55							
60							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Othe

Figure 3 cont.

V & A

LOG OF TEST HOLE NO. 3 Cont.

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 2/08/93

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
	31	S		1.9		SM	SAND, very silty, fine to coarse-grained, slight fine to coarse gravel, poorly graded, dense, slightly moist, light brown
35							
	41	S		3.1	1		
40							
	50	S		3.7			
							Bottom of hole at 41-1/2'
45							
50							
55							
60							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Other

Figure 4 cont.

V & A

LOG OF TEST HOLE NO. 4

Project: Domingo Baca Dam
Project No. 93-1-30
Elevation - Top of Test Hole: n/a
Date Drilled: 2/08/93
Depth to Groundwater: not encountered
Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, silty, fine to coarse-grained, slight fine gravel, poorly graded, loose, moist, brown
	8	R	121	7.6	1		
5	11	R	107	2.4			Very silty, slightly moist, medium dense
10	66	S		4.3	1,2		Very silty to silt, dense
15	78	S					
20	34	S					
25	76	S		5.6	1,2		Very silty, clayey
30	32	S		2.6			Bottom of hole at 31-1/2'

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Othe

Figure 5

V & A

LOG OF TEST HOLE NO. 5

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 2/08/92

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, very silty, fine to coarse-grained, slight fine gravel, poorly graded, loose, moist, brown
		B		4.9	1		
5							Silty, slightly moist
	27	R	117	1.3			Medium dense
10							
	24	S		7.3	1,2		Very silty to silt, clayey
15							
	22	S					
20							
	21	S					Silty to very silty
25							
	45	S					
30							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Othe

Figure 6

V & A

LOG OF TEST HOLE NO. 5 Cont.

Project: Domingo Baca Dam

Project No. 93-1-30

Elevation - Top of Test Hole: n/a

Date Drilled: 2/08/93

Depth to Groundwater: not encountered

Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
	29	S				SM	SAND, silty to slightly silty, fine to coarse-grained, slight fine gravel, poorly graded, medium dense, slightly moist, light brown
35	27	S					
40	56	S		1.2			Dense
							Bottom of hole at 41-1/2'
45							
50							
55							
60							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Other

Figure 6 cont.

V & A

LOG OF TEST HOLE NO. 6

Project: Domingo Baca Dam

Project No. 93-1-30

Elevation - Top of Test Hole: n/a

Date Drilled: 2/08/93

Depth to Groundwater: not encountered

Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density, pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, very silty, fine to coarse-grained, slight fine gravel, poorly graded, medium dense, moist, brown
		B					
5							
	19	R	110	1.5	1,5		
10							
	21	S		6.3			Very silty to silt, slightly moist, light brown
							Clayey
15							
	100	S		6.1	1,2		Dense
20							
	23	S		1.5			
25							
	11	S		6.0			Very silty
30							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Other

Figure 7

V & A

LOG OF TEST HOLE NO. 6 Cont.

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 2/08/93

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
	23	S				SM	SAND, silty to very silty, fine to coarse-grained, slight fine to coarse gravel, poorly graded, medium dense, moist, brown
35							
	16	S		3.4			Silty
40							
	26	S		2.0			Silty to slightly silty
							Bottom of hole at 41-1/2'
45							
50							
55							
60							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Other

Figure 7 cont.

V & A

LOG OF TEST HOLE NO. 7

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 6/29/94

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						ML	SILT, sandy, fine to coarse-grained, stiff, slightly moist, brown
							Very sandy
5	20	R	111	1.3	1,2	SP	SAND, fine to coarse-grained, trace silt, trace gravel, medium dense, slightly moist, brown
10	12	R	97	4.7	1,2,5	SC	SAND, very clayey, fine to coarse-grained, medium dense, medium moist, brown
15	25	S		4.0	1,2	SM	SAND, very silty, fine to coarse-grained, trace gravel, medium dense, medium moist, brown
20	25	S		1.3		SP-SM	SAND, slightly silty, fine to coarse-grained, medium dense, slightly moist, brown
25	11	S		1.4	1	SP	SAND, fine to coarse-grained, trace silty, slightly gravelly, medium dense, slightly moist, brown
30							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Othe

Figure 8

V & A

LOG OF TEST HOLE NO. 7 cont.

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 6/29/94

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
	30	S		1.3		SP	SAND, fine to coarse-grained, trace silty, sll. gravelly, medium dense, slightly moist, brown
							Dense
35	43	S		1.3	1,2		
40	10	S		6.4		SC	SAND, clayey, fine to coarse-grained, medium dense, moist, brown
							Bottom of hole at 41-1/2'
45							
50							
55							
60							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Other

Figure 8 cont.

V & A

LOG OF TEST HOLE NO. 8

Project: Domingo Baca Dam — Project No. 93-1-30

Elevation - Top of Test Hole: n/a — Date Drilled: 6/28/94

Depth to Groundwater: not encountered — Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, fine to coarse-grained, very silty, slightly gravelly, medium dense, medium moist
	10	R	101	4.5	1,2		
		B			1,2,5		
5							Clayey/silty
	15	R	97	3.9	1		
10						CL	CLAY, very sandy, fine-grained, trace gravel, stiff, medium moist, brown
	13	S		5.7	1,2		
15							
	120	S		4.7			
							Bottom of hole at 16-1/2'
20							
25							
30							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Othe

Figure 9

V & A

LOG OF TEST PIT NO. 10

Project: Domingo Baca Dam Project No. 93-1-30

Elevation - Top of Test Hole: n/a Date Drilled: 3/23/93

Depth to Groundwater: not encountered Drilling Method: 24" backhoe

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, silty, fine to coarse-grained, slight fine to coarse gravel, poorly graded, moist, brown
							Silty to very silty
		B		3.9	1,2		
5							
							Slightly moist, light brown
							Silty to slightly silty lenses
10							
							Bottom of pit at 10-1/2'
15							
20							
25							
30							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Othe

Figure 11

V & A

LOG OF TEST HOLE NO. 11

Project: Domingo Baca Dam
Project No. 93-1-30
Elevation - Top of Test Hole: n/a
Date Drilled: 6/28/94
Depth to Groundwater: not encountered
Drilling Method: 6" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SM	SAND, fine to coarse-grained, silty, gravelly, medium dense, medium moist, brown
	14	R	117	1.3	1,2		
		B					
5							Clayey/silty, slightly gravelly
	19	R	114	1.5	1		
10							
	15	S		4.9			
15							
	15	S		2.7			
							Bottom of hole at 16-1/2'
20							
25							
30							

ADDITIONAL TESTS: 1 = Sieve Analysis 2 = Atterberg Limits 3 = Direct Shear 4 = R-Value 5 = Other

Figure 12

V
&
A

NOTES - LOGS OF TEST HOLES

Test hole locations were determined by compass bearing and pacing distances from known topographic points.

"Drilling Method" refers to the equipment utilized to advance the test hole. Six inch outside diameter, continuous flight, hollowstem auger was utilized.

"S" under "Sample Type" indicates a Standard Penetration test (ASTM D-1586). The Standard Penetration sampler is 2 inches in outside diameter and 1 3/8 inches inside diameter.

"R" under "Sample Type" indicates a 3 inch outside diameter by 2.5 inch inside diameter sampler. The sampler is lined with 1 inch high brass rings.

"B" under "Sample Type" indicates a bulk sample.

"Blows Per Foot" indicates the number of blows of a 140 pound hammer falling 30 inches required to drive the indicated sampler 12 inches.

"NR" under "Blows/Foot" indicates that no sample was recovered.

"Dry Density PCF" indicates the laboratory determined soil dry density in pounds per cubic foot.

"Water Content %" indicates the laboratory determined soil moisture content in percent (ASTM D-2216).

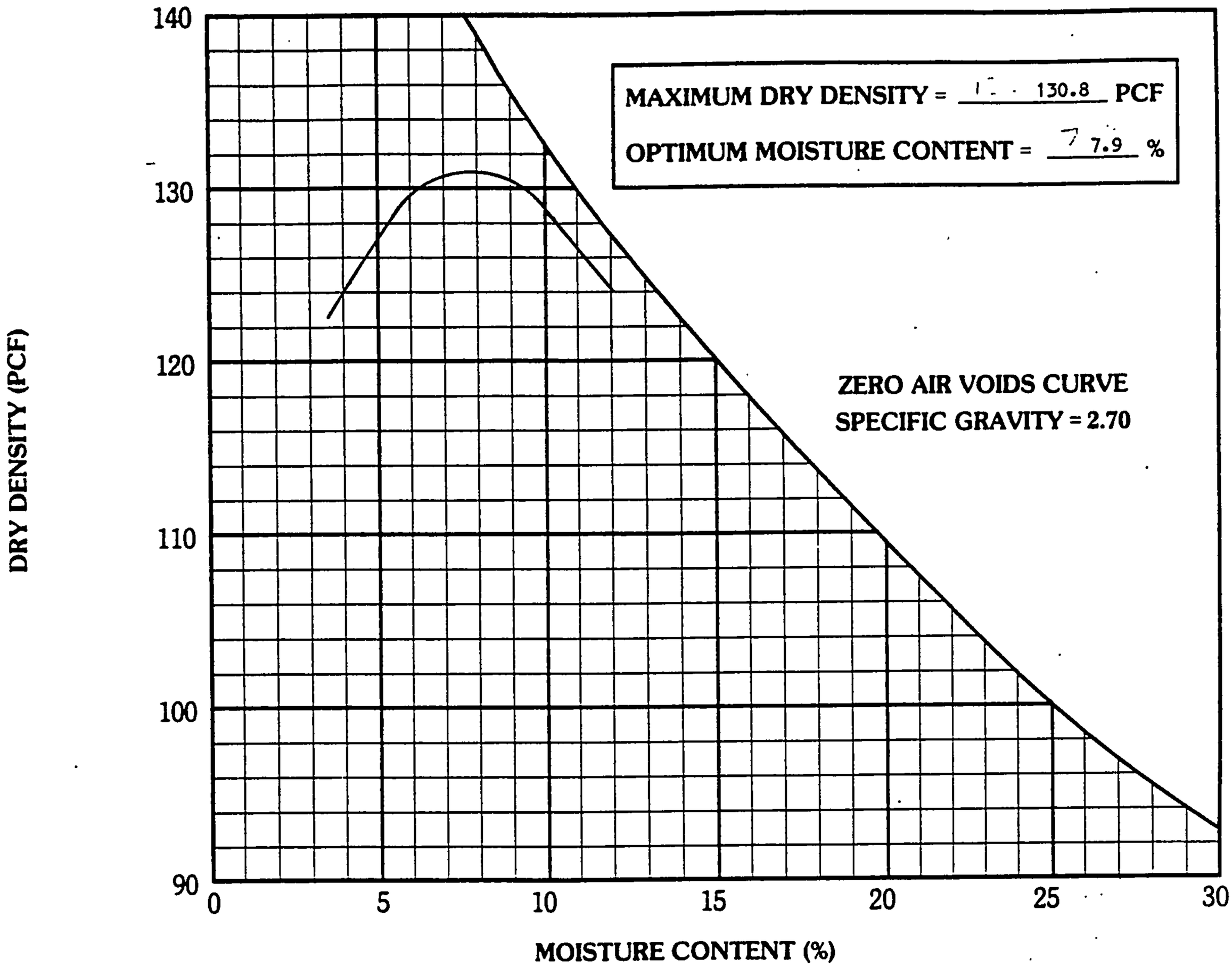
"Unified Classification" indicates the field soil classification as per ASTM D-2488. When appropriate, the field classification is modified based upon subsequent laboratory tests.

Variations in soil profile, consistency, and moisture content may occur between test holes. Subsurface conditions may also vary between test holes and with time.

Figure 13

V & A

COMPACTION TEST RESULTS



SAMPLE LOCATION: Test Hole 8 at 3' to 4'

SOIL DESCRIPTION: SAND, very silty

UNIFIED SOIL CLASSIFICATION: (SM)

AASHTO SOIL CLASSIFICATION: -

TEST METHOD: ASTM D-1557

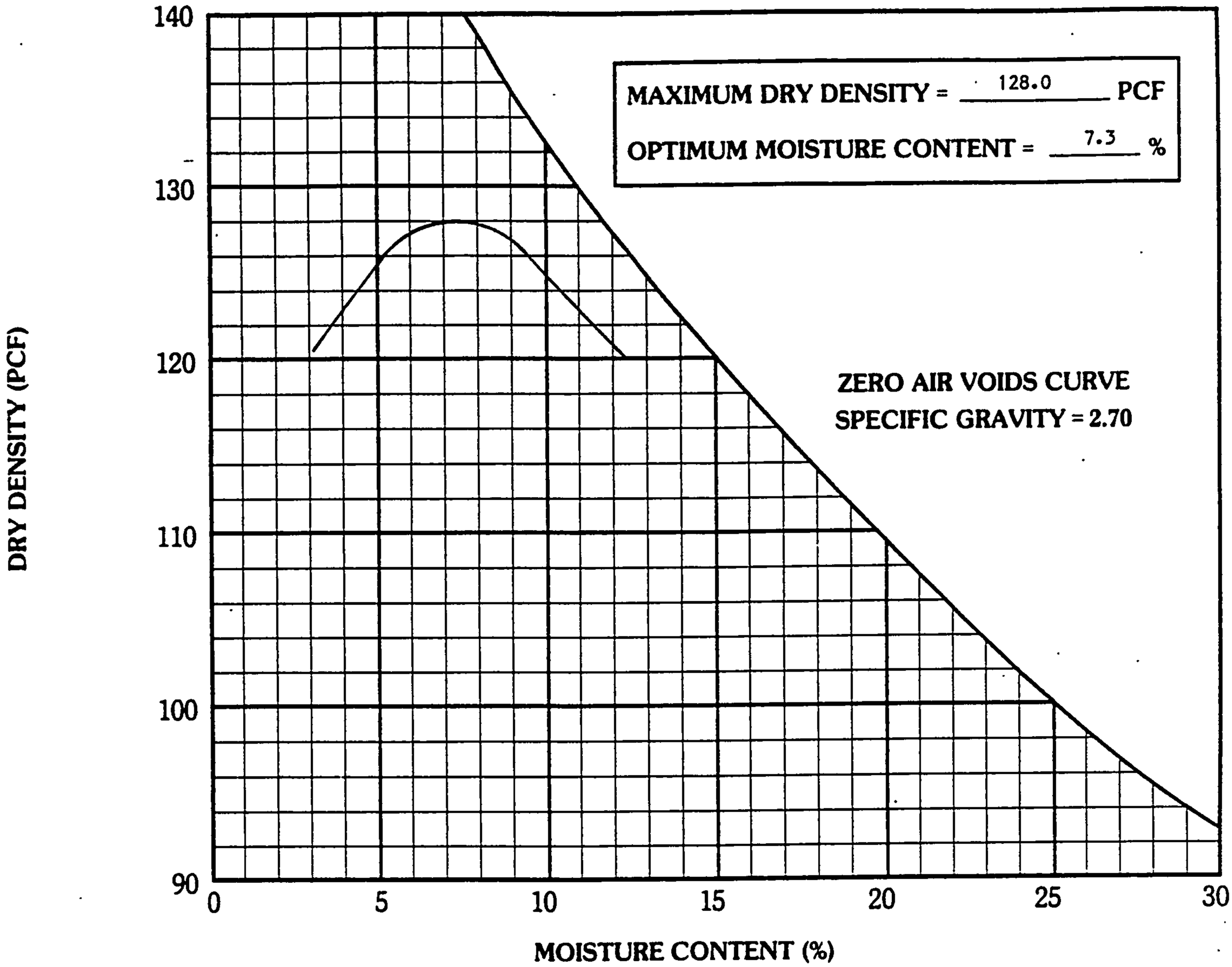
ATTERBERG LIMITS: LL 19 % PI 5 %

SIEVE ANALYSIS - % PASSING									
1 1/2"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
		100	98	90	78	70	65	53	38.2

Project No: 93-1-30
Figure 14

V & A

COMPACTION TEST RESULTS



SAMPLE LOCATION: Test Hole 11 at 3' - 4'

SOIL DESCRIPTION: SAND, silty

UNIFIED SOIL CLASSIFICATION: (SM)

AASHTO SOIL CLASSIFICATION: -

TEST METHOD: ASTM D-1557

ATTERBERG LIMITS: LL NV % PI NP %

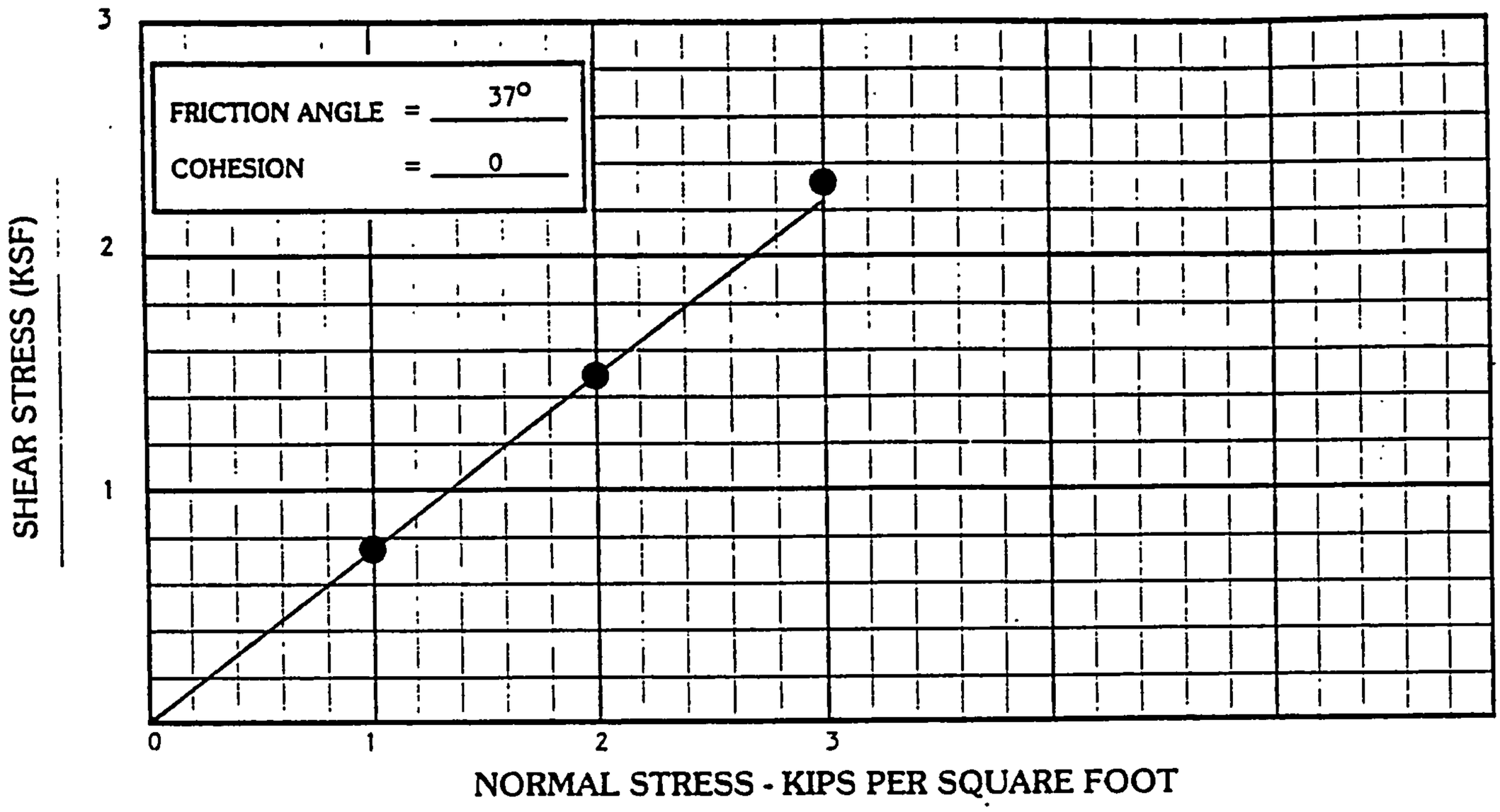
SIEVE ANALYSIS - % PASSING									
1 1/2"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
		100	98	89	73	59	43	35	16.3

Project No: 93-1-30

Figure 15

V & A

DIRECT SHEAR TEST RESULTS

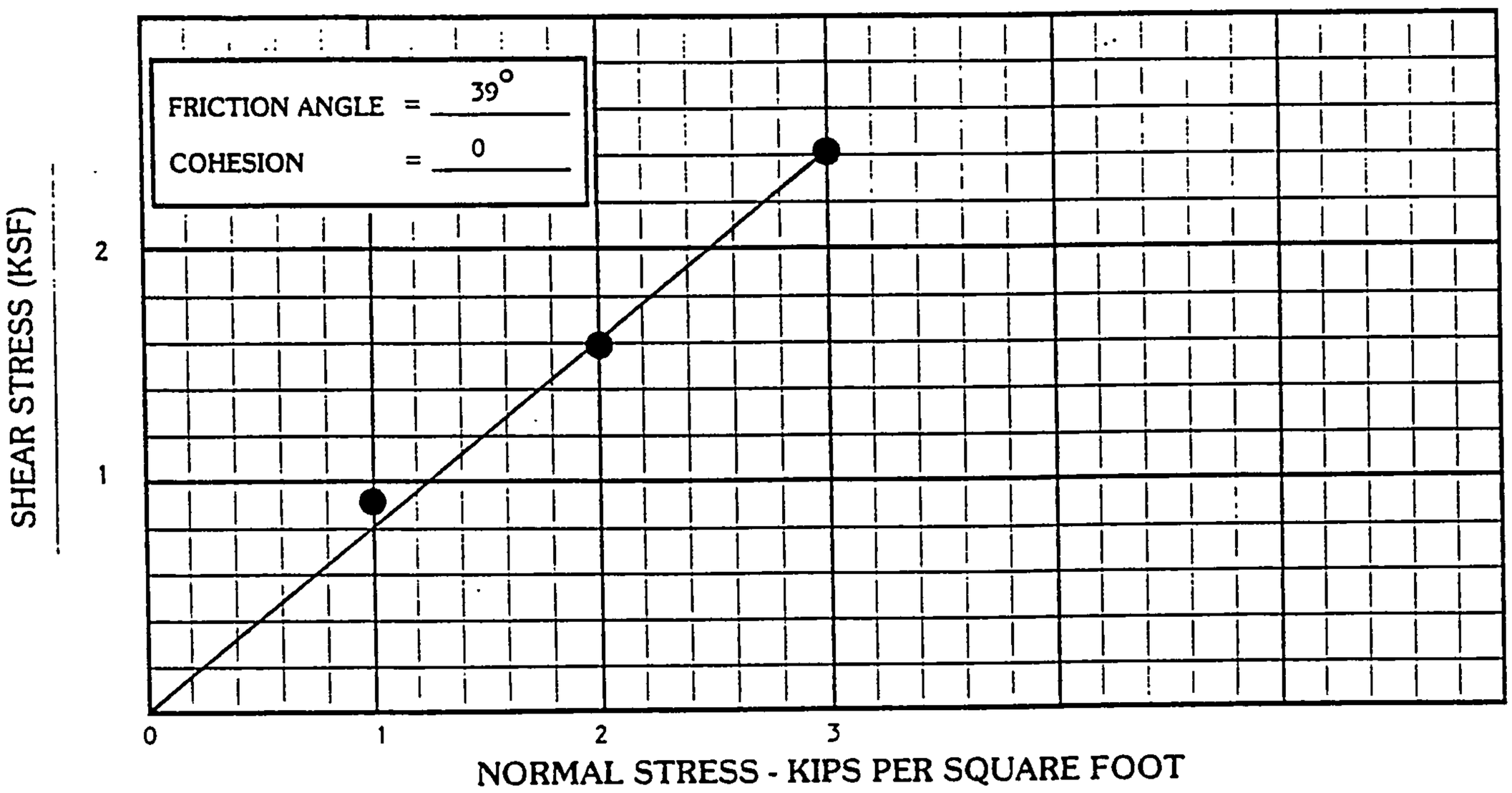


TEST HOLE NUMBER 2 SAMPLE DEPTH 5 FEET

SOIL CLASSIFICATION SM SOIL DESCRIPTION silty, gravelly SAND

MOISTURE CONTENT (%) 3.6 DRY DENSITY (PCF) 103

SAMPLE TYPE Undisturbed TEST TYPE Submerged



TEST HOLE NUMBER 3 SAMPLE DEPTH 5 FEET

SOIL CLASSIFICATION SM SOIL DESCRIPTION SAND, silty, gravelly

MOISTURE CONTENT (%) 1.2 DRY DENSITY (PCF) 120

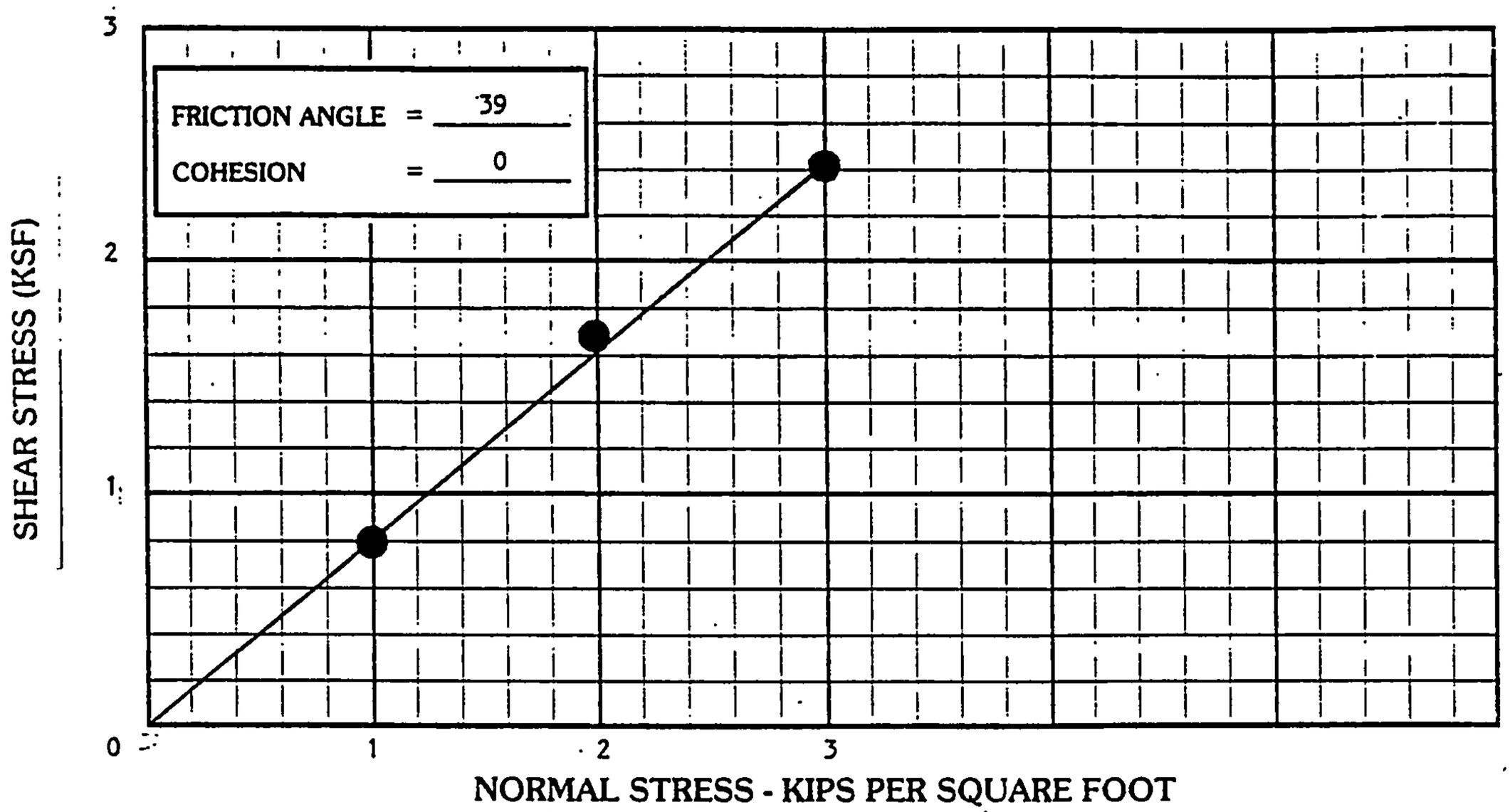
SAMPLE TYPE Undisturbed TEST TYPE Submerged

Project No. 93-1-30

Figure No.: 16

V & A

DIRECT SHEAR TEST RESULTS

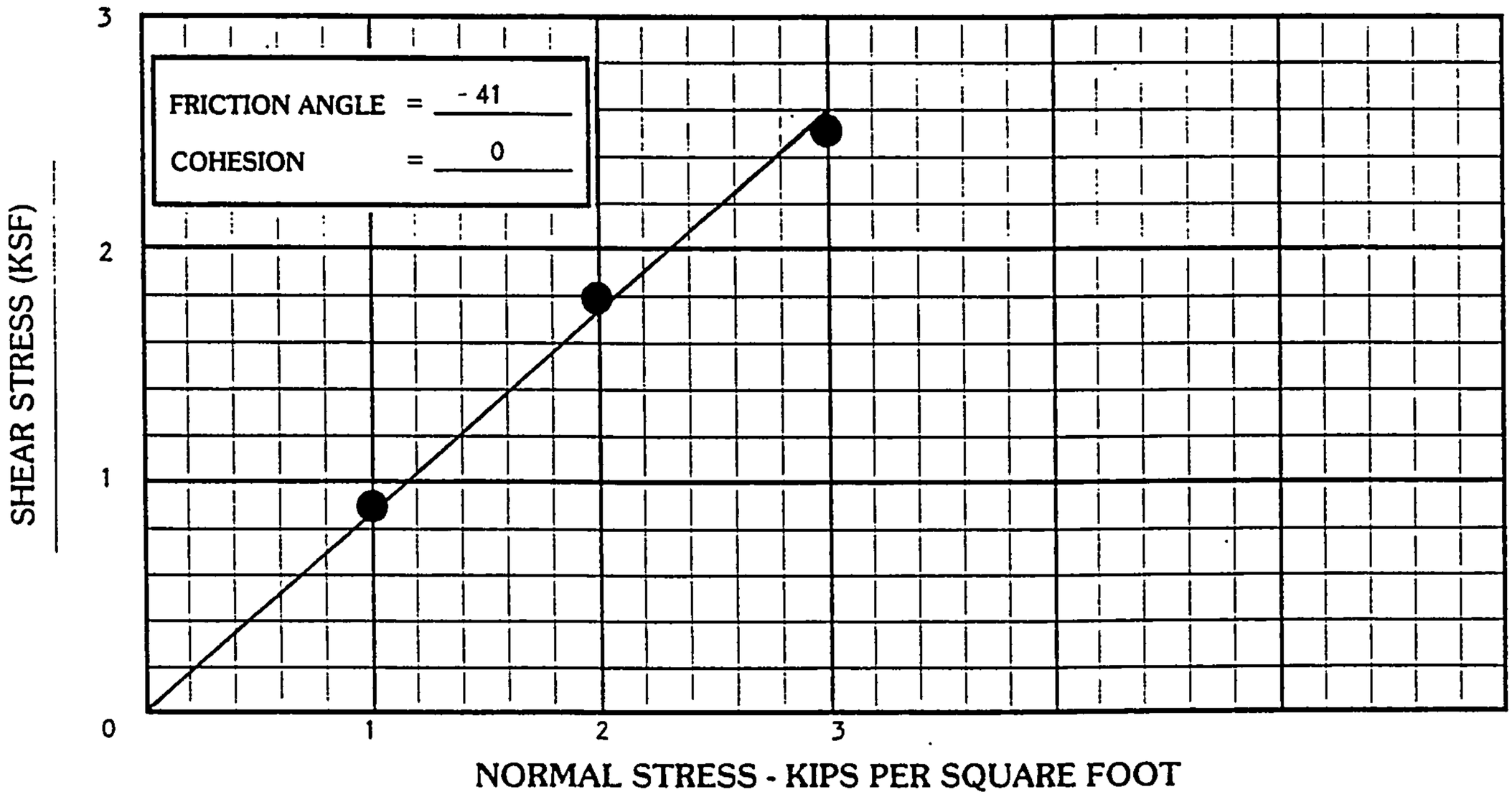


TEST HOLE NUMBER 8 SAMPLE DEPTH 3-4 FEET

SOIL CLASSIFICATION SM SOIL DESCRIPTION silty SAND

MOISTURE CONTENT (%) 8.0 DRY DENSITY (PCF) 124.2

SAMPLE TYPE Remolded TEST TYPE Submerged



TEST HOLE NUMBER 11 SAMPLE DEPTH 3-4 FEET

SOIL CLASSIFICATION SM SOIL DESCRIPTION silty SAND

MOISTURE CONTENT (%) 7.3 DRY DENSITY (PCF) 121.6

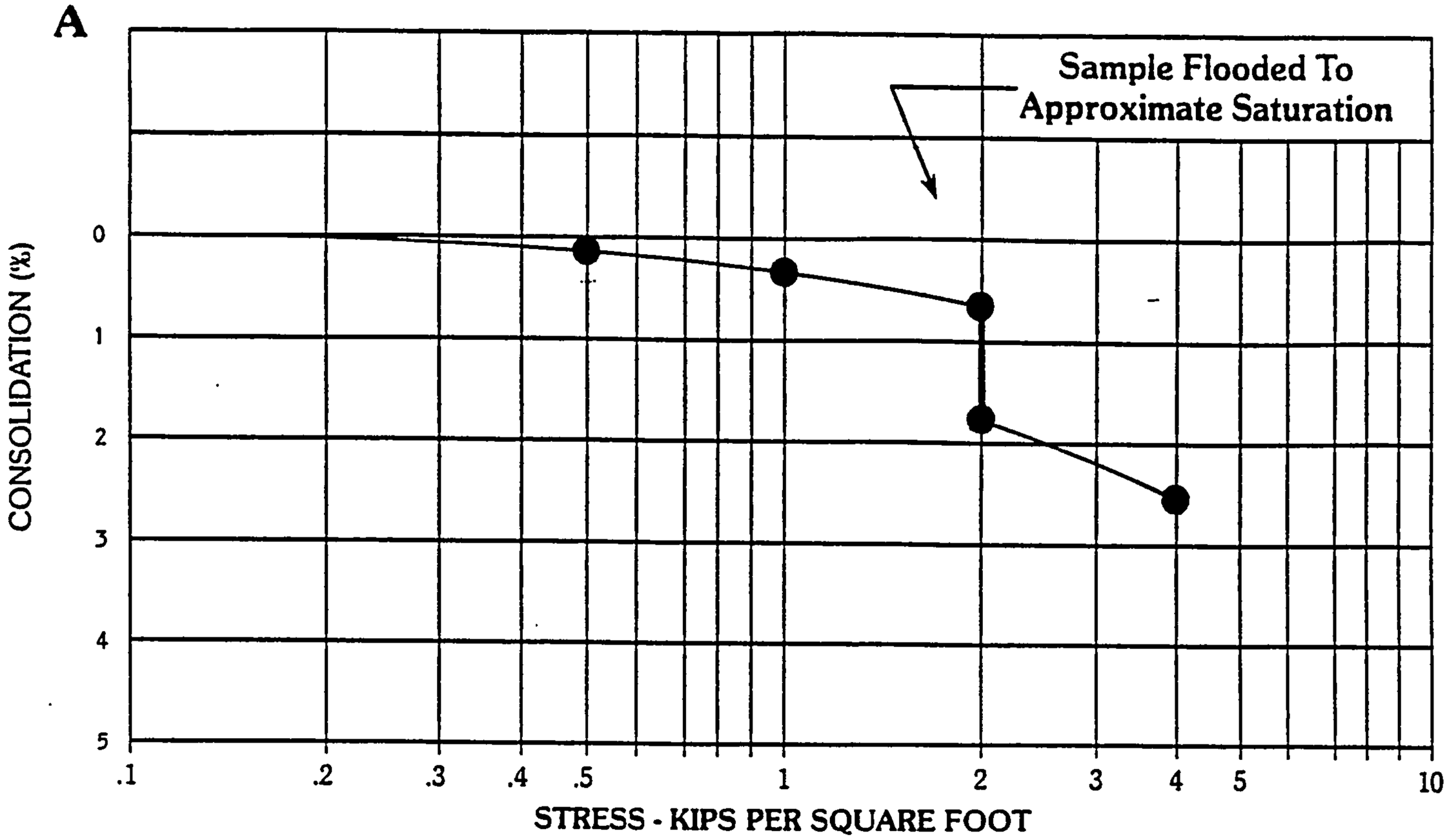
SAMPLE TYPE Remolded TEST TYPE Submerged

Project No. 93-1-30

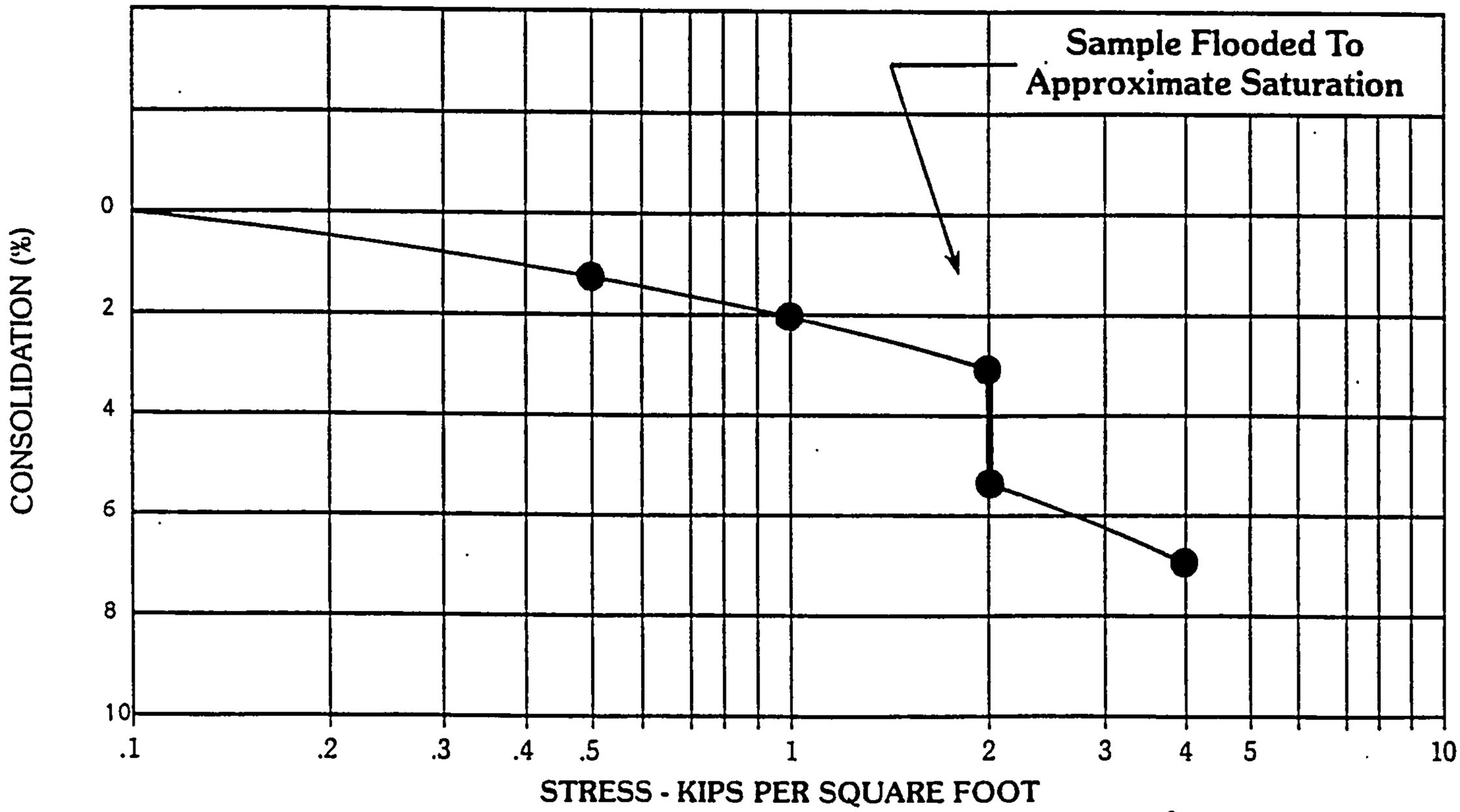
Figure No.: 17

V & A

CONSOLIDATION TEST RESULTS



TEST HOLE NUMBER 1 SAMPLE DEPTH 5 FEET
SOIL CLASSIFICATION SP-SM SOIL DESCRIPTION SAND, sli. silty
MOISTURE CONTENT (%) 0.9 DRY DENSITY (PCF) 122

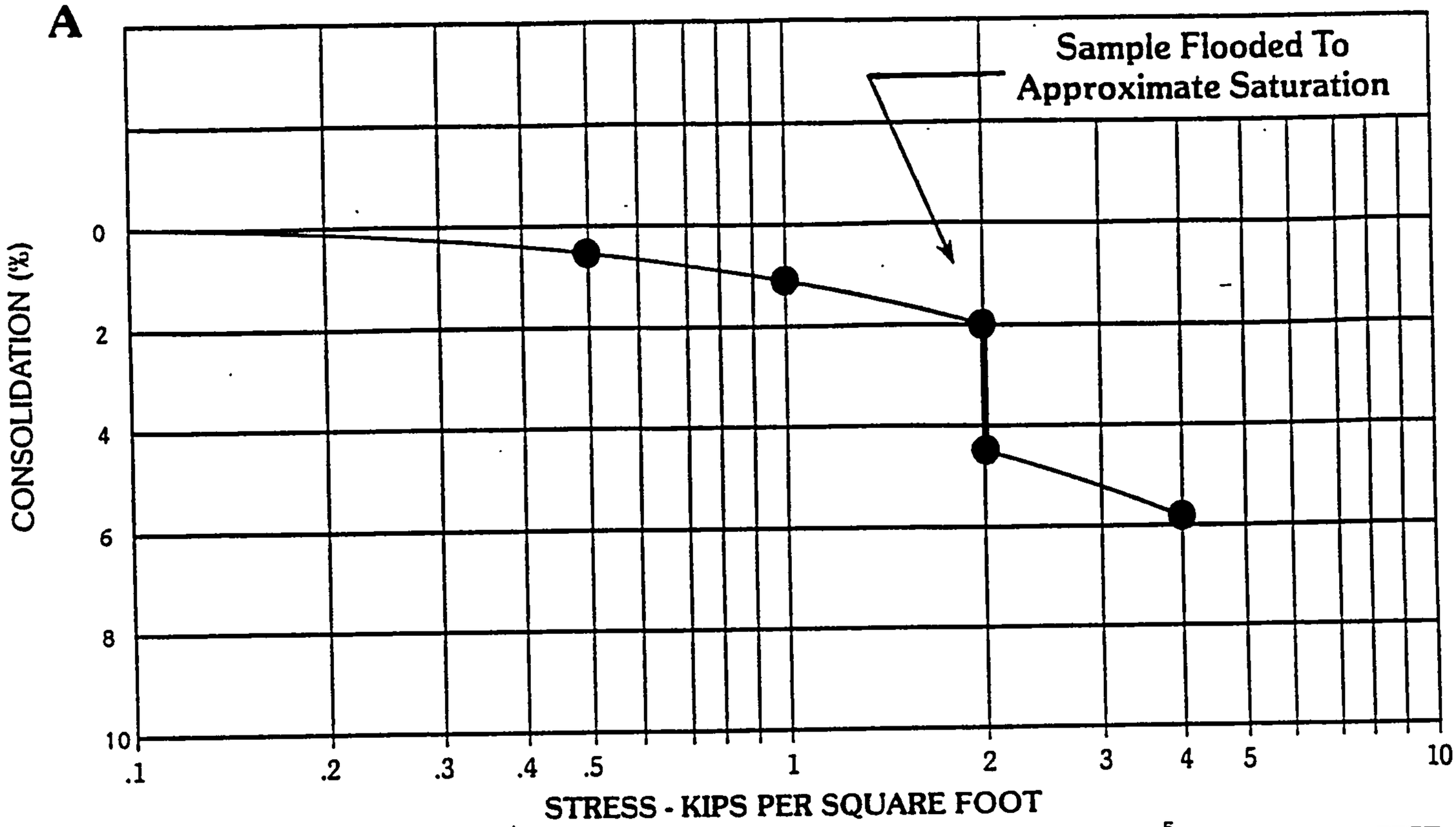


TEST HOLE NUMBER 4 SAMPLE DEPTH 2 FEET
SOIL CLASSIFICATION SM SOIL DESCRIPTION silty SAND
MOISTURE CONTENT (%) 7.6 DRY DENSITY (PCF) 121

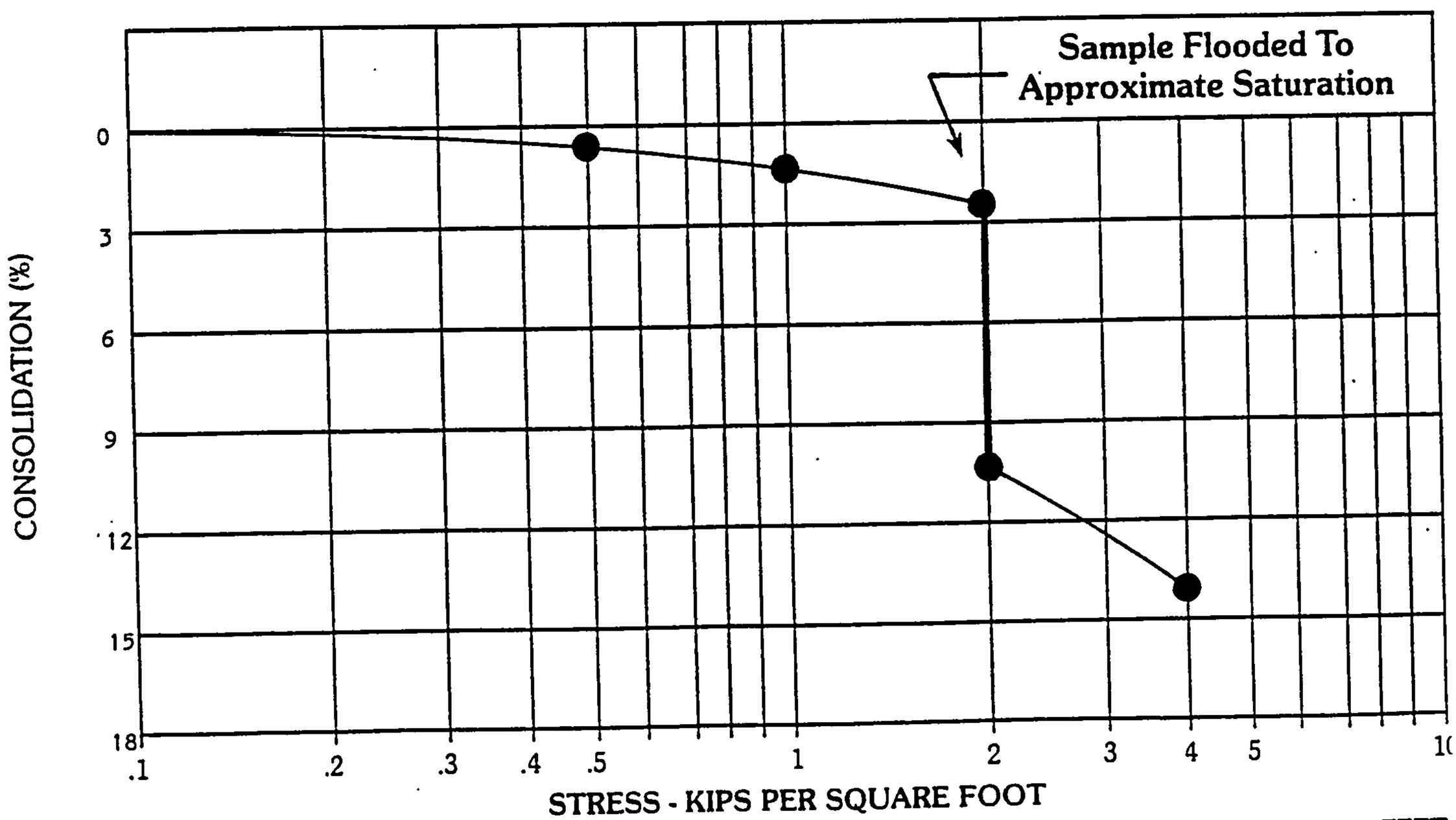
Project No. 93-1-30
Figure 18

V & A

CONSOLIDATION TEST RESULTS



TEST HOLE NUMBER 6
SOIL CLASSIFICATION SP-SM
MOISTURE CONTENT (%) 1.5
SAMPLE DEPTH 5 FEET
SOIL DESCRIPTION silty SAND
DRY DENSITY (PCF) 110

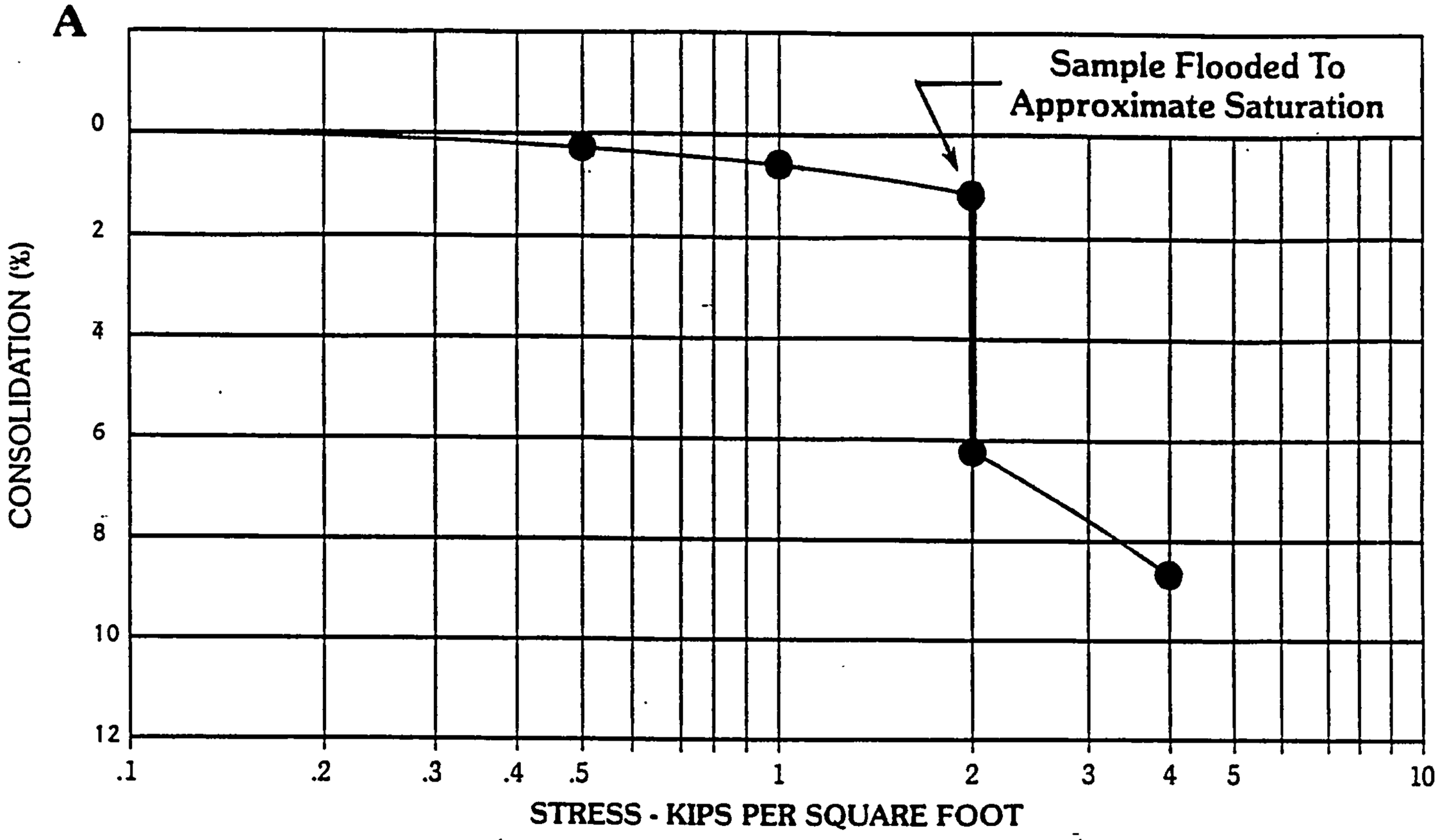


TEST HOLE NUMBER 7
SOIL CLASSIFICATION SC
MOISTURE CONTENT (%) 4.7
SAMPLE DEPTH 10 FEET
SOIL DESCRIPTION SAND, very clayey
DRY DENSITY (PCF) 97

Project No. 93-1-30
Figure 19

V & A

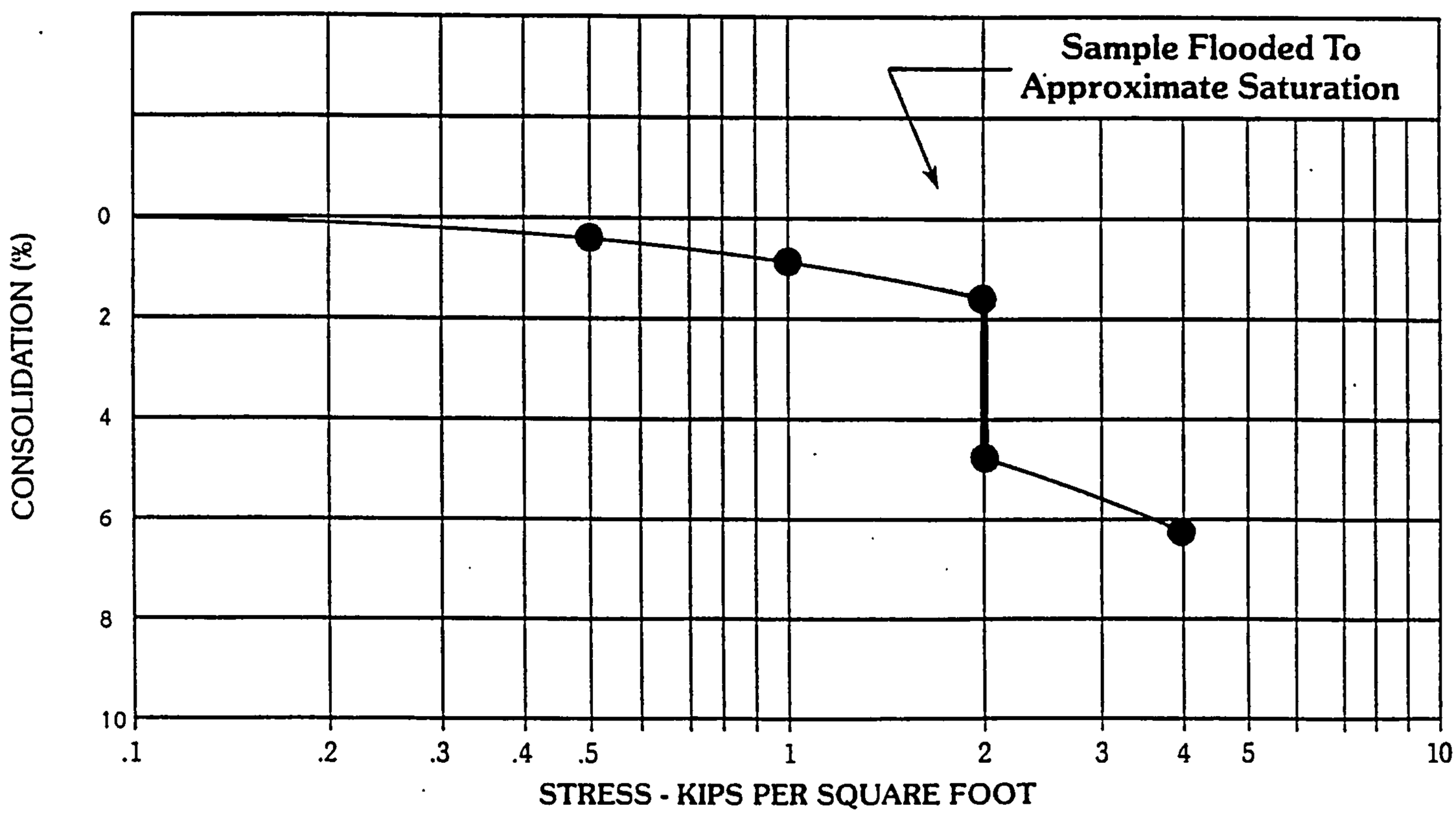
CONSOLIDATION TEST RESULTS



TEST HOLE NUMBER 8 SAMPLE DEPTH 2 FEET

SOIL CLASSIFICATION SM SOIL DESCRIPTION SAND, very silty

MOISTURE CONTENT (%) 4.5 DRY DENSITY (PCF) 101



TEST HOLE NUMBER 11 SAMPLE DEPTH 2 FEET

SOIL CLASSIFICATION SM SOIL DESCRIPTION SAND, silty, gravelly

MOISTURE CONTENT (%) 1.3 DRY DENSITY (PCF) 117

Project No. 93-1-30

Figure 20

SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: Domingo Baca Detention Dam 93-1-30
LOCATION: Static Loading 3:1 Slope
FILE: 93-1-30
COMPLETE SLOPE CROSS SECTION SHOWN

CIRCLE	X	Y	RADIUS	FS
1	50.0	5335.0	22.5	2.27

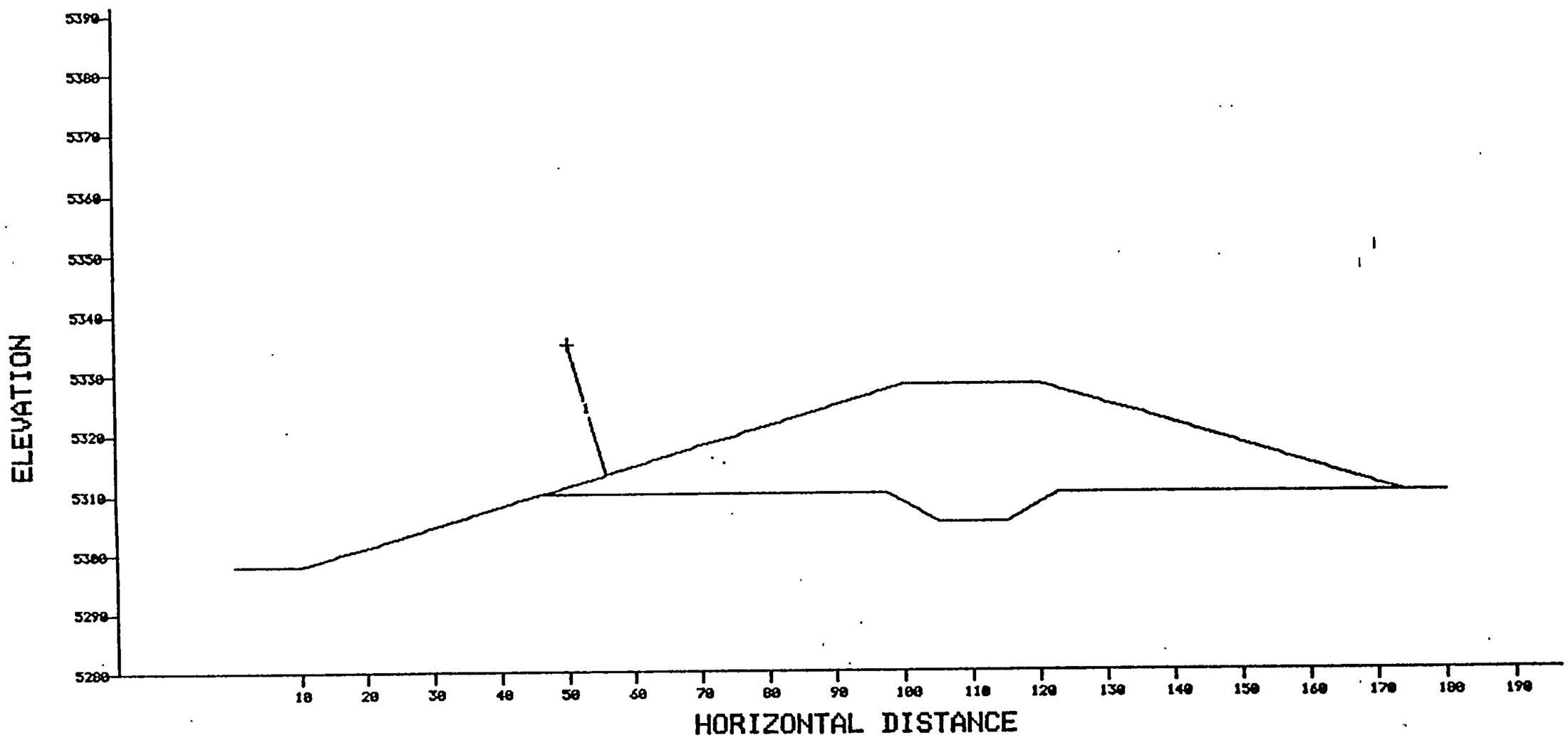


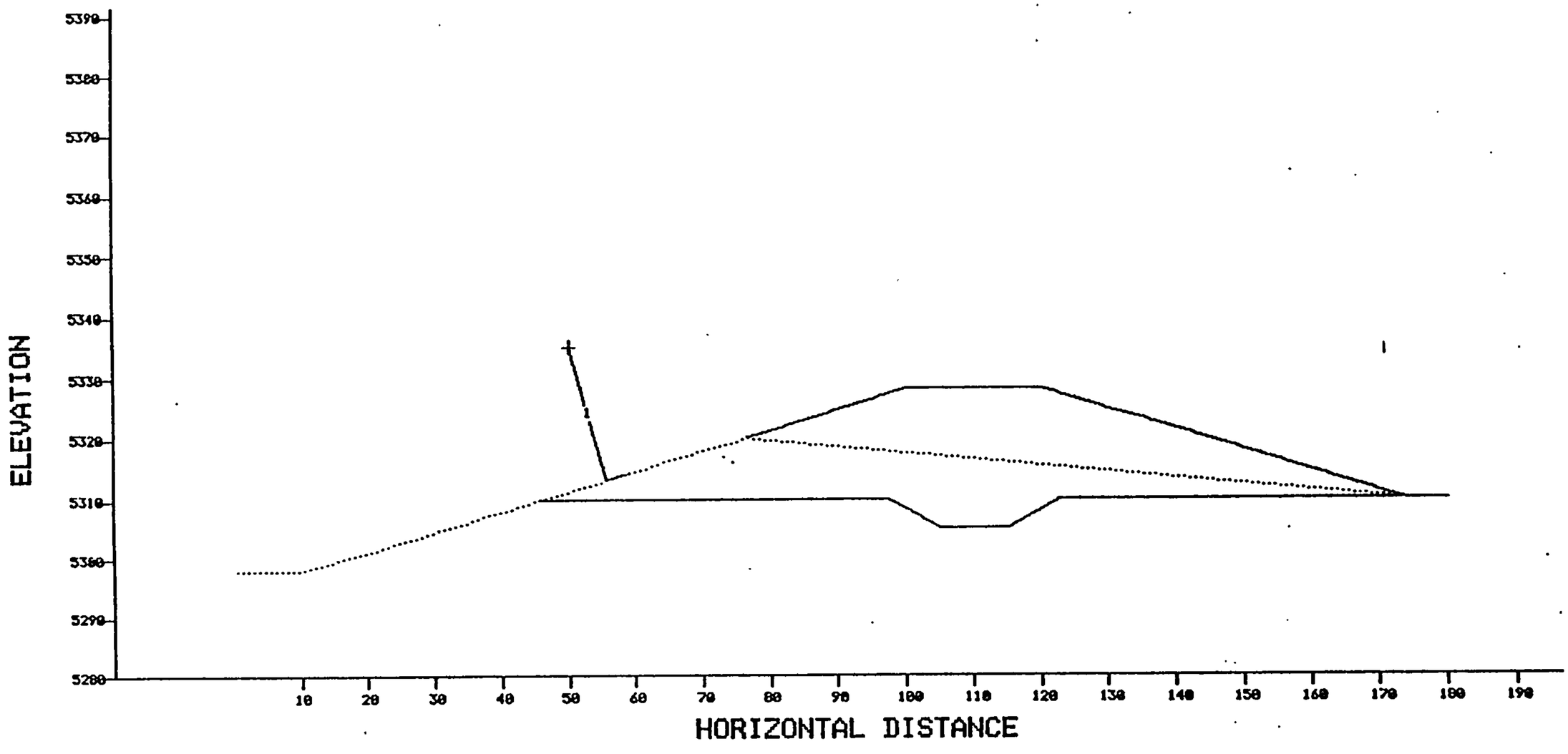
Figure No.: 21

SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: Domingo Baca Detention Dam 93-1-30
LOCATION: Rapid Draw Down 3:1 Slope
FILE: 93-1-30
COMPLETE SLOPE CROSS SECTION SHOWN

CIRCLE	X	Y	RADIUS	FS
1	50.0	5335.0	22.5	1.08



Vinyard & Associates, Inc.

Figure No.: 23

V & A

SUMMARY OF LABORATORY TEST DATA

Test Hole No.	Depth (Feet)	Unified Classification	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits		SIEVE ANALYSIS % PASSING BY WEIGHT										DESCRIPTION
					LL	PI	1½"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
1	5	SP-SM	122	0.9	NV	NP	-	100	98	92	73	51	35	21	13	7.0	SAND, sll. silty, sll. gravelly
1	10	SM	102	6.3	-	-	-	-	100	98	97	86	80	74	66	47.9	SAND, very silty, trace gravel
1	15	SC	-	6.4	29	16	-	-	100	96	85	72	65	60	53	37.8	SAND, very clayey, trace gravel
1	20	SM	-	4.2	20	NP	-	100	98	94	86	78	71	64	53	24.3	SAND, very silty, sll. gravelly
1	25	-	-	5.0	-	-	-	-	-	-	-	-	-	-	-	-	
1	30	SP-SM	-	1.2	NV	NP	-	100	98	88	63	39	24	15	10	6.3	SAND, sll. silty, gravelly
1	35	-	-	4.2	-	-	-	-	-	-	-	-	-	-	-	-	
1	40	SM	-	2.6	NV	NP	-	100	99	95	83	70	61	53	42	20.0	SAND, silty, trace gravel
2	6	SM	111	1.4	21	NP	-	100	99	94	84	71	61	54	47	32.7	SAND, very silty, sll. gravelly
2	11	SM-SC	-	2.3	20	5	-	100	98	89	71	50	37	30	25	17.4	SAND, clayey/silty, sll. gravelly
2	15	-	-	4.2	-	-	-	-	-	-	-	-	-	-	-	-	
2	20	SM	-	5.3	20	NP	-	100	98	96	90	83	76	69	61	30.1	SAND, very silty, sll. gravelly
2	25	-	-	2.8	-	-	-	-	-	-	-	-	-	-	-	-	
2	30	SP-SM	-	1.7	NV	NP	-	100	99	92	65	37	22	15	11	7.7	SAND, sll. silty, sll. gravelly
2	35	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	
2	40	SC	-	5.0	22	9	-	-	100	97	89	80	73	67	60	36.0	SAND, very clayey, trace gravel
3	2	SP-SM	113	2.5	-	-	-	-	100	97	78	43	25	16	10	5.0	SAND, sll. silty, trace gravel
3	5	SM	120	1.2	NV	NP	-	100	99	88	69	57	48	36	29	20.2	SAND, silty, gravelly
3	10	SM	-	3.5	-	-	-	100	97	94	86	76	67	61	54	36.3	SAND, very silty, sll. gravelly
3	20	SP-SM	-	1.0	-	-	-	100	99	89	70	49	34	25	18	8.4	SAND, sll. silty, gravelly
3	30	-	-	1.9	-	-	-	-	-	-	-	-	-	-	-	-	
3	35	SM	-	3.1	-	-	-	100	99	96	85	69	56	48	40	21.9	SAND, silty, sll. gravelly

NV - Indicates no value

NP - Indicates non-plastic

Project No. 93-1-30

Table 1

V & A

SUMMARY OF LABORATORY TEST DATA

Test Hole No.	Depth (Feet)	Unified Classi-fication	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits		SIEVE ANALYSIS % PASSING BY WEIGHT										DESCRIPTION
					LL	PI	1½"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
3	40	-	-	3.7	-	-	-	-	-	-	-	-	-	-	-	-	
4	2	SM	121	7.6	-	-	-	-	100	98	87	65	47	35	28	18.4	SAND, silty, trace gravel
4	5	-	107	2.4	-	-	-	-	-	-	-	-	-	-	-	-	
4	10	SC	-	4.3	21	10	-	-	100	98	92	81	70	61	52	32.1	SAND, very silty, clayey, trace gravel
4	25	SC	-	5.6	25	15	-	-	100	98	93	88	83	77	66	38.4	SAND, very silty, clayey, trace gravel
4	30	-	-	2.6	-	-	-	-	-	-	-	-	-	-	-	-	
5	2	SM	-	4.9	-	-	-	100	98	92	78	65	55	47	38	22.1	SAND, silty, sll. gravelly
5	5	-	117	1.3	-	-	-	-	-	-	-	-	-	-	-	-	
5	10	SC	-	7.3	28	16	-	100	99	96	88	78	72	68	63	48.3	SAND, very silty, clayey, trace gravel
5	40	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	
6	5	SP-SM	110	1.5	-	-	-	-	100	98	85	51	22	12	9	5.8	SAND, sll. silty, trace gravel
6	10	-	-	6.3	-	-	-	-	-	-	-	-	-	-	-	-	
6	15	SC	-	6.1	24	13	-	-	100	96	87	77	71	66	57	30.4	SAND, very silty, clayey, trace gravel
6	20	-	-	1.5	-	-	-	-	-	-	-	-	-	-	-	-	
6	25	-	-	6.0	-	-	-	-	-	-	-	-	-	-	-	-	
6	35	-	-	3.4	-	-	-	-	-	-	-	-	-	-	-	-	
6	40	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	
7	5	SP	111	1.3	22	NP	-	-	100	94	77	45	21	11	7	4.8	SAND, trace silt, trace gravel
7	10	SC	97	4.7	23	6	-	100	98	94	88	83	77	72	65	45.6	SAND, very clayey, sll. gravelly
7	15	SM	-	4.0	19	NP	-	100	99	97	92	81	72	67	56	32.2	SAND, vrey silty, trace gravel
7	20	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	
7	25	SP	-	1.4	-	-	-	100	99	94	74	45	25	15	10	4.7	SAND, trace silt, sll. gravelly

NP - Indicates non-plastic

Project No. 93-1-30
Table 1 cont.

V & A

SUMMARY OF LABORATORY TEST DATA

Test Hole No.	Depth (Feet)	Unified Classi-fication	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits		SIEVE ANALYSIS % PASSING BY WEIGHT										DESCRIPTION
					LL	PI	1½"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
7	30	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	
7	35	SP	-	1.3	NV	NP	-	-	100	91	65	43	30	23	12	4.8	SAND, trace silt, sli. gravelly
7	40	-	-	6.4	-	-	-	-	-	-	-	-	-	-	-	-	
8	2	SM	101	4.5	19	NP	-	-	100	98	95	91	86	78	67	43.5	SAND, very silty, trace gravel
8	5	SM	97	3.9	-	-	-	100	97	93	85	76	67	59	51	36.6	SAND, very silty, sli. gravelly
8	10	CL	-	5.7	22	16	-	-	100	98	93	87	82	77	70	54.7	CLAY, very sandy, trace gravel
8	15	-	-	4.7	-	-	-	-	-	-	-	-	-	-	-	-	
11	2	SM	117	1.3	NV	NP	-	100	97	88	72	55	42	34	28	17.6	SAND, silty, gravelly
11	5	SM	114	1.5	-	-	-	100	98	93	73	47	31	23	18	12.1	SAND, silty, slightly gravelly
11	10	-	-	4.9	-	-	-	-	-	-	-	-	-	-	-	-	
11	15	-	-	2.7	-	-	-	-	-	-	-	-	-	-	-	-	

NV - Indicates no value
NP - Indicates non-plastic

Project No. 93-1-30
Table 1 cont.

V & A

PERMEABILITY TEST RESULTS

Test Hole	Depth (Ft.)	Permeability (CM/SEC)	Permeability (Ft./Hour)	Notes
1	5	2.1×10^{-5}	.003	Undisturbed
2	6	3.7×10^{-6}	.0004	Undisturbed
6	5	6.3×10^{-4}	.07	Undisturbed
7	10	3.4×10^{-6}	.0004	Undisturbed
8	3-4	7.3×10^{-6}	.0009	Remolded*
11	3-4	6.8×10^{-6}	.0008	Remolded*

* Remolded to 95% of maximum density as determined by ASTM D-1557.

Project No.: 93-1-

Table No.: 2

V & A

Compaction

Each lift of structural fill shall be mechanically compacted using a sheepsfoot type compactor to a minimum of 95% of maximum density as determined by ASTM D-1557.

Compaction by flooding and jetting is specifically prohibited unless authorized in advance by the Owner or his representative and the Geotechnical Engineer.

In any areas where density testing is not feasible the Geotechnical Engineer may evaluate adequacy of soil compaction by "probing" with a hand held rod. The Geotechnical Engineers assessment of the relative compaction shall be the sole and final assessment. Any areas deemed to be inadequately compacted by "probing" shall be reworked.

If for any reason any area develops a relatively smooth surface, the smooth surface shall be thoroughly reworked prior to placement of subsequent material.

Observation and Testing

The Geotechnical Engineer or his representative shall perform field density tests with a frequency and at the locations he feels appropriate. The Geotechnical Engineer or his representative will perform Proctor tests on representative samples of all fill material. To minimize delays the Earthwork Contractor is encouraged to submit soil samples prior to use for proctor testing.

APPENDIX F

Anaheim Outfall Pipe Supplemental Letter

Resource Technology, Inc.

2129 OSUNA ROAD NE. SUITE 200
ALBUQUERQUE, NEW MEXICO 87113
(505) 345-3115
FAX (505) 345-4132

February 7, 1995

Mr. Larry Blair, P.E.
AMAFCA
2600 Prospect NE
Albuquerque, New Mexico 87107

RE: Recommendations for use of excess capacity in Lower North Domingo Baca Outfall Pipe
RTI File No. 94-200-1.2

Dear Larry,

In response to your request that RTI provide some guidance for proposed use of the Lower North Domingo Baca Dam Outfall Pipe as part of the Design Analysis Report for the above referenced project, I have prepared the following discussion of the issues and recommendations.

DAM DISCHARGE HYDROGRAPH

The attached discharge hydrograph provides the basis for the following discussion of potential excess capacity. As can be seen, the hydrograph peaks at 3.2 hours with a discharge of 204 cfs. It also shows that from hour 2 to hour 12 the discharge is consistently in the 190-200 cfs range. The discharge at 1.5 hours, the time increment where most small local drainages peak, is approximately 130 cfs. Excess capacity in the Outfall Pipe is the difference between the dam discharge at a given time and the hydraulic capacity of the pipe. All references to time are based on a rainfall distribution that starts at 0.0 hours.

HYDRAULIC CAPACITY OF EXISTING FACILITIES

The existing Outfall Pipe, located in Anaheim Avenue, is 48-inch diameter RCP from Louisiana to Ute (west of San Pedro) and 54 inch RCP from Ute to the Box culvert at I-25. The maximum capacity of the 48-inch pipe reach is 220 cfs and the maximum capacity of the 54-inch reach is 295 cfs. The maximum capacity was calculated for low pressure flow (2 feet of head) in the most restricted reach.

There are 4 - 4 x 9 concrete box culverts (CBC) at I-25. The Outfall Pipe ties into the second barrel from the north. The capacity of each of the box culverts is 190 cfs based on inlet control with Hw/d=1.0. The full flow capacity of each box is 590 cfs.

PROPOSED FACILITIES

A City of Albuquerque project, SAD 221, designed by Wilson and Co. makes use of the Dam Outfall pipe for several small storm drain systems serving the Mobile Home park west of San Pedro. The design of this project is complete and construction is to begin later in 1995. Stubouts were constructed for future connection to these systems at Anaheim and Ute and on Anaheim just east of the winery when the outfall pipe was installed.

Another system, located in Corona Avenue on the north side of the Mobile Home Park, was proposed in the North and South Domingo Baca Arroyos and Paseo Del Norte Drainage Management Plan (RTI, 1991). This system, consisting of a 42"-48" trunk line in Corona, was to extend from the 8-48" CMP culverts at I-25 to a point midway between San Pedro and Louisiana. To date there has been no activity on this proposal.

A third small system is being constructed as part of the Dam construction project. It consists of several drop inlets located downstream from the dam draining to the outfall pipe. These inlets pick up runoff from the east side of Louisiana between Corona and Carmel and from the dam embankment slopes. There is a second manhole in the street at Louisiana and Anaheim that was constructed with stubouts.

The storm drain which is part of the Paseo del Norte improvements should be constructed within the next few years. It was designed to pick up some of the local flows between Paseo del Norte and the North Domingo Baca Arroyo basin to the north. Local storm drains in San Pedro, Louisiana and Wyoming that will connect to this system could have some impact on the Anaheim Outfall Pipe system.

USE OF EXCESS CAPACITY

A comparison of the dam discharge hydrograph with the limiting hydraulic capacity of the outfall pipe indicates that during the first 1.5 hours of a 100-year storm there is capacity for an additional 90 cfs east of Ute and 165 cfs west of Ute. However, after 2.0 hours this excess capacity shrinks to 15 cfs and 90 cfs respectively. This indicates that there are two general and not necessarily exclusive possibilities:

1. Pick up local flows that peak at or near 1.5 hours.
2. Pick up discharges from one or more detention ponds that discharge peak flows to the outfall pipe limited by the capacity of the location where they are picked up.

Existing and future drainage basins as developed in the North and South Domingo Baca and Paseo Del Norte DMP are shown in Figure 1. Assumed future condition hydrology characteristics are shown in Table 1. The DMP indicated that basins 940, 943.1 and 943.2 would continue, with some basin boundary modification, to drain to the CBC at I-25. In addition, a portion of basin 939.1 will be picked up by SAD 221 improvements. The AHYMO model for the Dam discharge hydrograph and these basins was modified to reflect the capture

of a portion of these basins in the outfall pipe with the remainder left as street flow. The results are shown in Table 2. As can be seen, with the assumed future condition hydrology, flow exceeds the excess pipe capacity at several locations. This would result in street or other surface flow until the runoff reaches the CBC at I-25. If the actual future condition hydrology exceeds the levels of imperviousness assumed then small local detention basins may be required.

SUMMARY AND RECOMMENDATIONS

Summary

The Lower North Domingo Baca Arroyo Detention Dam Outfall Pipe has sufficient capacity to accommodate most of the local storm water runoff generated by the future conditions DMP basins draining to the existing CBC at I-25. The remainder can be controlled by street flow or, in the worst case, by local detention ponds. There does not appear to be surplus capacity for the Outfall Pipe facility to receive any additional storm water from diversions from other basins without a corresponding diversion from the DMP basins to some other facility (such as the future Paseo del Norte Storm Drain).

Recommendations

1. In general, the future condition drainage boundaries as indicated in the North and South Domingo Baca Arroyos and Paseo Del Norte Corridor Drainage Master Plan should be followed.

2. Each proposed tie-in to the Lower North Domingo Baca Detention Dam Outfall Pipe should be accompanied by runoff hydrograph reflecting the effects on the dam discharge hydrograph and the actual proposed hydrologic conditions.

3. It is likely that much of the future development in this area will involve large assemblages of existing lots, with or without replatting, that cross drainage basin divides. Proposed modifications to DMP basin boundaries should only be considered when proposed diversions to the outfall pipe are offset by corresponding diversions to other adjacent drainage systems.

4. AMAFCA should continue to encourage the development of additional drainage facilities in adjacent drainage basins as indicated in the DMP.

Sincerely,

RESOURCE TECHNOLOGY, INC.

Donald S. Dixon, P.E.

DONALD S. DIXON
NEW MEXICO
11043
REGISTERED PROFESSIONAL ENGINEER

2/7/96

TABLE 1

HYDROLOGIC CHARACTERISTICS

Basin	Area (sq mi)	Land Treatment A (%)	B (%)	C (%)	D (%)	100 Yr Peak Discharge (cfs)	Time to Peak (hr.)
939.15	.014	0	34	16	50	34	1.50
940.1	.028	0	34	16	50	68	1.50
940.2	.047	0	34	16	50	116	1.50
943.1	.012	0	15	15	70	33	1.50
943.2	.013	0	34	16	50	32	1.50

TABLE 2

100-YEAR FLOW RATES

At Selected Locations

Location	Q (cfs)	Time to Peak (Hrs.)	Capacity (cfs)
Dam Only	204	3.20	220
Anaheim and San Pedro (w/local)	299	1.55	220
Anaheim and Ute (w/local)	357	1.55	295
I-25 CBC	385	1.55	1160

AHYMO SUMMARY TABLE (AHYMO993) - AMAFCA VERSION OF HYMO - SEPTEMBER, 1993 RUN DATE (MON/DAY/YR) =02/06/1995
INPUT FILE = ANAHEIM.REV USER NO.= RSTECHNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .00
*S DAM DISCHARGE AT LOUISIANA										
RECALL HYD	940.87	-	2	4.29270	203.55	398.388	1.74011	3.200	.074	
RAINFALL TYPE= 2										RAIN24= 2.850
COMPUTE NM HYD	940.10	-	1	.02800	68.27	2.667	1.78583	1.500	3.810	PER IMP= 50.00
*S SUB-BASIN 940.1										
COMPUTE NM HYD	940.20	-	3	.04700	114.59	4.476	1.78583	1.500	3.809	PER IMP= 50.00
*S SUB-BASIN 940.2										
COMPUTE NM HYD	939.15	-	5	.01400	34.14	1.333	1.78582	1.500	3.811	PER IMP= 50.00
*S SUB-BASIN 939.15										
COMPUTE NM HYD	943.10	-	6	.01200	32.86	1.368	2.13689	1.500	4.278	PER IMP= 70.00
*S SUB-BASIN 943.1										
ADD HYD	201.00	2& 1	1	4.32070	208.93	401.055	1.74041	1.600	.076	
ROUTE	202.00	1	4	4.32070	206.90	401.025	1.74028	2.050	.075	
*S ADD IN SAN PEDRO Q										
ADD HYD	203.00	4& 3	2	4.36770	298.57	405.501	1.74077	1.550	.107	
*S ROUTE TO UTE										
ROUTE	204.00	2	4	4.36770	298.39	405.481	1.74068	1.550	.107	
*S ADD IN UTE Q										
ADD HYD	205.00	4& 6	1	4.37970	326.30	406.849	1.74177	1.550	.117	
ADD HYD	206.00	1& 5	1	4.39370	356.32	408.182	1.74191	1.550	.127	
COMPUTE NM HYD	943.20	-	2	.01300	31.71	1.238	1.78583	1.500	3.811	PER IMP= 50.00
*S SUB-BASIN 943.2										
ADD HYD	207.00	1& 2	1	4.40670	384.79	409.420	1.74204	1.550	.136	
*S TOTAL Q AT I-25 CBC										
FINISH										

```
START                    0.0 HRS
* THIS FILE WILL PRINT ALL HYD'S WITH A PRINT HYD
*
* FILE NAME ANAHEIM.REV
*
* TITLE 1                LNDB OUTFALL PIPE PLUS LOCAL Q AT I-25
* TITLE 2                FUTURE COND. 100-YR. 24-HR. STORM
*
*S DAM DISCHARGE AT LOUISIANA
*
*
RECALL HYD            ID= 2 HYD=       940.87 DT=  .050000 HRS DA=   4.2927 SQ MI
                      PEAK=     203.548CFS  RO= 1.7401 INCHES  NO PTS=599
                      FLOW RATES
                          .000        .000        .000        .000        .000
                          .000        .000        .000        .000        .000
                          .000        .000        .000        .000        .000
                          .000        .001        .005        .014        .045
                          .163        .854       4.087      12.360      33.359
                        66.544      76.324      90.573      97.120     110.320
                       127.866     146.195     161.857     167.704     172.822
                       178.008     182.449     185.951     188.959     191.552
                       193.681     195.457     196.999     198.302     199.366
                       200.209     200.865     201.372     201.777     202.097
                       202.361     202.585     202.774     202.934     203.069
                       203.181     203.275     203.351     203.411     203.459
                       203.495     203.521     203.537     203.546     203.548
                       203.544     203.533     203.518     203.498     203.474
                       203.446     203.415     203.382     203.345     203.306
                       203.265     203.222     203.177     203.131     203.083
                       203.034     202.984     202.932     202.880     202.827
                       202.773     202.718     202.662     202.606     202.549
                       202.492     202.435     202.377     202.318     202.260
                       202.201     202.142     202.083     202.023     201.964
                       201.904     201.839     201.773     201.707     201.641
                       201.576     201.510     201.444     201.378     201.312
                       201.247     201.181     201.115     201.050     200.984
                       200.919     200.854     200.789     200.724     200.659
                       200.595     200.530     200.466     200.401     200.336
                       200.270     200.203     200.135     200.068     199.999
                       199.930     199.861     199.792     199.722     199.652
                       199.581     199.511     199.440     199.369     199.298
                       199.226     199.155     199.083     199.010     198.938
                       198.865     198.792     198.719     198.645     198.572
                       198.498     198.423     198.349     198.274     198.199
                       198.123     198.048     197.972     197.896     197.820
                       197.743     197.666     197.589     197.512     197.434
                       197.356     197.278     197.200     197.121     197.043
                       196.964     196.884     196.805     196.725     196.645
                       196.565     196.484     196.403     196.322     196.240
                       196.159     196.076     195.994     195.912     195.829
                       195.745     195.662     195.578     195.494     195.409
                       195.325     195.240     195.154     195.069     194.983
                       194.897     194.811     194.725     194.638     194.551
                       194.463     194.376     194.288     194.200     194.112
                       194.024     193.936     193.847     193.759     193.670
                       193.581     193.493     193.404     193.315     193.226
                       193.136     193.047     192.958     192.868     192.779
                       192.689     192.599     192.501     192.402     192.304
                       192.205     192.107     192.008     191.909     191.810
```

190.717	190.618	190.518	190.418	190.317
190.217	190.116	190.015	189.913	189.811
189.709	189.607	189.504	189.401	189.298
189.195	189.091	188.987	188.882	188.778
188.673	188.568	188.462	188.356	188.250
188.144	188.038	187.931	187.824	187.716
187.609	187.501	187.393	187.284	187.176
187.067	186.957	186.848	186.737	186.627
186.517	186.406	186.294	186.183	186.071
185.959	185.847	185.734	185.621	185.507
185.394	185.280	185.166	185.051	184.936
184.821	184.705	184.590	184.474	184.357
184.241	184.124	184.007	183.890	183.772
183.654	183.536	183.417	183.298	183.178
183.058	182.937	182.806	182.670	182.534
182.397	182.260	182.122	181.983	181.844
181.704	181.564	181.424	181.283	181.141
180.999	180.857	180.714	180.570	180.426
180.282	180.137	179.992	179.846	179.699
179.553	179.405	179.258	179.110	178.961
178.812	178.662	178.512	178.362	178.211
178.060	177.909	177.758	177.606	177.454
177.302	177.149	176.996	176.844	176.690
176.537	176.383	176.229	176.075	175.921
175.767	175.612	175.457	175.302	175.146
174.991	174.835	174.679	174.522	174.366
174.209	174.052	173.895	173.738	173.580
173.423	173.265	173.107	172.949	172.790
172.631	172.494	172.361	172.228	172.094
171.961	171.827	171.694	171.560	171.425
171.291	171.156	171.021	170.886	170.751
170.616	170.480	170.344	170.208	170.072
169.936	169.799	169.663	169.526	169.389
169.252	169.114	168.977	168.839	168.701
168.562	168.423	168.284	168.144	168.004
167.863	167.722	167.581	167.439	167.297
167.154	167.011	166.867	166.723	166.579
166.434	166.289	166.143	165.997	165.851
165.704	165.557	165.409	165.261	165.113
164.964	164.815	164.665	164.516	164.365
164.215	164.064	163.913	163.761	163.609
163.457	163.304	163.152	162.998	162.845
162.691	162.537	162.382	162.227	162.072
161.916	161.760	161.467	161.088	160.708
160.329	159.951	159.572	159.194	158.816
158.439	158.061	157.684	157.307	156.930
156.554	156.177	155.801	155.425	155.050
154.675	154.300	153.925	153.551	153.177
152.803	152.430	152.056	151.679	151.299
150.915	150.527	150.136	149.694	149.225
148.754	148.282	147.808	147.333	146.858
146.383	145.908	145.433	144.959	144.486
144.013	143.540	143.069	142.598	142.128
141.659	141.191	140.723	140.256	139.788
139.320	138.849	138.377	137.903	137.426
136.891	136.333	135.774	135.212	134.649
134.084	133.518	132.950	132.381	131.811
131.239	130.667	130.093	129.516	128.936
128.351	127.757	127.155	126.544	125.923
125.294	124.656	124.012	123.360	122.569
121.759	120.944	120.124	119.300	118.472
117.640	116.804	115.965	115.124	114.282
113.440	112.597	111.754	110.911	110.069
109.228	108.388	107.549	106.517	105.478

```
                    94.385     93.413     92.449     91.491     90.541
                    89.598     85.754     73.907     46.671       .000
                    12.712       .000     11.668       .000     10.762
                      .000      9.957       .000      9.223       .000
                     8.543       .000      7.911       .000      7.323
                      .000      6.775       .000      6.267

*********************
RAINFALL            TYPE=-2  RAIN QUARTER=0.0  RAIN ONE=2.10
                    RAIN SIX=2.45  RAIN DAY=2.85  DT=.05
*
PRINT HYD           ID=2   CODE=1
*************************     *     *     *     *     *     *     *     *
*  SUB-BASIN  940
*************************
COMPUTE NM HYD      ID=1  HYD=940.1 DA=0.028 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*S SUB-BASIN 940.1
*
PRINT HYD           ID=1   CODE=1
*
*********************
COMPUTE NM HYD      ID=3  HYD=940.2 DA=0.0470 SQ MI
                    PER A=0  B=34 C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*S SUB-BASIN 940.2
*
PRINT HYD           ID=3   CODE=1
*
*********************
COMPUTE NM HYD      ID=5  HYD=939.15 DA=0.0140 SQ MI
                    PER A=0  B=34  C=16  D=50
                    TP=0.13 HRS        RAIN=-1
*S SUB-BASIN 939.15
*
PRINT HYD           ID=5   CODE=1
*
*********************
COMPUTE NM HYD      ID=6  HYD=943.1 DA=0.0120 SQ MI
                    PER A=0  B=15  C=15  D=70
                    TP=0.13 HRS        RAIN=-1
*S SUB-BASIN 943.1
*
PRINT HYD           ID=6   CODE=1
*
*********************
*********************
*    ADD IN Q FROM 940.1        AT LOUSIANA
ADD HYD             ID=1  HYD=201  ID I=2      ID II=1
*
PRINT HYD           ID=1     CODE=1
*
*
*  ROUTE  AP 202 TO SAN PEDRO
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.028  DIA=4.0 FT N=.015
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME  ID=4      REACH=1  NO VS=1
                    L=2700       ft       SLP=.028       ft/ft
*     *     *     *     *     *     *     *     *     *     *     *     *
ROUTE               ID=4      HYD=202  INFLOW HYD ID=1   DT=.05
PRINT HYD           ID=4   CODE=1
*
*S ADD IN SAN PEDRO Q
```

```
*
PRINT HYD                ID=2     CODE=1
*
*S ROUTE TO UTE
*
*
*
*    ROUTE  AP 204. TO I-25
COMPUTE RATING CURVE CID=1 VS NO=1 CODE=-1 SLP=.028  DIA=4.50 FT N=.015
*     *     *     *     *     *     *     *     *     *     *     *     *
COMPUTE TRAVEL TIME  ID=4       REACH=1  NO VS=1
                     L=1400        ft        SLP=.028        ft/ft
*     *     *     *     *     *     *     *     *     *     *     *     *
ROUTE                ID=4       HYD=204  INFLOW HYD ID=2   DT=.05
PRINT HYD            ID=4    CODE=1
*
*S ADD IN UTE Q
*
ADD HYD              ID=1   HYD=205  ID I=4      ID II=6
*
PRINT HYD            ID=1     CODE=1
*
*
ADD HYD              ID=1   HYD=206  ID I=1      ID II=5
*
PRINT HYD            ID=1     CODE=1
*
*
COMPUTE NM HYD       ID=2  HYD=943.2 DA=0.013 SQ MI
                     PER A=0  B=34  C=16  D=50
                     TP=0.13 HRS         RAIN=-1
*S SUB-BASIN 943.2
*
PRINT HYD            ID=2    CODE=1
*
*
ADD HYD              ID=1   HYD=207  ID I=1      ID II=2
*S TOTAL Q AT I-25 CBC
*
PRINT HYD            ID=1     CODE=1
*
FINISH
```